

# Concussion Guidebook for Healthcare Professionals



NB Trauma Program  
Programme de  
traumatologie du NB



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# Introduction

The NB Trauma Program is a formalized partnership that includes Horizon Health Network, Vitalite Health Network, Ambulance New Brunswick and the New Brunswick Department of Health. It has been created to provide provincial leadership and coordination of injury prevention, clinical care, education and research related to serious and critical injuries in New Brunswick.

**With the support from an interprofessional panel of experienced healthcare professionals, the NB Trauma Program has compiled the most up to date evidence-based concussion information for assessment and management of patients with a concussion.**

This guidebook provides an overview of guidelines and resources available for healthcare professionals.

The “Consensus Statement on Concussion in Sports” (Zurich 2012) defines concussion as a complex pathophysiological process affecting the brain, induced by biomechanical forces which may be caused by either a direct blow to the head, face, neck or elsewhere on the body with an “impulsive” force transmitted to the head <sup>(1)</sup>.

Any person who is suspected of sustaining a concussion based on mechanism of injury and related symptom (s) should be assessed by a healthcare professional trained in concussion management. Early recognition and treatment of concussion is important to help decrease recovery time and the risk of prolonged symptoms. It is also crucial to help avoid the potential for second impact syndrome and post-concussion syndrome.

The majority of concussions (80-90%) resolve in 7 – 10 days, although the recovery may be prolonged due to a range of factors which include:

- <18 years old
- Post injury convulsive
- Repeated concussions over time
- Another concussion occurs before resolution of symptoms from a previous concussion
- Migraine headaches, mental health disorders such as depression
- Patients taking psychoactive drug or anticoagulant medication

Persistent symptoms (>10 days) are generally reported in 10–15% of cases. These patients should be managed in a multidisciplinary manner by healthcare professionals with experience managing patients with persistent concussion symptoms.

For more information on concussions, a list of resources is included in this guidebook (p. 14).

#### References

1. McCorry, P., Meeuwisse, WH., Aubry, M., et al. Consensus Statement on Concussion in Sport 4th International Conference on Concussion in Sport Held in Zurich, November 2012. *British Journal of Sports Medicine* 2013; 47:250-258.
2. Marshall, S., Bayley, M., McCullagh, S., Velikonja, D., Berrigan, L., Ouchterlony, D., Weegar, K. (2013) Guidelines for Concussion/Mild Traumatic Brain Injury & Persistent Symptoms. Second edition. Retrieved from [http://onf.org/system/attachments/201/original/ONF\\_mTBI\\_Guidelines\\_2nd\\_Edition\\_MODULE\\_12.pdf](http://onf.org/system/attachments/201/original/ONF_mTBI_Guidelines_2nd_Edition_MODULE_12.pdf)

# Frequently Asked Questions

## What is the most important change to the diagnosis of a concussion?

There is no scientific evidence to support a grading system for the diagnosis or management of a concussion. Research has suggested that a brief loss of consciousness (LOC) is not necessarily as significant an indicator of concussion severity as once thought (BCIRPU, 2015).

Patients are diagnosed as having a concussion if there is the presence of one or more signs and/or symptoms which can be categorized as physical, emotional, cognitive and/or associated with sleep disturbances.

Physical	Emotional	Cognitive	Sleep
Headache	More emotional	Confusion	Drowsiness
Nausea	Irritability	Difficulty concentrating	Sleeping less than usual
Vomiting	Nervousness	Difficulty remembering	Sleeping more than usual
Balance problems	Sadness	Feeling like "in a fog"	Trouble falling asleep
Sensitivity to noise	Feeling of depression	Feeling slowed down	

## What should a healthcare practitioner's initial exam include when examining a patient with a suspected concussion?

According to the BC Injury Research and Prevention Unit, the key features of the initial exam should include:

- A medical assessment encompassing
  - A comprehensive history
  - Mechanism of injury
  - Time and date of injury
- A detailed neurological examination that includes a thorough assessment of
  - Mental Status
  - Cognitive functioning
  - Gait and Balance
- A determination of the clinical status of the patient including whether there has been improvement or deterioration since the time of injury.
  - Assessment of signs and symptoms may be done with the help of the Post-concussion Symptom Checklist given to patient/family member to complete in the waiting room before the medical assessment.
  - This may involve seeking additional information from parents, coaches, teammates and/or eyewitnesses to the injury.
- A determination of the need for emergent neuroimaging in order to exclude a more severe brain injury involving a structural abnormality (BCIRPU, 2015).

*\*Most of the elements of an assessment are included in the SCAT3 (Sport Concussion Assessment Tool)*

## **What neuroimaging should be ordered to assist in the diagnosis and/or exclusion of a concussion?**

According to McCory, Meeuwisse, Aubry et al. (2013):

“Brain CT scans (or where available, brain MRI) contribute little to concussion evaluation but should be employed whenever suspicion of an intracerebral or structural lesion (eg, skull fracture) exists. Examples of such situations may include a prolonged disturbance of the conscious state, a focal neurological deficit or worsening symptoms.”(p. 251)

*\*Please consult the Canadian CT Head Rule guideline to help determine the need for neuroimaging.*

## **What is the difference between assessing an adult and assessing a child for concussion?**

The main difference is the type of assessment tool used for the evaluation of the patient. The Sport Concussion Assessment Tool – 3rd edition (SCAT3) is an evaluation tool designed for use in individuals 13 years and older. The Child Sport Concussion Assessment Tool (Child-SCAT3) is used to assess children five to 12 years old. Both tools allows for similar symptom, cognitive and physical evaluations. However, the Child-SCAT3 contains more age-appropriate evaluation questions as well as a medical history section and a concussion symptom scale that is to be completed by the parent (McCory, Meeuwisse, Aubry et al., 2013).

## **Can I use a Sport Concussion Assessment Tool for my patients with non-sport-related concussions?**

YES. However, the return to physical exertion protocol should be tailored to help meet the specific work demands of the individual patient (BCIRPU, 2015).

## **What are the considerations for a concussed patient in the early recovery phase?**

According to Marshall, Bayley and al. (2013, p.1):

- An initial period of minimal physical and mental exertion is recommended, with gradual resumption of pre-injury activities as soon as tolerated.
- Cognitive rest is an equally important consideration as physical rest when returning to activity following a concussion.
- While graded rest may be useful during graduated return to activity, the idea of complete bed rest should be avoided.
- Suggestions to reduce physical and cognitive load include increasing periods of rest/sleep, taking time off from work or school, avoiding challenging social interactions, abstaining from visually stimulating activities (e.g., computer use or watching TV) and refraining from participating in physical exercise or exertion.

## **How should patient information be shared amongst Emergency Departments, family physicians and concussion clinics?**

The preferable method for communication is by fax or by giving the documents to the patient/parents.

## **When should a patient be referred to a specialist for further treatment?**

Consider referring the patient to a healthcare professional specializing in concussion in the following situations if:

- Any indication or suspicion of neurologic deterioration
- Patients whose symptoms remain steady or worsen after 3 to 5 days
- If you need help to manage the return to cognitive/physical exertion protocol
- Young children exhibiting the following symptoms for an extended period of time:
  - Excessive crying
  - Poor attention
  - Persistent headache habits
  - Change in nursing or eating
  - Change in sleep patterns
  - Sad or lethargic mood
  - Becoming upset easily
  - Increased temper tantrums
  - Lack of interest in favourite toys (BCIRPU, 2015)

## How and where should healthcare professionals obtain additional resources on concussion?

The NB Trauma Program (NBTP) has developed a concussion awareness toolkit for healthcare professionals that contains a variety of additional resources. If interested, a printed version of the toolkit can be requested by email [nbtrauma@HorizonNB.ca](mailto:nbtrauma@HorizonNB.ca) or by telephone (506) 648-8040. These resources are also available online at [www.nbtrauma.ca](http://www.nbtrauma.ca). These include:

- A list of other recommended websites
- A list of NB concussion clinics to facilitate patient referrals
- A copy of the SCAT3 and Child-SCAT3
- A post-concussion symptom checklist
- Several concussion handouts for the public

### References

1. Marshall, S., Bayley, M., McCullagh, S., Velikonja, D., Berrigan, L., Ouchterlony, D., Weegar, K. (2013) Guidelines for Concussion/Mild Traumatic Brain Injury & Persistent Symptoms. Second edition. Retrieved from [http://onf.org/system/attachments/201/original/ONF\\_mTBI\\_Guidelines\\_2nd\\_Edition\\_MODULE\\_12.pdf](http://onf.org/system/attachments/201/original/ONF_mTBI_Guidelines_2nd_Edition_MODULE_12.pdf) (Accessed: 15 July 2015).
2. McCory, P., Meeuwisse, WH., Aubry, M., et al. Consensus Statement on Concussion in Sport 4th International Conference on Concussion in Sport Held in Zurich, November 2012. British Journal of Sports Medicine 2013; 47:250-258.
3. British Columbia Injury Research and Prevention Unit (2015) Concussion Toolkit for Medical Professionals – Frequently Asked Questions. Retrieved from <http://physicians.cattonline.com/faq> (Accessed: 15 July 2015).

# Return to Cognitive Exertion Protocol

Objective of each stage	<b>Stage 1</b> Restrictive cognitive activity  Recovery	<b>Stage 2</b> Gradual reintroduction of cognitive activity  Add cognitive activity	<b>Stage 3</b> Homework at home  Increase cognitive stamina with self-paced school
Activities that should be avoided	<ul style="list-style-type: none"> <li>• Schoolwork</li> <li>• Reading</li> <li>• Texting</li> <li>• Video games</li> </ul>	Avoid prolonged participation in the same type of activities found in Stage 1	Avoid prolonged participation in the same type of activities found in Stage 1
Acceptable activities at each stage of rehabilitation	Cognitive rest at home	Adding cognitive activities <ul style="list-style-type: none"> <li>• Start with 5-15 minutes at a time</li> <li>• Build to a 60 minute session without a break</li> </ul>	Adding homework <ul style="list-style-type: none"> <li>• Start with 20 minute sessions</li> <li>• Build to the equivalent of half a school day (1 hour)</li> </ul>
Timeline	<b>Symptom-free for 24 hours?</b> <b>Yes:</b> Begin Stage 2 <b>No:</b> Continue resting	<b>Tolerates cognitive activity for 1 hour without a break?</b> <b>Yes:</b> Move to Stage 3 <b>No:</b> Return to Stage 1	<b>Tolerates 3-4 hours trial school schedule at home?</b> <b>Yes:</b> Move to Stage 4 <b>No:</b> Return to Stage 3

Each Stage should last at least 24h. You may need to go back a stage more than once during the recovery process. Physical activity during Return to Cognitive Exertion Protocol is restricted to walking as tolerated.

	<b>Stage 4</b> <b>School part-time</b>	<b>Stage 5</b> <b>Full days of school</b>	<b>Stage 6</b> <b>School full-time</b>
	Begin gradual return to school	Work up to some full days at school	Resume full cognitive workload
	<ul style="list-style-type: none"> <li>• Tests</li> <li>• Noisy locations</li> <li>• Carrying heavy backpacks</li> </ul>	<ul style="list-style-type: none"> <li>• Compelling to attend a full week a class</li> <li>• More than one test per day</li> </ul>	Excessive use of stimulants <ul style="list-style-type: none"> <li>• Caffeine</li> <li>• ADHD drugs (Ritalin, Adderall...)</li> </ul>
Student 3-4	Attend school with classroom accommodations only <ul style="list-style-type: none"> <li>• Start with a half-day of school</li> <li>• Build to a full day of quieter classes</li> </ul> Homework <ul style="list-style-type: none"> <li>• Start with 15 minute blocks</li> <li>• Build to 1 hour of homework daily</li> </ul>	Tests <ul style="list-style-type: none"> <li>• Allowing extra time to complete tests</li> </ul> Homework <ul style="list-style-type: none"> <li>• Ability to go beyond 1 hour as tolerated</li> </ul>	Catching up with homework and tests
Student 4-2	<b>Tolerates a full day of school with modifications?</b> <b>Yes:</b> Move to Stage 5 <b>No:</b> Return to Stage 3	<b>Tolerates a full school day and a normal work load?</b> <b>Yes:</b> Move to Stage 6 <b>No:</b> Return to Stage 4	<b>Tolerates full cognitive workload?</b> <b>Yes:</b> Begin Return to Physical Exertion Protocol <b>No:</b> Return to Stage 5

# Return to Physical Exertion Protocol

Objective of each stage	<b>Stage 1</b> No activity  Recovery	<b>Stage 2</b> Light aerobic exercise  Increase heart rate (HR)	<b>Stage 3</b> Sport-specific exercise  Addition of movement
Activities that should be avoided	<ul style="list-style-type: none"> <li>• Reading</li> <li>• Typing or texting</li> <li>• Television or Internet use</li> <li>• Playing video games</li> <li>• Riding roller coasters or ATVs</li> </ul>	<ul style="list-style-type: none"> <li>• Intensity &gt; 70% maximum HR</li> <li>• Resistance or weight training</li> <li>• Sport training drills</li> </ul>	<ul style="list-style-type: none"> <li>• Activities involving head impacts                             <ul style="list-style-type: none"> <li>- Heading a ball</li> <li>- Activities involving jarring motions</li> <li>- Hitting a baseball</li> <li>- High speed stops</li> </ul> </li> </ul>
Acceptable activities at each stage of rehabilitation	<ul style="list-style-type: none"> <li>• Complete physical and cognitive rest</li> <li>• Listening to audiobook</li> <li>• Talking on telephone / cellphone</li> </ul>	<ul style="list-style-type: none"> <li>• Progressively increase duration of aerobic workout to 20-30 minutes</li> <li>• Walking</li> <li>• Swimming</li> <li>• Stationary cycling</li> </ul>	<ul style="list-style-type: none"> <li>• Progressively increase duration of workout to 60 minutes</li> <li>• Practice sport specific individual skills</li> <li>• Skating drills in hockey</li> <li>• Running drills in soccer</li> <li>• Shooting drills in basketball</li> </ul>
Timeline	<p><b>Symptom-free for 24 hours?</b></p> <p><b>Yes:</b> Begin Stage 2</p> <p><b>No:</b> Continue resting</p>	<p><b>Symptom-free for 24 hours?</b></p> <p><b>Yes:</b> Move to Stage 3</p> <p><b>No:</b> Return to Stage 1</p>	<p><b>Symptom-free for 24 hours?</b></p> <p><b>Yes:</b> Move to Stage 4</p> <p><b>No:</b> Return to Stage 2</p>

Return to Cognitive Exertion Protocol should be completed before Return to Physical Exertion. Each stage should last at least 24h. If any symptoms recurs, the individual should rest until it resolves before trying again (24h to 48h at a minimum). You may need to move back a stage more than once during the recovery process.

Adapted from "Return to Play Communication Tool" by BC Injury Research and Prevention Unit, Concussion Awareness Training Tool

<h2>Stage 4</h2> <h3>Non-contact training drills</h3> <p>Exercise, coordination and cognitive load</p>	<h2>Stage 5</h2> <h3>Full-contact practice</h3> <p>Restore confidence and assess functional skills by coaching staff</p>	<h2>Stage 6</h2> <h3>Return to play</h3> <p>Assess the ability to compete by coaching staff</p>
<ul style="list-style-type: none"> <li>• Participating in any competitive activity</li> <li>• Activities involving body contact               <ul style="list-style-type: none"> <li>- Hockey/Football</li> <li>- Judo / wrestling</li> <li>- Boxing / MMA</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Any competition involving body contact</li> </ul>	<ul style="list-style-type: none"> <li>• Bad sportsmanship</li> <li>• Disrespecting the rules of the sport</li> </ul>
<ul style="list-style-type: none"> <li>• Resume pre-injury duration of training</li> <li>• May start progressive resistance training</li> <li>• Progression to more complex training drills</li> <li>• Activities without any body contact               <ul style="list-style-type: none"> <li>- Zumba / aerobics</li> <li>- Badminton / tennis</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Full participation/competition in non-contact sports</li> <li>• Full training / practices for contact sports</li> </ul>	<ul style="list-style-type: none"> <li>• Full participation in contact sports</li> </ul>
<p><b>Symptom-free for 24 hours?</b></p> <p><b>Yes:</b> Move to Stage 5</p> <p><b>No:</b> Return to Stage 3</p>	<p><b>Symptom-free for 24 hours?</b></p> <p><b>Yes:</b> Move to Stage 6</p> <p><b>No:</b> Return to Stage 4</p>	<p><b>Symptom-free for 24 hours?</b></p> <p><b>Yes:</b> Allow continued participation in normal physical activities</p> <p><b>No:</b> Return to Stage 5</p>

**NB Department of Education requires medical clearance for ALL NB students before moving to Stage 5**

# Resources

## Free Education Programs for healthcare professionals

### Concussion Clinical Course for Medical Professionals

(currently available in English only)

<http://physicians.cattonline.com>

### HEADS UP to Clinicians Course (available in English only)

<http://www.cdc.gov/headsup/providers/training/index.html>

## Online Resources for healthcare professionals

### Concussion Assessment & Response: Sport Version

(App available in English only)

<https://itunes.apple.com/us/app/concussion-assessment-response/id495161270?mt=8>

### Concussion management and return to learn by Doc Mike Evans (Video)

<https://www.youtube.com/watch?v=55YmbIG9YM>

### Consensus Statement on Concussion in Sport 4th International Conference on Concussion in Sport Held in Zurich, November 2012

(available in English only)

<http://bjsm.bmj.com/content/47/5/250.full.pdf+html>

### Clinical practice guidelines for mild traumatic brain injury and persistent symptoms

<http://www.cfp.ca/content/58/3/257.full.pdf+html>

### Guidelines for Concussion/mTBI & Persistent Symptoms: Second Edition

(available in English only)

<http://onf.org/documents/guidelines-for-concussion-mtbi-persistent-symptoms-second-edition>

### Guidelines for Diagnosing and Managing Pediatric Concussion

[http://onf.org/system/attachments/265/original/GUIDELINES\\_for\\_Diagnosing\\_and\\_Managing\\_Pediatric\\_Concussion\\_Full\\_v1.1.pdf](http://onf.org/system/attachments/265/original/GUIDELINES_for_Diagnosing_and_Managing_Pediatric_Concussion_Full_v1.1.pdf)

### Sport-related concussion: Evaluation and Management

<http://www.cps.ca/documents/position/sport-related-concussion-evaluation-management>

### Concussion Guidelines for Physicians

[www.nbtrauma.ca](http://www.nbtrauma.ca) (injury prevention section for healthcare professionals)

### SCAT 3 Sport Concussion Assessment Tool – 3rd Edition

[www.nbtrauma.ca](http://www.nbtrauma.ca) (injury prevention section for healthcare professionals)

**Child-SCAT3 Sport Concussion Assessment Tool  
for children ages 5 to 12 years**

[www.nbtrauma.ca](http://www.nbtrauma.ca) ([injury prevention section for healthcare professionals](#))

**Post-concussion symptom checklist**

[www.nbtrauma.ca](http://www.nbtrauma.ca) ([injury prevention section for healthcare professionals](#))

**List of NB concussion clinics for patient referrals**

[www.nbtrauma.ca](http://www.nbtrauma.ca) ([injury prevention section for healthcare professionals](#))

**Community Based Concussion Clinic:**

**A Collaborative and Systematic Approach**

[www.nbtrauma.ca](http://www.nbtrauma.ca) ([injury prevention section for healthcare professionals](#))

## **Resources for Patients / Caregivers**

**Concussion Recognition & Response: Coach & Parents Version  
(App available in English only)**

<https://itunes.apple.com/us/app/concussion-recognition-response/id436009132?mt=8>

**Concussion 101, a Primer for Kids and Parents by Doc Mike Evans (Video)**

<https://www.youtube.com/watch?v=zCCD52Pty4A>

**Return to Cognitive Exertion Protocol**

[www.nbtrauma.ca](http://www.nbtrauma.ca) ([resources section for for injury prevention](#))

**Return to Physical Exertion Protocol**

[www.nbtrauma.ca](http://www.nbtrauma.ca) ([resources section for for injury prevention](#))

**Concussion Guidelines for Parents/Caregivers**

[www.horizonnb.ca/home/facilities-and-services/provincial-programs/new-brunswick-trauma-program/injury-prevention/resources.aspx](http://www.horizonnb.ca/home/facilities-and-services/provincial-programs/new-brunswick-trauma-program/injury-prevention/resources.aspx)

**Concussion Guidelines for the Athlete**

[www.nbtrauma.ca](http://www.nbtrauma.ca) ([resources section for for injury prevention](#))

**Guidelines for Return to Play after a Concussion**

[www.nbtrauma.ca](http://www.nbtrauma.ca) ([resources section for for injury prevention](#))

## **Related Websites**

**Canadian Concussion Collaborative**

[www.casem-acmse.org/education/ccc/](http://www.casem-acmse.org/education/ccc/)

**Concussion Awareness Training Tool (updated every 2 weeks)**

[www.cattonline.com](http://www.cattonline.com)

**Parachute Canada**

[www.parachutecanada.org/injury-topics/topic/C9](http://www.parachutecanada.org/injury-topics/topic/C9)

**New Brunswick Trauma Program  
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