

# Pearls and Perils of Navigating Concussion Management

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MultiCare Sports Medicine

School Nurse Series - 8/17/2023

# Disclosures

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# Objectives

- Review pathophysiology and diagnosis of concussion
- Examine key aspects of concussion management
- Explain barriers that can inhibit improvement and return to school / play
- Appraise resources available to the medical provider and patient

# Relevance

Concussion is common in:

- Scholastic and non-scholastic sport

- Non-traditional recreational activities

- Routine activities of daily living

# Relevance

Concussion is common in:

Scholastic and non-scholastic sport = **Sport-related concussion (SRC)**

Non-traditional recreational activities

Routine activities of daily living

# Relevance

Concussion is common in:

- Scholastic and non-scholastic sport

- Non-traditional recreational activities

- Routine activities of daily living

Estimated 1-2 million SRCs per year in 0-18 age range

400,000 SRCs per year in high school athletes

Consensus statement

## American Medical Society for Sports Medicine position statement on concussion in sport

Kimberly G Harmon,<sup>1</sup> James R Clugston,<sup>2</sup> Katherine Dec,<sup>3</sup> Brian Hainline,<sup>4</sup>  
Stanley Herring,<sup>5</sup> Shawn F Kane,<sup>6</sup> Anthony P Kontos,<sup>7</sup> John J Leddy,<sup>8</sup> Michael McCrea,<sup>9</sup>  
Sourav K Poddar,<sup>10</sup> Margot Putukian,<sup>11,12</sup> Julie C Wilson,<sup>13</sup> William O Roberts<sup>14</sup>

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American Medical Society for Sports Medicine (AMSSM)

Consensus statement

## Consensus statement on concussion in sport—the 5<sup>th</sup> international conference on concussion in sport held in Berlin, October 2016

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Michael Makhssi,<sup>30,31</sup> Geoff T Manley,<sup>32</sup> Michael McCrea,<sup>33</sup> William P Meehan,<sup>34,35</sup>  
Sinji Nagahiro,<sup>36</sup> Jon Patricios,<sup>37,38</sup> Margot Putukian,<sup>39</sup> Kathryn J Schneider,<sup>40</sup>  
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Concussion in Sport Group (CISG)

Consensus statement

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Kimberly G Harmon,<sup>1</sup> James R Clugston,<sup>2</sup> Katherine Dec,<sup>3</sup> Brian Hainline,<sup>4</sup> Stanley Herring,<sup>5</sup> Shawn F Kane,<sup>6</sup> Anthony P Kontos,<sup>7</sup> John J Leddy,<sup>8</sup> Michael McCrea,<sup>9</sup> Sourav K Poddar,<sup>10</sup> Margot Putukian,<sup>11,12</sup> Julie C Wilson,<sup>13</sup> William O Roberts<sup>14</sup>

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### American Medical Society for Sports Medicine (AMSSM)

Consensus statement

## Consensus statement on concussion in international conference on concussion in Berlin, October 2016

Paul McCrory,<sup>1</sup> Willem Meeuwisse,<sup>2</sup> Jiří Dvorak,<sup>3,4</sup> Mark Aubry, Steven Broglio,<sup>7</sup> Robert C Cantu,<sup>8</sup> David Cassidy,<sup>9</sup> Ruben J Eck Rudy J Castellani,<sup>12</sup> Gavin A Davis,<sup>13,14</sup> Richard Ellenbogen,<sup>15</sup> Lars Engebretsen,<sup>17</sup> Nina Feddermann-Demont,<sup>18,19</sup> Christoph Kevin M Guskiewicz,<sup>22</sup> Stanley Herring,<sup>23</sup> Grant L Iverson,<sup>24</sup> Ka James Kissick,<sup>26</sup> Jeffrey Kutcher,<sup>27</sup> John J Leddy,<sup>28</sup> David Madd Michael Makdissi,<sup>30,31</sup> Geoff T Manley,<sup>32</sup> Michael McCrea,<sup>33</sup> W Sinji Nagahiro,<sup>36</sup> Jon Patricios,<sup>37,38</sup> Margot Putukian,<sup>39</sup> Kathryn Allen Sills,<sup>41,42</sup> Charles H Tator,<sup>43,44</sup> Michael Turner,<sup>45</sup> Pieter E V

### Concussion in Sport Group (CISG)

Consensus statement

## Consensus statement on concussion in sport: the 6th International Conference on Concussion in Sport—Amsterdam, October 2022

Jon S Patricios <sup>1</sup>, Kathryn J Schneider <sup>2</sup>, Jiri Dvorak <sup>3</sup>, Osman Hassan Ahmed <sup>4,5</sup>, Cheri Blauwet <sup>6,7</sup>, Robert C Cantu,<sup>8,9</sup> Gavin A Davis <sup>10,11</sup>, Ruben J Echemendia <sup>12,13</sup>, Michael Makdissi,<sup>14,15</sup> Michael McNamee,<sup>16,17</sup> Steven Broglio <sup>18</sup>, Carolyn A Emery <sup>2</sup>, Nina Feddermann-Demont,<sup>19,20</sup> Gordon Ward Fuller <sup>21</sup>, Christopher C Giza,<sup>22,23</sup> Kevin M Guskiewicz,<sup>24</sup> Brian Hainline <sup>25</sup>, Grant L Iverson <sup>26,27</sup>, Jeffrey S Kutcher,<sup>28</sup> John J Leddy <sup>29</sup>, David Maddocks,<sup>30</sup> Geoff Manley <sup>31</sup>, Michael McCrea <sup>32</sup>, Laura K Purcell,<sup>33</sup> Margot Putukian <sup>34</sup>, Haruhiko Sato <sup>35</sup>, Markku P Tuominen,<sup>36</sup> Michael Turner <sup>37,38</sup>, Keith Owen Yeates <sup>39</sup>, Stanley A Herring,<sup>40,41</sup> Willem Meeuwisse<sup>42</sup>

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# Definition

Disagreement, evolved over time

Per AMSSM:

“traumatically induced transient disturbance of brain function that involves a complex pathophysiological process”

Subset of mild traumatic brain injury (TBI)

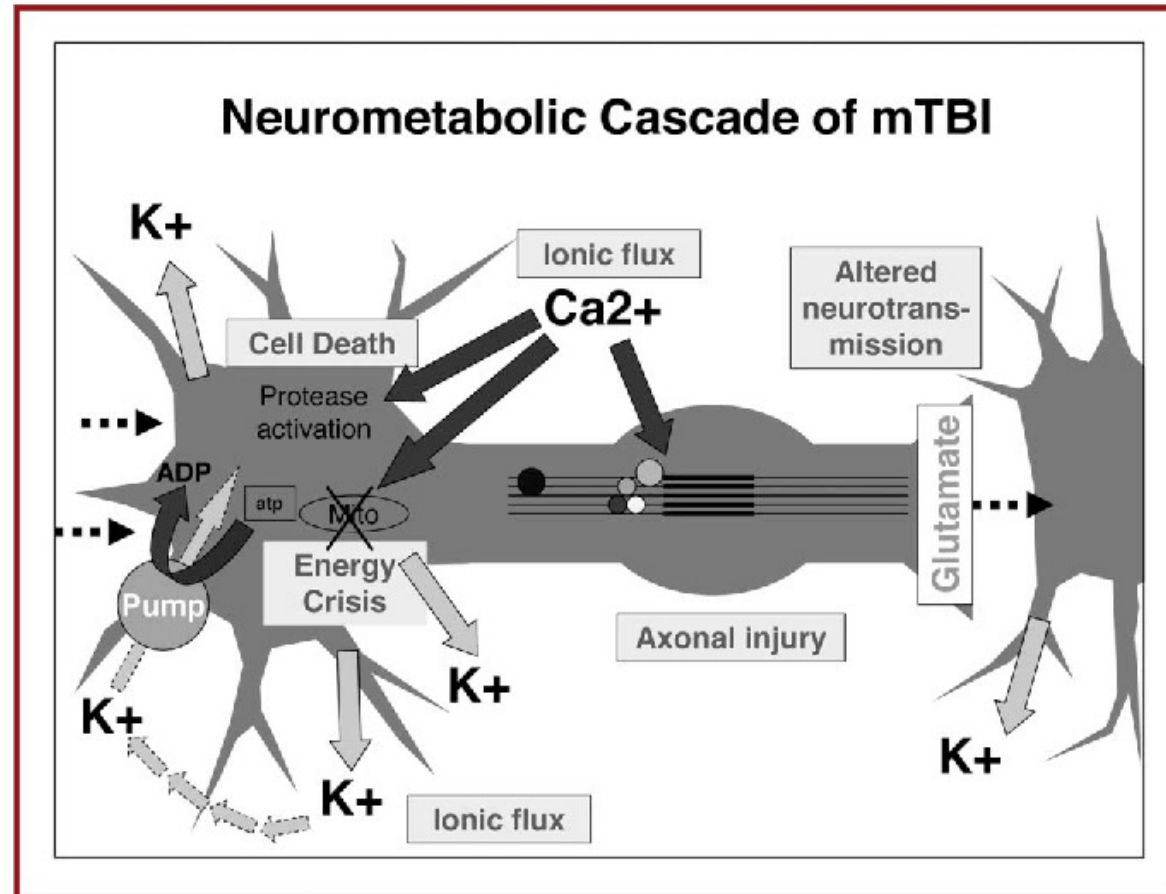
Signs and symptoms cannot be otherwise explained by:

drug, alcohol, medication use

other injuries (cervical spine, muscular, peripheral vestibular, etc)

other comorbidities (psychological or medical conditions)

# Pathophysiology



# Pathophysiology

Not completely understood

Force delivered to brain causing disruptive stretching of neuronal cell membranes

Complex cascade of ionic, metabolic, and neurotransmitter events

Changes in cerebral blood flow and inflammation

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Not completely understood

Force delivered to brain causing disruptive stretching of neuronal cell membranes

Complex cascade of ionic, metabolic, and neurotransmitter events

Changes in cerebral blood flow and inflammation

**Chemical process, not structural injury**

# Evaluation and Diagnosis

Visualization of event helpful

Immediate removal from play/activity and prompt evaluation:

- Loss of consciousness

- Impact seizure

- Tonic posturing

- Gross motor instability

- Confusion or amnesia

# Evaluation and Diagnosis

Concerns of serious injury should trigger activation of Emergency Action Plan (EAP)

- Prolonged loss of consciousness

- Severe or worsening headache

- Repeated emesis

- Declining mental status

- Focal neurological deficit

- Significant cervical spine injury

# Evaluation and Diagnosis

If any concern for a potential concussion, remove from play/activity to evaluate  
Healthcare professional who knows the patient (if possible)

- Brief history of event (from patient and witnesses)
- Orientation
- Memory
- Concentration, processing, speech
- Balance
- Cervical spine palpation and ROM

# Evaluation and Diagnosis

If clear concussion:

- Initial evaluation can be stopped

- Patient should not return to activity

If concussion suspected but not diagnosed:

- Hold from activity

- Serial evaluations

- More thorough testing



# Evaluation and Diagnosis

Sports Concussion Assessment Tool Fifth Edition (SCAT5)

Recommended by CISG with Berlin (5<sup>th</sup>) consensus

On-field component

Memory/orientation

Glasgow Coma Scale (GCS)

Cervical spine assessment

Off-field component

Symptom checklist

Cognitive assessment (Standardized Assessment of Concussion [SAC])

Neurologic screen

Balance exam (Modified Balance Error Scoring System [mBESS])

# Evaluation and Diagnosis

	none	mild	moderate	severe				
Headache	0	1	2	3	4	5	6	
"Pressure in head"	0	1	2	3	4	5	6	
Neck Pain	0	1	2	3	4	5	6	
Nausea or vomiting	0	1	2	3	4	5	6	
Dizziness	0	1	2	3	4	5	6	
Blurred vision	0	1	2	3	4	5	6	
Balance problems	0	1	2	3	4	5	6	
Sensitivity to light	0	1	2	3	4	5	6	
Sensitivity to noise	0	1	2	3	4	5	6	
Feeling slowed down	0	1	2	3	4	5	6	
Feeling like "in a fog"	0	1	2	3	4	5	6	
"Don't feel right"	0	1	2	3	4	5	6	
Difficulty concentrating	0	1	2	3	4	5	6	
Difficulty remembering	0	1	2	3	4	5	6	
Fatigue or low energy	0	1	2	3	4	5	6	
Confusion	0	1	2	3	4	5	6	
Drowsiness	0	1	2	3	4	5	6	
More emotional	0	1	2	3	4	5	6	
Irritability	0	1	2	3	4	5	6	
Sadness	0	1	2	3	4	5	6	
Nervous or Anxious	0	1	2	3	4	5	6	
Trouble falling asleep (if applicable)	0	1	2	3	4	5	6	
Total number of symptoms:							of 22	
Symptom severity score:							of 132	
Do your symptoms get worse with physical activity?							Y	N
Do your symptoms get worse with mental activity?							Y	N
If 100% is feeling perfectly normal, what percent of normal do you feel?								

# Evaluation and Diagnosis

Sports Concussion Assessment Tool Fifth Edition (SCAT5)

- Having preparticipation baseline can be helpful

- Not a stand-alone tool

- Most accurate/valid in first 72 hours

# Evaluation and Diagnosis

Diagnosis can be difficult and unclear

No single test

Helps to know the patient at baseline

If evaluation deems concussion unlikely, can return to activity

# Evaluation and Diagnosis

Diagnosis can be difficult and unclear

No single test

Helps to know the patient at baseline

If evaluation deems concussion unlikely, can return to play

**If any doubt, sit them out**

# Evaluation and Diagnosis

## Zackery Lystedt Law

Washington State, 2009

First concussion law in the nation

Athlete/parent education

Informed consent signed by parents and youth athletes about dangers of sports-related head injuries

Any youth athlete suspected of head injury removed from practice/game

Athlete may not return to play until evaluated by licensed health care professional and cleared

# Management – Standards

Every patient and every concussion different

Most (80-90% older adolescents and adults) resolve spontaneously within 2 weeks

Track symptom score

No contact activity until fully resolved and cleared

- Repeat head injuries can worsen/prolong symptoms

- Risk of “second impact syndrome”

Relative rest

- Specifically first 24-48 hours

- Increasing evidence for early return to light cognitive / physical activity

- “Cocoon” no longer recommended

- “Red line” analogy

- Gradual screentime increases okay as tolerated

# Management – Standards

School accommodations

Excused as needed initially

Earplugs, headphones, sunglasses

Breaks

Decreased workload

Delay testing

Increased time allotments

Gradual return to screens as tolerated



# Management – Standards

Active recovery / subthreshold exercise program increasingly favored

- Should not provoke symptoms

- Should not have risk of head contact

- Can speed recovery and reduce risk of prolonged symptoms

- Athletes appreciate being able to do something

# Management – Standards

## Consensus statement

**Table 2** Graduated return-to-school strategy

Stage	Aim	Activity	Goal of each step
1	Daily activities at home that do not give the child symptoms	Typical activities of the child during the day as long as they do not increase symptoms (eg, reading, texting, screen time). Start with 5–15 min at a time and gradually build up	Gradual return to typical activities
2	School activities	Homework, reading or other cognitive activities outside of the classroom	Increase tolerance to cognitive work
3	Return to school part-time	Gradual introduction of schoolwork. May need to start with a partial school day or with increased breaks during the day	Increase academic activities
4	Return to school full time	Gradually progress school activities until a full day can be tolerated	Return to full academic activities and catch up on missed work

# Management – Standards

Should return first to all daily life activities and learning

If successful and completely asymptomatic, can consider return to play (RTP)

Typically recommend 24-48 hours asymptomatic prior to initiating RTP progression

Consider psychological readiness as part of RTP decision

# Management – Standards

## Consensus statement

**Table 1** Graduated return-to-sport (RTS) strategy

Stage	Aim	Activity	Goal of each step
1	Symptom-limited activity	Daily activities that do not provoke symptoms	Gradual reintroduction of work/school activities
2	Light aerobic exercise	Walking or stationary cycling at slow to medium pace. No resistance training	Increase heart rate
3	Sport-specific exercise	Running or skating drills. No head impact activities	Add movement
4	Non-contact training drills	Harder training drills, eg, passing drills. May start progressive resistance training	Exercise, coordination and increased thinking
5	Full contact practice	Following medical clearance, participate in normal training activities	Restore confidence and assess functional skills by coaching staff
6	Return to sport	Normal game play	

NOTE: An initial period of 24–48 hours of both relative physical rest and cognitive rest is recommended before beginning the RTS progression.

There should be at least 24 hours (or longer) for each step of the progression. If any symptoms worsen during exercise, the athlete should go back to the previous step.

Resistance training should be added only in the later stages (stage 3 or 4 at the earliest). If symptoms are persistent (eg, more than 10–14 days in adults or more than 1 month in children), the athlete should be referred to a healthcare professional who is an expert in the management of concussion.

# Management – Specifics

## Headache

Tylenol in first 48-72 hours (limit anti-inflammatories)

Naproxen (or other NSAID) for breakthrough headaches

Avoid consistent prolonged dosing because can result in rebound symptoms

Some expert opinion for supplements

MigreLief versus riboflavin/magnesium

Taken daily to reduce baseline headaches

# Management – Specifics

## Sleep

- Recommend 8-10 hours per day

- Favor during nighttime hours

- Try to keep sleep schedule consistent

- Avoiding over-napping (set alarm if needed)

- General good sleep hygiene

- Consider melatonin supplement if difficulty initiating sleep

  - 3-10 mg dose

  - 30 minutes prior to bedtime

# Management – Specifics

## Headache and Sleep

Some expert opinion for amitriptyline prescription

Low dose 30 minutes prior to bedtime

Can reduce headaches and help with sleep

## Nausea

Regular small meals/snacks

Avoid overstimulation (monitor “red line”)

Could trial anti-emetic

Prescription Zofran as needed

# Management – Specifics

## Hydration

- Typically recommend 64+ ounces per day
- Divide throughout the day

## Diet

- Generally balanced diet
- Could try Omega-3 fatty acids with fish oil supplement



# Barriers to Recovery

Overstimulation

Common in school

Entering RTP / advancing activity before appropriate

Under-reporting or mis-interpreting symptoms

Underlying headache disorder (migraine, etc)

Lingering vestibular and visual symptoms

Underlying mood/anxiety/ADHD/behavior health disorder

Development of behavioral health disorder due to altered life events

Disruption of sleep schedule

# Barriers to Recovery

Communication breakdown amongst healthcare team

Referral wait times

Insurance restrictions

Lack of specialist resources/availability

# Resources

Physical Therapy

- Cervical spine rehab

- Vestibular rehab

- Exercise threshold testing

Primary Care Physician

Sports Medicine Physician

Neuropsychology (Mary Bridge Concussion team)

Optometry/Ophthalmology

Neurology

# Other Recommendations

Clear communication regarding progress and expectations

Don't hesitate to seek help when needed

Locate physician in community with concussion interest/knowledge

Brainstorm ways to streamline referral/consultation care

Advocate for patients/students/athletes

Support school modifications when appropriate, limit overstimulation (red line)

Work with school's Athletic Trainer (if available)

# Summary

Reviewed consensus statements regarding concussion diagnosis and management

Discussed specific pearls of concussion care used in clinical setting

Detailed common barriers to recovery and associated resources/strategies



Questions?