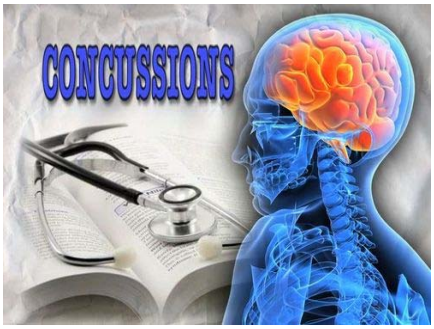
Concussion Update 2019

27th Annual Rural and Remote Medicine Course
Society of rural Physicians of Canada
April 4th,2019



David Cudmore MD, CCFP(SEM),Dip Sport Med
Assistant Professor
Dept of Family Medicine
Dalhousie University

Mediplex

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My experience in concussion diagnosis and management

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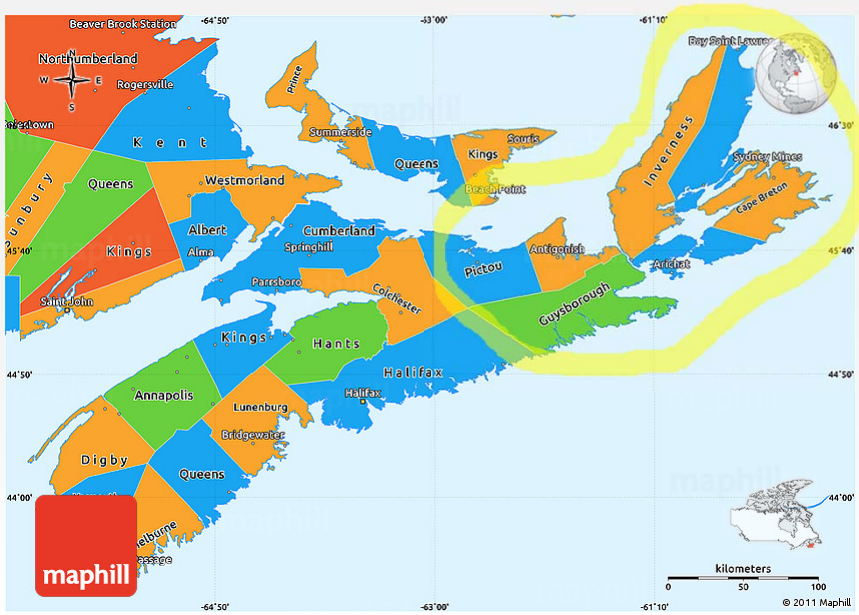
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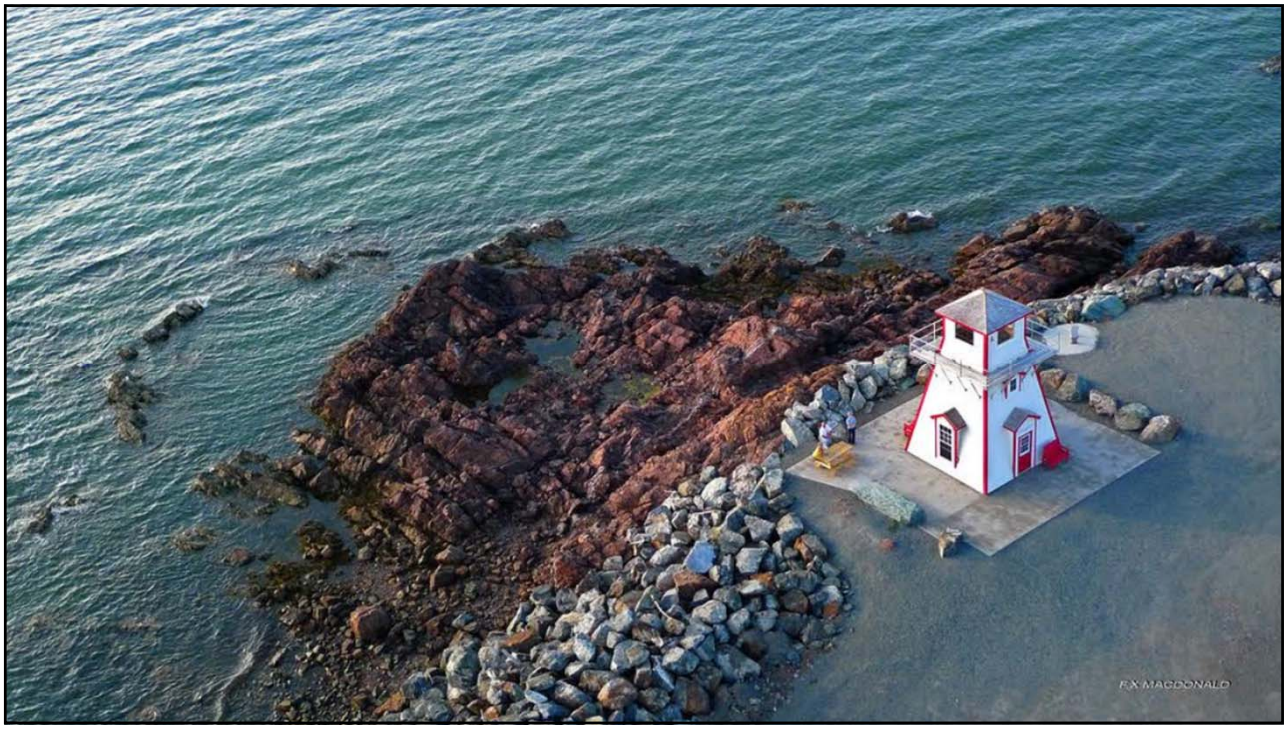
R.K. MACDONALD

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Tara Sutherland
CATA Hall of Fame Inductee 2018

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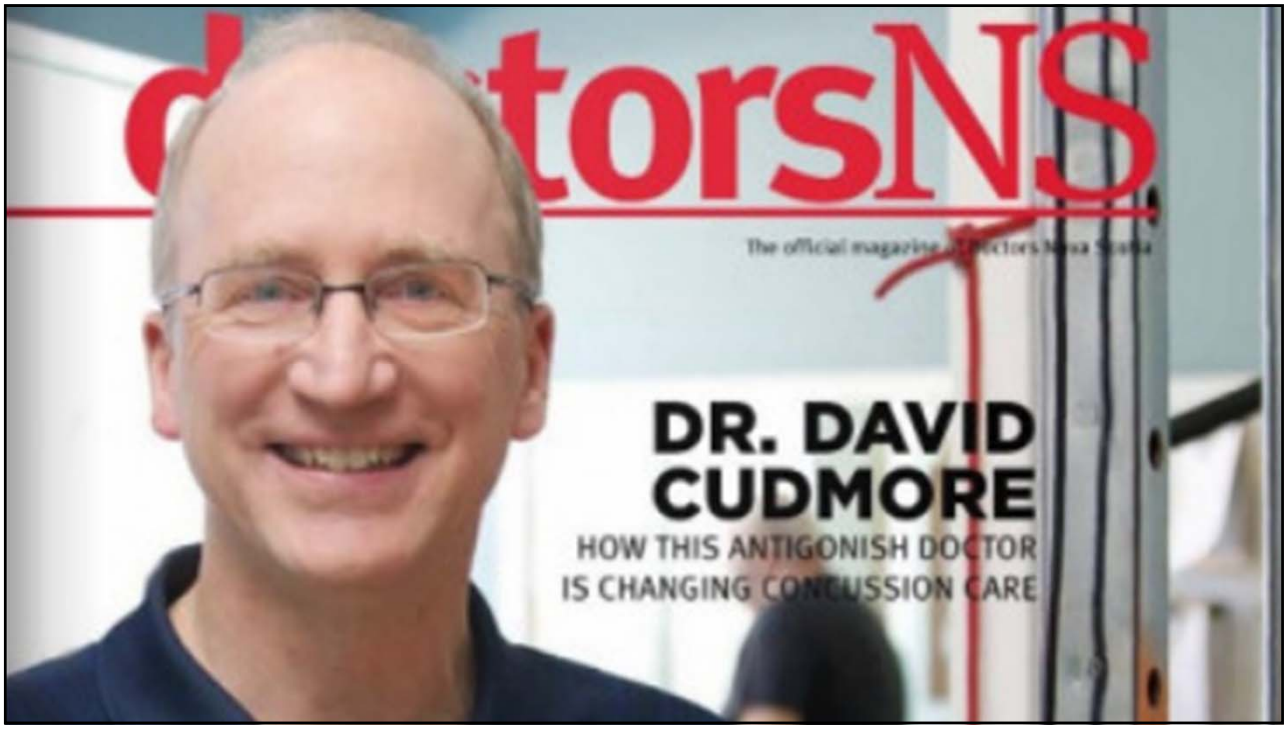

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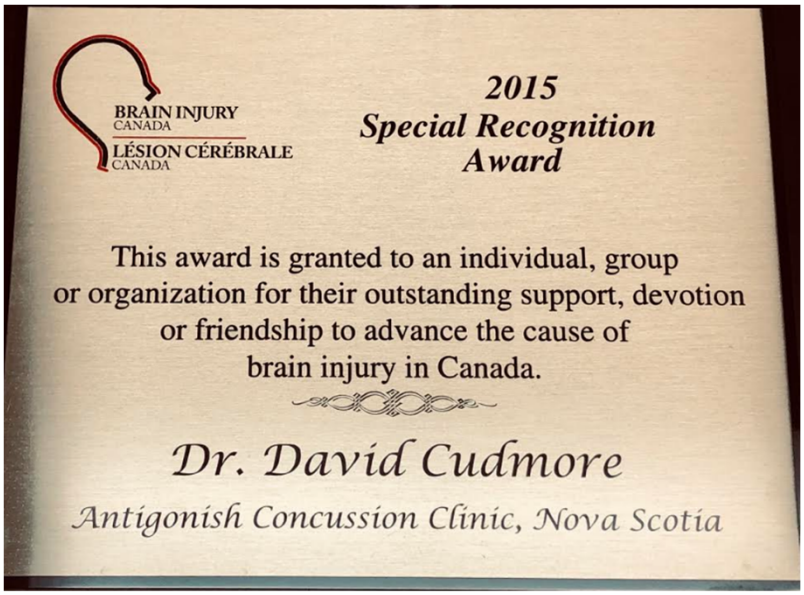

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Learning Objectives

- General Principles
- What's New?
- Practice Tools
- Evidence based -Diagnosis and Treatment
- Evidence based -Return to LEARN, PLAY, WORK

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Case Study Examples

Case #1:

42 y/o woman beaten by her brother. Struck in the head and head hit floor twice.

Was on holidays. When returned to work at a hospital a few days later, couldn't work at the computer for more than 2 minutes. Went to FD and placed off work for 5 days.

What would you do next?

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Case Study Examples

Case #2:
15 y/o in a race car accident who hit a cement wall going 70mph
Got out of the vehicle on his own. Foggy and off balance. Poor memory.
X-ray of his neck and shoulder normal. CT scan normal.

Tried to go back to school but couldn't. Stayed out for 1 week.

Balance was off. Nausea and visual issues with tracking and focus.

How would you approach?

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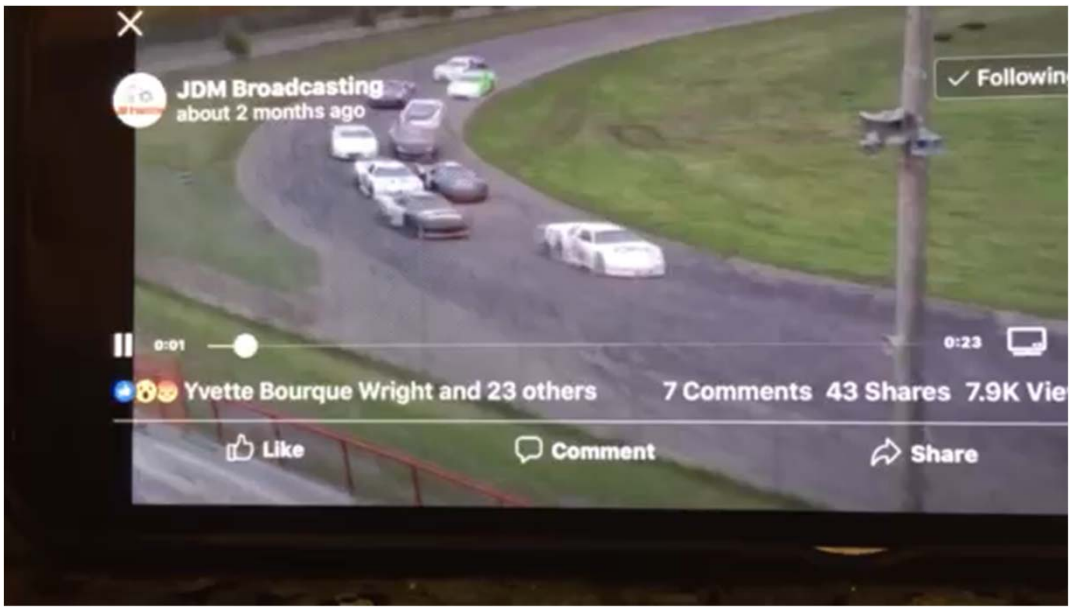

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Case Study Examples

Case #3:

16 yo girl from Truro on Canada Games Freestyle Ski Team, injured in a competition 9 days ago. Supposed to leave for Red Deer, Alberta in 2 days.

Seen in the ER in Truro on day of injury. Advised to rest for a week and see her FD. FD sent her to us on an urgent basis for a decision re return to sport.

What would you do next?

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Diagnosis

- Transient alteration in brain function caused by trauma.
- Hit to Head
- Hit to body

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Common Misconception

Does NOT have to be loss of consciousness

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Suspected Concussion:

Must NOT Return To Play the Same Day

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When in doubt, sit them out!

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Doctor's responsibilities

- Confirm diagnosis
- Educate patient about concussions
- Manage symptoms
- Oversee Return to Learn and Return to Play.

Name: Date

Date of Injury Age Sport /Activity

Signs: *did you experience any of the following at the time of injury*

Loss of consciousness	YES	NO
Seizures	YES	NO
Balance /Unsteadiness	YES	NO

Concussion History

Previous number

1 2 3 4 other

Longest symptom duration

days weeks months years

Headache History

Prior treatment for Headaches

YES NO

History of Migraines

Personal Family

Symptom Check List

Please circle the number which describes your symptom best at this time

	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

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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	
Trouble falling asleep	0	1	2	3	4	5	6	
More emotional than usual	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	**TOTAL**
SYMPTOM SCORE								max
						132		

TO BE COMPLETED BY PHYSICIAN

Cognitive Assessment

Word Recall		Immediate	Delayed
Word 1	Cat		
word 2	Pen		
word 3	Shoe		
word 4	Book		
word 5	Car		

Months in Reverse

Jan - Feb - Mar - April - May - June - July - Aug - Sept - Oct - Nov - Dec

Neurological Screening	Pass	Fail
Speech		
PEARL		
Pronator Drift		
Gait assessment		

Neck	pain location	
	ROM	
	neurological	

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IMAGING

- CT Rarely useful
- MRI possibly @ 3-6mths
- Plain C Spine
- CT/ MRI C Spine

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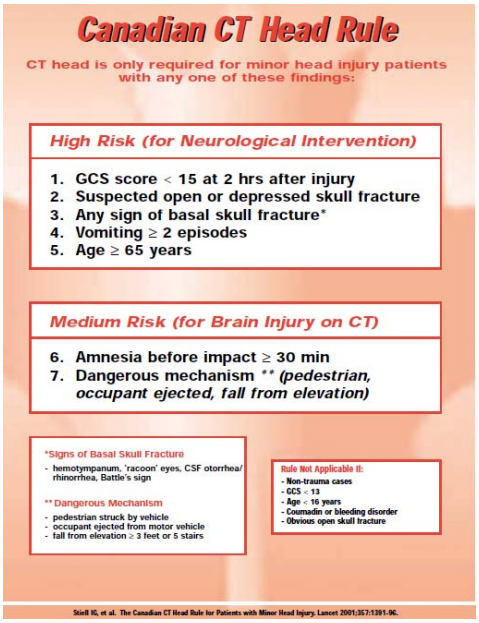

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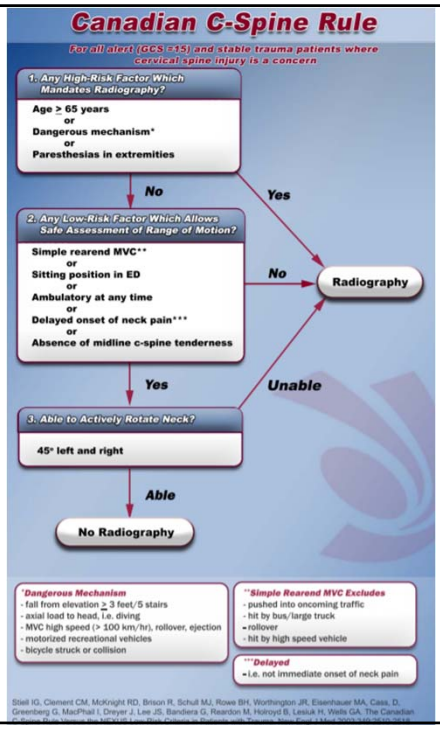

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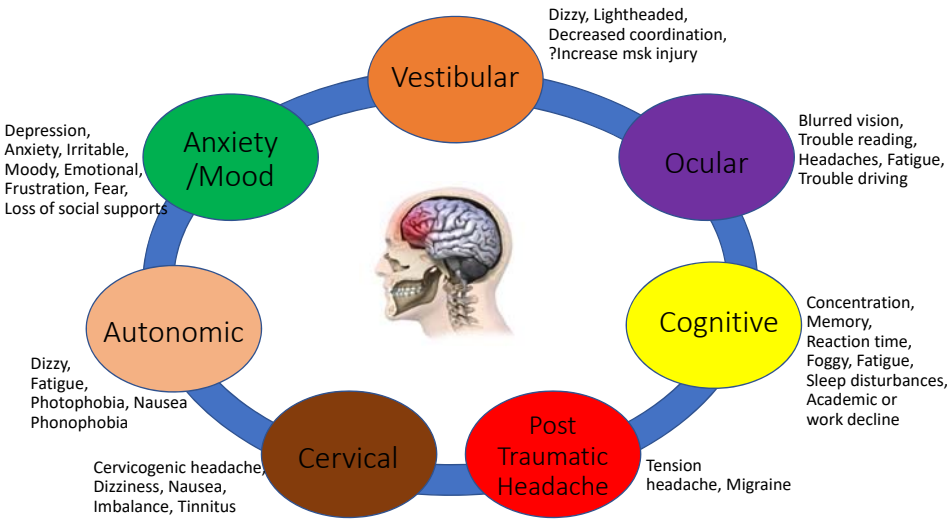
Concussion Symptoms



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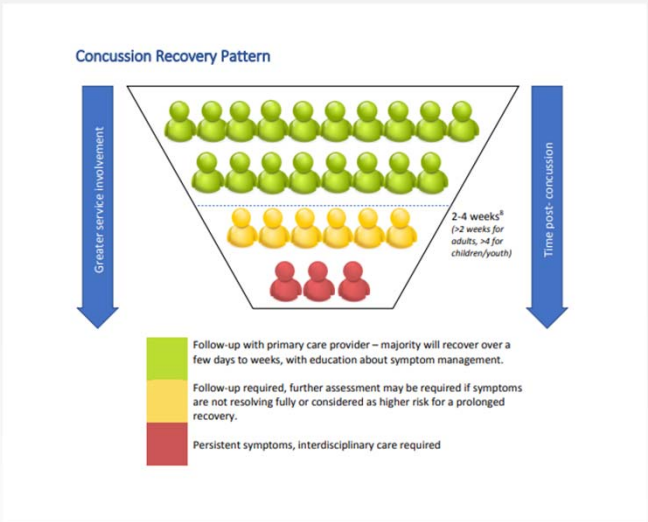

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Treatment Hierarchy

Primary Symptoms (to be addressed early) Depression/Anxiety/Irritability Sleep Disorder Post Traumatic Headache
Secondary Symptoms (recommend addressed secondarily) Balance Dizziness/Vertigo Cognition Impairment Fatigue Tinnitus/Noise Intolerance

ONF mTBI Guidelines 2nd Ed P.6

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Consensus statement on concussion in sport—the 5th international conference on concussion in sport held in Berlin, October 2016

Paul McCrory,[1] Willem Meeuwisse,[2] Jiří Dvorak,[3,4] Mark Aubry,[5] Julian Bailes,[6] Steven Broglio,[7] Robert C Cantu,[8] David Cassidy,[9] Ruben J Echemendia,[10,11] Rudy J Castellani,[12] Gavin A Davis,[13,14] Richard Ellenbogen,[15] Carolyn Emery,[16] Lars Engebretsen,[17] Nina Feddermann-Demont,[18,19] Christopher C Giza,[20,21] Kevin M Guskiewicz,[22] Stanley Herring,[23] Grant L Iverson,[24] Karen M Johnston,[25] James Kissick,[26] Jeffrey Kutcher,[27] John J Leddy,[28] David Maddocks,[29] Michael Makdissi,[30,31] Geoff T Manley,[32] Michael McCrea,[33] William P Meehan,[34,35] Sinji Nagahiro,[36] Jon Patricios,[37,38] Margot Putukian,[39] Kathryn J Schneider,[40] Allen Sills,[41,42] Charles H Tator,[43,44] Michael Turner,[45] Pieter E Vos[46]

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D Lawrence et al, PLoS One 2018,13(4)

Starting aerobic exercise soon after concussion improves recovery time, U of T study finds

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BJSM Online First, published on April 26, 2017 as 10.1136/bjsports-2017-097506SCAT5

To download a clean version of the SCAT tools please visit the journal online (http://dx.doi.org/10.1136/bjsports-2017-097506SCAT5)

SCAT5©

SPORT CONCUSSION ASSESSMENT TOOL – 5TH EDITION

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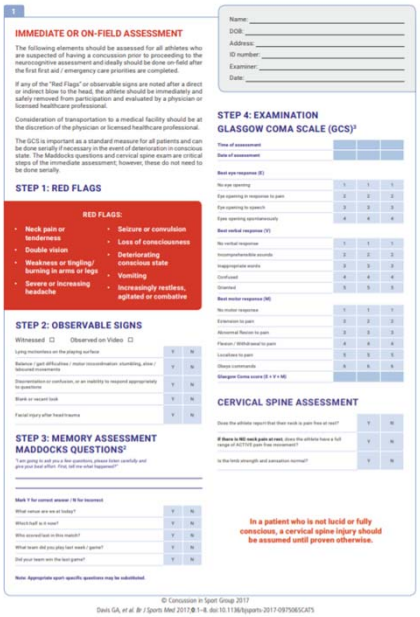

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IMMEDIATE OR ON-FIELD ASSESSMENT

The following elements should be assessed for all athletes who are suspected of having a concussion prior to proceeding to the neurocognitive assessment and ideally should be done on-field after the first first aid / emergency care priorities are completed.

If any of the "Red Flags" or observable signs are noted after a direct or indirect blow to the head, the athlete should be immediately and safely removed from participation and evaluated by a physician or licensed healthcare professional.

Consideration of transportation to a medical facility should be at the discretion of the physician or licensed healthcare professional.

The GCS is important as a standard measure for all patients and can be done serially if necessary in the event of deterioration in conscious state. The Maddocks questions and cervical spine exam are critical steps of the immediate assessment; however, these do not need to be done serially.

STEP 1: RED FLAGS

RED FLAGS:

- Neck pain or tenderness
- Double vision
- Weakness or tingling/ burning in arms or legs
- Severe or increasing headache
- Seizure or convulsion
- Loss of consciousness
- Deteriorating conscious state
- Vomiting
- Increasingly restless, agitated or combative

STEP 2: OBSERVABLE SIGNS

Witnessed ☐ Observed on Video ☐

Lying motionless on the playing surface	Y	N
Balance / gait difficulties / motor incoordination: stumbling, slow / laboured movements	Y	N
Disorientation or confusion, or an inability to respond appropriately to questions	Y	N
Blank or vacant look	Y	N
Facial injury after head trauma	Y	N

STEP 3: MEMORY ASSESSMENT MADDOCKS QUESTIONS[2]

"I am going to ask you a few questions, please listen carefully and give your best effort. First, tell me what happened?"

Mark Y for correct answer / N for incorrect

What venue are we at today?	Y	N
Which half is it now?	Y	N
Who scored last in this match?	Y	N
What team did you play last week / game?	Y	N
Did your team win the last game?	Y	N

Note: Appropriate sport-specific questions may be substituted.

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date: _____

STEP 4: EXAMINATION

GLASGOW COMA SCALE (GCS)[3]

Time of assessment			
Date of assessment			
Best eye response (E)			
No eye opening	1	1	1
Eye opening in response to pain	2	2	2
Eye opening to speech	3	3	3
Eyes opening spontaneously	4	4	4
Best verbal response (V)			
No verbal response	1	1	1
Incomprehensible sounds	2	2	2
Inappropriate words	3	3	3
Confused	4	4	4
Oriented	5	5	5
Best motor response (M)			
No motor response	1	1	1
Extension to pain	2	2	2
Abnormal flexion to pain	3	3	3
Flexion / Withdrawal to pain	4	4	4
Localises to pain	5	5	5
Obeys commands	6	6	6
Glasgow Coma score (E + V + M)			

CERVICAL SPINE ASSESSMENT

Does the athlete report that their neck is pain free at rest?	Y	N
If there is NO neck pain at rest, does the athlete have a full range of ACTIVE pain free movement?	Y	N
Is the limb strength and sensation normal?	Y	N

In a patient who is not lucid or fully conscious, a cervical spine injury should be assumed until proven otherwise.

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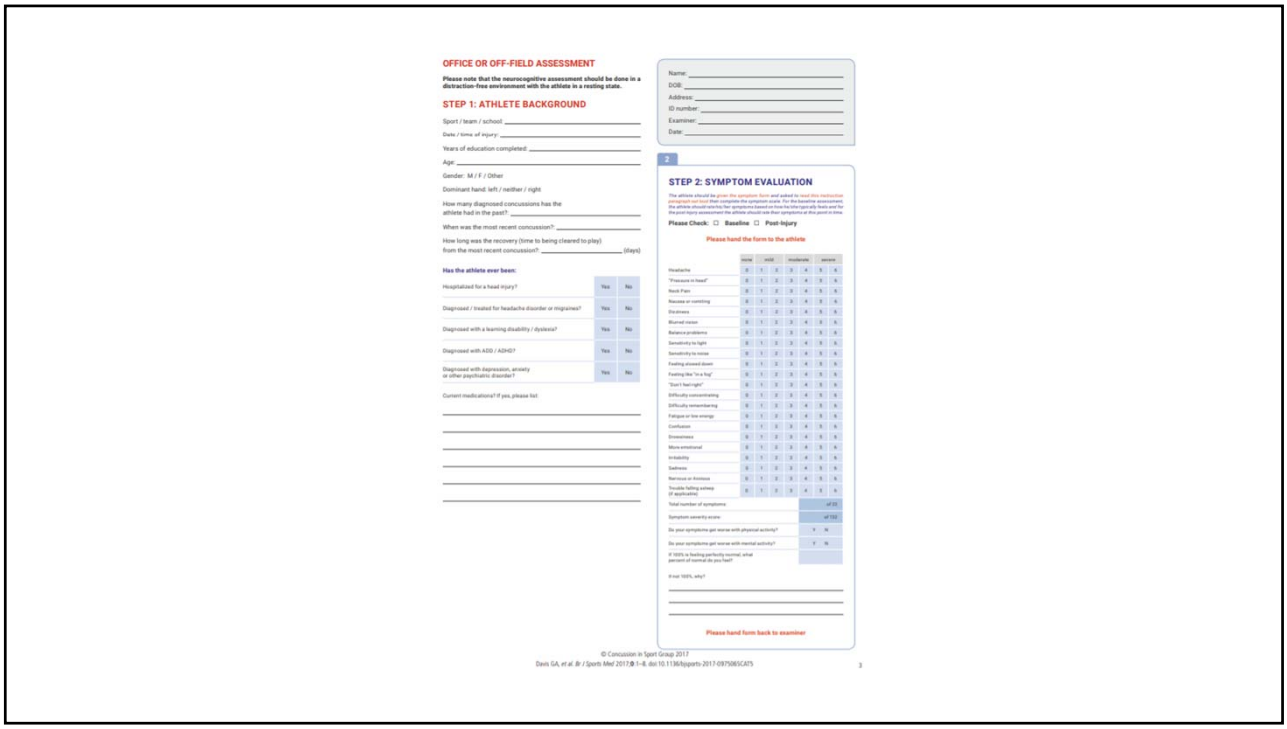

OFFICE OR OFF-FIELD ASSESSMENT

Please note that the neurocognitive assessment should be done in a distraction-free environment with the athlete in a resting state.

STEP 1: ATHLETE BACKGROUND

Sport / team / school: _____

Date / time of injury: _____

Years of education completed: _____

Age: _____

Gender: M / F / Other

Dominant hand: left / neither / right

How many diagnosed concussions has the athlete had in the past? _____

When was the most recent concussion? _____

How long was the recovery (time to being cleared to play) from the most recent concussion? _____ (days)

Has the athlete ever been:

Hospitalized for a head injury?	Yes	No
Diagnosed / treated for headache disorder or migraines?	Yes	No
Diagnosed with a learning disability / dyslexia?	Yes	No
Diagnosed with ADD / ADHD?	Yes	No
Diagnosed with depression, anxiety or other psychiatric disorder?	Yes	No

Current medications? If yes, please list:

_____

_____

_____

_____

_____

_____

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date: _____

2

STEP 2: SYMPTOM EVALUATION

The athlete should be given the symptom form and asked to read this instruction paragraph out loud then complete the symptom scale. For the baseline assessment, the athlete should rate his/her symptoms based on how he/she typically feels and for the post-injury assessment the athlete should rate their symptoms at this point in time.

Please Check: ☐ **Baseline** ☐ **Post-injury**

Please hand the form to the athlete

	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?							

If not 100%, why?

_____

_____

_____

Please hand form back to examiner

Davis GA, *et al*. *Br J Sports Med* 2017;**0**:1–8. doi:10.1136/bjsports-2017-097506SCAT5

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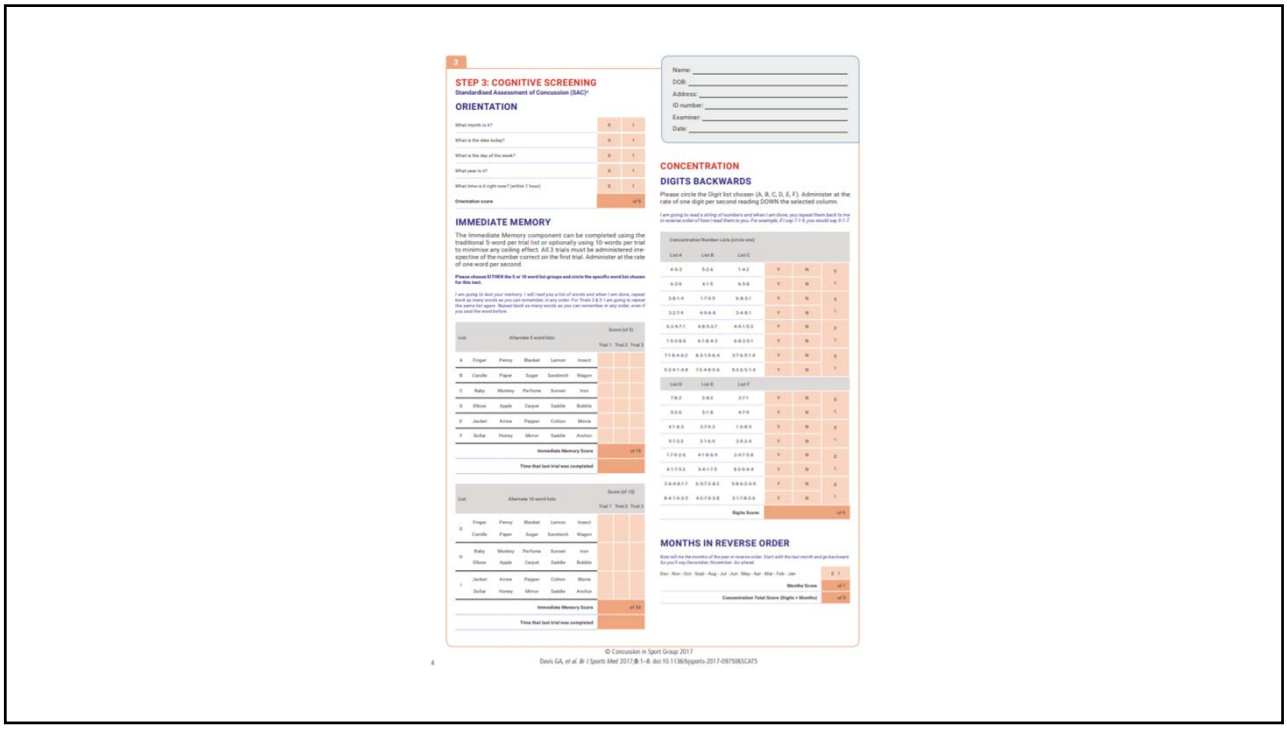

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STEP 3: COGNITIVE SCREENING

Standardised Assessment of Concussion (SAC)[1]

ORIENTATION

What month is it?	0	1
What is the date today?	0	1
What is the day of the week?	0	1
What year is it?	0	1
What time is it right now? (within 1 hour)	0	1
Orientation score		of 5

IMMEDIATE MEMORY

The Immediate Memory component can be completed using the traditional 5-word per trial list or optionally using 10-words per trial to minimise any ceiling effect. All 3 trials must be administered irrespective of the number correct on the first trial. Administer at the rate of one word per second.

Please choose EITHER the 5 or 10 word list groups and circle the specific word list chosen for this test.

I am going to test your memory. I will read you a list of words and when I am done, repeat back as many words as you can remember, in any order. For Trials 2 & 3 I am going to repeat the same list again. Repeat back as many words as you can remember in any order, even if you said the word before.

List	Alternate 5-word lists					Score (of 5) Trial 1	Trial 2	Trial 3
A	Finger	Penny	Blanket	Lemon	Insect			
B	Candle	Paper	Sugar	Sandwich	Wagon			
C	Baby	Monkey	Perfume	Sunset	Iron			
D	Elbow	Apple	Carpet	Saddle	Bubble			
E	Jacket	Arrow	Pepper	Cotton	Movie			
F	Dollar	Honey	Mirror	Saddle	Anchor			
						Immediate Memory Score		of 15
						Time that last trial was completed		

List	Alternate 10-word lists					Score (of 10) Trial 1	Trial 2	Trial 3
G	Finger	Penny	Blanket	Lemon	Insect			
	Candle	Paper	Sugar	Sandwich	Wagon			
H	Baby	Monkey	Perfume	Sunset	Iron			
	Elbow	Apple	Carpet	Saddle	Bubble			
I	Jacket	Arrow	Pepper	Cotton	Movie			
	Dollar	Honey	Mirror	Saddle	Anchor			
						Immediate Memory Score		of 30
						Time that last trial was completed		

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date: _____

CONCENTRATION

DIGITS BACKWARDS

Please circle the Digit list chosen (A, B, C, D, E, F). Administer at the rate of one digit per second reading DOWN the selected column.

I am going to read a string of numbers and when I am done, you repeat them back to me in reverse order of how I read them to you. For example, if I say 7-1-9, you would say 9-1-7.

Concentration Number Lists (circle one)					
List A	List B	List C			
4-9-3	5-2-6	1-4-2	Y	N	0
6-2-9	4-1-5	6-5-8	Y	N	1
3-8-1-4	1-7-9-5	6-8-5-1	Y	N	0
3-2-7-9	4-9-6-8	3-4-8-1	Y	N	1
6-2-9-7-1	4-8-5-0-7	4-9-1-5-3	Y	N	0
1-5-2-8-6	6-1-8-4-3	6-4-2-5-1	Y	N	1
7-1-8-4-6-2	8-3-1-9-6-4	3-7-6-5-1-8	Y	N	0
5-3-9-1-4-8	7-2-4-8-5-6	9-2-6-5-1-4	Y	N	1
List D	**List E**	**List F**			
7-8-2	3-8-2	3-7-1	Y	N	0
9-2-6	5-1-8	4-7-9	Y	N	1
4-1-6-3	2-7-9-5	1-6-8-3	Y	N	0
6-2-3-2	3-1-6-9	3-8-2-4	Y	N	1
1-7-9-2-6	4-1-8-6-9	2-4-7-5-8	Y	N	0
4-1-7-5-2	5-4-1-7-5	8-3-9-6-4	Y	N	1
2-5-4-8-1-7	6-9-7-3-8-2	5-8-6-2-4-9	Y	N	0
8-4-1-9-3-5	4-2-7-9-3-8	3-1-7-8-2-6	Y	N	1
			Digits Score		of 4

MONTHS IN REVERSE ORDER

Now tell me the months of the year in reverse order. Start with the last month and go backward. So you'll say December, November. Go ahead.

Dec - Nov - Oct - Sept - Aug - Jul - Jun - May - Apr - Mar - Feb - Jan | 0 | 1

Months Score | of 1

Concentration Total Score (Digits + Months) | of 5

Davis GA, *et al*. *Br J Sports Med* 2017;**0**:1–8. doi:10.1136/bjsports-2017-097506SCAT5

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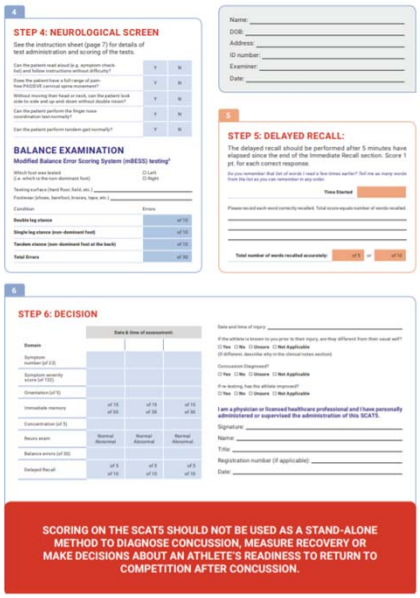

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STEP 4: NEUROLOGICAL SCREEN

See the instruction sheet (page 7) for details of test administration and scoring of the tests.

Can the patient read aloud (e.g. symptom check-list) and follow instructions without difficulty?	Y	N
Does the patient have a full range of pain-free PASSIVE cervical spine movement?	Y	N
Without moving their head or neck, can the patient look side to side and up and down without double vision?	Y	N
Can the patient perform the finger nose coordination test normally?	Y	N
Can the patient perform tandem gait normally?	Y	N

BALANCE EXAMINATION

Modified Balance Error Scoring System (mBESS) testing[4]

Which foot was tested (i.e. which is the non-dominant foot): ☐ Left ☐ Right

Testing surface (hard floor, field, etc.) _____

Footwear (shoes, barefoot, braces, tape, etc.) _____

Condition	Errors
Double leg stance	of 10
Single leg stance (non-dominant foot)	of 10
Tandem stance (non-dominant foot at the back)	of 10
Total Errors	of 30

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date: _____

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STEP 5: DELAYED RECALL:

The delayed recall should be performed after 5 minutes have elapsed since the end of the Immediate Recall section. Score 1 pt. for each correct response.

Do you remember that list of words I read a few times earlier? Tell me as many words from the list as you can remember in any order.

Time Started: _____

Please record each word correctly recalled. Total score equals number of words recalled.

_____

_____

_____

Total number of words recalled accurately: _____ of 5 or _____ of 10

6

STEP 6: DECISION

Domain	Date & time of assessment		
Symptom number (of 22)			
Symptom severity score (of 132)			
Orientation (of 5)			
Immediate memory	of 15 of 30	of 15 of 30	of 15 of 30
Concentration (of 5)			
Neuro exam	Normal Abnormal	Normal Abnormal	Normal Abnormal
Balance errors (of 30)			
Delayed Recall	of 5 of 10	of 5 of 10	of 5 of 10

Date and time of injury: _____

If the athlete is known to you prior to their injury, are they different from their usual self?
☐ Yes ☐ No ☐ Unsure ☐ Not Applicable
(if different, describe why in the clinical notes section)

Concussion Diagnosed?
☐ Yes ☐ No ☐ Unsure ☐ Not Applicable

If re-testing, has the athlete improved?
☐ Yes ☐ No ☐ Unsure ☐ Not Applicable

I am a physician or licensed healthcare professional and I have personally administered or supervised the administration of this SCAT5.

Signature: _____

Name: _____

Title: _____

Registration number (if applicable): _____

Date: _____

SCORING ON THE SCAT5 SHOULD NOT BE USED AS A STAND-ALONE METHOD TO DIAGNOSE CONCUSSION, MEASURE RECOVERY OR MAKE DECISIONS ABOUT AN ATHLETE'S READINESS TO RETURN TO COMPETITION AFTER CONCUSSION.

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VOMS

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Use of Blood Biomarkers in the Assessment of Sports-Related Concussion—A Systematic Review in the Context of Their Biological Significance

O'Connell, Brendan, BSc[*,†]; Kelly, Áine M., PhD[‡]; Mockler, David[§]; Orešič, Matej, PhD[¶]; Denvir, Karl, MSc[†]; Farrell, Garreth, MSc[†]; Janigro, Damir, PhD[‖]; Wilson, Fiona, PhD[*]

Clinical Journal of Sport Medicine: November 2018 - Volume 28 - Issue 6 - p 561–571
doi: 10.1097/JSM.0000000000000478
General Review

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STANDARDS FOR POST-CONCUSSION CARE

from diagnosis to the interdisciplinary concussion clinic

June 8, 2017

Ontario Neurotrauma Foundation
Fondation ontarienne de neurotraumatologie

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Why do we do education sessions?

- Rowan Stringer- 17 yo rugby player who died from concussion. Inquest deemed it was preventable.
- ROWANS LAW- Ontario. Enacted Mar 7, 2018. Not proclaimed yet, except for one section: annual "Rowan's Law Day"

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Rowan's Law

• **Annual review of Concussion Awareness Resources** by athletes, coaches, and parents/guardians before registering or serving with a sport organization;

• Sport organizations to establish **Removal-from-Sport and Return-to-Sport protocols**, to ensure that an athlete is immediately removed from sport if they are suspected of having sustained a concussion; and

• **A Concussion Code of Conduct** that would set out rules of behaviour to minimize concussions while playing sport.

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4 Characteristics of a Good Concussion Clinic

A document of the Canadian Concussion Collaborative (CCC)
First edition, July 2017

Who Should Use This Guide

This guide is designed to help people who have persistent symptoms of a concussion (symptoms that are not clearly improving after a period of seven to 10 days) find a good concussion clinic. Many sport medicine clinics and concussion clinics offer concussion management and treatment. Before you choose one, be sure that care is provided by licensed health care practitioners and ask the questions described in this document.

The answers to these questions will tell you whether the clinic provides good concussion care:

- "Yes" to questions 1 to 3 means they are likely providing up-to-date concussion care.
- "No" to any question means that the clinic does not follow best practices. They should make it clear that their approach is not supported by current guidelines.

Quick Concussion Facts

A concussion is a brain injury. It can happen when a blow to the head, face, neck or body makes the brain suddenly shake or jerk inside the skull. You can have a concussion and not lose consciousness. Signs and symptoms of a concussion include:

- Headache
- Neck pain
- Dizziness
- Irritability
- Blurred vision
- Nausea or vomiting
- Sensitivity to light or noise

After a medical evaluation, most concussions will heal gradually with an initial period of mental and physical rest, followed by gradual return to mental and physical activity. If the symptoms of a concussion do not clearly improve within 7 to 10 days, a personalized concussion care plan should be developed.

Questions to Ask a Concussion Clinic

Does the clinic have a medical doctor?

The treatment of patients with persistent concussion symptoms may involve many health care professionals, but a physician should ideally do the initial assessment of patients and should direct patient care and provide final medical clearance to return to sport, school and work-related activities. Clinics offering concussion care should have timely access to physicians with training and experience in concussion. These physicians should be identified by name.

WARNING! Proceed to an emergency department if any of the RED FLAGS listed in the "Concussion Recognition Tool" (CRT5) are observed:

- Neck pain or tenderness
- Double vision
- Weakness or tingling/burning in arms or legs
- Severe or increasing headache
- Seizure or convulsion
- Loss of consciousness
- Deteriorating conscious state
- Vomiting
- Increasing restlessness, agitation or combativeness

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Questions to Ask a Concussion Clinic

Does the clinic have a team of licensed health care professionals?

In addition to a medical doctor, a team approach is helpful to evaluate and manage concussions more effectively. A good clinic has access to licenced professionals from several health care disciplines, either on-site or by referral. If needed, these professionals help provide mental and physical evaluation, education, rehabilitation and advice about getting back to work, school and sport. They provide complementary expertise from their health care disciplines and should work with the medical doctor to design a personalised treatment plan. The professional teams present at these clinics may include: athletic therapists, chiropractors, neuropsychologists, nurses, occupational therapists and physiotherapists.

Does the clinic follow the most up-to-date standards of care for managing a concussion?

Recommended standards of care are updated every few years by groups of experts in documents like the "International Consensus Statement on Concussion in Sport." The clinic should follow the most up-to-date standards to ensure good concussion care.

What tools, tests and recommendations is the clinic using?

The clinic should be using the tests recommended in the most current "International Consensus Statement on Concussion in Sport." The clinic should perform tests to evaluate many different components including patient symptoms, mental functions, balance, cervical spine, mood, response to exercise and neurological (brain) functions.

The use of pre-season (baseline) neuropsychological testing, including baseline computerized neurocognitive testing, is not recommended in children and adolescents.

Concussion clinics and health care providers that are advertising "certification" for concussion management isn't a guarantee of proper concussion care. Private certification is an unregulated practice and is not endorsed by the Canadian Concussion Collaborative. To identify a good concussion clinic, ask the four questions described in this document!

BEWARE IF:

- **The clinic charges access fees or more for concussion treatments:** Clinics should have standardized time-based fee schedules regardless of the injury being treated.
- **The clinic's website or publicity offers testimonials:** This is an unethical practice for most health care professions.
- **The clinic claims to use a treatment that is proven to improve recovery from concussions:** No single treatment has been shown to improve recovery from all concussions.

Visit the CASEM website for additional concussion tools and resources.

Mediplex

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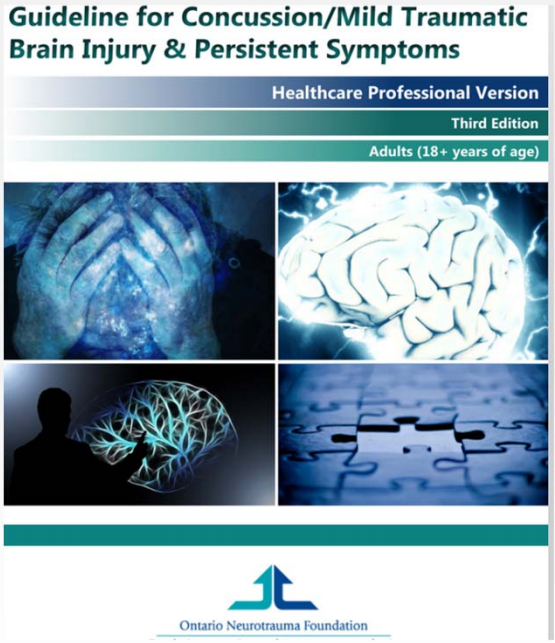

Published June 2018

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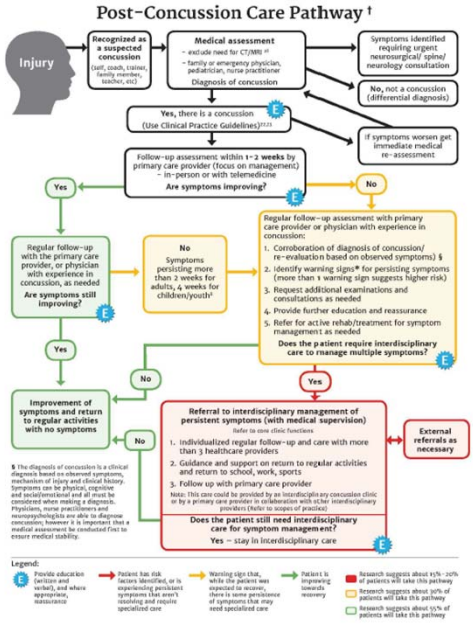

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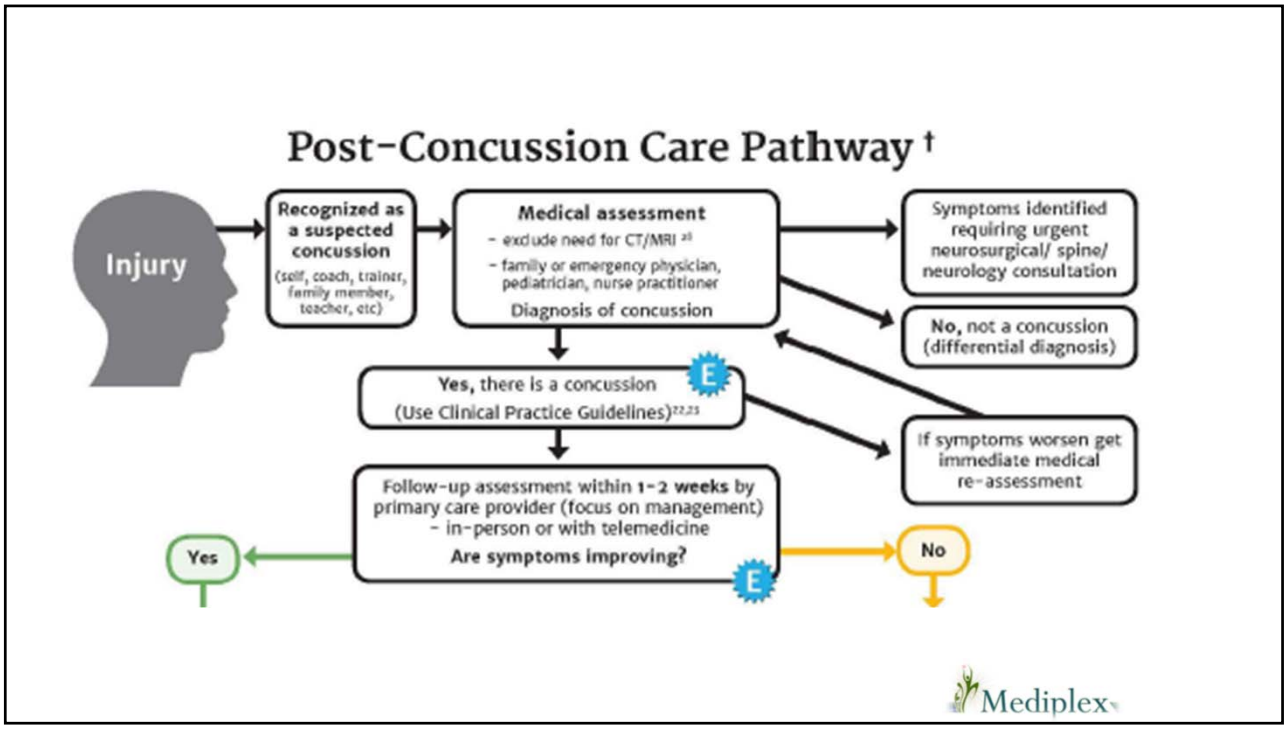
Post-Concussion Care Pathway †
Injury
Recognized as a suspected concussion
(self, coach, trainer, family member, teacher, etc)
Medical assessment
- exclude need for CT/MRI [23]
- family or emergency physician, pediatrician, nurse practitioner
Diagnosis of concussion
Symptoms identified requiring urgent neurosurgical/ spine/ neurology consultation
No, not a concussion (differential diagnosis)
Yes, there is a concussion
(Use Clinical Practice Guidelines)[22,23]
E
If symptoms worsen get immediate medical re-assessment
Follow-up assessment within 1-2 weeks by primary care provider (focus on management)
- in-person or with telemedicine
Are symptoms improving?
E
Yes
No
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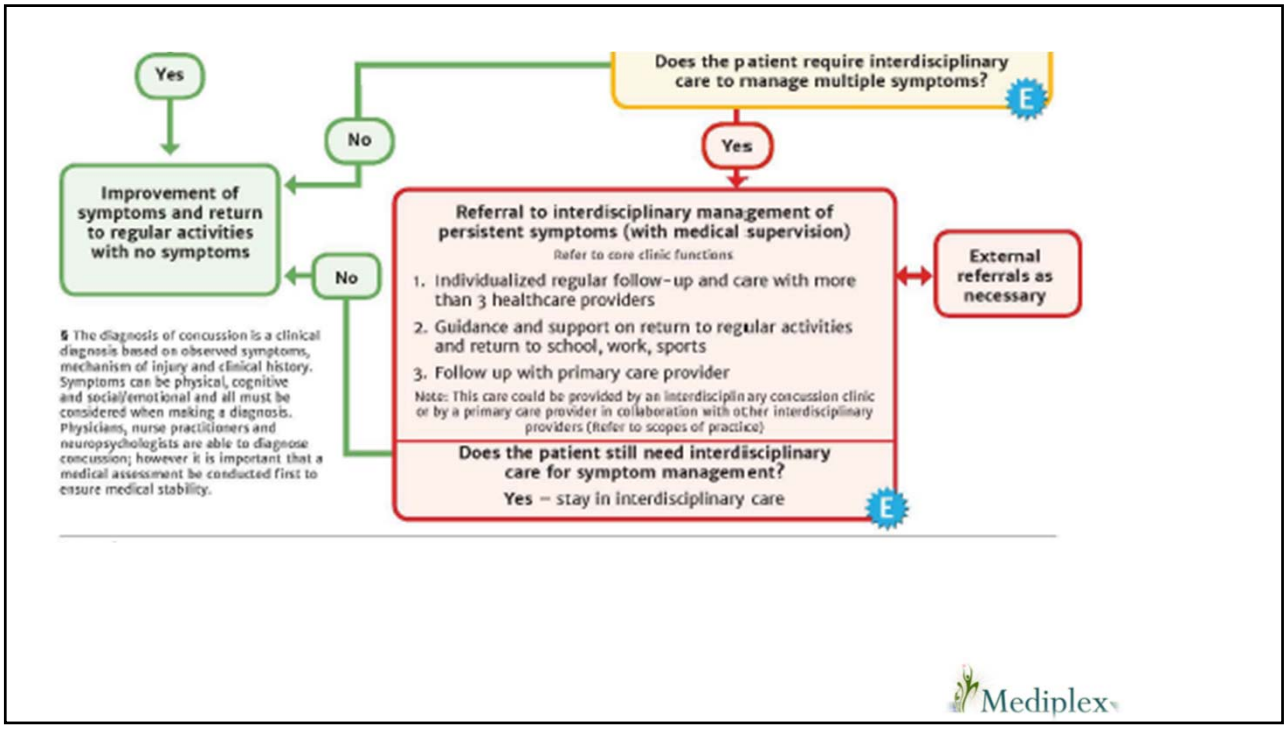
Yes
No
Improvement of symptoms and return to regular activities with no symptoms
No
§ The diagnosis of concussion is a clinical diagnosis based on observed symptoms, mechanism of injury and clinical history. Symptoms can be physical, cognitive and social/emotional and all must be considered when making a diagnosis. Physicians, nurse practitioners and neuropsychologists are able to diagnose concussion; however it is important that a medical assessment be conducted first to ensure medical stability.
Does the patient require interdisciplinary care to manage multiple symptoms?
E
Yes
Referral to interdisciplinary management of persistent symptoms (with medical supervision)
Refer to core clinic functions
1. Individualized regular follow-up and care with more than 3 healthcare providers
2. Guidance and support on return to regular activities and return to school, work, sports
3. Follow up with primary care provider
Note: This care could be provided by an interdisciplinary concussion clinic or by a primary care provider in collaboration with other interdisciplinary providers (Refer to scopes of practice)
External referrals as necessary
Does the patient still need interdisciplinary care for symptom management?
Yes – stay in interdisciplinary care
E
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Referral to other team members if not improving by 4 weeks

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Team Members

- Under one roof or a virtual team

- AT/ PT/ RMT
- OT
- Psychology
- Pain Clinic
- Neurology
- Neuro-optometry

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A concussion is a serious injury, but you can recover fully if your brain is given enough time to rest and recuperate.

Returning to normal activities, including sport participation, is a step-wise process that requires patience, attention, and caution.

In the Return-to-Sport Strategy:

- Each stage is at least 24 hours.
- Move on to the next stage when activities are tolerated without new or worsening symptoms.
- If any symptoms worsen, stop and go back to the previous stage for at least 24 hours.
- If symptoms return after medical clearance, follow up with a doctor for re-assessment.

Stage 1: Symptom-limiting activities

After an initial short period of rest of 24 to 48 hours, light cognitive and physical activity can begin, as long as these don't worsen symptoms. You can start with daily activities like moving around the house, simple chores, and gradually introducing school and work activities at home.

Stage 2: Light aerobic activity

Light exercise such as walking or stationary cycling, for 10 to 15 minutes. The duration and intensity of the aerobic exercise can be gradually increased over time if symptoms don't worsen and no new symptoms appear during the exercise or in the hours that follow. No resistance training or other heavy lifting.

Stage 3: Individual sport-specific exercise with no contact

Activities such as skating, running, or throwing can begin for 20 to 30 minutes. There should be no body contact or other jarring motions, such as high-speed stops or hitting a ball with a bat. No resistance training.

Stage 4: Begin training drills with no contact

Add in more challenging drills like passing drills. There should be no impact activities (no checking, no heading the ball, etc.). Start to add in progressive resistance training.

Stage 5: Full contact practice following clearance by a doctor.

Stage 6: Return to Sport

Full game play or competition.

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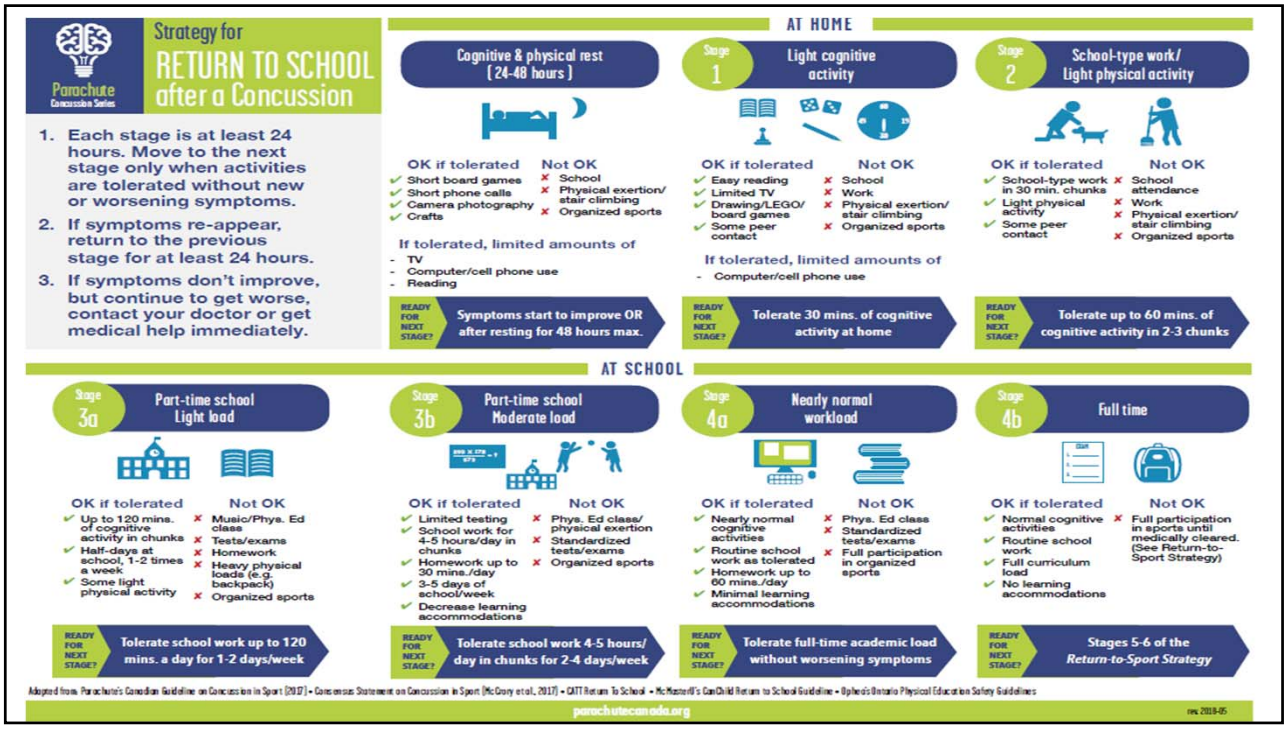

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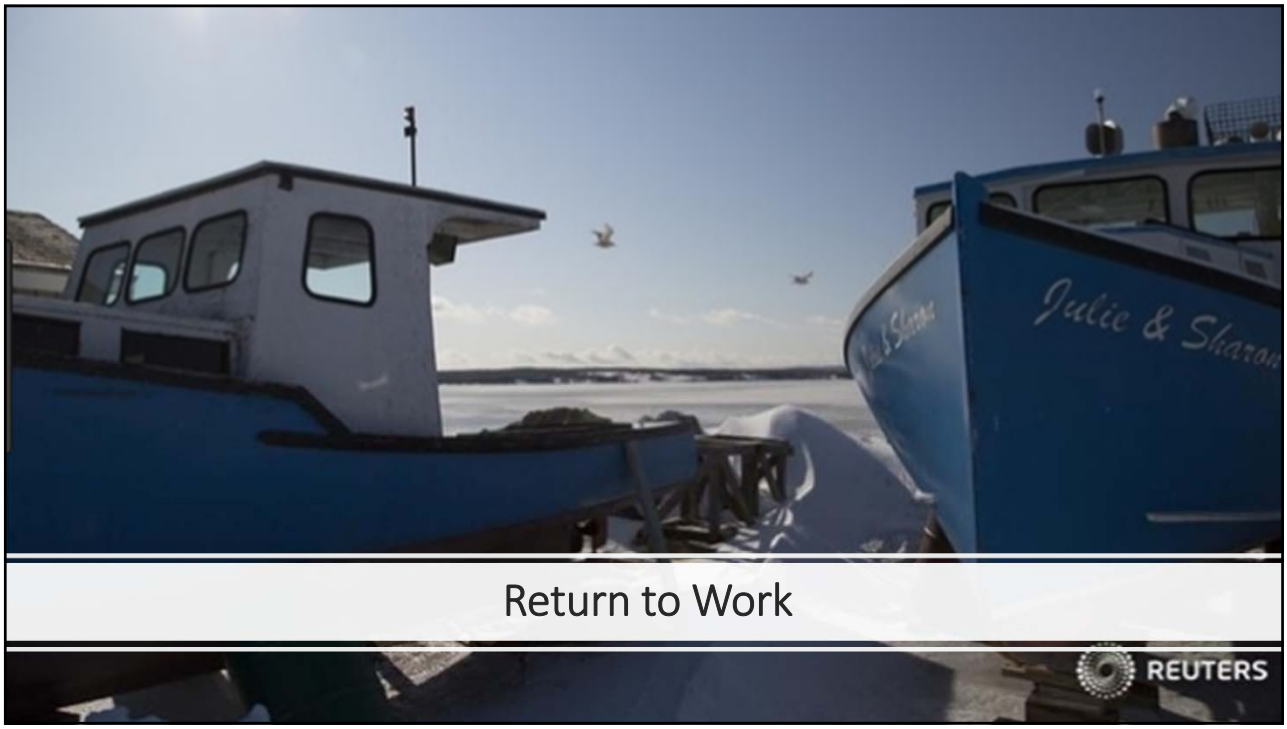

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Case Study Examples

Case #1:

42 y/o woman beaten by her brother. Struck in the head and head hit floor twice.

Was on holidays. When returned to work at a hospital a few days later, couldn't work at the computer for more than 2 minutes. Went to FD and placed off work for 5 days.

What would you do next?

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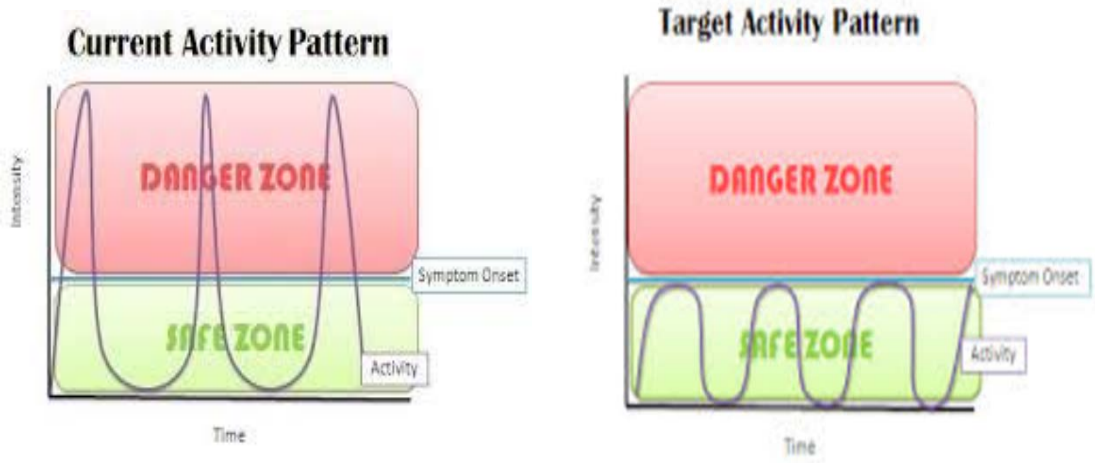
Pacing



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Case#1

- At almost 3 weeks she was having better days when she was less active.
- Discussed PACING
- Graduated Return to work, starting with 4 hours M, W, Fr
- Did well
- Can be very useful to have an OT help with RTW. Good communication with employer is essential.

- Beware of mental health issues as a reason for delayed recovery or worsening symptoms.

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Case Study Examples

Case #2:
15 y/o in a race car accident who hit a cement wall going 70mph
Got out of the vehicle on his own. Foggy and off balance. Poor memory.
X-ray of his neck and shoulder normal. CT scan normal.

Tried to go back to school but couldn't. Stayed out for 1 week.

Balance was off. Nausea and visual issues with tracking and focus.

How would you approach?

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- We were initially very concerned. 2 years ago he had a fractured skull and intracranial bleed. He had required extensive multidisciplinary treatment to recover.
- However on this occasion he made a good recovery over a couple of months with return to school after home schooling for a week.
- His initial screens were very satisfactory and we were able to reassure him and his family.
- We did ImPact testing to confirm good cognitive recovery and to have a baseline for the future.

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Case Study Examples

Case #3:

16 yo girl from Truro on Canada Games Freestyle Ski Team, injured in a competition 9 days ago. Supposed to leave for Red Deer, Alberta in 2 days.

Seen in the ER in Truro on day of injury. Advised to rest for a week and see her FD. FD sent her to us on an urgent basis for a decision re return to sport.

What would you do next?

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- Should she have been told to do nothing for a week?
- Fortunately she had ignored some of that advice and had returned to school with no issues 2 days after the accident.
- She had called an Athletic therapist friend who correctly told her to start the return to play protocol.
- First Step?

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Take home points:

- Have a concussion strategy for your ER/ clinic.
- Need to be seen in follow up within 1-2 weeks of injury. These cases will require 20-30 minutes.
- Use the SCAT 5 initially as your tool
- Not all cases will be immediately apparent.
- Focus on Insomnia, Mood issues and HA early on.
- Refer or involve other team members if not improving after 4 weeks.
- Provide medical guidance and notes to clear them for return to play and for return to work.

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