The Australasian Society for Motorsports Medicine and Rescue

Contents

Race control

Welcome to the fourth edition of the ASMMR newsletter. This month there is a clinical review section on concussion in sport, with a summary of the 3rd International Conference on Concussion in Sport Consensus Statement paper, presented in Zurich in November 2008. Representatives on the expert panel include a Dr. Paul McCrory, an Australian consultant neurologist who works as an Associate Professor and Director of Neurotrauma Research at the Brain Research Institute as well as at the Centre for Health, Exercise & Sports Medicine at the University of Melbourne. The data and recommendations draw mainly from experience with field sports and boxing, with almost no reference to motorsport, but the principles outlined are valid and provide a useful base of information. It highlights the need for more motorsport data in the public domain.

Additionally, there is the usual results segment, an FIA Institute update and another case of right place, right time and camera in hand.

Good luck.

Matthew Mac Partlin

Clinical review
Highlights of the 3rd International Conference on Concussion in Sports
Zurich, December 2008
(From Br. J. Sports Med. 2009; 43: i76-i84)

Key authors: Largely physicians providing support for field sports (soccer, rugby, and ice hockey). Included an Australian neurologist from the Centre for Health, Exercise & Sports Medicine, University of Melbourne, Parkville.

The statement has been consensus rather than evidence based and was "developed for use by physicians, therapists, certified athletic trainers, health professionals, coaches and other people involved in the care of injured athletes, whether at the recreational, elite or professional level".

The conference produced two formal documents, of which the authors encourage free distribution:
- the Zurich Consensus document, summarised in this article
- the Standardised Concussion Assessment Tool (SCAT2) card; not included in this article but its predecessor, the SCAT card, can be accessed at http://multimedia.olympic.org/pdf/en_report_1006.pdf

Consensus definition of concussion

"Concussion is defined as a complex pathophysiological process affecting the brain, induced by traumatic biomechanical forces."

Characteristically involves transmission of an impulse, direct or indirect (blow to face, neck, thorax, abdomen), to the head, resulting in an acute onset but transient duration of impaired neurological function, which may or may not include loss of consciousness, with no structural abnormality seen on standard structural neuroimaging. There is a graded set of clinical features (mild to severe) which resolves spontaneously in a sequential fashion, though deficits may persist indefinitely in a small proportion. Evidence suggests that recovery is more prolonged for younger athletes (<18yo), presumably reflecting ongoing neural network development.

Concussion evaluation

A detailed concussion history is an important part of the evaluation both in the injured athlete and when conducting a pre-participation examination

The diagnosis of acute concussion usually involves the assessment of a range of domains including clinical symptoms, physical signs, behaviour, balance, sleep and cognition. Clearly not all of these will manifest in the immediate on-site aftermath; eg sleep disturbance.

1) On-site evaluation:
- Prioritise management, with resuscitative requirements taking precedence
- Due concern for potential associated cervical spine injury (3% incidence with severe closed head injury).
- Once resuscitation completed and no other acute care issues active, a concussion assessment should be made with a standardised tool, such as the SCAT2 card. Be aware that features of concussion may be delayed in onset.
- Once considered to be at risk of a concussive injury, the injured athlete should not be left unattended and provisions for ongoing monitoring should be made and return to competition should be deferred for at least 24 hours, until further formal assessment has been made.
- Standard attention and memory deficit assessment (orientation to time place and person) is often inaccurate in the sporting arena and cognitive deficit should be screened with abbreviated neuropsychiatric tests (eg. Maddock's questions, Standardised Assessment of Concussion – SAC). These tests do not replace formal testing as they will miss subtle deficits.

Table 1 - *Modified Maddocks questions*

At what venue are we? __;	Which half is it? __;	Who scored last?__
What team did we play last? __;	Did we win last game? __?	

While the Maddock's questions are clearly intended for field-based sports, it would be easy to modify them to fit a motorsports evaluation and it probably what most of us do on instinct.

2) Emergency department assessment

- Primary and secondary survey
- Full history of event, features to date, past medical history and other risk factors
- Full neurological assessment, including mental state, cognitive function, gait and balance
- Determination of need for neuroimaging for structural lesion
- Ongoing monitoring until cleared or admitted

3) Investigations

These are off-field office based evaluations and not immediately relevant to the trackside assessment.

- CT brain – no structural deficit in concussion, but should be performed in line with standard head injury indications (The New Orleans and Canadian Clinical Decision Rules for CT after Concussion)
- MRI – role remains unclear and unproven. Functional MRI findings may correlate with symptom course and recovery
- Objective balance testing (force plate, BESS test) help track motor deficit but have little prognostic value
- Neuropsychiatric testing – guides the return to play decision. The significance of loss of consciousness and retrograde amnesia has been decreased in recent evaluation of readiness for return to play in favour of the progress of neuropsychiatric deficit.
- Biomarkers and genetic marker – poor discriminatory capacity, with resulting poor predictive value

Concussion management

- Remove the competitor from play
- Attend first to resuscitation requirements and injuries identified during the secondary survey
- Subsequent management is office based and follows a protocolised sequence that moves from a rest period, through a graduated increase in physical and cognitive exertion, back to full competitive activity.
- The rest period requires both physical and cognitive rest, so no planning the racing line or adjustment of the engineering setup.
- The graduated return to play protocol is standardised; see Table 2 (Reproduced from Br J Sports Med 2009;43:i76–i84.)

Table 2 Graduated return to play protocol

Rehabilitation stage	Functional exercise at each stage of rehabilitation	Objective of each stage
1. No activity	Complete physical and cognitive rest	Recovery
2. Light aerobic exercise	Walking, swimming or stationary cycling keeping intensity <70% maximum predicted heart rate No resistance training	Increase heart rate
3. Sport-specific exercise	Skating drills in ice hockey, running drills in soccer. No head impact activities	Add movement
4. Non-contact training drills	Progression to more complex training drills, eg passing drills in football and ice hockey May start progressive resistance training)	Exercise, coordination, and cognitive load
5. Full contact practice	Following medical clearance participate in normal training activities	Restore confidence and assess functional skills by coaching staff
6. Return to play	Normal game play	

Medication is used in two situations only:
- Management of ongoing specific symptoms such as anxiety or sleep disturbance
- Medications used to shorten the duration of recovery. Used by clinicians with specific experience in concussion management.

Caution must be exercised with medications to ensure they do not mask concussive features and in general an athlete returning to full competition should not be on concussion related drugs.

Pre-competition concussion assessment

This should include:
- The number of previous concussions – proven to be unreliable as a stand-alone marker, including the recall of coaches and team mates.
- Previous concussion symptoms
- Occurrence of associated injuries; eg face, cervical spine, chest
- Protective equipment used

The aim is to identify high-risk competitors and potential aspects of their involvement that could, or might need to be modified. These include the number, severity and duration of previous concussion events, age < 18yo, post concussive seizures, reducing concussion threshold with subsequent episodes, dangerous competitive behaviour, type of sport.

The significance of loss of consciousness in the setting of concussion, as opposed to moderate to severe head injury, is uncertain. Similarly, the significance of amnesia remains unclear. Motor and convulsive phenomena, while indicating the need for a head CT, do not influence the need for intervention beyond standard resuscitation.

Depression and anxiety post concussion are not uncommon and should be considered where symptoms of concussion are not resolving.

Special populations

1) Young athletes (<18yo)
Adult principles can be applied down to the age of 10yo. Below this age, specific management protocols are required. Cognitive assessment needs to be age-appropriate. In general, a more

conservative approach to return to play is taken.

2) Elite versus non-elite athletes
The management principles should apply equally and resource allocation should be based upon nature of risk, rather than level of participation

Injury prevention

There are no good quality trials supporting the use of protective equipment (helmets, mouthguards) in the prevention of concussion. There are, however, sport specific benefits to protective devices against specific injuries; eg. helmets in motor sport reducing the incidence of facial, skull vault and structural intracranial injury. There is concern regarding risk compensation, whereby the presence of a protective device potentially encourages more aggressive competition.

Rule changes probably benefit where a clear mechanism can be identified.

Broader education and awareness activities, along with the encouragement of sporting ethics, should be developed, to improve competitors and their support crew knowledge regarding concussion risks, features and effects and return to play principles.

Comments

The statement paper panel admitted the dirth of high quality evidence to support their recommendations and suggested that the next stage would be to try to gather that evidence in key areas of the assessment and management of concussion in sports, with targeted evaluation of specific groups. They also state that the paper is intended as a guide and not a standard of care document.

The sports represented by the panellists and the papers used to justify the recommendations drew heavily from field and arena based contact sports such as soccer, rugby, ice-hockey, boxing and skiing.

The vast majority of the evidence base was drawn from obsevational studies, though it would be difficult (and probably unethical) to perform randomised control trials for many of the unanswered questions.

To their credit, however, the authors include a description of the consensus statement development process, which appears to be prospective, in line with other consensus statements and transparent.

Unintentionally, it also highlights how little evidence is available in the public domain with respect to motorsports. Perhaps this can be rectified through bodies such as the FIA Institute, AIMSS and the ASMMR.

Overall, the statement reflects the information and advice that is presented in many of the standard major medical, surgical and critical care textbooks; though information on this topic is fairly brief in most, and in the context of sports, where most of the data is obtained, generally receives little more than a line or two. It is concise, clear and transparent, though lacking in validation for most of its recommendations.

Recent race results

MotoGP

Ten rounds completed, seven to go

1 Valentino Rossi 187	4 Dani Pedrosa 115	7 Marco Melandri 79
2 Jorge Lorenzo 162	5 Colin Edwards 103	8 Randy de Puniet 74
3 Casey Stoner 150	6 Andrea Dovisioso 94	9 Chris Vermeulen 67

Next event: Czech Republic, 16th August

World Rally Championship

Nine rounds completed

1 M. Hirvonen 68	4 J-M. Latvala 31	7 M. Wilson 20
2 S. Loeb 65	5 H. Solberg 27	8 S. Ogier 16
3 D. Sordo 44	6 P. Solberg 25	9 F. Villagra 14

Loeb's pacenotes seem to be his downfall, though a puncture on day one was the source of his woes in Finland. It's nice to see a few battles developing though, with only three stages left. Latvala made up for his awful finish in Poland with a podium in Finland, but clearly needs to work on consistency. And there's a bit of sibling rivalry going on between the Solberg brothers, though unfortunately Petter is unlikely to appear competitively for the Australian round.

Next event: It's us … Repco Rally Australia, based around Tweed Heads and the Kyogle shire over the first weekend in September. Here's to the return to Australian soil.

Formula 1 Grand Prix

Ten rounds completed, seven to go

1 Jenson Button 70	8 Lewis Hamilton 19	15 Robert Kubica 2
2 Mark Webber 51.5	9 Kimi Räikkönen 18	16 Sebastien Bourdais 2
3 Sebastian Vettel 47	10 Timo Glock 16	17 Giancarlo Fisichella 0
4 Rubens Barrichello 44	11 Fernando Alonso 13	18 Kazuki Nakajima 0
5 Nico Rosberg 22.5	12 Heikki Kovalainen 9	19 Adrian Sutil 0
6 Jarno Trulli 22.5	13 Nick Heidfeld 6	20 Nelsinho Piquet 0
7 Felipe Massa 22	14 Sebastien Buemi 3	21 Jaime Alguersuari 0

An awful injury for Massa, and a frightening video – if you haven't seen it, it is freely available on You Tube. It will be interesting to see how Schumacher's stint goes, especially after objections from Williams and Red Bull canned any formal testing.

Next round: Telefonica Grand Prix of Europe, 23rd August

<u>V8 Supercars</u>

Eight rounds completed, seven to go

1 Jamie Whincup 1791	5 Steven Johnson 1194	8 Rick Kelly 992
2 Will Davison 1674	6 Lee Holdsworth 1116	9 Russell Ingall 989
3 Garth Tander 1416	7 Mark Winterbottom 1083	10 Michael Caruso 984
4 Craig Lowndes 1350		

Next event: Queensland Raceway, 21 - 23 August

<u>Australian Rally Chamionship</u>

Five rounds completed, one to go

1 S. Evans 379.5	5 J. Dowel 213	8 B. Kipling 120
2 G. Raymond 338	6 S. Shepheard 169	9 S. Knowles 87.5
3 N. Bates 271	7 R. Smart 146	10 J. Berne 83
4 E. Evans 247		

Simon and Sue Evans won the South Australia event and, with it, the ARC championship (for the third time), aided by Neal Bates' car failing to start. It has been 19 years since Mitsubishi have won the ARC manufacturer's championship.

Next round:.Repco Rally Australia, NSW, 3rd – 6th September, in conjunction with the WRC.

FIA Institute update

In June this year, the FIA Institute announced a research partnership with the Toyota Motor Corporation with the aim of developing a virtual simulator which facilitates the study of high speed accidents and their effect on human physiology. Called THUMS (Total Human Model for Safety), it is driven by data accumulated from front and rear end impacts in Formula 1 and the Indycar Racing League, collected by Dr. Terry Trammell; an American orthopedic surgeon with an interest in spinal injury, who is also an FIA Institute fellow.

THUMS allows accident dynamics that are difficult to fully evaluate with traditional crash test dummies to be analysed, with the aim of modifying components or regulations to improve safety. Currently, they are working on seat configuration in single seater, open cockpit cars to reduce spinal loading from the various g-forces experienced.

Out of interest, from Dr Trammell's F1 and IRL data up to 2006, it was noted that rear impacts produced the greater number of fractures, but that frontal impacts produced fractures of greater severity.

Caught by the cameras

This rally crash was caught on video. The car slides into an outside ditch and gets flipped about seven feet up into the air, barrel rolling about three times. Both occupants walked away.