

4th EDITION

CONCUSSION
Kit

Understanding and Managing Concussion in Youth



4th Edition, 2023

Hôpital de Montréal
pour enfants

Centre universitaire
de santé McGill



Montreal Children's
Hospital

McGill University
Health Centre

TRAUMATOLOGIE TRAUMA

All information in the KiT is based on the clinical experience and expertise of the Montreal Children's Hospital Trauma Centre, McGill University Health Centre.
It is in keeping with current research.

thechildren.com/concussions

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Note from the Editors

Concussions have been identified as a health issue of significant societal concern. As such, they are of great interest to the medical, sports, educational, and scientific communities.

Over the past 25 years, Trauma Specialists at the Montreal Children's Hospital Trauma Centre, McGill University Health Centre have been leaders in this area, developing and implementing an innovative, comprehensive, proactive, inter-professional approach to the management of concussions in youth. The approach to care is in keeping with the most recent evidence and based on extensive clinical expertise.

The 4th edition of the Concussion KiT once again provides us with an opportunity to combine our trauma knowledge and expertise with injury prevention strategies, and apply it to the composite life of a child or teen at school, play, and at home. The key messages conveyed in this Concussion KiT are: 1) recognize symptoms early on, 2) see a doctor to confirm diagnosis, 3) follow recommendations for a period of physical, cognitive and academic activity restrictions, 4) never play injured, and 5) gradually return to physical activity as tolerated, but no return to contact until symptom-free..

We proudly present the 4th edition of the Montreal Children's Hospital, Trauma Centre, McGill University Health Centre Concussion KiT. In it you will find:

- Information on the prevention, recognition, and management of concussions
- General Activity Management Plan
- Return to Learn Management Plan
- Return to Physical Activity/Sports Management Plan
- Recommendations for teachers and educators
- References

The prevention, recognition, and management of children and teens with a concussion is challenging and drawing the attention of many. Our KiT is therefore designed to provide important information to our target audience comprised of clinicians, teachers, educators, coaches, professional sporting associations, governing bodies, parents, patients, media and community organizations, so as to enhance their understanding, and thereby support the child or teen through their recovery.

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FACTS | A concussion...

- Can be caused by a blow or hit to the head, face, neck or body, or by acceleration/deceleration forces.
- Is not usually seen on regular clinical imaging. This explains why children and teens can be symptomatic and still have a normal CT scan or skull x-ray.
- Is the most common form of traumatic brain injury suffered by athletes, children and teens.
- May be accompanied by a loss of consciousness.
- Can result in a variety of symptoms that can appear immediately, hours later or over the following days.
- Means that the child or teen should be seen by a doctor to confirm diagnosis.

What Is a Concussion

- A concussion is a type of brain injury.
- A concussion is also referred to as a mild traumatic brain injury (MTBI).
- A concussion causes a temporary disruption in function of the brain.

COMMON CAUSES OF A CONCUSSION





FACT | Signs and symptoms

Signs and symptoms can arise over the first 24-48 hours. It is essential to observe the child or teen as they may under-report symptoms.

Recognizing a Concussion

- > A concussion should be suspected in the presence of any of the following signs and symptoms after an injury:



SYMPTOMS REPORTED BY THE CHILD OR TEEN

- Headache.
- Nausea.
- Vomiting.
- Dizziness.
- Feeling dazed and confused.
- Memory problems.
- Poor balance or coordination.
- Drowsiness or fatigue.
- Irritability.
- Agitation.
- Double or blurred vision.
- Sensitivity to light, noise and motion.
- Not feeling right.



SIGNS OBSERVED BY OTHERS

- Confused/disoriented, does not know: time, place, activity.
- Cannot remember what happened before, during and/or after the injury.
- A brief loss of consciousness (knocked out).
- Easily distracted, difficulty with concentration, reduced attention.
- Not playing as well. Inappropriate playing behavior.
- Lacks coordination.
- Slow to answer questions or follow directions.
- Strange or inappropriate emotions (i.e. laughing, crying, getting angry easily).
- Blank stare.

Call 911 if the child or teen has a loss of consciousness, has trouble breathing, complains of weakness or numbness in limbs or is having a seizure. Presume neck injury, do not move.



FACT | A concussion is a brain injury

Recognize symptoms, see a doctor to confirm diagnosis, and never play injured!

Managing a Concussion

> If you suspect a concussion

- Remove the child or teen from the activity and seek medical attention immediately.
- Make sure that parents or caregivers are aware of the injury.
- Do not leave the child or teen alone. Adult supervision is essential.
- Do not allow the child or teen to return to the current activity, game or practice. If uncertain, remove from play!
- Continuing to play sports or other recreational activities while experiencing symptoms may prolong recovery.
- **Experiencing a repeat concussion prior to fully recovering from the signs and symptoms of the previous one may result in a rare condition known as second impact syndrome, in which severe and rapid brain swelling usually results in a catastrophic outcome.**



If the child or teen exhibits any of the following symptoms within 24-48 hours following the injury, even after medical consultation, he/she must go to an emergency department immediately

- Loss or deterioration in level of consciousness.
- Worsening headache, especially if localized.
- Persistent vomiting.
- Behavioral changes (persistent irritability in younger children; increased agitation in teens).
- Excessive drowsiness (difficult to arouse).
- Difficulty seeing, hearing, speaking or walking.
- Seizure.
- Confusion or disorientation (does not recognize people or places).

What to Expect Following a Concussion

- The signs and symptoms following a concussion usually improve over a period of 2-4 weeks, but may occasionally last longer.

Symptoms frequently reported are: headaches, dizziness, nausea, sleep disturbances, fatigue, irritability, visual disturbances, sensitivity to light, sound and motion, difficulty with memory, concentration, attention span, or balance.

Repeated concussions may result in prolonged recovery time especially if the concussions are sustained within a short time period. If in this situation, further consultation with the MTBI Program – Concussion Clinic is recommended.

It is very important to **modify and manage physical, cognitive and academic activities until the child or teen is fully symptom-free**. This reduces the chance of developing persisting symptoms. The *General Activity Management Plan* will provide guidance on managing the child or teen's activity level.

If there is no improvement within 10 DAYS following the concussion, further consultation with the MTBI Program – Concussion Clinic is recommended. Please note: A referral from a doctor is required. A referral to the MTBI Program is always accepted immediately following an initial consultation and concussion diagnosis.

PLEASE CALL: 514-412-4400, EXTENSION 23310

FAX MEDICAL REFERRALS TO: 514-412-4254

RETURNING TO SCHOOL, PHYSICAL ACTIVITY/SPORTS AND LEISURE ACTIVITIES FOLLOWING A CONCUSSION

The goal during concussion recovery is to determine the appropriate level of cognitive and physical activities that will not worsen or provoke new symptoms.

Normalizing a child or teen’s home and school life as soon as possible is key to maintaining their psychosocial well-being.

The following three management plans organized in progressive stages should be used to guide the post-concussion recovery.

GENERAL ACTIVITY MANAGEMENT PLAN

Pages 14–18

RETURN TO LEARN MANAGEMENT PLAN

Pages 20–29

Includes recommendations for teachers 


RETURN TO PHYSICAL ACTIVITY/SPORTS MANAGEMENT PLAN

Pages 31–33

GENERAL ACTIVITY MANAGEMENT PLAN

STAGE 1 — VERY SYMPTOMATIC

Brief Physical and Cognitive Relative Rest

	
PHYSICAL ACTIVITIES	<ul style="list-style-type: none">✘ Don't play sports (observe or participate).
HOME AND LEISURE	<ul style="list-style-type: none">✘ Don't watch TV.✘ Don't play video games.✘ Don't text (can talk on phone).✘ Don't use computers and tablets.✘ Don't participate in music lessons.✘ Don't go to movies.✘ Don't attend parties.✘ Don't go to malls.✘ Don't drive.✘ Don't drink alcohol.✘ Don't use drugs.
SCHOOL	<ul style="list-style-type: none">✘ DON'T ATTEND SCHOOL FOR THE FIRST 2 DAYS FOLLOWING THE CONCUSSION. <p>Upon return to school: Follow the <i>Return to Learn Management Plan</i> (p. 20).</p>



- ✔ Take short leisurely walks up to 10-15 minutes as tolerated.
- ✔ Refresh in the pool (no laps/diving/jumping).
- ✔ Cook and bake.
- ✔ Play board games.
- ✔ Listen to relaxing music.
- ✔ Do arts and crafts.
- ✔ Socialize with friends at home.
- ✔ Read (limit the duration to a maximum of 15 minutes).

—

SYMPTOM MANAGEMENT FOR HEADACHES

- Acetaminophen and/or ibuprofen can be taken regularly for 3-5 days as needed. Ibuprofen should not be taken within the first 24 hours following the injury unless otherwise advised by your doctor. **Check labels for dosage instructions and warnings.** If still needed after 3-5 days, **reduce** to no more than **3 doses per week.** If in doubt, consult your pediatrician, family doctor or local clinic.
- Drink water regularly (dehydration has been noted to trigger headaches).
- Sleep 8-10 hours per day.
- Don't skip meals.
- If headache is constant and debilitating, return to the Emergency Department for other headache management, treatments or interventions.




ONCE SYMPTOMS BEGIN TO IMPROVE (WITHIN APPROXIMATELY 2 DAYS), MOVE TO **STAGE 2**

GENERAL ACTIVITY MANAGEMENT PLAN

STAGE 2 — LESS SYMPTOMATIC

Able to Participate in Activities at Own Pace Within Symptom-Limits

	
PHYSICAL ACTIVITIES	<ul style="list-style-type: none">✘ No physical activities or sports at risk of contact, collision or falls.
HOME AND LEISURE	<ul style="list-style-type: none">✘ Avoid highly stimulating environments such as parties, movies, concerts, sporting events, malls and videogames if they worsen or provoke new symptoms.
SCHOOL	Refer to the guidelines in STAGE 2 of the <i>Return to Learn Management Plan</i> (p. 20-27).



- ✔ May progressively begin **Steps 1 to 3** of the Return to Physical Activity/Sports Management plan (p. 30) as long as it does not worsen or provoke new symptoms.
- ✔ Watch TV for 30 minutes. If symptoms do not increase or appear during or after, can increase time over the next few days.
- ✔ Read for short periods (10-15 min) up to 3 times/day. If symptoms do not increase or appear during or after, may increase as tolerated.
- ✔ Use computer and text for short periods (10-15 min) up to 3 times/day. If symptoms do not increase or appear during or after, may increase as tolerated.

Do not engage in the above activities one after the other. Allow adequate time between activities for symptom assessment.

If unable to accomplish the above at 10 days post-concussion, call the MTBI Program – Concussion Clinic, 514-412-4400 extension 23310.

A confirmed diagnosis and referral from a physician is required.

See the *Return to Learn Management Plan* (p. 20-27) for recommendations on a progressive return to academic workload.

SYMPTOM MANAGEMENT

- In addition to the recommendations from **STAGE 1**: Consult a doctor if significant sleeping difficulties are experienced.

ADDITIONAL RECOMMENDATIONS FOR TEENS

- Avoid driving until symptoms have resolved.
- Absolutely no energy drinks, alcohol or drugs.




ONCE SYMPTOMS HAVE COMPLETELY RESOLVED FOR A FEW DAYS, MOVE TO STAGE 3

GENERAL ACTIVITY MANAGEMENT PLAN

STAGE 3 — CONCUSSION SYMPTOMS HAVE COMPLETELY RESOLVED FOR A FEW DAYS

Gradual Return to Testing and Physical Activities

	
PHYSICAL ACTIVITIES	<ul style="list-style-type: none">✓ Progressive return to sports and physical activities using the <i>Return to Physical Activity/Sports Management Plan</i> (p. 31-33).
HOME AND LEISURE	<ul style="list-style-type: none">✓ Resume regular daily activities.
SCHOOL	<ul style="list-style-type: none">✓ Resume exams. Some students may still require some accommodations as per STAGE 3 of the <i>Return to Learn Management Plan</i> (p. 28-29).







FACT | Managing a concussion

Follow the recommendations in each stage to promote recovery.

RETURN TO LEARN MANAGEMENT PLAN






STAGE 1 — VERY SYMPTOMATIC

Brief Physical and Cognitive Rest

		
ATTENDANCE	 DON'T ATTEND SCHOOL FOR THE FIRST 2 DAYS FOLLOWING THE CONCUSSION.	 Follow the <i>General Activity Management Plan</i> (p. 14-15).

STAGE 2 — LESS SYMPTOMATIC

Able to Participate at Their Own Pace Within Symptom-Limits

	
ATTENDANCE	 Don't partake in music lessons and/or drama class for the first few days.  Don't participate in sports and physical education class (observing or participating), or as directed by a physiotherapist.  Don't partake in active play at recess, lunch break and after school.
TESTING	 No quizzes, tests, exams or oral presentations until attending full days at school, for a few days. Additionally, the student must be up to date with current material.



ONCE SYMPTOMS BEGIN TO IMPROVE,
MOVE TO **STAGE 2**



RETURN TO SCHOOL ON DAY 3 AFTER THE CONCUSSION FOR 1 OR 2 HALF DAYS.

✔ **IF TOLERATED:**

Increase to full days with breaks.

✔ **IF NOT TOLERATED:**

Continue with half days for a few more days. If unable to progress to full days within 10 days following the concussion, call the MTBI Program - Concussion Clinic at 514-412-4400 extension 23310.


✔ May gradually begin participating in music lessons and/or drama classes if symptoms are improving.

✔ Student can begin progressive testing when symptoms have improved.

Continued on next page ➤

RETURN TO LEARN MANAGEMENT PLAN

STAGE 2 (continued)


	
WORKLOAD	<ul style="list-style-type: none">✘ Don't do homework for the first few days.✘ Don't encourage tutoring or catch up sessions for the first few days.
NOTE TAKING	<ul style="list-style-type: none">✘ Don't take notes if it causes symptoms to increase.
BREAKS	<ul style="list-style-type: none">✘ Don't frequent noisy and over-stimulating environments (for example: cafeteria, hallway, gymnasium).
READING AND SCREENS	<ul style="list-style-type: none">✘ Don't look at/focus on smart boards for the first few days.✘ Don't use computers/tablets for the first few days.✘ Stop reading when it provokes or worsens your headaches.



- ✔ Begin homework for periods of 15 minutes up to 3 times/day. Increase sessions by 5-10 minutes as tolerated (if symptoms develop or increase, stop, rest and retry later for a shorter period of time).
- ✔ Keep up to date with course material. Review work for short periods.
- ✔ Attend class and listen for the first few days. Then, begin and continue note taking as long as symptoms don't increase.
- ✔ Find a quiet place to eat.
- ✔ Go to the library to rest.
- ✔ Leave the class 5 minutes before it ends to avoid hallway noise and congestion.
- ✔ Continue to take breaks as needed to help manage symptoms.
- ✔ Wear sunglasses or a cap in class if sensitive to light.
- ✔ Use audiobooks; have someone read to you.
- ✔ Limit reading to school work and not for pleasure for 15 -30 minute intervals. Increase as tolerated.
- ✔ Request a paper version of the assignment and/or homework.
- ✔ Begin school screen time for 15-30 minute intervals and increase as tolerated.

RETURN TO LEARN MANAGEMENT PLAN

STAGE 2 (continued)

	 RECOMMENDATIONS FOR TEACHERS
ATTENDANCE	<ul style="list-style-type: none">✔ Allow the student to take: breaks as needed, shortened day, abbreviated class, late start or early departure.
TESTING	<ul style="list-style-type: none">✔ Base grades on pre-injury work for formal evaluation.✔ Once attending full days, the student may do quizzes, tests, exams and an oral presentation if the student is up to date and is ready. Allow the student to read the text during oral presentation.✔ Most students will require accommodations (see p.29).
WORKLOAD	<ul style="list-style-type: none">✔ Provide additional time to submit homework, projects, and assignments.✔ Reduce workload.
NOTE TAKING	<ul style="list-style-type: none">✔ Provide the student with lecture notes/outlines ahead of time.✔ Allow the student to photocopy notes from another student.
BREAKS	<ul style="list-style-type: none">✔ Allow the student to take a scheduled break in the morning and in the afternoon.✔ Allow the student to alternate classes (one class on / one class off).
READING AND SCREENS	<ul style="list-style-type: none">✔ Allow the use of audiobooks.✔ Allow someone else to read to the student.✔ Allow the student to wear sunglasses or a cap in class if sensitive to light.✔ Allow the student preferential seating (back of the class if sensitive to screen or away from window if sensitive to light).

- ✔ Allow the student to bring a water bottle to class.
- ✔ Allow the student to take analgesics for headache management if consent has been given.
- ✔ Allow the student to do work at home at their own pace for marks in lieu of formal testing.
- ✔ Allow the student to work at their own pace in order to keep up with essential course material only.
- ✔ Allow the student to record lectures.
- ✔ Offer to assign a homework buddy.
- ✔ Allow the student to leave class early in order to avoid hallway noise and congestion.
- ✔ Allow the student to eat in a quiet area.
- ✔ Allow the student to wear earplugs.
- ✔ Provide a paper version of the assignment and/or homework.
- ✔ Allow the student to begin reading for 15-30 minute intervals and to increase as tolerated.
- ✔ Allow the student to begin school screen time for 15-30 minute intervals, increase as tolerated.

RETURN TO LEARN MANAGEMENT PLAN

STAGE 2 (continued)

UNDERSTANDING THE ACADEMIC RESTRICTIONS

ATTENDANCE

- Returning to learn too early can significantly increase symptoms in a concussed student and impede recovery.
- Limiting drama and music lessons helps to reduce stimulation.
- Adequate breaks will facilitate the student's return to learn.
- It is important to normalize and resume academic activities within symptom tolerance.
- Limiting physical activities (such as: in physical education class and at recess) will reduce the student's risk of re-injury.

TESTING

- Testing early on in the recovery process may increase headaches, mental fatigue and stress. Furthermore, grades may not be reflective of the student's actual ability.

WORKLOAD

- A concussed student may require additional time to complete assignments due to decreased processing speed and concentration.
- A student's anxiety surrounding missed work can be reduced by allowing the student to work at their own pace.

NOTE TAKING

- A concussed student may have impaired multitasking abilities.
- Eye and head movement during note taking may provoke headaches, dizziness and fatigue.

BREAKS

- Overstimulating environments and prolonged periods of concentration may increase and/or provoke symptoms.

READING AND SCREENS

- A concussed student may find it difficult to tolerate reading from screens due to the lighting and/or eye strain. As symptoms resolve, the student's tolerance should increase.



ONCE SYMPTOMS HAVE COMPLETELY RESOLVED, MOVE TO **STAGE 3**













FACT | Recovery

It is important to manage activities in order to promote recovery.

RETURN TO LEARN MANAGEMENT PLAN

STAGE 3 — CONCUSSION SYMPTOMS HAVE COMPLETELY RESOLVED FOR A FEW DAYS

Progressive Increase to Testing and Physical Activities

		
ATTENDANCE	NO RESTRICTIONS.	<ul style="list-style-type: none">  SHOULD ALREADY BE ATTENDING FULL DAY OF CLASSES.  Resume music and drama lessons.  Return to physical education class following the <i>Return to Physical Activity/Sports Guidelines</i> (p. 31-33).
TESTING	See recommendations for teachers.	<ul style="list-style-type: none">  Gradually resume progressive testing if not already started.
WORKLOAD	No restrictions.	<ul style="list-style-type: none">  Resume regular workload.
NOTE TAKING	No restrictions.	<ul style="list-style-type: none">  Resume regular note taking in class.
BREAKS	No restrictions.	<ul style="list-style-type: none">  Resume regular school schedule.
READING AND SCREENS	No restrictions.	<ul style="list-style-type: none">  Resume regular classroom schedule.



RECOMMENDATIONS FOR TEACHERS

No restrictions.

Some students will require these accommodations for a period of 1-2 weeks:

- ✔ Coordinate tests/exams and workload amongst the student's teachers.
- ✔ Provide the student with a progressive test/exam schedule.
- ✔ Allow additional time to complete tests/exams.
- ✔ Offer testing in a quiet environment.
- ✔ Reduce the length of tests/exams.
- ✔ Allow 1-2 days between tests/exams.
- ✔ Allow breaks as needed.

No restrictions.

No restrictions.

No restrictions.

No restrictions.

UNDERSTANDING THE ACADEMIC RESTRICTIONS

ATTENDANCE

- The student has recovered. No accommodations are required.

TESTING

- The student has recovered and is ready to resume/progressively increase testing and other forms of academic evaluation.

WORKLOAD

- The student needs to become up to date with missed homework, assignments and current class material if not already completed.



Important: The Brain Needs Time to Heal

- A complete recovery following a concussion is essential before returning to full physical activity/sports/competition.
- Experiencing a repeat concussion prior to fully recovering from the signs and symptoms of the previous one may result in a rare condition known as second impact syndrome, in which severe and rapid brain swelling usually results in a catastrophic outcome.

Returning to Physical Activity/Sports Following a Concussion

- If you have sustained a concussion, it is recommended to follow these steps before fully returning to physical activity/sports.

At this point, you have reached STAGE 2 of the *General Activity Management Plan*.

- After an initial period of rest of at least 48 hours, you can start the Return to Physical Activity/Sports Management Plan (**Steps 1-3 only**, p. 32). This should be done in conjunction with the Return to Learn Management Plan.
- It is important to be symptom-free for a few days and to have returned to school full-days (Stage 3 of the Return to Learn Management Plan, p. 28) before progressing to **Steps 4 to 6** of the Return to Physical Activity/Sports Management Plan.



RETURN TO PHYSICAL ACTIVITY/SPORTS MANAGEMENT PLAN

BEGIN WITH STEPS 1-3 ONLY.

There should be approximately 24 hours or longer in between each step. If your symptoms worsen or you experience new symptoms, stop working out. Rest for 24 hours, then return to the previous step.



STEP 1

Very light physical activity.



30%
EFFORT

- **NO CONTACT.**
- Start a cardio workout of 15-20 minutes which can include: stationary bicycle, treadmill, walking, or swimming.



STEP 2

Light aerobic activity and sport-specific skill work done individually.



50%
EFFORT

- **NO CONTACT.**
- Begin with a warm up (stretching and flexibility) for 5-10 minutes.
- Increase intensity and duration of cardio workout to 20-30 minutes. Can include: fast-paced walking, light jog, elliptical, rowing, dancing.
- Begin sport specific skill work within the workout, but no spins, dives or jumps.



STEP 3

General conditioning, skill work done individually.



75%
EFFORT

- **NO CONTACT.**
 - Increase duration of session up to 60 minutes. Begin bodyweight training.
 - Continue practicing sport specific individual skills: dribbling, shooting, footwork.
 - Start beginner level spins, dives and jumps.
- Progress to STEP 4 only once symptom-free for a few days and attending school full days.**

* A written authorization may be needed prior to fully returning to activities or competitions.



STEP 4

Team practices and drills without contact.



**75-90%
EFFORT**

- **NO CONTACT. NO SCRIMMAGES.**
- May return to physical education class.
- Resume pre-injury duration of practice and team drills.
- Increase resistance training and skill work specific to the sport/activity.
- Gradually increase skill level of spins, dives and jumps.

Progress to STEP 5 only following full return to cognitive and academic activities without accommodations.



STEP 5

Full practice with body contact.



**90-100%
EFFORT**

- **CONTACT. SCRIMMAGES.**
- Participate in a full practice. If completed with no symptoms, discuss returning to play with the coach.

Do not progress until the following is achieved:

- Coaches make sure that the child or teen has regained their pre-injury skill-level.
- The child or teen is confident in their ability to return to play.



STEP 6

RETURN TO FULL ACTIVITY/COMPETITION.



**100%
EFFORT**



PREVENTION TIPS

- Wear appropriate standardized, sport/activity specific protective equipment. Make sure it fits.
- Inspect protective head gear regularly and replace it according to the manufacturer's recommendations.
- Verify other appropriate protective equipment (e.g. mouth guard).
- Wearing a helmet decreases the severity of brain injuries.
- Physical conditioning and skill training is fundamental.
- Participate in activities that are appropriate for age and skill level.
- Fair play which includes teamwork, sportsmanship, respecting the rules and zero tolerance of violence is essential.
- Verify environmental factors such as the condition of playing fields, ice surfaces, and other sports venues.

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