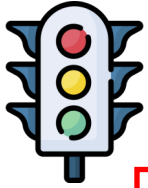


This tool provides information to facilitate the management of mild traumatic brain injury (mTBI) among children and adolescents ≤18 years of age

## Focused examination



### 1. Patient History

- Assess level of concern for major structural or other pathologies. If required, refer to an appropriate healthcare provider.
- Identify and assess other conditions, co-morbidities. Manage using appropriate care pathways.
- Address any prognostic factors that may delay recovery.

Major structural or other pathologies may be suspected with certain signs and symptoms (red flags) including:

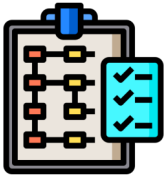
- Age younger than 2 years, vomiting, loss of consciousness, severe mechanism of injury, severe or worsening headache, amnesia, non-frontal scalp hematoma, GCS score less than 15, clinical suspicion of skull fracture, seizures, focal neurologic signs, looks very drowsy/can't be awakened, slurred speech, can't recognize people or places, increasing confusion or irritability, weakness or numbness in arms or legs, neck pain, unusual behavioural change, change in state of consciousness

Examples of risk factors for persistent symptoms:

- Older children/adolescents, lower socioeconomic status, severe presentation of mTBI including those associated with intracranial injury

Examples of prognostic factors that may delay recovery:

- Premorbid histories of mTBI, intracranial lesion, neurological or psychiatric disorders, learning difficulties, increased preinjury symptoms, family and social stressors



### 2. Physical Examination

- Use validated clinical decision rules (e.g., [Pediatric Emergency Care Applied Research Network \(PECARN\) Decision Rules](#)).
- Assess level of concern regarding major structural or other pathologies.
- Use the [Canadian C-spine Rule](#) to rule out cervical spine fractures and dislocations associated with acute trauma.
- Assess mental status and cognition, physical status, cranial nerves, extremity tone, strength, and reflexes, gait and balance, deterioration/ improvement since injury manage symptoms.

### 3. Management

- Offer information on nature, management, and the course of mTBI.
- Discuss the range of effective interventions with the patient and, together, select a therapeutic intervention.

### 4. Reevaluation and discharge

- Reassess the patient at every visit to determine if: (1) additional care is necessary; (2) the condition is worsening; or (3) the patient has recovered.
- Monitor for any emerging factors that may delay recovery.

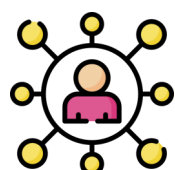
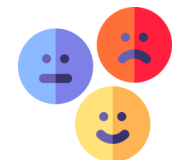
Incorporate one or more valid and reliable outcome measurements when assessing and monitoring patients

- [Self-rated Recovery Question](#)
- [Graded Symptom Checklist](#)
- [Post Concussion Symptom Scale](#)
- [Post-Concussion Symptom Inventory](#)
- [Pediatric Balance Scale](#)
- [Berg Balance Scale](#)
- [Pittsburgh Sleep Quality Index](#)

Visit our website for more [outcome measurements](#)

### 5. Referrals and collaboration

- Refer the patient to an appropriate healthcare provider for further evaluation at any time during their care if they develop worsening symptoms and new physical or psychological symptoms.



Include the following information:

- Warning signs of more serious injuries
- Description of injury and expected course of symptoms and recovery
- How to monitor post-concussive symptoms
- Prevention of further injury
- Return to play/school as tolerated; avoid prolonged physical and cognitive rest

## Specific Management of Symptoms

**Provide structured patient education (reassurance, promote and facilitate return to work and normal activities, self-care advice) and any one of the following therapeutic interventions\*:**

### Cognitive/Physical Rest and Aerobic Exercise

**Consider** restricting physical and cognitive activity during the first several days after injury

**Consider** counselling to resume a gradual schedule of activity that does not exacerbate symptoms significantly

**Consider** progressive reintroduction of non-contact aerobic activity that does not exacerbate symptoms

**Consider** counselling to return to full activity when they return to pre-injury performance

### Psychological and Emotional Support

**Assess** the extent and types of social support available to the patient and emphasize its importance in their recovery

### Return to School

**Consider** counselling patient and family regarding the process of gradually increasing the duration and intensity of academic activities as tolerated

**Consider** customizing return-to-school protocols based on severity of symptoms

**Consider** assessing the educational needs of the patient and determine the need for additional educational supports for those with prolonged symptoms that interfere with academic performance

**Consider** monitoring post-concussive symptoms and academic progress in school

**Consider** monitoring and adjusting educational supports on an ongoing basis

**Consider** referring patient to a specialist in paediatric mTBI for those who demonstrate prolonged symptoms and academic difficulties

### Post-traumatic Headache

**Consider** obtaining a head CT for severe headache, especially when associated with other risk factors and worsening headaches after injury

**Consider** emergent neuroimaging when undergoing observational periods for headache with acutely worsening symptoms

**Consider** non-opioid analgesia (ie. ibuprofen or acetamenophen) for painful headache combined with counselling regarding the risks of analgesic overuse, including rebound headache

**Consider** referring for multidisciplinary evaluation and treatment

### Vestibulo-Oculomotor Dysfunction

**Consider** referring for vestibular rehabilitation

### Sleep

**Consider** sleep hygiene

**Consider** referring to sleep disorder specialist

### Cognitive Impairment

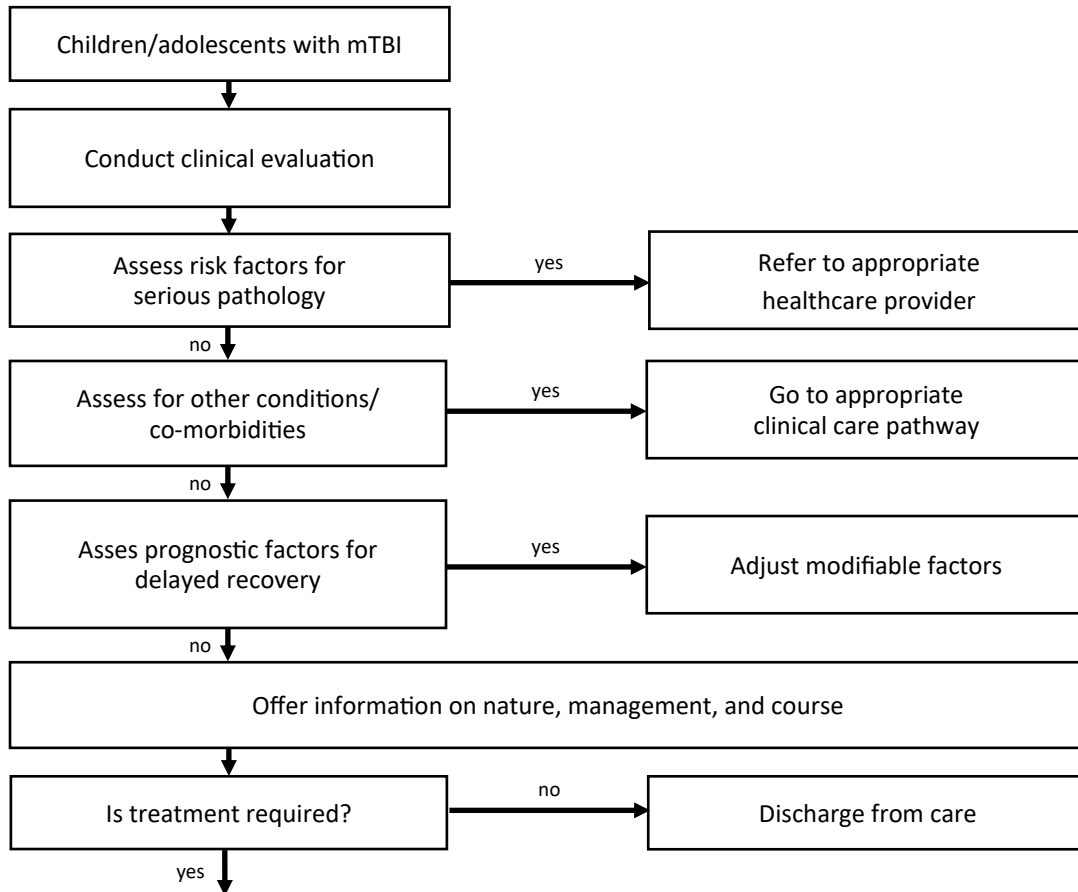
Determine the etiology of cognitive dysfunction within the context of mTBI symptoms and recommend treatment that reflects presumed etiology

**Consider** referring for a formal neuropsychological evaluation

\*Interventions are recommended if guidelines used terms such as 'recommended for consideration' (e.g., 'offer', 'consider'), 'strongly recommended', 'recommended without any conditions required', or 'should be used'. Recommendations from low-quality evidence are not listed.

[Lumba-Brown A, Yeates KO, Sarmiento K, et al. Centers for Disease Control and Prevention Guideline on the Diagnosis and Management of Mild Traumatic Brain Injury Among Children. \*JAMA Pediatr.\* 2018;172\(11\):e182853. doi:10.1001/jamapediatrics.2018.2853](#)

## Care pathway for the management of mTBI in children and adolescents



**Provide structured patient education (advice to stay active, reassurance, promote and facilitate return to work and normal activities, self-care advice, as appropriate) and any one of the following therapeutic interventions\*:**

### Cognitive/Physical Rest and Aerobic Exercise

- Restricting physical and cognitive activity
- Counselling to resume a gradual schedule of activity
- Progressive reintroduction of non-contact aerobic activity
- Counselling to return to full activity

### Return to School

- Gradual increase of academic activities
- Return-to-school protocol
- Additional educational supports
- Adjust educational supports

### Post-traumatic Headache

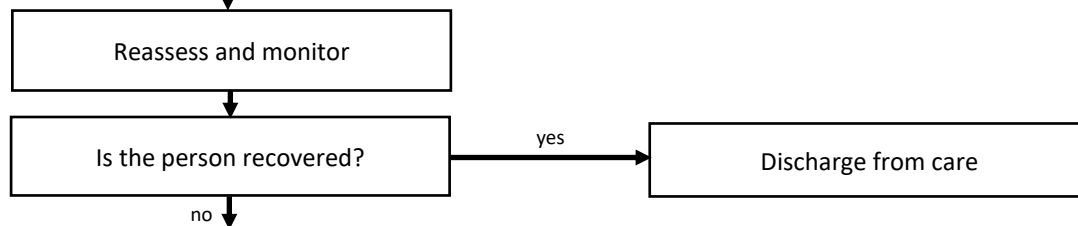
- Non-opioid analgesia

### Sleep

- Sleep hygiene

### Cognitive Impairment

- Determine the etiology of cognitive dysfunction within the context of mTBI symptoms and recommend treatment that reflects presumed etiology



**Incomplete recovery or major symptom change (new or worsening physical, mental or psychological symptoms): refer to appropriate healthcare provider**

\*Interventions are recommended if guidelines used terms such as 'recommended for consideration' (e.g., 'offer', 'consider'), 'strongly recommended', 'recommended without any conditions required', or 'should be used'. Recommendations from low-quality evidence are not listed.