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Concussion / Mild Traumatic Brain Injury (mTBI)

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Scope

This guideline provides recommendations for the primary care assessment, diagnosis, and management of concussion/mild traumatic brain injury (mTBI) for patients of all ages. This guideline is not appropriate for use with moderate or severe brain injuries.

Key Recommendations

Assessment and Diagnosis

- Assess all individuals suspected of concussion as soon as possible, ideally within 72 hours, and before potential re-exposure to head trauma.
- Triage patients with red flags for emergency department evaluation.
- Screen patients to identify those at risk of persisting symptoms.
- Routine neuroimaging is not recommended unless specific red flags are present.
- Evaluate patients for other relevant conditions (e.g., mental health or mood disorders, attention-deficit/hyperactivity disorder (ADHD), chronic headache, substance use). Manage these while also treating for concussion.

Management

- Counsel all patients to observe relative rest for 24-48 hours.
- Reassure patients of likelihood of good prognosis but highlight importance of early recognition and management of persisting symptoms.
- Advise patients that they can gradually return to activities even in the presence of mild symptoms. This should be at a pace with no more than mild and brief symptom exacerbation.
- Advise patients to avoid activities that risk reoccurrence of head trauma until medical readiness has been determined.
- Prescribe aerobic exercise interventions to decrease concussion-related symptoms and reduce the risk of persistent symptoms. Begin with 55% max heart rate then progress to 70%.
- Focus early management strategies on 1) headache, 2) sleep, and 3) mood.
- Conduct a follow-up assessment, ideally within two weeks of diagnosis.
- Refer patients at risk of or experiencing persisting symptoms to interdisciplinary care.
- Provide patient education in verbal and written formats.
- Where possible, co-manage patients <5 years old with persisting symptoms with a pediatrician.

Special Considerations

- Consider interpersonal violence and child abuse/neglect with trauma-related presentations. Report and refer as required.
- Consider specialist involvement to assess/manage patients with neurological conditions or injuries (e.g., Parkinson's disease, multiple sclerosis, spinal cord injury).
- Maintain a high index of suspicion for mental health sequelae, screen and manage appropriately.

Definition

A concussion is a type of mild traumatic brain injury (mTBI) caused by a direct or indirect external force that results in acceleration of the brain within the skull.[1,2] Concussion may or may not include a brief loss of consciousness (LOC).[2] Concussion results in acute or delayed onset (<72 hours) of neurological impairment that generally resolves spontaneously.[2,3] Standard neuroimaging is not clinically indicated but if done, is normal.[2]

While all concussions are mTBIs, not all mTBIs are concussions. mTBI is a broader category that includes injuries with a similar clinical presentation, but with abnormal neuroimaging. For the purposes of this document, the term concussion is used throughout as outpatient management is the same.

Etiology

Concussions are not specific to sporting environments. While falls are the most common cause across all ages[4], concussion can also result from motor vehicle or bicycle collisions, assault (including interpersonal violence), military combat, blast/explosions, work-related incidents, etc.[3]

Epidemiology

In 2019/20, approximately 19,000 British Columbians visited the emergency department for concussion.[5] These figures likely under-report injury incidence because many either do not seek medical assessment or are seen in community-based clinics.[5] Children aged 0-14 years have the highest rate of emergency department visits for concussion.[5] Older adults also have high concussion rates that are influenced by general frailty and age-specific risk factors for falls (e.g., cognitive impairment, polypharmacy, reduced physical fitness).[6]

Prognosis and Risk Factors for Persisting Symptoms

Prognosis is generally good, with most experiencing symptom resolution within a few weeks[3] to months[7]. However, symptom resolution does not necessarily indicate complete physiological recovery and subtle deficits that are not measurable through subjective assessments may persist.[8] Patients are at increased risk of re-injury during the recovery period, even if they are asymptomatic. Re-injury before complete recovery can result in more severe and longer-lasting physiological/clinical disturbances.[8]

While most patients recover well, one in four youth[9] and at least one in six adults have persisting symptoms (i.e., those that remain >4 weeks) and concussion-related disability.[7] High initial symptom severity is the strongest, most reliable predictor of persisting symptoms. Refer to the Initial Medical Assessment section for other examples.

Initial Medical Assessment

Assess all individuals suspected of concussion as soon as possible, ideally within 72 hours, and before potential re-exposure to head trauma. The purpose of the initial assessment is to:

1. Rule out serious injury,
2. Confirm a diagnosis, and
3. Provide patient education and direct early management.

See Figure 1: Concussion Diagnostic/Management Algorithm. Tailor the assessment based on time elapsed since injury and clinical judgment. Note that patients may have diminished concentration and tolerance for a lengthy assessment as well as impaired recall for education/instruction. Some patients involved in higher risk contact sports may be asked to undergo a pre-injury examination to document their healthy baseline status. However, such examinations are not recommended as standard practice in BC primary care settings.

Standardized assessment forms are available to document, organize, and compare initial post-injury and serial concussion assessments. However, the reality of practitioner time and availability may make lengthy assessments challenging to complete in the primary care setting. The information in this guideline represents a condensed version of these standardized assessments, based on the clinical expertise of the working group.

- Acute Concussion Evaluation (ACE)
- <72 hours – Sport Concussion Assessment Tool (SCAT). See Adult SCAT6 and Child SCAT6.
- >72 hours – Sport Concussion Office Assessment Tool (SCOAT). See Adult SCOAT6 and Child SCOAT6.

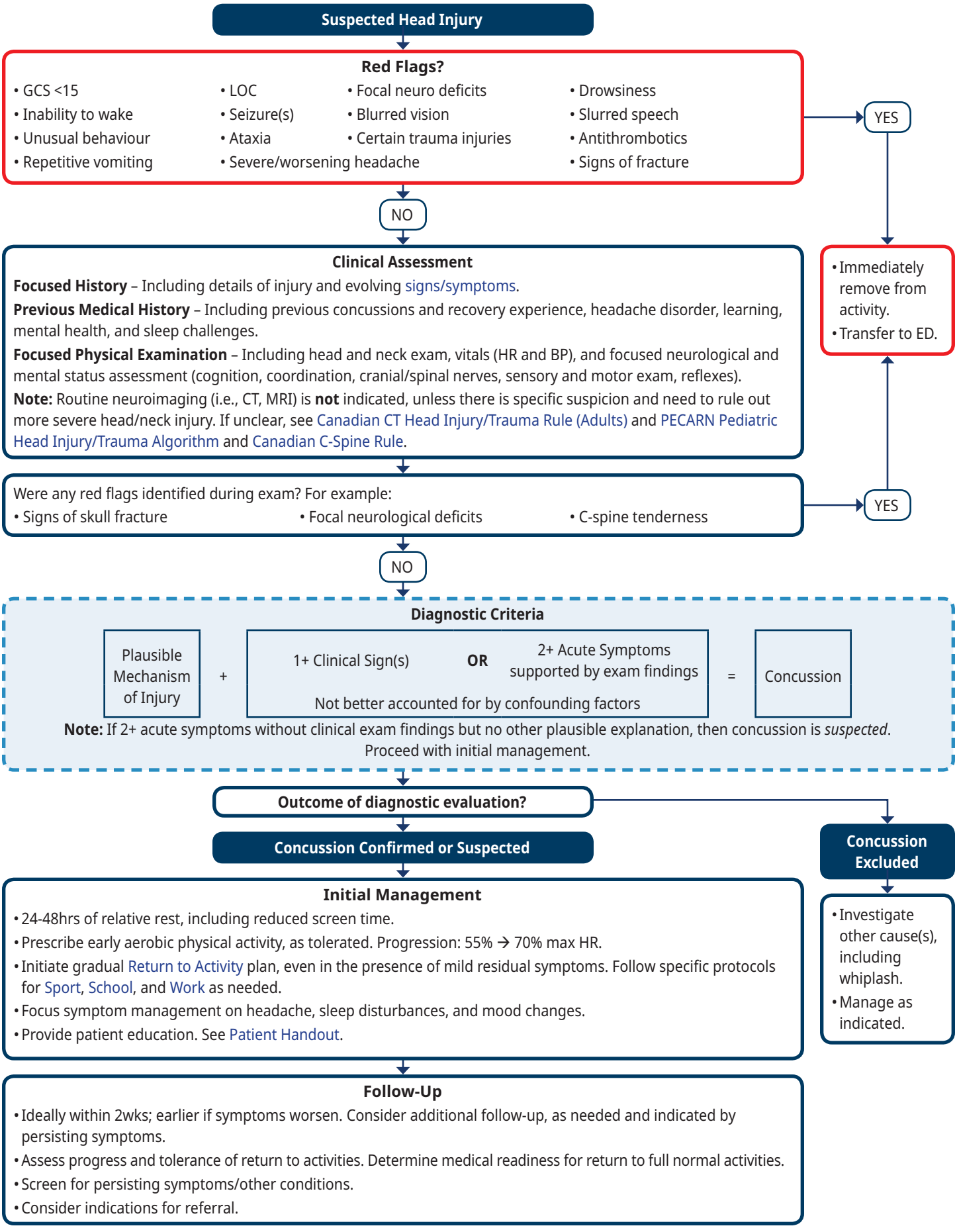
1. Rule out Serious Injury

The presence of head injury red flags (Table 1: Head Injury Red Flags) requires referral to the emergency department for further investigation and management.

Table 1: Head Injury Red Flags

Head Injury Red Flags
• Glasgow Coma Scale <15 [Pediatric GCS (<2 years old) and GCS (>2 years old)]
• Loss of consciousness, however brief, if evaluating within 24 hours of injury
• Focal neurologic deficits
• Drowsiness or inability to wake up
• Signs of skull/neck fracture (e.g., midline neck pain)
• Ataxia
• Seizure(s)
• Blurred vision
• Slurred speech
• Weakness or numbness
• Unusual behaviour, such as restlessness or agitation
• Chronic/recent use of anticoagulant or antiplatelet medications
• Severe/worsening headache (especially for adults with risk factors like anticoagulant use)
• Repetitive vomiting (>3 episodes in children, >2 episodes in adults)
• Certain mechanisms: pedestrian struck, MVI with ejection, or fall >1 meter
• For toddlers and infants (in addition to any of the above): persistent crying, cannot be consoled, palpable skull fracture or non-frontal boggy hematoma, will not nurse or eat

Figure 1. Concussion Diagnostic/Management Algorithm



2. Confirm a Diagnosis

Concussion is a clinical diagnosis that requires a plausible mechanism of injury, and acute clinical signs, or symptoms with exam findings.[2] See Table 2: Concussion Related Signs and Symptoms for more detailed diagnostic criteria information. Differential diagnosis should consider potential confounding factors, including pre-existing and co-occurring health conditions that can mimic signs and symptoms of concussion.[11]

Diagnosis may be complicated because concussion signs and symptoms are often non-specific, and can be concussion-related, pre-existing, or both.[1] For example, an individual with a previous history of headaches may experience exacerbation of those headaches following concussion. A further challenge is that clinical signs, if present immediately following the impact, are typically transient, resolving before the first primary care visit. If not clearly documented in acute care medical records, clinical signs can be assessed retrospectively by asking the patient or witnesses for details about the injury event.

Table 2: Concussion Related Signs and Symptoms[2]

Signs	Symptoms	Examination Findings
Onset: Immediate	**Onset:** Immediate or delayed up to 72 hours	**Note:** Tests are generally only sensitive if performed within 24-72 hours of injury.
• LOC (<30 min) • Altered mental status, including confusion/ disorientation (<24 hrs) • Amnesia for the injury or events immediately following injury (<24 hrs) • Motor incoordination upon standing • Seizure • Tonic posturing	• Physical symptoms: headache, nausea, dizziness, balance problems, vision problems, sensitivity to light, and/or sensitivity to noise. • Cognitive symptoms: feeling slowed down, "mental fog," difficulty concentrating, and/or memory problems. • Emotional symptoms: uncharacteristic emotional lability and/or irritability.	Impairment on tests of: • Cognition • Balance • Vestibular-oculomotor function

Clinical History

- Determine whether there was a plausible mechanism of injury.
- Assess signs and symptoms, including their severity.
  - Consider using validated tools for this assessment. The Rivermead Post Concussion Symptoms Questionnaire (RPQ)[12] is helpful in establishing an initial list/severity of concussion related symptoms and serially assessing them throughout the management period.
  - Assessing initial symptom severity can identify patients who may warrant closer monitoring given that this is the greatest predictor of persisting symptoms.
- If present, clarify details on onset of neurological impairment, including LOC and/or amnesia.
- Screen for risk of persisting symptoms by identifying significant/relevant medical history, including the following: [4,8,13–17]
  - Pre-injury history of:
    - Concussion with persistent symptoms
    - Migraine
    - Psychiatric history (e.g., depression, anxiety)
    - Sleeping problems
    - Learning disabilities, including ADHD
  - Post-injury experience of:
    - Highly symptomatic [strongest, most reliable predictor]
    - Negative recovery expectations
    - Psychological distress, including new onset depression and anxiety
    - Whiplash

        - CT abnormalities (Note: Routine imaging is **not** indicated, unless specific red flags are present. If done, abnormal CT result is associated with persisting symptoms.)
        - For older adults: High post-injury scores of neck pain, irritability, and forgetfulness
    - Sex (female at greater risk)
    - Age (younger patients and older adults at greater risk)

Physical Examination

Conduct a focused examination based on the mechanism of injury and clinical judgment. Include:

- Head and neck exam, including ruling out c-spine point tenderness.
- Focused neurologic and mental status exam, which may include:
    - Cognition (e.g., word recall and counting digits backwards)
    - Coordination, gait, and balance (e.g., simple tandem gait, tandem gait with cognitive task).
    - Cranial and spinal nerves, including visual system (e.g., pupils, vestibular ocular reflex)
    - Sensory and motor exam
    - Reflexes
- Heart rate and blood pressure, taken after 2 min supine and then after 1 min standing.[1]

Investigations

Routine neuroimaging (i.e., CT, MRI) is **not** indicated, unless there is specific suspicion and need to rule out more severe head/neck injury. If unclear, the following validated tools can help determine injury severity and need for imaging. Refer to *BC Guidelines*: Appropriate Imaging for Common Situations in Primary and Emergency Care and *BC Guidelines*: Computed Tomography (CT) Prioritization.

- The PECARN Pediatric Head Injury/Trauma Algorithm to rule out the presence of clinically important traumatic brain injury (ciTBI) in patients <18 years old with GCS >14.
- The Canadian CT Head Injury/Trauma Rule to rule out the presence of intracranial injuries requiring neurosurgical intervention without CT in patients >16 years old with GCS 13-15.
- The Canadian C-Spine Rule to rule out the presence of cervical spine injury in alert, stable patients >16 years old without radiographic imaging.

Electrocardiogram (ECG) and electroencephalogram (EEG) are **not** recommended unless there is a high index of suspicion for cardiac factors or a seizure disorder.

While common in research settings, advanced neuroimaging, fluid-based biomarkers, and genetic testing are **not** indicated for a standard clinical concussion assessment.[1]

3. Provide Patient Education and Direct Early Management

- Provide education verbally and in written format at all visits.
- Reassure patients that prognosis is usually good and most recover within a few weeks.
- Educate patients about the nature of their injury, the increased risk of subsequent injury, how to improve recovery, and how to identify persisting symptoms.
- Refer to Appendix D: Patient Handout for a comprehensive patient handout and to BC's Concussion Awareness Training Tool (CATT) for documentation (e.g., Medical Assessment Letter).

Management

Early and active management is associated with improved outcomes while prolonged periods of rest may hinder concussion recovery.[18,19] It is important that patients avoid activities that risk reoccurrence of head trauma until medical readiness has been determined. Prescribe aerobic exercise interventions to decrease concussion-related symptoms and reduce the risk of persistent symptoms.[20] Prioritizing hydration, regular meals with balanced nutrition, and good sleep is also important during the recovery period.

For the **first 24-48 hours**, patients should:

- Observe relative physical/cognitive rest, including minimizing screen time and not driving.[21,22]
- Monitor for new or worsening symptoms and report back to primary care or emergency department, as appropriate. See Table 1: Head Injury Red Flags.
- Maintain light physical activity (e.g., slow walks), as long as there is no more than mild and brief exacerbation of symptoms (i.e., <2 point increase in symptom severity score for <1 hour).[23]

After 24-48 hours of relative rest, patients can initiate a graded return to normal activities even if they have mild residual symptoms. See Figure 2: General Return to Activity Protocol.

- Progression through this protocol is limited to one step per day based on symptom presentation.
- Mild and brief exacerbation of symptoms (i.e., <2 point increase in symptom severity score for <1 hour) is normal and is not associated with longer recovery.[23]
- If symptoms worsen significantly, the pace of return to activity should be slowed and the patient should return to the previous level of activity that did not worsen symptoms.
- Prescribe light aerobic activity (55% max heart rate) with progression to moderate aerobic activity (70% max heart rate) before determining medical readiness for greater exercise intensity and activities where there is a risk of reinjury.
    - Max heart rate = 220-age

Physical Activity/Sport: Patients should be encouraged to return to physical activity as soon as possible as this has been shown to help speed recovery. Aerobic activity should be prioritized prior to advancing through modified sport/recreation activities based on symptom presentation. See Appendix A: Return to Sport Protocol.

School: Patients should return to learning activities as soon as they can tolerate them, with or without accomodations.[24] Absence from these activities >1 week is not recommended.[24] Collaborate with teachers, support staff, and family members, as appropriate.[25] Use of the CATT Student Return to Learn Plan is recommended for ease of documentation. See Appendix B: Return to School Protocol.

Work: Modifications to the work environment and/or demands are often necessary to support an effective return to work. Completion of the CATT Medical Assessment Letter can be helpful to provide clear and documented instruction for the patient and their employer. See Appendix C: Return to Work Protocol.

- WorkSafeBC has two relevant programs for workplace injuries: Early Concussion Assessment and Treatment (ECAT) Program and Post-Concussion Management Program (PCMP). Occupational health consult is also available through the RACE line. Refer to the Practitioner Resources section below.
- Consultation with WorkSafeBC experts is available provincially through the RACE line, both for clinical management of work-related injuries as well as general occupational medicine inquiries.

Driving: Determine whether patient should refrain from driving and whether a Driver's Medical Examination Report might be required.

Symptom Management

Physical activity and aerobic exercise are important interventions to decrease concussion-related symptoms and reduce the risk of persistent symptoms.[20] This activity can begin even in the presence of mild residual symptoms. However, activity should be slowed if there is more than mild and brief exacerbation of symptoms (i.e., >2 point increase in symptom severity score for >1 hour).[23] Refer to Figure 2: General Return to Activity Protocol for specific instruction on introducing and increasing aerobic activity intensity.

Headache, sleep disturbances, and mood changes are the most important symptoms to manage as these respond best to intervention and may impact other concussion-related symptoms.[13] See Table 3: Ongoing Management Strategies for Adult Headache, Sleep Disturbances, and Mood.

- Consider non-pharmacological and self-management approaches first.
- Avoid opiates[10] and substances like alcohol, cannabis, and sedatives. These can mask concussion-related symptoms.

Table 3: Ongoing Management Strategies for Adult Headache, Sleep Disturbances, and Mood

Non-Pharmacological / Self-Management		
Headache[26] • Identify and avoid triggers (e.g., noise and bright lights) for the first 1-2 weeks. Note that prolonged avoidance may increase sensitivity. • Self-regulated interventions (e.g., cold/hot packs). • Lifestyle strategies (e.g., regular/balanced nutrition and adequate hydration). • Passive therapies (e.g., relaxation, massage, acupuncture, manual therapies).	**Sleep Disturbances** **Mild Sleep Disturbances** • Environmental and behavioural modifications, including sleep hygiene strategies • Avoiding stimulating food and substances[10] **Moderate-Severe Insomnia** • CBT	**Mood Changes** **Major Depressive Disorder, anxiety disorders** • CBT • Physical exercise[27]
Pharmacological		
Headache ***Tension/Unclassified Headaches*** • Acetaminophen • NSAIDs, e.g., ibuprofen, naproxen ***Migraine Headaches:*** • Triptans (e.g., sumatriptan) *Clinical Considerations:* • Recommend acetaminophen over NSAIDs within 24-48 hours of injury (↑ risk of bleed) • Avoid opioids (may mask concussion symptoms and associated with adverse events, e.g., drowsiness and risk of dependence). • Limit analgesic use to <15 days/month and triptans <10 days/month to avoid medication overuse headache.	**Sleep Disturbances** Natural health products: • Melatonin[28] • Magnesium, zinc May consider low-dose, *short-term* use: • Trazodone • Tricyclic antidepressants (e.g. amitriptyline) • Mirtazapine • Zopiclone (With caution) *Clinical Considerations:* • Avoid benzodiazepines due to potential adverse events, e.g., sedation, cognitive impairment, increased risk of falls, etc.	**Mood Changes** **Depression and Anxiety (moderate-severe)** • 1st Line: SSRI (e.g., sertraline) • 2nd Line: an alternate SSRI, SNRI, mirtazapine, TCA

Notes: *ASA = Acetylsalicylic acid; CBT = Cognitive Behavioural Therapy; NSAIDs = Non-steroidal anti-inflammatory drugs; SNRI = Serotonin and norepinephrine reuptake inhibitors; SSRI = Selective serotonin reuptake inhibitors; TCA = Tricyclic antidepressants.*

Figure 2. General Return to Activity Protocol

Return to Activity

This tool is intended for a general audience and serves as a guideline for managing an individual's return to activity following a concussion and does not replace medical advice. Timelines and activities may vary based on direction from a doctor, nurse practitioner, or healthcare professional with relevant training. Begin Step 1 within 24 hours of injury, with progression through each subsequent step taking a minimum of 24 hours.

STEP 1:

Activities of daily living and relative rest*

- Maximum of 24-48 hours
- Activities at home such as social interactions and light walking that do not result in more than mild and brief** exacerbation (worsening) of concussion symptoms.

Examples:
- Preparing meals
- Housework
- Light walking

- Minimize screen time for first 24-48 hours following concussion.
- Sleep as much as your body needs while trying to maintain a regular night sleeping schedule.
- Avoid driving during the first 24-48 hours after a concussion.

Note: The goal for each step is to find the balance between doing too much and too little.

Activities of daily living, as tolerated

After a maximum of 24-48 hours after injury,
BEGIN STEP 2

STEP 2:

2A: Light effort aerobic activity

- Up to approximately 55% of maximum heart rate (predicted according to age - i.e. 220-age).
- In a safe and controlled environment, engage in light effort aerobic activity.

Examples:
- Stationary cycling
- Walking at slow to brisk pace
- Gardening
- Dancing
- Housework

- Use of devices with screens may be gradually resumed.

2B: Moderate effort aerobic activity

- Up to approximately 70% of maximum heart rate (predicted according to age - i.e. 220-age).

Examples:
- See examples in Step 2A
- Exercises and activities that do not result in more than mild and brief** exacerbation (worsening) of concussion symptoms and do not have a risk of falling or head impact.

- Take a break and modify activities as needed with the aim of gradually increasing tolerance and the intensity of aerobic activities.

Increase heart rate

If can tolerate moderate aerobic activity,
BEGIN STEP 3

STEP 3:

Increase activity intensity

- Participate in normal day-to-day activities, including normal physical/training activities, school gym-class, and work-related activities

Examples:
- Workouts
- Swimming
- Fast-paced walking
- Shoveling
- Yoga/Pilates

It is important to get medical clearance before returning to activities that involve any risk of inadvertent head impact.

Increase intensity of aerobic activities, resume usual intensity of exercise, coordination, and activity-related cognitive skills

If can tolerate further increase in aerobic activity to pre-injury levels and have received medical clearance,
BEGIN STEP 4

STEP 4:

Return to activity

Back to normal, unrestricted activity

Examples:
- Outdoor biking
- Paddling and water activities
- Normal unrestricted work-related tasks and higher risk activities
- School gym class
- No restrictions on physical activities

Note: Returning to high-risk activities before you have recovered increases the risk of delayed recovery and for sustaining another more severe concussion or serious injury.

Medical determination of readiness to return to at-risk activities should occur prior to returning to any activities that pose risk of contact, collision, or fall.

*Refer to the **Return to Sport Strategy** for information on returning to high-risk activities, including sports and competitive play.*
If more than mild exacerbation (worsening) of symptoms (i.e., more than 2 points on a 0-10 scale***) occurs during Steps 1-2, stop the activity, and attempt to exercise the next day. Individuals experiencing concussion symptoms during Steps 3-4 should return to Step 2 to establish full resolution of symptoms with exertion before engaging in at-risk activities. Written determination of medical clearance should be provided before returning to activities that involve any risk of inadvertent head impact.
Driving should resume after consultation with a doctor, nurse practitioner, or healthcare professional.

*Relative rest: activities of daily living including walking and other light physical and cognitive activities are permitted as tolerated.
Mild exacerbation (worsening) of symptoms: No more than a 2-point increase when compared with the pre-activity value on a 0-10-point symptom severity scale.* "Brief" exacerbation of symptoms: Worsening of symptoms for up to 1 hour.
***0-10 point symptom severity scale: Please see the Visual Analog Scale for an example of a 0-10 symptom severity scale.

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Adapted from: Zemek, R., Reed, N., Dawson, J., et al . "Living Guideline for Pediatric Concussion Care." www.pedsconcussion.com (*the PedsConcussion protocol was modified with permission from the Amsterdam International Consensus Statement on Concussion in Sport*)

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Follow-Up

Ideally, all patients should have a primary care follow-up within 2 weeks. Additional follow-up may be required depending on recovery trajectory. The purpose of follow-up is to:

1. Assess progress and tolerance of return to activities.
2. Determine medical readiness for return to full normal activities and document, if required.
3. Screen for persisting symptoms and evaluate for other conditions.
4. Consider indications for referral.

1. Assess Progress and Tolerance of Return to Activities

Reassess signs and symptoms while inquiring about progress and tolerance of return to normal activities. Provide additional education with respect to tailoring or proceeding with graded protocols. Provide guidance on appropriate accommodation for work/school/sport activities.

2. Determine Medical Readiness for Return to Full Normal Activities

The graded return to activities protocol requires medical readiness prior to return to at-risk activities (e.g., full contact sport practice or activities with risk of head injury) (See Figure 2: General Return to Activity Protocol).[29] Many organizations require documentation of this medical clearance for athletic, learning, or occupational activities. Be aware that social and other pressures may suggest an inappropriate/premature return to activity. If needed, consider completion of the CATT Medical Clearance Letter with explicit written guidance regarding restricted activities. Note appropriately in the patient record.

3. Screen for Persisting Symptoms and Evaluate for Other Conditions

Consider screening for risk of persisting symptoms using either the 5P pediatric risk score[30] (5-18 years old) or the Post-Concussion Symptoms Rule (PoCS Rule)[31] (≥14 years) (See Appendix E: Screening Tools for Persisting Concussion Symptoms). These validated tools can help support initial assessment of relevant medical history (e.g., migraines, mental health or mood disorders, etc.).

Consider the following validated tools for other conditions based on patient history, symptoms, and clinical assessment. Treat other conditions while concurrently treating for concussion. Initiate specialist referrals, as appropriate.

- **Headache:** International Classification of Headache Disorders (ICHD-III)
- **Neck Pain:** Neck Pain Disability Index
- **Anxiety:** Generalized Anxiety Disorder 7-item Scale (GAD-7)
- **Depression:** Patient Health Questionnaire-9 (PHQ-9)[32] or PROMIS Emotional Distress – Anxiety – Short Form for adults, Kutcher Adolescent Depression Scale (11-item) for adolescents
- **Attention Deficit/Hyperactive Disorder (ADHD):** SNAP-IV 26 parent teacher questionnaire, Adult ADHD Self-Report Scale (ASRS-v1.1)
- **Vestibular Impairment:** Vestibular/Ocular Motor Screen (VOMS)
- **Postural Orthostatic Tachycardia Syndrome (POTS):** Orthostatic vitals monitoring at regular intervals for 10 minutes when supine and then standing, ECG).[33] Refer here for more information.
- **Substance Use Disorders:** CAGE (alcohol) and CAGE-AID (alcohol and other substances)
- **Post-Traumatic Stress Disorder (PTSD):** PC-PTSD-5 or PCL-5

4. Consider Indications for Referral

Specialized interdisciplinary care is best initiated early for those who are at risk for persistent symptoms, are highly active, are involved in high-risk activities, have comorbidities, or do not tolerate graded return to activity.

- While management at interdisciplinary concussion clinics is ideal, access is not readily available outside major urban areas. Consider virtual consultations. Refer to the Practitioner Resources section for information on regional health authority services. The RACE line is available provincially for consults in physical and rehabilitation medicine, psychiatry, and WorkSafeBC.
- There is evidence to support cervicovestibular or vestibular rehab for concussion rehabilitation. Consider referral to allied health rehabilitative practitioner(s) with specialty in vestibular rehab (e.g., physiotherapy) for patients with persisting impairments in these domains.[1,34] However, these services may not be publicly funded.

Support may be available through WorkSafeBC (e.g., vocational rehabilitation), Veterans Affairs Canada, Victims Services, Insurance Corporation of BC (ICBC), private insurers, First Nations Health Authority, and individual Indigenous bands.

Special Considerations for Children, Older Adults, and Certain Populations

Children

- Young children present with more generalized symptoms of malaise/fatigue/behavior change.[35]
- While most recover within a normal timeframe without incident,[36] children and youth 5-18 years have an increased risk of mental health issues, self-harm, and psychiatric hospitalization following concussion.[37] Screen and manage appropriately.
- Where possible, co-manage patients <5 years old with persisting symptoms with a pediatrician. Consultation is available through the RACE and Real Time Virtual Support (RTVS) Child Health Advice in Real-Time Electronically (CHARLiE) programs.
- Children <2 years old should be screened for abuse related head trauma.

Older Adults

- Falls are the most common mechanism of injury for concussion in the older adult.[6] Refer to BC Guidelines: Fall Prevention: Risk Assessment and Management for Community-Dwelling Older Adults.
- Cognitive impairment, polypharmacy, and physical aging increase the risk of concussion in older adults.[6] Some medications (e.g., sedatives, psychotropics, and antithrombotic) can increase the risk of injury as well as severity/complications.[6]
- Concussion may be more difficult to diagnosis in the older adult.
  - Older adults may present with fewer occurrences of LOC and higher GCS scores, which may decrease clinical suspicion for concussion.[6]
  - Differentiating between delirium, pre-existing cognitive impairment, and cognitive effects resulting from a concussion may be challenging.[6]
- High scores for post-injury neck pain, irritability, and forgetfulness are predictive of increased risk of incomplete recovery in older adults.[15]
- Older adults might report more issues with balance, fatigue, and noise sensitivity as persisting symptoms.[6]

Other Special Populations/Scenarios

- Interpersonal violence, including intimate partner violence, and child abuse/neglect are always a consideration with trauma-related presentations. Report as required. Refer for forensic examination, child maltreatment clinic, and/or Victim Support Services, as appropriate.
- Patients with neurological conditions or injuries (e.g., Parkinson's disease, multiple sclerosis, spinal cord injury) will likely require an altered approach to assessment and management. Consider specialist involvement.
- Mental health sequelae of concussion are often under-reported, under-appreciated and may surface in a gradual or insidious way. Maintain a high index of suspicion, screen and manage appropriately.
- Repetitive head trauma is a risk factor for chronic traumatic encephalopathy (CTE). CTE is associated with progressive neurological deterioration and symptoms, including changes in behaviour/mood, memory loss, cognitive impairment, and dementia.[38] However, CTE has been described exclusively based on autopsy studies in certain professional athletes (i.e., football players, boxers) and combat personnel.[38]
- Second impact syndrome can result from subsequent head trauma leading to diffuse cerebral swelling and brain herniation. This is a controversial diagnosis and is exceptionally rare.

Controversies in Care

- The American Congress of Rehabilitative Medicine (ACRM) exclusion criteria[2] for mTBI list LOC >30 min and GCS <13 at 30 minutes post injury. However, many clinical experts suggest that almost any LOC and a GCS <15 at 30 minutes would be sufficient to exclude mTBI and raise consideration of more severe brain injury.
- While the full ACRM diagnostic criteria reference laboratory test findings for diagnosis of mTBI, such tests are not currently available in BC nor are they universally used in specialized concussion clinics.

Resources

Abbreviations

ACRM American Congress of Rehabilitative Medicine
ASA Acetylsalicylic acid
CATT Concussion Awareness Training Tool
CBT Cognitive Behavioural Therapy
ciTBI Clinically Important TBI
CT Computed Tomography
CTE Chronic Traumatic Encephalopathy
ECAT Early Concussion Assessment and Treatment (WorkSafeBC)
ECG Electrocardiogram
EEG Electroencephalogram
GCS Glasgow Coma Scale
ICBC Insurance Corporation of BC
LOC Loss of Consciousness
mTBI Mild Traumatic Brain Injury
NSAIDs Nonsteroidal anti-inflammatory drug
PCMP Post-Concussion Management Program (WorkSafeBC)
POTS Postural Orthostatic Tachycardia Syndrome
ROM Range of Motion
SCAT Sport Concussion Assessment Tool
SCOAT Sport Concussion Office Assessment Tool
SNRI Serotonin and norepinephrine reuptake inhibitors
SSRI Selective serotonin reuptake inhibitors
TCA Tricyclic antidepressants
VOMS Vestibular Ocular Motor Screening

Practitioner Resources

- **Health Authority Concussion Clinics**
  - **Vancouver Coastal:**
    - G.F. Strong Adult Concussion Service: Two services (1) Early Response Concussion Service, and (2) Self-Management Program.
    - G.F. Strong Adolescent Complex Concussion Clinic (12-18 years old) for interdisciplinary rehabilitation.
  - **Fraser:**
    - Fraser Health Concussion Clinic: Early education and link to specialists, as needed.
    - Embrace Clinic and Strangulation Clinic for victims of recent violence, including head injuries from violence. Self-referral or referral by professional with patient consent – 604-827-5406 or www.fraserhealth.ca/embraceclinic (available to any person living in BC, located in Surrey, BC.)
  - **Island, Northern, and Interior Health:** No dedicated concussion program.
- **Standardized Concussion Assessment Tool Examples**
  - Acute Concussion Evaluation (ACE)
  - <72 hours – Sport Concussion Assessment Tool (SCAT). See Adult SCAT6 and Child SCAT6.
  - >72 hours – Sport Concussion Office Assessment Tool (SCOAT). See Adult SCOAT6 and Child SCOAT6.
- **Continuing Medical Education:** UBC-CPD / BC Children's Hospital / Pediatrics and Parachute developed an online Concussion Awareness Training Tool (CATT) for medical professionals.
- **Pathways BC:** An on-line referral resource for clinicians available through all Divisions of Family Practice in BC. Membership in a regional Division of Family Practice is required to access.
- **Rapid Access to Consultative Expertise (RACE):** A phone consultation line for physicians, nurse practitioners and medical residents. If the relevant specialty area is available through your local RACE line, please contact them first. | Monday to Friday 0800 – 1700 | Toll Free: 1–877–696–2131
- **Real Time Virtual Support (RTVS):** Available to support practitioners in rural, remote, and First Nations communities in BC.
  - Rural Urgent Doctor in aid (RUDi) for instant emergency medicine support.
  - Child Health Advice in Real-Time Electronically (CHARLiE) for instant pediatric support.
- **Health Data Coalition:** An online, physician-led data sharing platform that can assist in assessing your own practice in areas such as chronic disease management or medication prescribing.
- **Family Practice Services Committee**
  - **Practice Support Program:** Offers focused, accredited training sessions for BC physicians to help them improve practice efficiency and support enhanced patient care.
  - **Chronic Disease Management and Complex Care Incentives:** Compensates family physicians for the time and skill needed to work with patients with complex conditions or specific chronic diseases.
- **Public Health Agency of Canada:** Provides resources to help patients make wise choices about healthy living, including increasing physical activity and eating well.
- **Relevant BC Guidelines**
  - Appropriate Imaging for Common Situations in Primary and Emergency Care
  - Computed Tomography (CT) Prioritization
  - Anxiety and Depression in Children and Youth / Major Depressive Disorder in Adults
  - Fall Prevention: Risk Assessment and Management for Community-Dwelling Older Adults
- **Other Concussion Symptom Severity Scoresheets**
  - Post Concussion Symptom Scale[39]
  - Post-Concussion Symptom Inventory

- **CATT Medical Clearance Letter**
- **Other Canadian Clinical Resources for Concussion**
  - National Adult Concussion Living Guidelines
  - National Pediatric Concussion Living Guidelines
    - Virtual Concussion Exam Manual
  - Parachute – Canadian Guideline on Concussion in Sport

Patient, Family and Caregiver Resources

- **Concussion Awareness Training Tool (CATT):** For youth, athletes, caregivers, coaches, school professionals, workers and workplaces, women's support worker, and medical professionals.
- **HealthLinkBC:** Patients can call HealthLinkBC at 8-1-1 toll-free in B.C., or for the deaf and the hard of hearing, call 7-1-1. Patients will be connected with an English-speaking health-service navigator who can provide health and health-service information, and connect them with a registered dietitian, exercise physiologist, nurse, or pharmacist.
- **Vancouver Coastal Health My Guide – Adult Concussion:** Customizable self-management tool for adults.
- **Vancouver Coastal Health My Guide – Teen Concussion:** Customizable self-management tool for adolescents.
- **Crime Victims Assistance Program:** Assists victims, immediate family and some witnesses in coping with the effects of violent crime. This can include medical and dental services, prescription drug expenses, counselling, childcare, etc.
- **Return to Learn information:** Public Health Agency of Canada or GF Strong School Program
- **Support for interpersonal violence:** Ending Violence Association of Canada
- **Mental Health support**
  - BounceBack BC: Online or phone coaching for youth (13-18) and adults (18+)
  - Kelty's Key: Email counselling with a CBT therapist, self-management supports for adults.
- **Self-Management BC** for free general health support.

Diagnostic Codes

- 850.0-850.9: Concussion, excludes concussion with 1) cerebral laceration or contusion, and 2) cerebral hemorrhage.
- 959.01: Head injury, unspecified

Billing Codes

- ED: Level II (01812, 01822, 01832, 01842) or Level III (01813, 01823, 01833, 01843)
- Family: Exam / Visit / Counselling

Appendices

- Appendix A – Return to Sport Protocol
- Appendix B – Return to School Protocol
- Appendix C – Return to Work Protocol
- Appendix D – Patient Education Handout
- Appendix E – Screening Tools for Persisting Concussion Symptoms

Associated Documents

The following documents accompany this guideline:

- List of Contributors

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Appendix A: Return to Sport Protocol

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Return to Sport

This tool is a guideline for managing an individual's return to sport following a concussion and does not replace medical advice. Timelines and activities may vary based on direction from a doctor, nurse practitioner, or licensed healthcare professional with relevant training.
Begin Step 1 within 24 hours of injury, with progression through each subsequent step taking a minimum of 24 hours.

STEP 1:

Activities of daily living and relative rest*

- Maximum of 24-48 hours
- Activities at home such as social interactions and light walking that do not result in more than mild and brief** exacerbation (worsening) of concussion symptoms.

Examples:
- Preparing meals
- Housework
- Light walking

- Minimize screen time for first 24-48 hours following concussion.

Activities of daily living, as tolerated

After a maximum of 24-48 hours after injury,
BEGIN STEP 2

STEP 2:

2A: Light effort aerobic exercise

- Up to approximately 55% of maximum heart rate (predicted according to age - i.e. 220-age).
- In a safe and controlled environment, engage in light aerobic exercise.

Examples:
- Stationary cycling
- Walking at slow to medium pace
- Light resistance training that does not result in more than mild and brief** exacerbation (worsening) of concussion symptoms.

2B: Moderate effort aerobic exercise

- Up to approximately 70% of maximum heart rate (predicted according to age - i.e. 220-age).
- Take a break and modify activities as needed with the aim of gradually increasing tolerance and the intensity of aerobic activities.

Increase heart rate

If can tolerate moderate aerobic exercise,
BEGIN STEP 3

STEP 3:

Individual sport-specific activities
(that do not have a risk of inadvertent head impact)

- Addition of individual sport-specific activities that are supervised by a teacher/coach/parent.

Examples:
- Skating drills (hockey)
- Running drills (soccer)
- Change of direction drills
- Individual gym class activities

It is important to get medical clearance before returning to training that involves any risk of inadvertent head impact.

Increase intensity of aerobic activities and introduce low-risk sport-specific movements and changing of directions

If medically cleared and have fully returned to school,
BEGIN STEP 4

STEP 4:

Non-contact training drills and activities

- Progress to exercises at high intensity, including more challenging drills and activities.

Examples:
- Passing drills
- Multi-player training
- Supervised non-contact gym class activities
- Practices without body contact

Resume usual intensity of exercise, coordination, and activity-related cognitive skills

If can tolerate usual intensity of activities,
BEGIN STEP 5

STEP 5:

Return to all non-competitive activities

- Return to all non-competitive activities, all gym class activities, and full-contact practices
- Participate in higher-risk activities including normal training activities, all school gym-class activities, and full-contact sports practices and scrimmages. Avoid competitive gameplay.

Return to activities that have a risk of falling or body contact, restore game-play confidence, and have coaches assess functional skills.

If can tolerate non-competitive, high-risk activities,
BEGIN STEP 6

STEP 6:

Return to sport

Back to normal, unrestricted competitive game play, school gym class, and physical activities.

Note: Returning to full contact, competitive play or high-risk activities before you have recovered increases the risk of delayed recovery and for sustaining another more severe concussion or serious injury.

If more than mild exacerbation (worsening) of symptoms (i.e., more than 2 points on a 0-10 scale***) occurs during Steps 1-3, stop the activity, and attempt to exercise the next day. Individuals experiencing concussion symptoms during Steps 4-6 should return to Step 3 to establish full resolution of symptoms with exertion before engaging in at-risk activities. Written determination of medical clearance should be provided before unrestricted Return to Sport as directed by local laws and/or sporting regulations.

Medical determination of readiness to return to at-risk activities should occur prior to returning to any activities that pose risk of contact, collision, or fall.

*Relative rest: activities of daily living including walking and other light physical and cognitive activities are permitted as tolerated.
Mild exacerbation (worsening) of symptoms: No more than a 2-point increase when compared with the pre-activity value on a 0-10-point symptom severity scale.* "Brief" exacerbation of symptoms: Worsening of symptoms for up to 1 hour.
***0-10 point symptom severity scale: Please see the Visual Analog Scale for an example of a 0-10 symptom severity scale.

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Adapted from: Zemek, R., Reed, N., Dawson, J., et al . "Living Guideline for Pediatric Concussion Care." www.pedsconcussion.com (*the PedsConcussion protocol was modified with permission from the Amsterdam International Consensus Statement on Concussion in Sport*)

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Appendix B: Return to School Protocol

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Return to School

This tool is a guideline for managing a student's return to school following a concussion and does not replace medical advice. Timelines and activities may vary by direction of a health care professional.

AT HOME

STAGE 1:

Physical & cognitive rest

- Basic board games, crafts, talk on phone
- Activities that do not increase heart rate or break a sweat

Limit/Avoid:

- Computer, TV, texting, video games, reading

No:

- School work
- Sports
- Work
- Driving until cleared by a health care professional

Rest

When symptoms start to improve OR after resting for 2 days max, **BEGIN STAGE 2**

STAGE 2:

Start with light cognitive activity:

Gradually increase cognitive activity up to 30 min. Take frequent breaks.

Prior activities plus:

- Reading, TV, drawing
- Limited peer contact and social networking

Contact school to create *Return to School* plan.

When light cognitive activity is tolerated:

Introduce school work.

Prior activities plus:

- School work as per *Return to School* plan

Communicate with school on student's progression.

No:

- School attendance
- Sports
- Work

Gradually add cognitive activity including school work at home

Tolerates 30 min. of cognitive activity, introduce **school work at home**

Tolerates 60 min. of school work in two 30 min. intervals, **BEGIN STAGE 3**

AT SCHOOL

STAGE 3:

Back to school part-time

Part-time school with maximum accommodations.

Prior activities plus:

- School work at school as per *Return to School* plan

No:

- P.E., physical activity at lunch/recess, homework, testing, sports, assemblies, field trips

Communicate with school on student's progression.

School work only at school

Tolerates 120 min. of cognitive activity in 30-45 min. intervals, **BEGIN STAGE 4**

STAGE 4:

Part-time school

Increase school time with moderate accommodations.

Prior activities plus:

- Increase time at school
- Decrease accommodations
- Homework – up to 30 min./day
- Classroom testing with adaptations

No:

- P.E., physical activity at lunch/recess, sports, standardized testing

Communicate with school on student's progression.

Increase school work, introduce homework, decrease learning accommodations

Tolerates 240 min. of cognitive activity in 45-60 min. intervals, **BEGIN STAGE 5**

STAGE 5:

Full-time school

Full days at school, minimal accommodations.

Prior activities plus:

- Start to eliminate accommodations
- Increase homework to 60 min./day
- Limit routine testing to one test per day with adaptations

No:

- P.E., physical activity at lunch/recess, sports, standardized testing

Work up to full days at school, minimal learning accommodations

Tolerates school full-time with no learning accommodations **BEGIN STAGE 6**

STAGE 6:

Full-time school

Full days at school, no learning accommodations.

Prior activities plus:

- Attend all classes
- All homework
- Full extracurricular involvement
- All testing

No:

- full participation in P.E. or sports until *Return to Sport* protocol completed and written medical clearance provided

Full academic load

Return to School protocol completed; focus on ***RETURN TO SPORT***

Note: A student is tolerating an activity if symptoms are not exacerbated.

Adapted from the Return to Learn protocol by G.F. Strong School Program (Vancouver School Board), Adolescent and Young Adult Program, G.F. Strong Rehabilitation Centre.

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Appendix C: Return to Work Protocol

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Return to Work

This tool is a guideline for managing an individual's return to work following a concussion and does not replace medical advice. Every concussion is unique, and recovery is very different for each individual. Timelines and activities may vary based on direction from a doctor, nurse practitioner, or healthcare professional with relevant training. It is important to get medical clearance before returning to high-risk activities.

STEP 1:

Activities of daily living and relative rest*

- Maximum of 24-48 hours
- Activities at home such as social interactions and light walking that do not result in more than mild and brief** exacerbation (worsening) of concussion symptoms.
- **Examples:**
  - Preparing meals
  - Housework
  - Light walking
- Minimize screen time for first 24-48 hours following concussion.
- Avoid driving during the first 24-48 hours after a concussion.

Contact workplace to discuss a tailored Return to Work plan.

Activities of daily living, as tolerated

After a maximum of 24-48 hours after injury,
BEGIN STEP 2

STEP 2:

Work activities (at work, as tolerated)

- Medically unnecessary delays in Return to Work should be avoided.
- Individuals are encouraged to remain at, or promptly return, to some form of productive work, provided it does not pose risk of re-injury.
- Reading or other cognitive activities.
- Take breaks and adapt activities if concussion symptom exacerbation (worsening) is more than mild and brief.**
- Use of devices with screens may be gradually resumed, as tolerated.

Increase tolerance to work-related activities and connect socially with peers/colleagues.

If able to tolerate work with accommodations,
BEGIN STEP 3

STEP 3:

Part-time or full-time days at work with accommodations (if needed)

- Gradually reintroduce work activities, according to your graduated return to work plan.
- May require accommodations, such as:
  - Partial work days with access to breaks throughout the day
  - Extra time for tasks
  - Access to a quiet, distraction-free work environment
- Gradually reduce accommodations and increase workload until full days without concussion-related accommodations are tolerated.
- Accommodations can be phased out in "trial" periods, to ensure that they are no longer needed.

Gradually reduce accommodations and increase workload

If can tolerate full days without concussion related accommodations,
BEGIN STEP 4

STEP 4:

Return to work full-time

Return to full days at work without requiring accommodations (related to the concussion).

Note: Only return to job duties that may have safety implications for you or others (e.g., operating heavy equipment, working from heights) when cleared by a doctor, nurse practitioner, or licensed healthcare professional.

Full workload (no accommodations related to the concussion)

Return to Work completed

Returning to work is an individual process, in some instances workers may return to regular duties, while others may need accommodations or placement in a completely different job function. Progression through the strategy may be slowed when there is more than a mild and brief symptom exacerbation**. Therefore, each program should be individually prescribed and should support the reintegration and rehabilitation of the person with the injury or disability back into the workplace. Written determination of medical clearance should be provided before full Return to Work, as required by workplaces or occupational health and safety organizations.
Driving should resume after consultation with a doctor, nurse practitioner, or healthcare professional.
Progression through the strategy may be slowed when there is more than a mild and brief symptom exacerbation.**

*Relative rest: activities of daily living including walking and other light physical and cognitive activities are permitted as tolerated.
Mild exacerbation (worsening) of symptoms: No more than a 2-point increase when compared with the pre-activity value on a 0-10-point symptom severity scale.* "Brief" exacerbation of symptoms: Worsening of symptoms for up to 1 hour.
***0-10 point symptom severity scale: Please see the Visual Analog Scale for an example of a 0-10 symptom severity scale.

www.cattonline.com

Adapted from: Zemek, R., Reed, N., Dawson, J., et al . "Living Guideline for Pediatric Concussion Care." www.pedsconcussion.com

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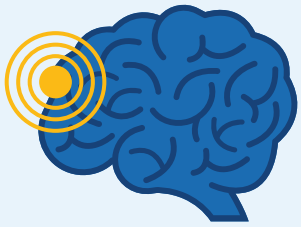
Concussion – Information for Patients

Concussion is a type of mild traumatic brain injury that can temporarily alter brain function. It can occur when the brain rapidly moves within the skull. Some common symptoms include headache, fatigue, nausea, imbalance, sensitivity to light and sound, cognitive difficulties, sleep disturbances, and emotional changes. Symptoms may appear immediately or several days after an injury. Symptoms typically resolve within four weeks.



Sleep

- The brain needs rest to heal. Follow these 12 Tips for Improving Sleep to help.
- Stick to a consistent sleep schedule. Napping a lot during the day might make it difficult to sleep at night.
- Don't wake up someone with a concussion if they're sleeping fine during the first few days following their injury.

Screen Time and Activities

- Minimize screen time for the first 2 days after your injury, including computers, TVs, and phones.
- Do things that help you relax. These could be things like painting, listening to quiet music, cooking, journaling, or spending time with loved ones.

Food and Fluids

- Eat healthy meals every 3-4 hours and prioritize hydration, mostly water.
- Avoid drinks with caffeine for the first few days because these can put added stress on your brain. However, know that you may get headaches if you are used to drinking caffeine regularly and you suddenly stop.

Alcohol and Drugs

- Avoid alcohol and recreational drugs. They can hide your symptoms and slow recovery.
- Discuss other medication use with your healthcare provider.

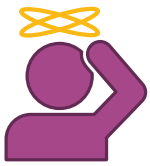
Driving

- Don't drive until you can focus well and manage complex situations. Talk to a doctor or nurse practitioner before driving.

Headache, Nausea, Dizziness

- If you have a headache, feel sick, or dizzy: put something cold or warm on your head, stretch and massage your neck and shoulders. Take slow breaths. Go to a quiet place.
- Pay attention to what triggers your headaches and, in general, try to avoid those things for the first 1-2 weeks. However, avoiding triggers for too long may make you more sensitive to them.

- Practice gentle neck exercises, including stretches and muscle contractions.
- Certain medications can mask concussion symptoms. Talk to your healthcare provide about when to use over-the-counter pain medication (e.g., acetaminophen or ibuprofen). Do not use opiates or narcotics that are not prescribed for you. Prolonged use and overuse of pain medications may lead to ongoing headaches after a concussion.



- Daily supplements like magnesium, omega-3 fatty acids, coenzyme Q10, and riboflavin may decrease how often you get headaches and how painful they are.

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Mood, Behavior, and Social Relationships

- Concussions can affect how you feel. You might feel tired, irritable, sad, or anxious.
- Being with family and friends can help make your mood better and more stable. Spend time with people you enjoy. Build fun into your day.
- If you are sad, anxious, irritable, depressed, etc., consider asking your doctor: Could counselling help? Could seeing a psychiatrist help?

Adults 65+ Years

- Ask your healthcare provider if they have any concerns about how your current medications might have an impact on your concussion recovery.
- Work with your healthcare provider to adjust your return to activity plan, if needed.
- Have someone accompany you to make sure you are safe when introducing activities back into your routine after concussion. For example, have someone join you for your aerobic walks in case you start to feel unsteady and need support.

Cognitive Tips

After a concussion, your brain might work slower. Conserve energy using the **Four Ps**:

Prioritize	Do the most important things first. Ask yourself: Is it urgent? Does it have to be done today? Can it wait until I am better?
Pace	Take breaks.
Plan	Plan your day and week so that you're doing work or chores when you have the most energy. Take turns between physical tasks like folding laundry and thinking tasks like using your computer for work. Make time for a hobby you enjoy.
Positions	Think about the things around you and how your posture can affect your energy level. Avoid standing too long and sitting hunched over. Avoid loud noises and bright lights. Find a quiet area where you can work. Listen to soothing music if that helps you. Consider a physical therapy plan to regain your postural strength and your awareness of your body's position and movement.

Returning to Physical Activity

- Aerobic activity like brisk walking has been shown to help concussion recovery.
  - Calculate your maximum heart rate.
    - Max heart rate = 220 – your age
  - Start with light aerobic activity (55% max heart rate) and then progress to moderate aerobic activity (70% max heart rate).
- Don't rush it. Follow a Return to Activity or Return to Sport plan to slowly get back to your regular activities with help from healthcare providers and/or sport coaches.
- Talk with your healthcare provider about moving on to greater exercise intensity and activities where there is a risk of re-injury.

Returning to School and Work

- You can go back to school/work within a few days if your symptoms aren't worse. You might need to adjust your normal school/work schedule or duties for the first little while.
- Talk to your teacher/employer and healthcare experts if you're not feeling well while at school/work.
- *School*: It is important to follow a structured, graded approach, and ensure accommodations have been arranged with your school, as needed. Work with school staff to make and follow a Return to Learn Plan.
- *Work*: Follow a Return to Work plan in consultation with medical professionals, occupational therapists, and workplace representatives.

When to Get More Help

- If you're not feeling better, talk to a healthcare professional so that you can get help.
- Learn more using the Concussion Awareness Training Tool. There are different modules for youth, parents and caregivers, school professionals, workers/workplaces, etc.
- Refer to Vancouver Coastal Health Authority's MyGuide: Concussion or MyGuide: Concussion (Teen Edition) for more patient information.

Appendix E: Screening Tools for Persisting Concussion Symptoms

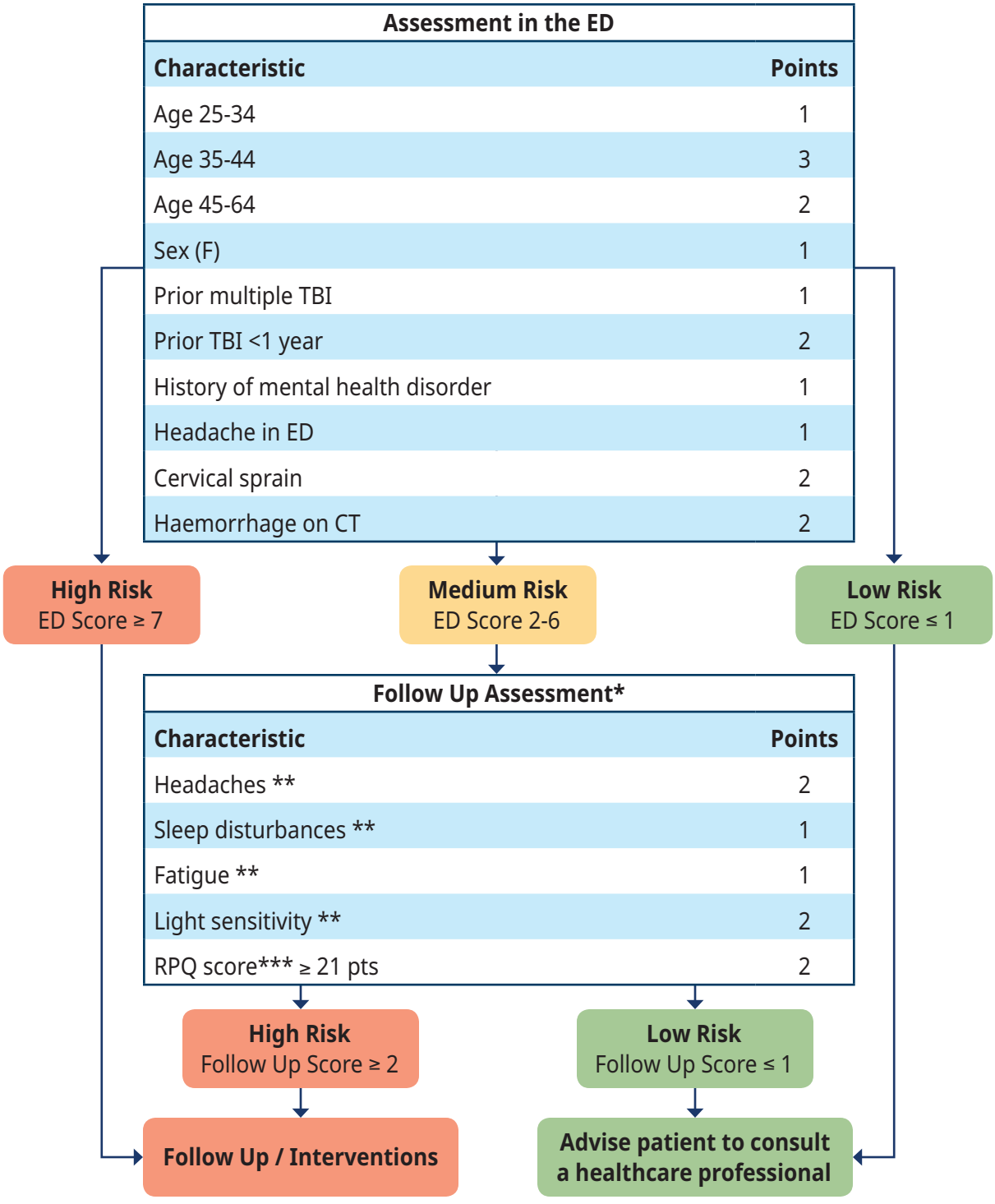
Paediatric Screening Tool (5-18 years): 5P

Accessed from: CHEO Research Institute - 5P (5pconcussion.com)

	0	1	2
Age	☐ 5 - <8	☐ 8 - <13	☐ 13 - <18
Sex	☐ Male		☐ Female
How long did the patient's previous concussion last?	☐ No previous concussion or recovery in < 1 week.	☐ Recovery took 1 week or longer.	
Does the patient have a history of migraines?	☐ No	☐ Yes	
Did the patient answer questions more slowly than normal as compared to before the injury?	☐ No	☐ Yes	
On the BESS Tandem stance balance testing, how many errors did the patient have in 20 seconds?	☐ 0-3 errors	☐ 4+ errors or could not complete testing	
Does the patient have a headache	☐ No	☐ Yes	
Does the patient have sensitivity to noise?	☐ No	☐ Yes	
Is the patient more fatigued?	☐ No		☐ Yes
TOTAL PATIENT SCORE	_____ (0 = lowest score, 12 = highest score)		

Youth/Adult Screening Tool (>14 years old): Prediction of Persistent Post-Concussion Symptoms (POCS Rule)

Accessed from: Le Sage N, Chauny JM, Berthelot S, Archambault P, Neveu X, Moore L, Boucher V, Frenette J, De Guise É, Ouellet MC, Lee J, McRae AD, Lang E, Émond M, Mercier É, Tardif PA, Swaine B, Cameron P, Perry JJ. Post-Concussion Symptoms Rule: Derivation and Validation of a Clinical Decision Rule for Early Prediction of Persistent Symptoms after a Mild Traumatic Brain Injury. J Neurotrauma. 2022 Oct;39(19-20):1349-1362. doi: 10.1089/neu.2022.0026. Epub 2022 Sep 9. PMID: 35765917; PMCID: PMC9529302.



* Follow-up by front line healthcare provider / phone call 7 days post mTBI
** At least 2 points on RPQ for each symptom
*** Rivermead Post Concussion Symptoms Questionnaire