PEDIATRIC CONCUSSION

PREVENTION, DIAGNOSIS AND MANAGEMENT

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WHAT IS A CONCUSSION

- Definitions:

- CDC: A concussion is a type of traumatic brain injury, or TBI, caused by a bump, blow or jolt to the head or by a hit to the body that causes the head and brain to move rapidly back and forth. This sudden movement can cause the brain to bounce around or twist in the skull , creating chemical changes in the brain and sometimes stretching and damaging brain cells.

- A concussion is a brain injury that occurs when there is a impact to the head or impulsive force to the head that causes the brain to move inside the skull . This cause a neurometabolic cascade that changes the way your brain works so you feel certain symptoms or will show certain signs that your brain is working differently.

SIGNS OF CONCUSSION

CHILDRENSNATIONAL.ORG

- Dazed or stunned
- Forgets what they are doing, confused
- Unsure of recent events
- Clumsy
- Answers questions slowly
- Loses consciousness
- Behaviour or personality changes, irritable , emotional
- Vomits

SYMPTOMS OF CONCUSSION

- Headache
- Nausea
- Balance problems or dizzy
- Double or fuzzy vision
- Light or noise sensitivity
- Feeling sluggish or slowed down
- Feeling foggy or groggy
- Fatigue
- Can’t concentrate or remember things
- Don’t feel right

DIFFERENCES IN CHILDREN AND ADULTS IN CONCUSSION

- May not be as obvious in children
- Have to ask specific symptoms - not “ are you ok “
- Child SCAT 5 for under 13
- Recovery is 3-4 weeks compared to 2-3 weeks in adults
- More cognitive symptoms exacerbated by return to learn

CONCUSSION RECOGNITION TOOL 5©

To help identify concussion in children, adolescents and adults

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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 a 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 so do.
- 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

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?"
- "Who scored last in this game?"
- "What team did you play last week/game?"
- "Did your team win the last 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.

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

Echemendia RJ, *et al*. *Br J Sports Med* 2017;**51**:872. doi: 10.1136/bjsports-2017-097508CRT5

DIAGNOSIS

- If concussion is suspected then should be assessed by a physician or nurse practitioner .
- History and physical looking for more severe injury and other injuries such as a c spine injury. Also identifying any co morbidities such as a neurological disorder or a mental health issue.
- Note any risk factors which may put at risk for a prolonged recovery such as ADHD, mental health issues, previous concussions, visual or vestibular issues or higher symptom scores at first presentation.

MANAGEMENT

- Complete rest for 24-48 hours, avoid screens, sleep as much as need,
- Return to light activity after 48 hours and gradual exposure to screens and other activities. Prolonged rest has been shown to do more harm than good.
- Address sleep issues and practice good sleep hygiene
- Return to physical and cognitive activity should be gradual and individualized based on symptom presentation and activity tolerance.
- Return to Learn and Return to Play protocols must be followed .

Parachute
Concussion Series

Strategy for RETURN TO SCHOOL after a Concussion

1. **Each stage is at least 24 hours. Move to the next stage only when activities are tolerated without new or worsening symptoms.**
2. **If symptoms re-appear, return to the previous stage for at least 24 hours.**
3. **If symptoms don't improve, but continue to get worse, contact your doctor or get medical help immediately.**

AT HOME

Cognitive & physical rest (24-48 hours)

OK if tolerated
- ✔ Short board games
- ✔ Short phone calls
- ✔ Camera photography
- ✔ Crafts

Not OK
- ✘ School
- ✘ Physical exertion/ stair climbing
- ✘ Organized sports

If tolerated, limited amounts of
- TV
- Computer/cell phone use
- Reading

READY FOR NEXT STAGE? Symptoms start to improve OR after resting for 48 hours max.

Stage 1 — Light cognitive activity

OK if tolerated
- ✔ Easy reading
- ✔ Limited TV
- ✔ Drawing/LEGO/ board games
- ✔ Some peer contact

Not OK
- ✘ School
- ✘ Work
- ✘ Physical exertion/ stair climbing
- ✘ Organized sports

If tolerated, limited amounts of
- Computer/cell phone use

READY FOR NEXT STAGE? Tolerate 30 mins. of cognitive activity at home

Stage 2 — School-type work/ Light physical activity

OK if tolerated
- ✔ School-type work in 30 min. chunks
- ✔ Light physical activity
- ✔ Some peer contact

Not OK
- ✘ School attendance
- ✘ Work
- ✘ Physical exertion/ stair climbing
- ✘ Organized sports

READY FOR NEXT STAGE? Tolerate up to 60 mins. of cognitive activity in 2-3 chunks

AT SCHOOL

Stage 3a — Part-time school Light load

OK if tolerated
- ✔ Up to 120 mins. of cognitive activity in chunks
- ✔ Half-days at school, 1-2 times a week
- ✔ Some light physical activity

Not OK
- ✘ Music/Phys. Ed class
- ✘ Tests/exams
- ✘ Homework
- ✘ Heavy physical loads (e.g. backpack)
- ✘ Organized sports

READY FOR NEXT STAGE? Tolerate school work up to 120 mins. a day for 1-2 days/week

Stage 3b — Part-time school Moderate load

OK if tolerated
- ✔ Limited testing
- ✔ School work for 4-5 hours/day in chunks
- ✔ Homework up to 30 mins./day
- ✔ 3-5 days of school/week
- ✔ Decrease learning accommodations

Not OK
- ✘ Phys. Ed class/ physical exertion
- ✘ Standardized tests/exams
- ✘ Organized sports

READY FOR NEXT STAGE? Tolerate school work 4-5 hours/ day in chunks for 2-4 days/week

Stage 4a — Nearly normal workload

OK if tolerated
- ✔ Nearly normal cognitive activities
- ✔ Routine school work as tolerated
- ✔ Homework up to 60 mins./day
- ✔ Minimal learning accommodations

Not OK
- ✘ Phys. Ed class
- ✘ Standardized tests/exams
- ✘ Full participation in organized sports

READY FOR NEXT STAGE? Tolerate full-time academic load without worsening symptoms

Stage 4b — Full time

OK if tolerated
- ✔ Normal cognitive activities
- ✔ Routine school work
- ✔ Full curriculum load
- ✔ No learning accommodations

Not OK
- ✘ Full participation in sports until medically cleared. (See Return-to-Sport Strategy)

READY FOR NEXT STAGE? Stages 5-6 of the *Return-to-Sport Strategy*

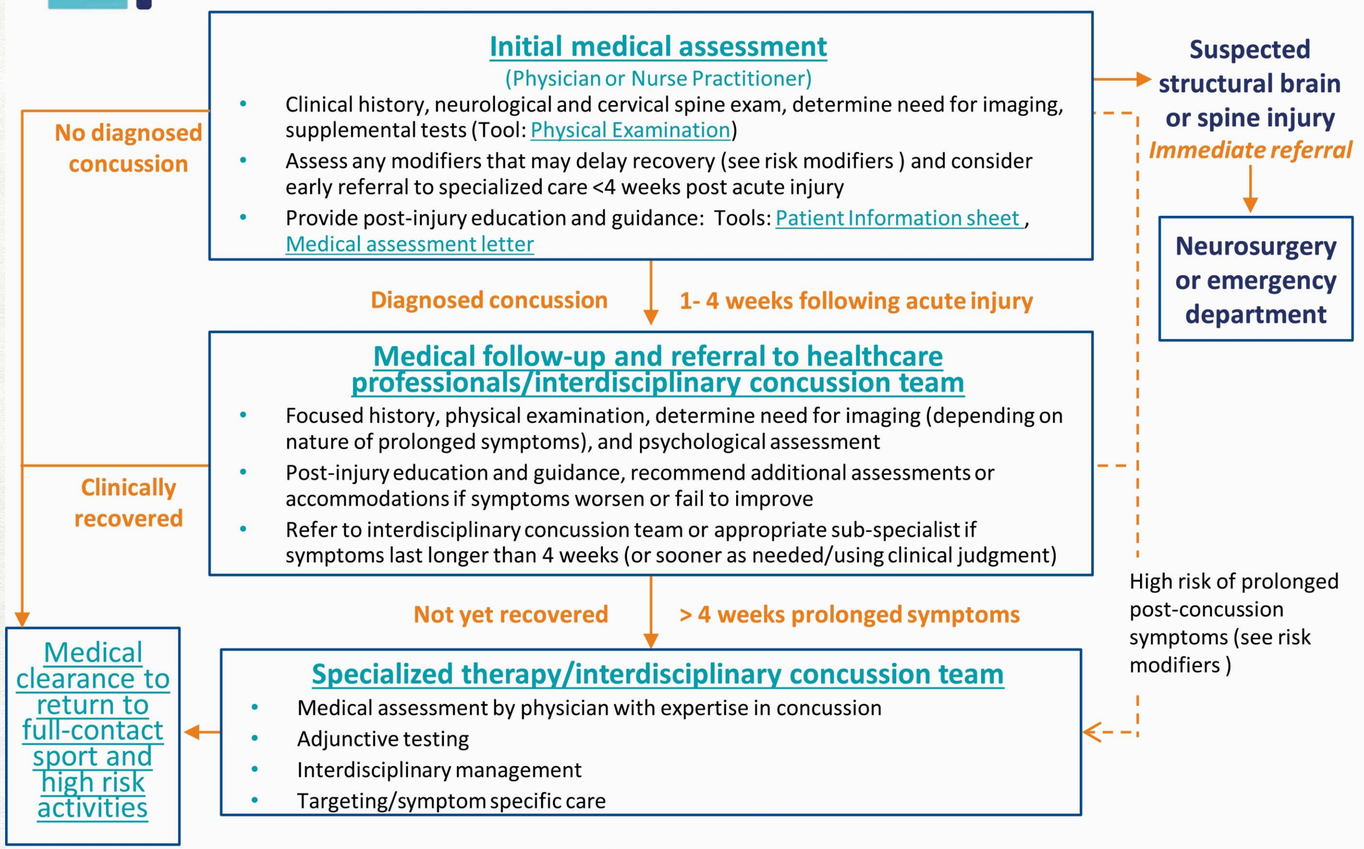
Adapted from: Parachute's Canadian Guideline on Concussion in Sport (2017) • Consensus Statement on Concussion in Sport (McCrory et al., 2017) • CATT Return To School • McMasterU's CanChild Return to School Guideline • Ophea's Ontario Physical Education Safety Guidelines

MANAGEMENT

- Reassess in 1-2 weeks, review symptoms and address any symptoms that are not improving. Discuss return to learn and then return to sport/activity. Provide documentation for school and team if applicable.

- If not improving need to address the specific symptoms that are not improving. Refer to the appropriate practitioner.

Manage Acute and Prolonged Concussion Symptoms Algorithm (Condensed)



Risk Modifiers That May Delay Recovery:

- Age (increases with age)
- Sex (female)
- Personal and family history of migraines
- History of learning or behavioural difficulties
- High pre-injury symptom presentation
- Personal and family history of mental health Family socioeconomic status/education

This condensed version has been adapted with permission from the Ontario Neurotrauma Foundation from Tool 1.3: Manage Acute and Prolonged Concussion Symptoms Algorithm (Living Guideline for Diagnosing and Managing Pediatric Concussion) and the Ontario Neurotrauma Foundation Standards for Post-Concussion Care - Post Concussion Care Pathway

https://braininjuryguidelines.org/pediatricconcussion/

IF NOT ABLE TO RETURN TO SCHOOL AND NOT RECOVERED IN 4 WEEKS

- Assess for symptoms in the persistent domains , approximately 10-15% will have persistent symptoms
  - Headache
  - Mental health/emotional
  - Sleep
  - Cognitive
  - Vision, vestibular and oculomotor function
  - Fatigue
  - Autonomic dysfunction

PEDIATRIC CONCUSSION

- In 2016-17 there were 46 000 concussions in Canadian hospital emergency departments for the 5-19 age group.
- In Jan 2022 the HBSC report (2020 year grades 6 to 10) stated about 1 in 10 youth had have a concussion in the previous year.
- 65.4% of concussions in boys while playing sports and 52.6 % of concussions in girls occur when playing sports.
- Approximately 50% occur while playing a sport and the other 50% are due to falls, playground , motor vehicle accidents.
- 10-20% of all head injuries are sustained in a school setting

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- The sports with the highest concussion rates are ice hockey, rugby, football and ringette.
- Most head injuries occur in
  - 1. Sports setting /athletic activity
  - 2. Home
  - 3. School


NE 50/50
G - GIVE BIG
calgary
be part of the energy
EXIT
CANADA
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C

PREVENTION

- Primary Prevention
  - Use seatbelts, car and booster seats and well fitted protective sports gear
  - Proper training for contact sports
  - Supervision for practices and games
  - Rules changes in sport, example eliminating body checking in hockey until age 15
  - Concussion awareness and education
    - Rowan’s Law . National Concussion Awareness Day

PREVENTION

- Secondary Prevention
  - Recognize and remove if suspect a concussion, avoid a second concussion
  - Follow the return to play and return to school guidelines to fully recover

- SHRed concussions (Surveillance in High School to Reduce Concussions and their Consequences in Youth Sport)
- Evaluate concussion prevention strategies across the country ,
- Carolyn Emery from University of Calgary and the SHRed bus

MENTAL HEALTH AFTER CONCUSSION

- In the HBSC national report , youth self reported that if they had a concussion in the past year they were less likely to be satisfied with their lives and more likely to report a lot of emotional problems and poor psychological well-being.
- Concussions associated with poor/negative mental health outcomes among youth
- High emotional problems: Respondent reports that they often have difficulty getting to sleep and frequently feels depressed, in a bad mood, and nervous.
- Poor psychological well-being: Respondent reports that their life is not "filled with things that interest them", and they often do not feel: "in good spirits", "calm and relaxed", "active and vigorous", or "fresh and rested".

WHY IS IT IMPORTANT TO RECOGNIZE AND MANAGE PROPERLY

- Prevent another more severe concussion or catastrophic injury.
- Prevent persistent symptoms.
- Successful return to school and activities and improve their quality of life.

KEY MESSAGES

- We all have a role to play in promoting awareness of concussion . We can all be concussion educators .
- Learn the symptoms and signs and know that symptoms can be delayed in onset..
- Encourage everyone to speak up and tell a parent, coach, teacher or trusted friend if they think they may have a concussion.
- Know the red flags and when to get immediate medical help.
- Know how to manage the first few days if no red flags.
- Be aware of and follow the gradual return to learn and return to sport protocols.
- Know you are not alone and there are resources and tools to help .

RESOURCES

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- Concussion NS https://braininjuryns.com/concussionns

- Living Guidelines for Pediatric Concussions pedsconcussion.com
- Resources for Educators https://schoolfirstconcussion.ca
- Canada; www.parachutecanada.org
- Rowans Law mtc.gov.on.ca
- Sport Information Resource Centre https://sirc.ca
- Concussion Awareness Training Tool -https://cattonline.com/