CEP | Providers

Diagnosing and Managing Concussion Tool

This tool has been developed to support family physicians and nurse practitioners in consistently diagnosing and managing concussion in adult patients (≥ 18 years).

Section A: Concussion overview

A concussion is an acute neurophysiological event related to blunt impact or mechanical injury applied to the head, neck, or body, with transmitting forces to the brain.[1,2,3,4,5]

- Although complex, concussion is manageable in a primary care setting.
- There is no perfect diagnostic test or marker for concussion.[3]
- Although the terms concussion and mild traumatic brain injury (mTBI) are often used interchangeably, they are different conditions along a continuum.[3] Evidence of intracranial injury or a persistent neurologic deficit are indicative of a mTBI.[1,4]

Clarifying common misconceptions about concussions

- **A concussion does not require a direct blow to the head.** Concussion can be caused by impulsive forces acting elsewhere on the body transmitting to the head – such as sudden acceleration, rotation, deceleration (whiplash) or by multiple sub-concussive hits.[1,3,4]
- **A concussion may or may not involve a loss of consciousness.** A majority of patients do not lose consciousness after sustaining a concussion. Do not rule out concussion in patients who have not lost consciousness.[3,4]

Section B: General treatment approach

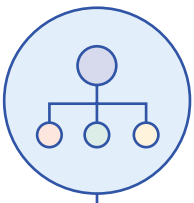
This section provides detailed information to support the provider in diagnosing and managing concussion in adults. Fillable forms linked to each section are included in Section C of this tool.

Assessment and diagnosis:

Establish diagnosis of concussion by taking the patient's history and assessing signs and symptoms. Rule out more severe forms of traumatic brain injury (TBI).

Assessment and diagnosis (pg. 2)

Diagnostic assessment (pg. 5)



Management and recovery planning:

Based on assessment, develop a tailored management and recovery plan with the patient.

Management and recovery planning (pg. 3)

Return to activities (pg. 7)

Monitoring and follow-up:

Track symptom resolution, refine medical clearance, and manage persistent symptoms.

Tools and mental health assessments (pg 2)

Monitoring and follow-up (pg. 4)

Symptom monitoring log (pg. 9)

Section B: General treatment plan (continued)

Assessment and diagnosis

The information in this section supports Section C: Diagnostic Assessment Form.

The purpose of the diagnostic assessment is to establish diagnosis of concussion by ruling out more severe forms of TBI, cervical spine injuries and medical and neurological conditions that can present with concussion-like symptoms.[1,4,5] In many cases, a concussion may be diagnosed as a result of an examination of the patient's history as there may be a delay between injury and presentation to a provider.[4] Note: Some individuals may not know they have sustained a concussion, and only seek medical care when symptoms do not resolve.[2]

Assessment at presentation[1,4]	
1. Take a thorough medical history and assess the patient's clinical status	• Current symptoms and health concerns • Setting and mechanism of injury • Immediate symptoms after injury • Co-occurring injuries • Pre-existing medical conditions, including mental health conditions. • Previous concussion history • Contributing psychosocial factors (have patient complete PHQ-9[18] and GAD-7[19]) • Course of symptoms since time of injury
2. Perform a physical exam	• Mental status and cognition • Physical status • Full neurological evaluation
3. Exclude more severe brain injury	• Determine the need for urgent neuroimaging. Use the Canadian CT Head Rule[6] or the ONF Assessment/Diagnosis Algorithm to determine if neuroimaging is clinically indicated. Note: Use ONF Guide to Neurological and Musculoskeletal Exam.

Neuroimaging is not recommended to diagnose concussion.[4] When it is clinically indicated, the need for neuroimaging should be determined using the Canadian CT Head Rule.[6] CT scans are the most appropriate to rule out acute intracranial hemorrhage.[1]

Diagnostic criteria for concussion[3]	• Caused by direct or indirect force • Rapid onset of neurological function impairment • May exhibit neuropathological changes; for example, memory or orientation. • Results in a range of clinical signs and symptoms that may not have involved loss of consciousness • Symptoms cannot be explained by drug, alcohol, medication use, other injuries or comorbidities

Resources for use immediately post-injury:

- Glasgow Coma Scale[11]: A scoring scale for eye-opening as well as motor and verbal responses to objectively measure level of consciousness.
- Sport Concussion Assessment Tool (SCAT-5)[13]: Combines aspects of several concussion tools including the Post-Concussion Symptom Scale into eight components designed to assess concussion symptoms, cognition and neurological signs. Utility decreases significantly 3-5 days after injury.[3]

Resources for use in assessment, diagnosis and management:

- Canadian CT Head Rule: Algorithm for assessing severity risk in patients with head injury.
- Acute Concussion Evaluation (ACE)[15]: A physician/clinician form used to evaluate individuals for concussion. Can be used serially to track symptom recovery over time.
- Post-Concussion Symptom Scale (PCSS)[16]: A 21-item self-report measure recording symptom severity using a 7-point Likert scale. Endorsed by the International Symposium for Concussion in Sport. Can be used serially to track symptom recovery over time.
- Rivermead Post-Concussion Symptoms Questionnaire (RPCSQ)[17]: A 16-item self-report measure of symptom severity asking patients to compare presence and severity of symptoms experienced within the past 24 hours relative to experience of the same symptoms prior to injury.
- Patient Health Questionnaire 9 (PHQ-9): A screening tool to assist in the diagnosis of depression and is used to quanitfy symptoms to monitor severity.
- Generalized Anxiety Disorder 7-item (GAD-7): A screening tool to assist in the diagnosis of anxiety and is used to quanitfy symptoms to monitor severity.
- Barrow Neurological Institute (BNI): Fatigue scale.

Section B: General treatment plan (continued)

Management and recovery planning

Management strategy

- Relative rest for the first 1-3 days.[1,3,5,8] Avoid over-emphasizing rest. Current evidence indicates that regardless of symptomatic status, activity (as tolerated) is more likely to speed up rather than delay recovery.[1,10]
- Emphasize reassurance and self-management, and set patient expectations for recovery. Patients will not be symptom-free when they start to reintegrate activities and may be anxious about when they will feel better.[1]
- Normalize symptoms and self-management, and set patient expectations for recovery.
- Advise the patient to avoid high-risk activities while symptomatic.
- Advise the patient to gradually perform every day activities within 3 days of concussion.[1,3,8]
- Emphasize non-pharmacological interventions.[3] There is limited evidence to support the use of pharmacotherapy. Avoid prescribing medications that mask symptoms or changes in mental status.[1] For more information about pharmacotherapy, see Appendix A.
- Follow-up with the patient within 7-14 days after the diagnosis of a concussion.[2]

Avoid

- Do not adjust treatment strategy based on mechanism of injury.[4]
- Do not refer to a specialist clinic unless symptom persistence is prolonged.
  - Note: There is no consistent definition of prolonged or persistent symptoms in the literature. Depending on the source, prolonged or persistent symptoms refer to those lasting from beyond 2 weeks to beyond 3 months.[1,2,3,4,5,7] Clinicians should use their judgment on a case-by-case basis.
- Do not delay return to social and professional roles more than medically necessary. Delayed return can result in demoralization and worsened emotional symptoms.[1]

Talking Points

Emphasize non-pharmacological treatment, self-management and goal-setting.

"You are the best person to monitor your daily symptoms, with help from your family and friends. Use the Daily Symptom log to record how you're feeling. If your symptoms get worse, remember to step back activities or check the Red Flags. We will go over this log at our next appointment to see how your symptoms have been progressing."

Developing a recovery plan

Recovery is defined functionally as a return to normal activities including work, play, school, and sport.[3] Full recovery is generally expected within 3 months post-concussion. However, not all patients will recover rapidly with a minimum of 15% of patients experiencing persistent symptoms beyond 3 months.[1]

Complete the Return to Activities form following the steps below.

Identify medical restrictions and limitations	Discuss gradual return to activities after initial rest period	Set goals and timelines for return to work and school	Set date of follow-up appointment	Provide patient with completed Return to Activities form and other resources
• **Medical restrictions** are high-risk impairments that could result in harm to the patient or others (e.g. no work at heights, no ladder work, no work with heavy equipment, etc.). • **Medical limitations** are functional impairments that do not pose risk or harm to the patient or others, but would interfere with the patient's ability to perform tasks (e.g. limit screen time, limit dual screen usage, etc.) • Medical restrictions and limitations require accommodation from work and school. • **Medical clearance** – the decision to lift these restrictions – can only be done by a physician or nurse practitioner. See ONF Return-to-Activity / Work / School Considerations for more details.	• Review symptoms patient may experience while adding in activities. Patients should expect not to be symptom-free when they start to reintegrate activities, and may be anxious about when they will feel better.[1] • Educate patient about red flags. • Provide patient with self-management resources. Section D. Patient resources **Other resources:** • Parkwood Pacing Graphs • EMPWR Foundation Return-to-Activities toolkit	• Some patients can return to work or school soon after injury; some require more time. Base timelines on severity of symptoms and consultation with the patient.[1] **Goal attainment resource:** • Goal attainment scaling **Return to work resources:** • ACE Return to Work plan • Vocational Evaluation • Return to Work Considerations algorithm: **Return to school resources:** • Return to Post-Secondary Activities • Return to Post-Secondary Activities algorithm • Accommodation for students with persistent symptoms	• Set date of follow-up after initial assessment.	• Complete Return to Activities Form • Provide Patient Symptom Monitoring Log • Review and provide patient with appropriate patient resources

Section B: General treatment plan (continued)

Monitoring and follow-up

At follow-up:

1. Assess symptoms using validated scale selected during diagnostic assessment.
2. Review patient Symptom monitoring log
3. Have patient complete PHQ-9 and GAD-7[1]
4. Approve medical clearance when appropriate. Medical clearance decisions for return to activity can only be made by a physician or nurse practitioner. See below for medical criteria guidance.[2,5]

Improving?

Yes

No

If symptoms not improving at first follow-up:

- Initiate symptomatic treatment.
- Review Appendix B, Clinical Symptom Management Guidance
- Schedule follow-up between 7-14 days

Improving?

Yes

No

If symptoms improving at follow-up:

- Encourage patient to continue returning to regular activities, increasing intensity and duration as appropriate.
- If patient has returned to school, work, or sports, discuss how transition has affected symptoms.
- If patient has not returned to school, work, or sports, develop timeline for return.
- Assess medical restrictions and limitations and adjust as needed.
- Provide medical clearance for return to activities as appropriate.
- Schedule follow-up if clinically indicated.

If symptoms not improving 4 weeks post concussion:

- Initiate bi-weekly follow-up schedule to monitor worsening or new symptoms.
- Direct management toward specific symptoms while considering etiology, elapsed time from injury, and symptom interaction. See Appendix B, Clinical Symptom Management Guidance.
- Review the patient's use of prescription medications, over-the-counter medications and supplements. See Appendix A, Pharmacotherapy Guidance.
- Review the patient's use of alcohol, cannabis and other recreational drugs.
- Consider re-evaluation and additional diagnostic assessment.

Medical clearance decisions for return to activity can only be made by a physician or nurse practitioner. However, patients should be considered recovered when they are[5]:

- At pre-injury state (asymptomatic or with pre-injury conditions)
- Able to tolerate full-time work, school and/or activities without symptoms
- Have a normal neurological examination

Section C: Patient encounter forms

PT NAME	DATE	DOB	AGE

Form: Diagnostic assessment

Use Section B. Assessment and Diagnosis for support in completing this form.

1. History

Injury description:			
Date, time and setting of injury:			
Time since injury:			
Reporter (patient, parent, coach, partner, etc.):			
Type of injury:	☐ MVC ☐ Assault ☐ Other:	☐ Pedestrian-MVC ☐ Sports	☐ Fall ☐ Polytrauma:
Location of impact:	☐ Indirect force ☐ Neck	☐ Frontal ☐ Occipital	☐ Temporal L / R ☐ Parietal L / R
Course of recovery since injury:			

History of Concussion

Does patient have history of concussion(s)? How many?:
Date of last concussion:
Longest symptom duration:
Did patient have a complete resolution of all symptoms?:
Has it required the same force to cause subsequent concussions?:
Notes:

Co-occurring conditions

☐ History of sleep disorder	☐ Hearing impairment
☐ History of headache/migraine	☐ Co-existing orthopedic injury
☐ Depression or anxiety disorder	☐ Seizure disorders
☐ Posttraumatic stress disorder (PTSD)	☐ Attention deficit/hyperactivity disorder
☐ Suicidality	☐ Learning disabilities
☐ Substance use disorders	☐ Motion sickness
	☐ Other:

Notes:

Section C: Patient encounter forms (continued)

2. Physical exam

Perform a physical exam to assess:

- ☐ Vital signs
- ☐ Mental status and cognition
- ☐ Cranial nerves
- ☐ Extremity tone, strength and reflexes
- ☐ Gait and coordination
- ☐ Scalp/basal skull fracture
- ☐ Cervical spine exam
- ☐ Any other exams identified during patient history

Exclude more severe forms of TBI

If any of the following indications are present, cease assessment for concussion and follow practice for moderate to severe TBI.

- ☐ Evidence of an intracranial injury or skull fracture
- ☐ Dilation of one or both pupils
- ☐ Loss of coordination
- ☐ Double vision
- ☐ Repeated vomiting
- ☐ Weakness/numbness in the extremities
- ☐ Convulsions or seizures
- ☐ Increasing confusion, restlessness or agitation
- ☐ Slurred speech

Initial Diagnosis/Assessment of Adult mTBI (CT scan indication)
Canadian CT Head Rule

Signs and symptoms of concussion:

Physical		Behavioural/Emotional	Cognitive
☐ Headache	☐ Trouble falling asleep	☐ Irritability	☐ Feeling "slow"
☐ Nausea	☐ Excessive sleep	☐ Sadness	☐ Feeling "foggy"
☐ Vomiting	☐ Loss of sleep	☐ Nervousness	☐ Difficulty concentrating
☐ Balance problems	☐ Drowsiness	☐ More emotional	☐ Difficulty remembering
☐ Dizziness	☐ Light sensitivity	☐ Numbness	
☐ Fatigue	☐ Noise sensitivity		
☐ Vision problems			

Scores		Notes:
PHQ-9	Date: _____ Score: _____ Date: _____ Score: _____ Date: _____ Score: _____	
GAD-7	Date: _____ Score: _____ Date: _____ Score: _____ Date: _____ Score: _____	
PCSS	Date: _____ Score: _____ Date: _____ Score: _____ Date: _____ Score: _____	

Section C: Patient encounter forms (continued)

PT NAME	DATE	DOB	AGE

Form: Return to activities

Talking Points

Define restrictions and limitations.

"There are things your concussion will make it harder for you to do."

"If doing certain things with your symptoms has the possibility to cause harm to yourself or others, it will be better for everyone if you give yourself some more time to recover until I give you medical clearance."

"If doing certain things with your symptoms will seriously impact your ability to do that activity, performance of that activity should be limited until symptoms improve."

Medical restrictions and limitations
Restrictions:
Limitations:

Gradually returning to activities

The purpose of a gradual approach is to add activities slowly to see how they affect the patient's symptoms. A slow return to regular activities will help speed recovery. Reassure the patient they will not be symptom-free immediately once they start to reintegrate activities. Let the patient know that they may experience some discomfort as they aim to advance in activities. If symptoms do not worsen concerningly, then the patient can increase duration or intensity of given activity.

A 24-hour period is the recommended time frame for each step. If symptoms worsen substantially with the addition of a new activity or the increase in intensity of an activity, advise the patien to step back the activity to a lower level that previously felt manageable for another 24 hours before trying again.

If your patients experience any of these Red Flag symptoms, use your clinical discretion to advise them to visit the emergency department.

	Physical	Thinking	Emotional	Sleep
Red Flags. Visit the Emergency Department if suddenly experiencing any of these symptoms.	• Worsening headaches • Seizures • Neck pain • Repeated vomiting • Weakness/numbness in arms or legs • Loss of consciousness	• Increasing confusion • Slurred speech • Cannot recognize people or places	• Unusual behaviour change • Increasing irritability	• Cannot be awakened

An example of gradually returning to activities

	Rest period	Activity day 1	Activity day 2	Activity day 3	Activity day 4	Activity day 5
Screen time	None	Minimal	Minimal, but increased	Increased	Near Normal	Normal

For more examples of slowly returning to activities, please visit EMPWR.

	Physical	Thinking	Emotional	Sleep
Common symptoms during recovery	• Headache • Nausea • Fatigue • Dizziness • Vomiting • Balance problems • Sensitivity to light or noise • Visual problems • Numbness/ tingling	• Feeling mentally foggy • Problems concentrating • Problems remembering • Feeling more slowed down	• Irritability • Sadness • Feeling more emotional • Nervousness	• Drowsiness • Sleeping more than usual • Sleeping less than usual • Trouble falling asleep

Section C: Patient encounter forms (continued)

Set goals and timelines with patient for return to work and school	Use resources from Section B. Management and recovery planning.
Should patient try returning to work/school before follow-up? ☐ Yes ☐ No	
If yes, conditions: ☐ Medical restrictions ☐ Medical limitations ☐ Part-time or limited hours	
If no: discuss timeline at follow-up	

Follow-up date:	

- Consider sharing a copy of this form with patient
- Consider printing a copy of the Symptom Monitoring Log (pg. 9)
- Consider printing a copy of the Patient resources (pg 10)

Symptom monitoring log

Date (D/M/YY)	Time	Activity (e.g. work, class, meeting, homework, cooking, driving, etc.)	Alone? (Yes or no) If yes, number of people present	Symptomatic? (Yes or No) If yes, list symptoms	Symptom intensity: 1 = low intensity 6 = highest intensity

Section D: Additional resources

Patient resources

Self-management

[i] Sunnybrook Mild Traumatic Brain Injury/Concussion Handbook: https://sunnybrook.ca/content/?page=bsp-brain-injury-education

Subsections include:

- Concussions and getting better: https://sunnybrook.ca/content/?page=bsp-about-concussions
- Toolkit for Recovery: https://sunnybrook.ca/content/?page=bsp-understanding-concussion
- Personal Recovery Plan: https://sunnybrook.ca/content/?page=bsp-concussion-recovery-plan

[ii] Post-Injury Advice Card (ONF):

- Short version: https://braininjuryguidelines.org/concussion/fileadmin/media/appendices/appendix-1-4-2.pdf
- Long version: https://braininjuryguidelines.org/concussion/fileadmin/media/appendices/appendix-1-3.pdf

[iii] Concussion Do's and Don'ts: The first few days of recovery: A hand-out for patients with reminders on what to do and what not to do for individuals who are suffering from symptoms of concussion.
Available from: http://concussionsontario.org/wp-content/uploads/2018/04/ONF-DoDonts-Tearaway-WEB-1.pdf

[iv] Concussion Care Guide (St. Joseph's Health Care London): A hand-out that patients can print out and keep with them as a resource for the first 48 hours after a concussion. It includes topics such as driving after displaying concussion symptoms, when to seek medical attention and how to return to the patient's normal levels of activity.
Available from: https://www.sjhc.london.on.ca/sites/default/files/pdf/abi_concussion_care_guide07.26.17.pdf

Education, legal issues and community resources

[v] Concussion Frequently Asked Questions – FAQs (Ontario Brain Injury Association): A list of seven commonly asked questions by patients including legal issues surrounding concussions. Available from: http://obia.ca/concussion-resources/

[vi] Ontario Brain Injury Association Helpline (OBIA): A toll-free helpline available Monday to Friday from 9am to 5pm for patients to speak with someone personally. Helpline number: 1-800-263-5404.

[vii] Online Concussion Support Group (OBIA): A free online support group (registration required) for patients living or having lived with concussion symptoms to share their feelings and experiences. The group runs for 60 minutes per week over eight weeks and is available via computer or phone. Registration here: http://obia.ca/online-concussion-support-group/

[viii] Regional Acquired Brain Injury Program: Information for Families (St. Joseph's Health Care London): A resource for concussion patient's family members on how they can help their loved ones.
Available from: https://www.sjhc.london.on.ca/regional-acquired-brain-injury-program/families

[ix] What Brain Injury Survivors Want You to Know (Brainline): A resource for patients, families and friends on communicating with brain injury survivors. Available from: https://www.brainline.org/article/lost-found-what-brain-injury-survivors-want-you-know

[x] Personal Stories (Concussion Legacy Foundation): Survivors of concussion share their own personal stories about having lived or living with concussion symptoms. Available from: https://www.concussionfoundation.ca/personal-stories

Prevention

[xi] Protecting your brain from having another injury (Sunnybrook Health Sciences Centre): Information about preventing future concussions. Available from: https://sunnybrook.ca/content/?page=bsp-concussion-protect-brain

[xii] Heads Up: Preventing Mild Traumatic Brain Injury (MBTI) (Brain Injury Canada): A list of preventative tactics patients can do to prevent future concussions. This resource includes some questions to ask primary care providers regarding prevention and returning to patient's baseline activities. Available from: https://www.braininjurycanada.ca/2010/05/31/heads-up-preventing-mild-traumatic-brain-injury-mtbi/

Section D: Additional resources (continued)

Provider resources:

Point-of-care tools and care pathways

[i] Initial Diagnosis/Assessment of Adult mTBI – CT scan indication algorithm (ONF).
Access at: https://braininjuryguidelines.org/concussion/fileadmin/media/algorithms/algorithm-1-1.pdf

[ii] Canadian CT Head Rule: Algorithm for assessing severity risk in patients with head injury.
Access at: https://braininjuryguidelines.org/concussion/fileadmin/media/figures/figure-1-1.png

[iii] Standards for Post-Concussion care: From diagnosis to the interdisciplinary concussion clinic, a tool for clinicians supporting the full clinical course of concussion. Includes concussion care pathway, referral indicators, symptom management, and patient/family education resources. http://onf.org/documents/standards-for-post-concussion-care

[iv] Patient Health Questionnaire 9 (PHQ-9): A screening tool to assist in the diagnosis of depression and is used to quanitfy symptoms to monitor severity. Access at: https://www.mdcalc.com/phq-9-patient-health-questionnaire-9

[v] Generalized Anxiety Disorder 7-item (GAD-7): A screening tool to assist in the diagnosis of anxiety and is used to quanitfy symptoms to monitor severity. Access at: https://www.mdcalc.com/gad-7-general-anxiety-disorder-7

[vi] BNI (Barrow Neurological Institute) Fatigue scale. Access at: https://braininjuryguidelines.org/concussion/fileadmin/media/appendices/appendix-11-1.pdf

[vii] Guide to Neurological and Musculoskeletal Exam (ONF). Access at: https://braininjuryguidelines.org/concussion/fileadmin/media/appendices/appendix-3-4.pdf

Patient support in return to work, school and activities

[viii] ACE Return to Work Care Plan:
Access at: https://braininjuryguidelines.org/concussion/fileadmin/media/appendices/appendix-12-5.pdf

[ix] ACE Return to School Care Plan:
Access at: https://braininjuryguidelines.org/concussion/fileadmin/media/appendices/appendix-12-6.pdf

Clinical Practice Guidelines

[x] Guideline for Concussion/Mild Traumatic Brain Injury & Persistent Symptoms, 3rd Edition [Internet]. Ontario Neurotrauma Foundation; 2018. Available from: http://onf.org/documents/guidelines-for-concussion-mtbi-persistent-symptoms-third-edition

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Available from: https://www.healthquality.va.gov/guidelines/Rehab/mtbi/mTBICPGFullCPG50821816.pdf

[xiv] Canadian Guideline on Concussion in Sport [Internet]. Parachute; 2017. Available from: https://parachute.ca/en/professional-resource/concussion-collection/canadian-guideline-on-concussion-in-sport/

Other resources

[xv] The Concussion Awareness Training Tool: An accredited medical professional course designed to provide medical professionals with the information they need to provide evidence-based care for their patients who have sustained a concussion.
Available here: https://cattonline.com/medical-professional-course/

[xvi] Specialized Concussion Clinics in Ontario: A list of various specialized concussion clinics in Ontario. The list is not comprehensive but is meant to give providers guidance on some available services.
Available here: https://braininjuryguidelines.org/concussion/fileadmin/media/appendices/appendix-2-1.pdf

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