

Concussion Awareness and Management for Coaches and Trainers

Presented by

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Outline

- Introduction
- Brain anatomy
- Understanding sport related concussion (SRC)
- Injury mechanics
- Complications associated with concussions
- Recognition of signs & symptoms
- Principles of management / action plan for coaches & trainers, CRT5
- Return to activity (RTL & RTP)
- Helping your athletes cope
- Prevention



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Sport specific injury statistics

Percent concussion distribution for females 2007 – 2010

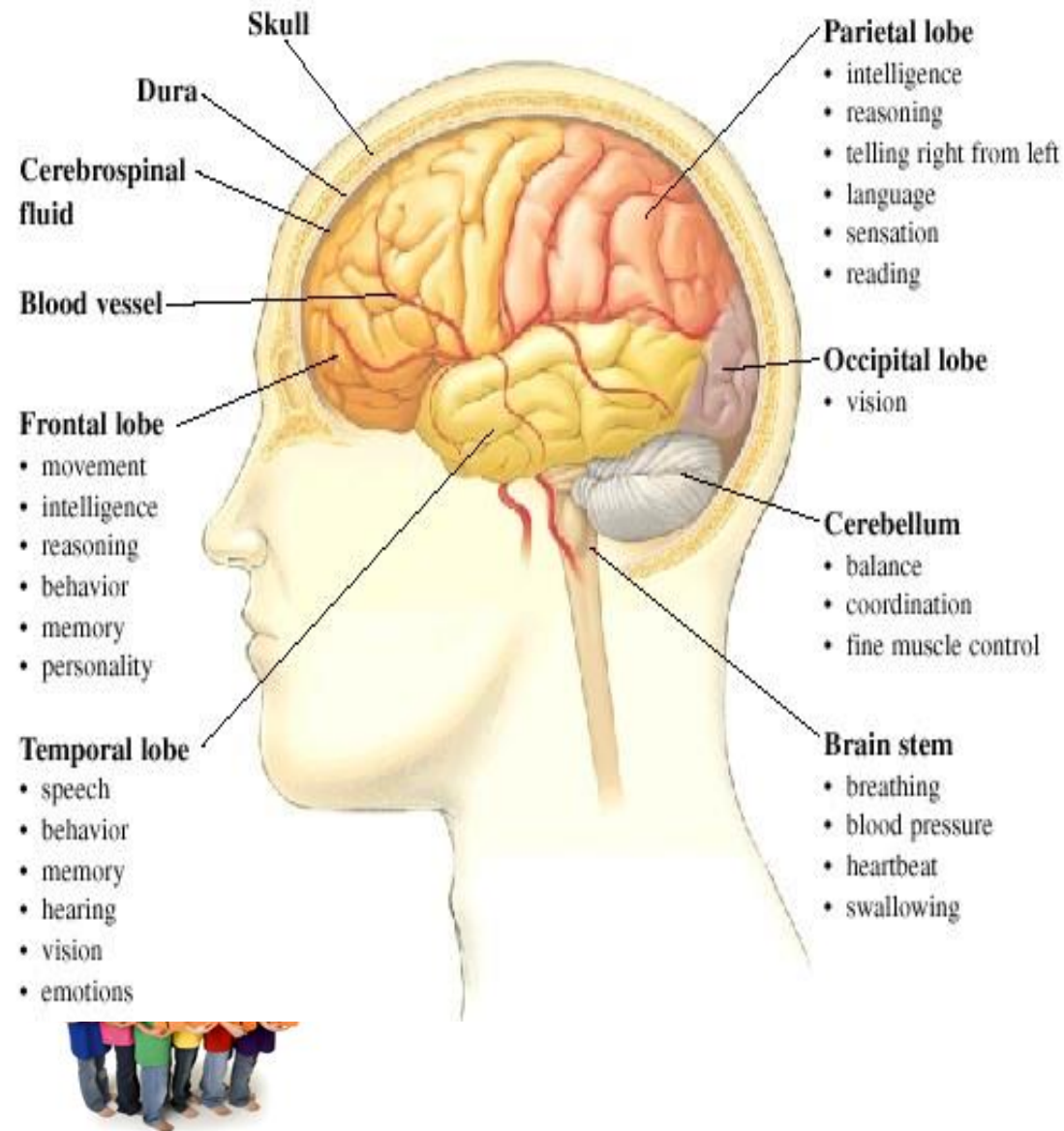
Sport/activity	Age group (yr), # (%)			% of concussions all ages
	5-9	10-14	15-19	
Ringette	6 (20.7)	36 (17.5)	12 (14.8)	17.1
Ice hockey	*	74 (12.5)	52 (16.3)	13.3
Rugby	0 (0.0)	11 (14.5)	53 (11.9)	12.3
Snowboarding	*	21 (4.4)	24 (7.1)	5.5
Skiing	5 (2.4)	24 (5.2)	20 (13.6)	6.0
Football	0 (0.0)	12 (3.8)	6 (3.7)	3.5
Sledding	13 (3.5)	17 (4.8)	6 (10.2)	4.6
Cycling	35 (3.2)	40 (3.8)	8 (3.7)	3.5
Lacrosse	*	0 (0.0)	0 (0.0)	2.7
Soccer	8 (1.5)	96 (3.2)	107 (7.0)	4.2
Baseball	*	18 (6.6)	*	4.6
Basketball	*	33 (1.8)	23 (3.2)	2.1
Volleyball	0 (0.0)	15 (2.6)	5 (1.5)	2.1



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Anatomy



- Skull and facial bones form rigid casing for brain
- Brain is a soft organ covered by tissue call meninges
- CSF between meninges and brain
- Brain suspended in the skull – somewhat mobile in fluid / skull

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Concussion fact check

A concussion is a traumatic injury.

True. Concussions cause widespread disruption in brain function.

Helmets prevent concussions.

False. Helmets protect against penetrating skull injuries, lacerations; inclusion of a cage protects the face and teeth.

Concussions show up on diagnostic imaging (x-rays, CT scan, MRI).

False. Concussions are functional injuries not structural and do not show up on diagnostic images.

If you did not lose consciousness, you did not suffer a concussion.

False. Most concussions occur without a loss of consciousness.

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Understanding sport related concussions

1. Concussion is a brain injury caused by a **collision with a surface or other athlete**, and/ or a **fall** entailing either a **direct** or **indirect** hit to the **head** or **body**.
2. Results in an immediate onset of short lived signs and symptoms that resolve spontaneously.
3. Leads to widespread temporary disruption of brain function.
4. The signs and symptoms of concussion may evolve over a number of minutes or hours.
5. **Diagnosis of concussion is based on clinical judgement by a medical doctor.**
6. If a concussion is suspected **REMOVE** athlete **immediately** from play.



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Biomechanics of injury

Differs among sports activities, possible mechanisms of injury include:

- **Compressive forces:** which may directly injure the brain at the point of contact (**coup**);
- **Tensile forces:** produce injury at the point opposite the injury (**contrecoup**) because the axons and nerves are stretched;
- **Rotational forces**:** may result in a shearing of axons.



<http://www.youtube.com/watch?v=Qq8XLD9kjzI>

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Biomechanics of injury

Linear component not solely responsible for concussive injury.
Rotational acceleration and shear effect contribute greatly to the severity of the injury.



Sequence of events

Trauma

Axonal Injury

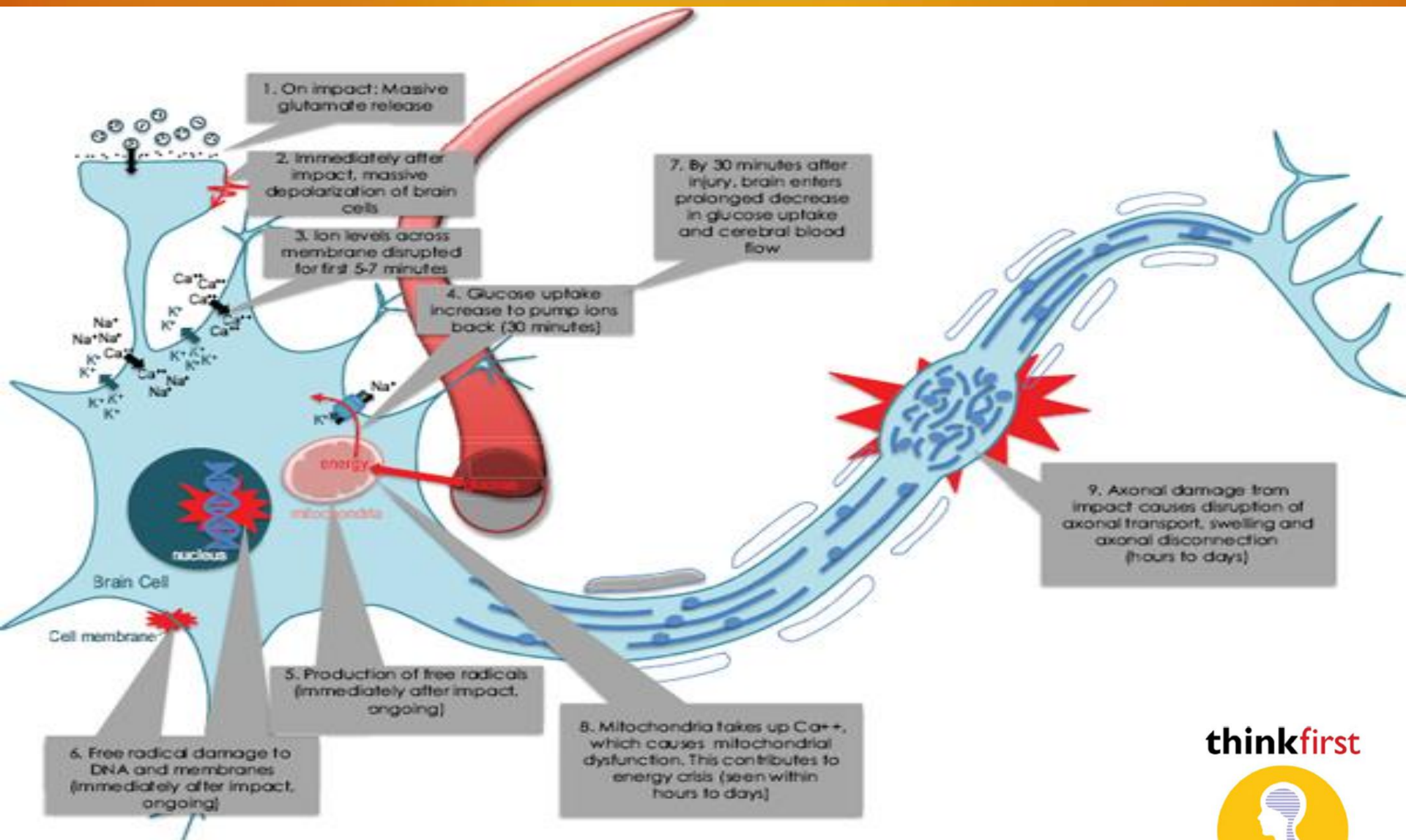
Neurometabolic Cascade

Energy Crisis

Symptom Appearance



Neurometabolic cascade



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Energy crisis

- Glucose requirements increase
- Cerebral blood flow decreases
- Creates “metabolic mismatch” – energy crisis
 - Appearance of symptoms in the minutes and hours that follow
 - Fundamental concept in acute concussion management
 - **Physical / cognitive rest – while symptomatic**
 - Activity increase / 2nd injury – **Sudden Impact Syndrome (SIS)**
 - **Kids and teens at higher risk**

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Potential Dangers

Concussions must be taken extremely seriously.

With rest and timely treatment most people (70-80%) recover fully from a concussion

- Adults 10 days to 2 weeks
- Children and teens 3 weeks to 1 month
- Women and girls 3 weeks to 1 month

When an athlete's brain is still healing, it is more **vulnerable**

- Threshold for re-injury is **lower** leading to **greater** risk
- Repeat concussions can increase the time it takes to recover

➤ The effects of multiple injuries to the head are **cumulative** and potentially more damaging than a single incident



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Complications with undiagnosed and/or repeat concussions

Short Term:

- Sudden Impact Syndrome (SIS)
- Post Concussion Syndrome (PCS)
- Cognitive impairment: young brains are still developing, injury interrupts development of critical cognitive skills (e.g. concentration, processing speed, memory)

Full impact on the brain may not be apparent for many years

Long Term: if symptoms persist and are left untreated:

- Chronic Traumatic Encephalopathy



**THE ATHLETE HAS A LOT MORE
TO LOSE
THAN A GAME !**

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Stages of concussive injury



Problems recognizing concussions

- **No two concussions are alike**
- Symptoms can be vague
- Some symptoms develop **immediately**, while others appear **gradually** and may not appear for hours to days
- Symptoms can mimic other conditions
- Athletes are reluctant to report
- Can be hard for others around injured person to spot.



Sign and symptoms of a concussion

SYMPTOM: What your athlete experiences or might report

- Head ache
- Nausea
- Dizziness
- Balance problems
- Blurry or double vision
- Memory difficulties
- Sensitivity to light and or noise
- Feeling groggy
- Sluggish feeling
- Confusion
- Difficulty concentrating

Signs of concussion in children U12

- Crying more than usual
- Headache that does not go away
- Changes in the way they play or act
- Changes in the way they eat or sleep
- Being upset easily or having more temper tantrums
- Sad mood
- Lack of interest in their usual activities or favourite toys
- Loss of balance and trouble walking
- Not being able to pay attention



Concussion symptoms

Cluster into 4 general categories:

1. Physical
2. Emotional
3. Cognitive
4. Maintenance/ Sleep Disturbances



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Physical



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Emotional

- Emotional mismatch
- Change in personality
- Nervousness/anxiety
- Emotional lability/fragility
- Irritable
- Sadness/depression
- Lack of motivation



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Cognitive

- Feel “in a fog”
- Feel “slowed down”
- Difficulty remembering
- Difficulty concentrating / distracted
- Slowed speech
- Easily confused



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Maintenance/sleep disturbance

- Sleeping too much
- Sleeping less than usual
- Trouble falling asleep
- Drowsiness
- Fatigue, not feeling rested
- Nightmares



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Immediate Medical Attention Required

- Complaint of double vision
- One pupil larger than the other
- Convulsions or seizures
- Unusual behavior
- Unable to recognize people or places
- Increased confusion, restlessness, or agitation
- Loss of consciousness
- Weakness, numbness or decrease coordination
- Repeated vomiting or nausea
- Slurred speech
- Headache worsens or does not go away



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Principles of concussion management

What should I do if I suspect an athlete has a concussion?

Use the Concussion Recognition Tool (CRT5) intended for **sideline assessment** by nonmedical personnel (coaches, trainers, parent volunteers) which is much easier to administer.

- Sport Concussion Assessment Tool 5
 - Child SCAT 5
 - SCAT
 - medical sideline assessment tools designed for use by **licensed healthcare practitioners** trained in the use of diagnostic assessment tools.



Engage the Concussion Action Plan

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First Steps: Concussion Action Plan

1. **Recognize** symptoms (use CRT5)
2. **Remove** from game / activity
 - When in doubt, sit them out.
 - If any LOC Call 911 – transport by ambulance
 - Have person rest quietly and stay with them til medical help arrives
3. **Refer** to healthcare professional

DO NOT return to play if **ANY** symptoms present
Inform coach, parent or guardian

DO NOT return to play even if symptoms resolve,
until **medical clearance** has been provided



CONCUSSION RECOGNITION TOOL 5[©]

To help identify concussion in children, adolescents and adults



FIFA[®]

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RECOGNISE & REMOVE

Head impacts can be associated with serious and potentially fatal brain injuries. The Concussion Recognition Tool 5 (CRT5) is to be used for the identification of suspected concussion. It is not designed to diagnose concussion.

STEP 1: RED FLAGS – CALL AN AMBULANCE

If there is concern after an injury including whether ANY of the following signs are observed or complaints are reported then the player should be safely and immediately removed from play/game/activity. If no licensed healthcare professional is available, call an ambulance for urgent medical assessment:

- 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

Remember:

- In all cases, the basic principles of first aid (danger, response, airway, breathing, circulation) should be followed.
- Assessment for a spinal cord injury is critical.
- Do not attempt to move the player (other than required for airway support) unless trained to do so.
- Do not remove a helmet or any other equipment unless trained to do so safely.

If there are no Red Flags, identification of possible concussion should proceed to the following steps:

STEP 2: OBSERVABLE SIGNS

Visual clues that suggest possible concussion include:

- Lying motionless on the playing surface
- Slow to get up after a direct or indirect hit to the head
- Disorientation or confusion, or an inability to respond appropriately to questions
- Blank or vacant look
- Balance, gait difficulties, motor incoordination, stumbling, slow laboured movements
- Facial injury after head trauma

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STEP 3: SYMPTOMS

- Headache
- "Pressure in head"
- Balance problems
- Nausea or vomiting
- Drowsiness
- Dizziness
- Blurred vision
- Sensitivity to light
- Sensitivity to noise
- Fatigue or low energy
- "Don't feel right"
- More emotional
- More irritable
- Sadness
- Nervous or anxious
- Neck Pain
- Difficulty concentrating
- Difficulty remembering
- Feeling slowed down
- Feeling like "in a fog"

STEP 4: MEMORY ASSESSMENT

(IN ATHLETES OLDER THAN 12 YEARS)

Failure to answer any of these questions (modified appropriately for each sport) correctly may suggest a concussion:

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

Athletes with suspected concussion should:

- Not be left alone initially (at least for the first 1-2 hours).
- Not drink alcohol.
- Not use recreational/ prescription drugs.
- Not be sent home by themselves. They need to be with a responsible adult.
- Not drive a motor vehicle until cleared to do so by a healthcare professional.

The CRT5 may be freely copied in its current form for distribution to individuals, teams, groups and organisations. Any revision and any reproduction in a digital form requires approval by the Concussion in Sport Group. It should not be altered in any way, rebranded or sold for commercial gain.

ANY ATHLETE WITH A SUSPECTED CONCUSSION SHOULD BE IMMEDIATELY REMOVED FROM PRACTICE OR PLAY AND SHOULD NOT RETURN TO ACTIVITY UNTIL ASSESSED MEDICALLY, EVEN IF THE SYMPTOMS RESOLVE

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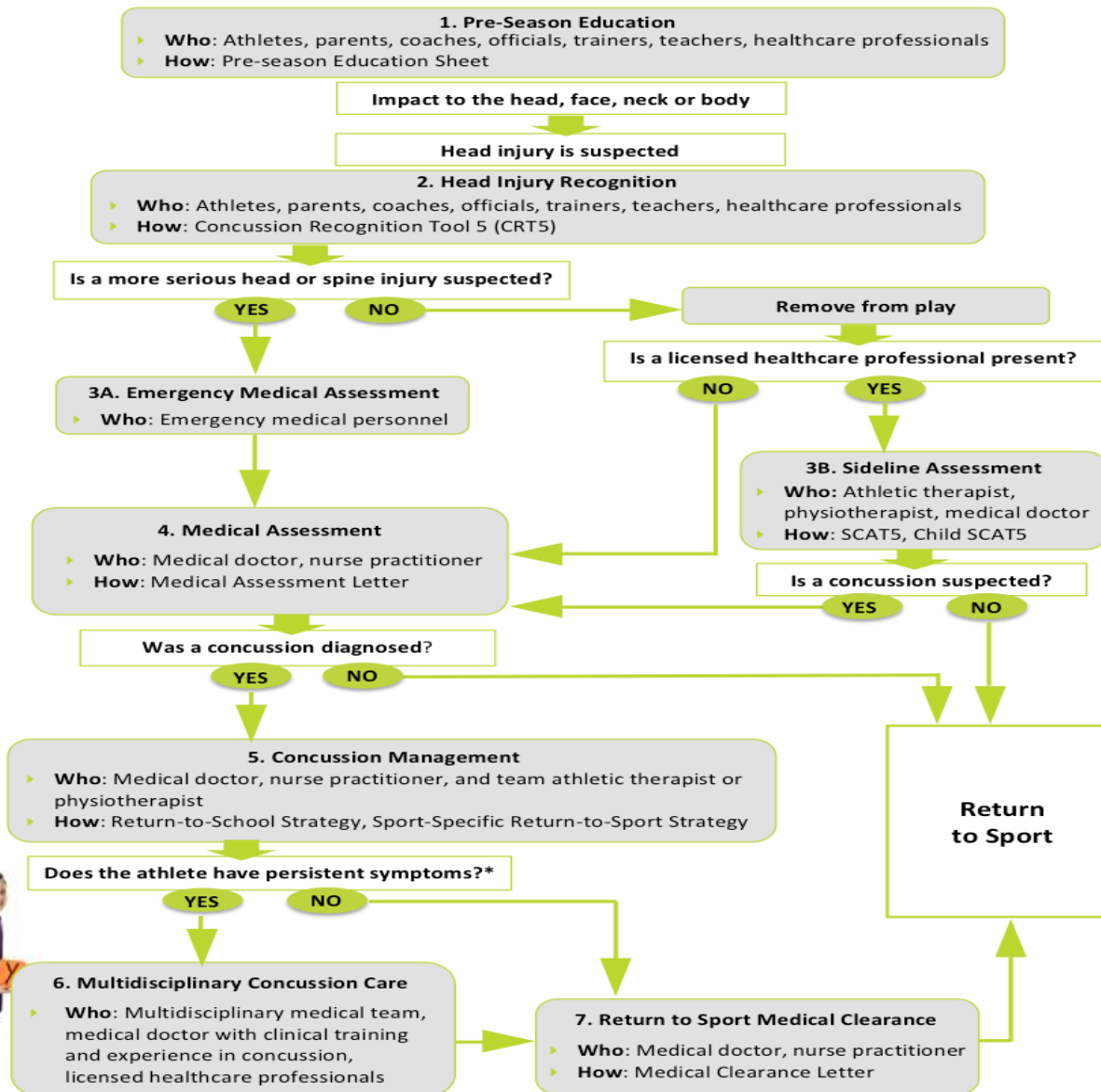
Sport Concussion Assessment Tool 5 (SCAT)

<http://bjsm.bmj.com/content/51/11/851>

- 8 page form (child version intended for U12)
- Consists of 4 distinct parts:
 - Sideline assessment
 - Evaluation of symptoms, series of diagnostic tests
 - Clinician notes
 - Instructions for conducting and scoring diagnostic tests



Canadian Concussion Pathway Guideline



*Persistent symptoms: lasting > 4 weeks in children & youth or > 2 weeks in adults



Concussion management

- Most acute symptoms resolve in 7-10 days (~ 80%)
- Prolonged recovery in 20% due to extenuating circumstances:
 1. Injury characteristics
 - Slow recovery time in ED
 - Cognitive symptoms in ED (confusion, slow to answer)
 2. Non-injury characteristics
 3. Environmental risk factors

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Non-injury predictors of prolonged recovery

- History of previous concussions
- Family or personal history of headache
- Developmental vulnerability (e.g., LD, ADHD, ASD)
- History of mood disorders (e.g. anxiety or depression)
- Psychosocial stressors (family/ peer relationship issues)
- Age
- Female sex

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Environmental factors

- Unrealistic expectations for recovery
 - Recovery from concussion should not be rushed, nor pressure applied to athletes to resume playing until recovery is complete.
- Family stressors
- Pressure to perform
- School = Stress!
 - Increasing grade-level standards
 - Increasing requirements for graduation
 - Emphasis on rote learning (memorization)
 - Exams



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Environmental factors (continued)

Having a Head Injury is Stressful!

[Social isolation -Disruption of sleep cycle -Anxiety re:
academics -Loss of stress-relieving activities]

+

[Limited peer support -Pressure from family, team, coach,
school]

=

STRESS

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PCS and symptom overlap

Many signs and symptoms of concussion and depression overlap, including:

- Nervousness or anxiety
- Sleeping less or more than usual
- Irritability
- Feeling tired
- Mood changes
- Sadness
- Difficult thinking clearly
- Headache
- Difficulty concentrating

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Concussion and depression overlap

Concussion patients may experience symptoms of depression due to:

- Situational changes such as not being able to participate in sports
- Living with unremitting headaches or dizziness
- Hopelessness regarding recovery

Symptoms of depression should resolve as recovery improves, but in some cases, may last longer.

The onset of depression following concussion can affect recovery and should be treated.

Athletes experiencing any symptoms of depression, need to speak with a doctor for a referral for treatment.

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Concussion management

- No “one size fits all”
- Recovery process is **individualized**
- Any presentation of headache following a blow to the head / body should be managed **conservatively**
- In adolescents physical symptoms typically resolve before cognitive deficits

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Best practices: Post concussion management

- Return to learning **first**, then back to activity as quickly and safely as possible
- General Principles:
 - Rest is important
 - Limit cognitive and physical stress
 - **But it's a balance:**
 - No more than 3 days of total rest
 - Not complete sensory deprivation
 - Self-limiting of activity with parental guidance
 - Protection from additional risk of head injury
 - Activity allowed if symptoms manageable
 - Some electronics allowed within reason

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Compassionate approach to management

- Don't minimize symptoms
- Don't discount anxiety or depression
- Don't blame athlete or allow them to blame themselves
- Don't compare the athlete to others who have suffered a concussion

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Summary post concussion management tips

- Cognitive & physical rest for ≤ 3 days
- Protect from additional head injury
- Athlete may engage in cognitive & physical activity if symptoms are manageable
- Recognize symptom overlap
- Pre-existing conditions & current stressors
 - Have realistic expectations for recovery
- Encourage good sleep habits
- Encourage athlete to seek help for anxiety & negative beliefs
- Encourage participation in calming activities to manage sleep, pain, & anxiety (e.g. meditation, yoga, walk in nature, etc.)

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Step wise RTL and RTP

Return to Learn:

Most important – Kids are students first

- Goal – manage workload so that demand on brain does not increase and symptoms worsen = “cognitive over exertion”
- Modifications based on symptom type / severity

Return to Play:

- **NO symptoms**
- Back to full academics
- Medical clearance
- Normal neurocognitive testing
- Complete graduated return to play

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Progression criteria for graded RTP

These steps should be medically supervised

- Return to learn before return to sport
- Gradual increase intensity / duration
- Each step 24 hours:
 - Monitor for symptoms
 - No symptoms move to next step
 - Symptoms – rest until gone - go back one step
- Usually spend 1 day at each step
 - Some may spend several days

**Medical clearance required
for return to practice**

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Return to Learn Berlin Consensus Statement 2016

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

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Return to Sport Berlin Consensus Statement 2016

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.



Return to Learn, Return to Play

Q. After a concussion, when can an athlete return to play?

- a) Never
- b) After cleared by a doctor
- c) As soon as the immediate effects wear off
- d) As soon as they have completed the graded RTP
- e) b and d

e) After the athlete has returned to school and completed a graded RTP and has received medical clearance to return



Return to Play

Additional factors to consider:

- Is the athlete confident to go back?
- Does the athlete have a new helmet/head gear?
- Upon return to play athlete should not be on medication that could mask symptoms.



Helping athletes cope when they return to practice

- Advise
 - Rest as needed (mental and physical)
 - Proper nutrition
 - Adequate sleep
- Support athletes
 - Athletes can tire when carrying out tasks that require concentration – i.e. work and school, complicated drills, plays
 - Be mindful of mood difficulties – athletes might feel depressed, anxious or irritable
 - Find another role for them on the team until they can participate fully
 - Encourage them to talk about how they feel
 - Reassure them of their value as a team member and their place
 - Be patient



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Prevention

It is everyone's job to help identify those persons at risk of having a concussion.

What you can do:

- Stay informed about concussion (Signs/symptoms)
- Educate your athletes to take hits to the head seriously
 - Never allow play when injured
 - Never allow play if athlete has symptoms
- Tell coach and parents that an athlete has received a blow to the head or body
- Reward athletes for looking out for their teammates and opposing players

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Prevention

- Report anything out of the ordinary
- Reinforce use of all protective equipment
- Stress the importance of following the rules of the sport
- Reward good sportsmanship at all times
- Include conditioning drills that develop and maintain physical fitness and agility
- Remind athletes to keep their heads up!



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Creating a culture of safe sport



Key points to remember: The 4 R's

1. **Recognise** the signs (CRT5)
2. **Remove** the athlete from play
3. **Refer** for medical treatment
4. **Return** after RTL, supervised graded RTP and medical clearance



Key points to remember

Reiterate the following key messages to your athletes:

1. Don't hide it
2. Report it
3. Take time to recover
4. Follow medical advice
5. Adhere to graded RTP guidelines
6. Reassure them of their place on the team **WHEN** they return

STAND TALL AND MAKE THE CALL!

WHEN IN DOUBT, SIT THEM OUT!



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Questions ???

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Thank***you!***

from

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