Guideline for Concussion/Mild Traumatic Brain Injury & Persistent Symptoms

Healthcare Professional Version

Third Edition

Adults (18+ years of age)

SECTION 1: Diagnosis/Assessment of Concussion/mTBI

Ontario Neurotrauma Foundation
Fondation ontarienne de neurotraumatologie
The project team would like to acknowledge the Ontario Neurotrauma Foundation (ONF), who initiated and funded the development of the original guideline, as well as the current update. ONF is an applied health research organization with a focus on improving the quality of lives for people with an acquired brain injury or spinal cord injury, and on preventing neurotrauma injuries from occurring in the first place. ONF uses strategic research funding activity embedded within a knowledge mobilization and implementation framework to build capacity within systems of care. ONF works with numerous stakeholders and partners to achieve its objective of fostering, gathering and using research knowledge to improve care and quality of life for people who have sustained neurotrauma injuries, and to influence policy towards improved systems. The foundation receives its funding from the Ontario Government through the Ministry of Health and Long-Term Care.

Please note, the project team independently managed the development and production of the guideline and, thus, editorial independence is retained.

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The recommendations and resources found within the Guideline for Concussion/mTBI & Persistent Symptoms are intended to inform and instruct care providers and other stakeholders who deliver services to adults who have sustained or are suspected of having sustained a concussion/mTBI (mild traumatic brain injury). This guideline is not intended for use with patients or clients under the age of 18 years. This guideline is not intended for use by people who have sustained or are suspected of having sustained a concussion/mTBI for any self-diagnosis or treatment. Patients may wish to bring their healthcare and other providers’ attention to this guideline.

The recommendations provided in this guideline are informed by best available evidence at the time of publication, and relevant evidence published after this guideline could influence the recommendations made within. Clinicians should also consider their own clinical judgement, patient preferences and contextual factors such as resource availability in clinical decision-making processes.

The developers, contributors and supporting partners shall not be liable for any damages, claims, liabilities, costs or obligations arising from the use or misuse of this material, including loss or damage arising from any claims made by a third party.
Diagnosis of concussion/mTBI (see Definition) is the first critical step in successful management leading to improved outcomes and prevention of further injury. Patients commonly present to the Emergency Department (ED) or their primary care provider’s (PCP’s) office following trauma and may be unaware that they have sustained concussion/mTBI. A high level of suspicion is required particularly when there is evidence of direct trauma to the head or mechanism of injury\(^1\) that is frequently associated with mTBI, such as motor vehicle collision, falls, assaults and nonintentional strike by/against an object, including sport and recreational injury.\(^2\) Patients may present in a post-traumatic amnestic (PTA) state, where they may have a Glasgow Coma Scale (GCS) score of 15/15; however, they may be variably oriented and not able to form continuous memories.

The purpose of the initial medical assessment is to establish the diagnosis of concussion/mTBI by ruling out more severe forms of TBI, cervical spine injuries and medical and neurological conditions that can present with concussion-like symptoms.\(^3\) The need for neuroimaging should also be determined using the Canadian CT Head Rule (Figure 1.1).\(^4,5\) Despite the current research on advanced neuroimaging studies (such as DTI and fMRI),\(^6\) CT scans represent the most appropriate and widely available diagnostic imaging test to rule out acute intracranial hemorrhage. Patients who did present symptoms compatible with a concussion/mTBI following a head injury may also be completely asymptomatic by the time they are medically assessed. Once the medical assessment has excluded more severe forms of TBI, these patients should be presumed to have sustained a concussion/mTBI and be managed accordingly.

The severity of a person’s symptoms in the initial few days after a TBI is the strongest and most consistent predictor of slower recovery, and demonstrates clinical utility in tracking recovery.\(^7\) Therefore, symptoms should be formally documented at the time of the initial assessment for the purpose of subsequent comparative analysis in the event of persistent symptoms. Blood-based biomarkers\(^8\) are still considered investigational and therefore are not recommended for use in diagnosing/assessing patients in the ED or PCP’s office.

When establishing the diagnosis of concussion/mTBI, PCPs should also prepare patients and their support person for possible delayed complications by providing both verbal and written information. Namely, given that the majority of patients will be symptomatic acutely post-concussion/mTBI, education about anticipated symptoms and duration may assist patients in anticipating and understanding their recovery.\(^9\) For instance, patients are likely to initially experience reduced cognitive functioning post-injury, which typically resolves in a few days but in some instances may persist for weeks to months.\(^10\) Provision of information regarding mTBI symptoms and expectations for recovery, as well as instructions for follow-up, have been shown to be one of the more effective strategies in preventing the development of persistent symptoms post-concussion/mTBI. Follow-up by a PCP should be arranged for all patients with a diagnosed concussion/mTBI especially for those with risk factors outlined in Table 1.1. The PCP, or ED physician, if necessary, can monitor progress and ensure that patient symptoms are resolving along expected timelines and make timely arrangements for specialty referral when indicated. In both the initial assessment and the follow-up period, the ED physician or PCP should also attempt to explore and document risk factors (see Table 1.1) that may potentially

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1. Diagnosis/Assessment of Concussion/mTBI

Special Contributors: Michael Ellis, Pierre Frémont & Catherine Varner

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**Figure 1.1 Canadian CT Head Rule**

(Reproduced with permission)
delay recovery following concussion/mTBI, and consider closer monitoring of recovery or an acceleration of intervention strategies if needed. See Algorithm 1.1, which outlines the key steps for diagnosis/assessment and initial management.

### Table 1.1. Risk Factors Influencing Recovery Post mTBI

<table>
<thead>
<tr>
<th>Medical Factors: Pre-existing/ concurrent medical conditions or post-injury symptoms that are associated with poor outcomes post mTBI</th>
</tr>
</thead>
<tbody>
<tr>
<td>• History of previous traumatic brain injury</td>
</tr>
<tr>
<td>• History of previous physical limitations</td>
</tr>
<tr>
<td>• History of previous neurological or psychiatric problems</td>
</tr>
<tr>
<td>• Skull fracture</td>
</tr>
<tr>
<td>• Early onset of pain and in particular headache within 24 hours after injury</td>
</tr>
<tr>
<td>• Confounding effects of other health-related issues, e.g., pain medications, disabling effects of associated injuries, emotional distress</td>
</tr>
<tr>
<td>• Anxiety</td>
</tr>
<tr>
<td>• High number of symptoms reported early after injury i.e., high score on the Rivermead or Post Concussion Symptom Questionnaire</td>
</tr>
<tr>
<td>- Vestibular/vestibular-ocular abnormalities</td>
</tr>
<tr>
<td>- Pre-injury sleep disturbance or post-injury changes</td>
</tr>
<tr>
<td>- Reduced balance or dizziness</td>
</tr>
<tr>
<td>- Nausea after injury</td>
</tr>
<tr>
<td>- Memory problems after injury</td>
</tr>
<tr>
<td>- Post-traumatic amnesia (PTA)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contextual Factors: Personal, psychosocial, or environmental factors that may negatively influence recovery post mTBI</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Injury sustained in a motor vehicle accident</td>
</tr>
<tr>
<td>• Potential influence of secondary gain issues related to litigation and compensation</td>
</tr>
<tr>
<td>• Not returning to work or significant delays in returning to work following the injury</td>
</tr>
<tr>
<td>• Being a student</td>
</tr>
<tr>
<td>• Presence of life stressors at the time of the injury</td>
</tr>
<tr>
<td>• Higher levels of symptom reporting is associated with mood symptoms and heightened self-awareness of deficits</td>
</tr>
<tr>
<td>• Older age</td>
</tr>
<tr>
<td>• Lack of social supports</td>
</tr>
<tr>
<td>• Lower education/low social economic status</td>
</tr>
<tr>
<td>• Female gender</td>
</tr>
<tr>
<td>• Lower Resilience</td>
</tr>
<tr>
<td>• Returning to a contact/ risk of contact sport activity</td>
</tr>
</tbody>
</table>

Adapted from the Motor Accidents Authority of NSW, Guidelines for Mild Traumatic Brain Injury following a Closed Head Injury (MAA NSW, 2008)

### Table 1.2. Key Features of mTBI Assessment in an Emergency Department or Doctor’s Office

(a) A medical history encompassing a review of:
- Current symptoms and health concerns
- Setting and mechanism of injury
- Severity/duration of altered consciousness and immediate symptoms
- Presence of co-occurring injuries
- Pre-existing medical and mental health conditions
- Potentially contributing psychosocial factors

(b) An examination including an assessment of:
- Mental status and cognition
- Physical status
- Cranial nerves
- Extremity tone, strength, and reflexes
- Gait and balance

(c) An assessment of the patient's clinical status, including whether there has been improvement or deterioration since the time of injury. This may require additional information from others, including eyewitnesses to the injury.

(d) Determination of the need for urgent neuroimaging to exclude a more severe brain injury (see Figure 1.1), such as a structural abnormality or hemorrhage.

Adapted from the NSW Ministry of Health. Closed Head Injury in Adults - Initial Management (PD2012_013).
### RECOMMENDATIONS FOR DIAGNOSIS/ASSESSMENT OF mTBI

<table>
<thead>
<tr>
<th>Section</th>
<th>Recommendation</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Concussion/mTBI should be recognized and diagnosed as soon as possible to improve positive health outcomes for patients. Concussion can be recognized in the community by a non-medical professional, whereas diagnosis should be made by a physician/nurse practitioner.</td>
<td>A</td>
</tr>
<tr>
<td>1.2</td>
<td>On presentation, the primary care provider should conduct a comprehensive review of every patient who has sustained concussion/mTBI (see Appendix 1.1). The assessment should include taking a history, examination and cognitive screen for post-concussive symptoms, and review of mental health (see Table 1.2).</td>
<td>A</td>
</tr>
<tr>
<td>1.3</td>
<td>The need for early neuroimaging should be determined according to the Canadian CT Head Rule (see Figure 1.1). For patients who fulfill these criteria, CT scanning is the most appropriate investigation for the exclusion of neurosurgically significant lesions, such as hemorrhage. Plain skull x-rays are not recommended.</td>
<td>A</td>
</tr>
<tr>
<td>1.4</td>
<td>The presence of post-traumatic amnesia should be specifically assessed for during the acute assessment and its impact on the patient’s capacity should be considered when planning management (see Appendix 1.2).</td>
<td>A</td>
</tr>
</tbody>
</table>
| 1.5     | Patients presenting to hospital/ clinic acutely with concussion/mTBI can be safely discharged for home observation after an initial period of in-hospital observation if they meet the following clinical criteria:  
  - Normal mental status (alertness/behaviour/cognition) with clinically improving post-concussive symptoms after observation until at least four hours post-injury.  
  - No clinical risk factors indicating the need for CT scanning or normal CT scan result if performed due to presence of risk factors.  
  - No clinical indicators for prolonged hospital observation such as:  
    - clinical deterioration  
    - persistent abnormal Glasgow Coma Scale (GCS) or focal neurological deficit  
    - persistent abnormal mental status  
    - vomiting/ severe headache  
    - presence of known coagulopathy  
    - persistent drug or alcohol intoxication  
    - presence of multi-system injuries  
    - presence of concurrent medical problems  
    - age >65 | A     |
| 1.6     | Patients with concussion/mTBI can be safely discharged for home observation after an initial period of observation if they meet the following discharge advice criteria provided in written and oral form:  
  - Discharge summary prepared by/for primary care provider.  
  - Written and verbal brain injury advice (see Appendices 1.3 and 1.4) given to patient (and support person) covering:  
    - Symptoms and signs of acute deterioration and when to seek urgent follow-up (e.g., worsening or new symptoms).  
    - Lifestyle advice to assist recovery.  
    - Typical post-concussive symptoms and reassurance about anticipated recovery. | C     |

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*a.* Adapted from the Motor Accidents Authority NSW, Guidelines for Mild Traumatic Brain Injury following a Closed Head Injury (MAA, NSW, 2008).  
*b.* Adapted from the NSW Ministry of Health. Closed Head Injury in Adults - Initial Management (PD2012_013)
If the patient re-attends an emergency department/urgent care service with symptoms related to the initial injury, the following should be conducted:

- Full re-evaluation, including an assessment for ongoing post-traumatic amnesia (PTA) and/or clinical deterioration.
- CT scan, if indicated
- Emphasis and encouragement to the patients to attend their primary care provider (PCP) for follow-up after discharge, if a PCP is not available it may be necessary to refer to follow-up at the ED.
- Provide written and verbal advice (see Appendices 1.3 and 1.4) to the patient (and support person) as stated in recommendation 1.6.
- Extra consideration should be given to persons considered part of a vulnerable population (youth, age >65, psychiatric illness), as they may need closer follow-up.a

Somatic, cognitive/communication and emotional/behaviour symptoms following concussion/mTBI should be documented using a standardized assessment scale (see Appendices 1.5 and 1.6) at the initial appointment as well as follow-up appointments until symptoms resolve.a

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**RESOURCES**

**APPENDICES**

1. Acute Concussion Evaluation - Physician/Clinician Office Version
   - Appendix 1.1
2. Abbreviated Westmead Post-Traumatic Amnesia Scale (A-WPTAS)
   - Appendix 1.2
3. Brain Injury Advice Card (Long Version)
   - Appendix 1.3
4. Brain Injury Advice Card (Short Version)
   - Appendix 1.4
5. Rivermead Post Concussion Symptoms Questionnaire
   - Appendix 1.5
6. Post Concussion Symptom Scale
   - Appendix 1.6
7. Other Links/Resources
   - Appendix F

**TABLES**

1. Risk Factors Influencing Recovery Post mTBI
   - Table 1.1
2. Key Features of mTBI Assessment in an Emergency Department or Doctor’s Office
   - Table 1.2

**FIGURES**

1. Canadian CT Head Rule
   - Figure 1.1

**ALGORITHMS**

1. Initial Diagnosis/Assessment of Adult mTBI
   - Algorithm 1.1

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**References**

Algorithm 1.1

Initial Diagnosis/Assessment of Adult mTBI*

Initial GCS 13-15 on arrival following blunt head trauma
Stabilise ABCDEs and assess clinical risk factors.
Commence minimum of hourly clinical observations of vital signs, GCS, pupils, PTA and clinical symptoms

Low risk mild head injury

No indication for CT scan if all of...
- GCS 15 at 2 hours post-injury.
- No focal neurological deficit.
- No clinical suspicion of skull fracture.
- No vomiting
- No known coagulopathy or bleeding disorder
- Age <65 years
- No seizure
- Brief loss of consciousness (<5 mins).
- Brief post-traumatic amnesia (<30 mins)
- No severe headache
- No large scalp haematoma or laceration
- Isolated head injury
- No dangerous mechanism
- No known neurosurgery/neurological impairment.
- No delayed presentation or representation

Note: Mild acute clinical symptoms such as lethargy, nausea, dizziness, mild headache, mild behavioural change, amnesia for event and mild disorientation are common and are not associated with increased risk of intracranial injury. These clinical symptoms usually start to improve within 2 to 4 hours of time of injury.

Continue minimum of hourly clinical observations until at least four hours post time of injury

High risk mild head injury (see explanation on next page)

Strong indication for CT scan if...
- GCS <15 at 2 hours post-injury.
- Deterioration in GCS.
- Focal neurological deficit.
- Clinical suspicion of skull fracture. #2
- Vomiting (especially if recurrent). #4
- Known coagulopathy or bleeding disorder. #4
- Age >65 years. #6
- Seizure. #6
- Prolonged loss of consciousness (>5 mins).
- Persistent post-traumatic amnesia (A-WPTAS <18/18 at 4hrs post-injury). #7
- Persistent abnormal alertness/behaviour/cognition. #8
- Persistent severe headache.
- Relative indication for CT scan if...
- Large scalp haematoma or laceration. #9
- Multi-system trauma. #10
- Dangerous mechanism. #11
- Known neurosurgery/neurological impairment. #12
- Delayed presentation or representation. #13

Note: The presence of multiple risk factors is more concerning than a single isolated risk factor. In most uncomplicated mild head injury patients clinical symptoms start to improve by 2 hours post-injury and are returning to normal by 4 hours post-injury. Clinical symptoms that are deteriorating or not improving by 4 hours post-injury on serial observation such as abnormal alertness/behaviour/cognition, PTA, vomiting or severe headache are very concerning.

Indication for CT scan. Continue clinical observations

Normal CT Scan

Abnormal CT scan

CT scan unavailable

Consider transfer for CT scanning particularly if:
- Persistent GCS <15.
- Deterioration in GCS.
- Focal neurological deficit.
- Clinical suspicion of skull fracture.
- Known coagulopathy (esp if INR>4).
- Persistent abnormal alertness/behaviour/cognition, PTA, vomiting or severe headache at 4 hours post-injury

Consult senior clinician and network neurosurgical service regarding further management and disposition. Continue clinical observations in hospital.

Continued*

* Adapted from the NSW Ministry of Health. Closed Head Injury in Adults - Initial Management (PD2012_013)
Explanatory notes for risk factors:

1. Using GCS<15 at 2 hours post-injury allows clinical judgement for patients who present soon after injury or who have drug or alcohol intoxication. Drug or alcohol intoxication has not been shown to be an independent risk factor for intracranial injury but persistent GCS<15 is a major risk factor and mandates CT.

2. Clinical suspicion of skull fracture includes history of focal blunt assault or injury; palpable skull fracture; large scalp haematoma or laceration; signs of base of skull fracture – haemotympanum / CSF leak / raccoon eyes / Battles sign.

3. Recurrent vomiting more concerning than isolated vomiting but both are indications.

4. Known coagulopathy is both a strong indication for early CT scan and to check the INR. Early reversal of anticoagulation if normal CT scan and consider reversal if initially normal CT scan with high INR (>4) depending on clinical situation.

5. Elderly patients have increasing risk of intracranial injury with increasing age; routine CT scanning indicated unless totally asymptomatic patient with no other risk factors.

6. Brief generalised seizures immediately following head injury are not significant risk factors. Prolonged, focal or delayed seizures are risk factors for intracranial injury.

7. Post-traumatic amnesia may manifest as repetitive questioning or short term memory deficits and can be objectively tested using the A-WPTAS. PTA > 30 mins is a minor risk factor and PTA > 4 hours a major risk factor for intracranial injury.

8. Abnormal alertness/behaviour/cognition detects subtle brain injury better than GCS and should be part of the bedside assessment. Family may help establish what is normal.

9. Multi-system trauma – beware patient with unstable vital signs or distracting injuries or who receive analgesia or anaesthesia, as significant head injury is easily missed.

10. Clinical judgement required as to what is a large scalp haematoma or laceration.

11. Dangerous - MVA ejection / rollover; pedestrians / cyclists hit by vehicle; falls >own height or five stairs; falls from horses / cycles etc; focal blunt trauma, eg bat / ball / club.

12. Known neurosurgery/neurological impairment – conditions such as hydrocephalus with shunt or AVM or tumour or cognitive impairment such as dementia make clinical assessment less reliable and may increase risk of intracranial injury.

13. Delayed presentation should be considered as failure to clinically improve during observation. For representation consider both intracranial injury and post concussion symptoms and have a low threshold for CT scanning if not
### Acute Concussion Evaluation (ACE): Physician/ Clinician Office Version

**Guidelines for Concussion/mTBI and Persistent Symptoms: 3rd Ed.**

**Appendix 1.1**

**Acute Concussion Evaluation (ACE): Physician/Clinician Office Version**

**Gerard Gioia, PhD & Micky Collins, PhD**

1.**Children’s National Medical Center**

2. University of Pittsburgh Medical Center

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### A. Injury Characteristics

**Date/Time of Injury:** __________

**Reporter:** __Patient__ __Parent__ __Spouse__ __Other________

1. **Injury Description**

   **1a. Is there evidence of a forcible blow to the head (direct or indirect)?** __Yes__ __No__ __Unknown__

   **1b. Is there evidence of intracranial injury or skull fracture?** __Yes__ __No__ __Unknown__

   **1c. Location of Impact:** __Frontal__ __Lft Temporal__ __Rt Temporal__ __Lft Parietal__ __Rt Parietal__ __Occipital__ __Neck__ __Indirect Force__

2. **Cause:**

   1. **MVC**
   2. **Pedestrian-MVC**
   3. **Fall**
   4. **Assault**
   5. **Sports (specify)**
   6. **Other**

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### B. Symptom Check List*

Since the injury, has the person experienced any of these symptoms any more than usual today or in the past day?

<table>
<thead>
<tr>
<th>PHYSICAL (10)</th>
<th>COGNITIVE (4)</th>
<th>SLEEP (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache</td>
<td>0 1</td>
<td>Feeling mentally foggy</td>
</tr>
<tr>
<td>Nausea</td>
<td>0 1</td>
<td>Feeling slowed down</td>
</tr>
<tr>
<td>Vomiting</td>
<td>0 1</td>
<td>Difficulty concentrating</td>
</tr>
<tr>
<td>Balance problems</td>
<td>0 1</td>
<td>Difficulty remembering</td>
</tr>
<tr>
<td>Dizziness</td>
<td>0 1</td>
<td>COGNITIVE Total (0-4)</td>
</tr>
<tr>
<td>Visual problems</td>
<td>0 1</td>
<td>EMOTIONAL (4)</td>
</tr>
<tr>
<td>Fatigue</td>
<td>0 1</td>
<td>Irritability</td>
</tr>
<tr>
<td>Sensitivity to light</td>
<td>0 1</td>
<td>Sadness</td>
</tr>
<tr>
<td>Sensitivity to noise</td>
<td>0 1</td>
<td>More emotional</td>
</tr>
<tr>
<td>Numbness/Tingling</td>
<td>0 1</td>
<td>Nervousness</td>
</tr>
<tr>
<td>PHYSICAL Total (0-10)</td>
<td></td>
<td>EMOTIONAL Total (0-4)</td>
</tr>
</tbody>
</table>

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### C. Risk Factors for Protracted Recovery (check all that apply)

- **Concussion History?** __Y__ __N__

- **Headache History?** __Y__ __N__

- **Developmental History** __Y__ __N__

- **Psychiatric History** __Y__ __N__

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### D. RED FLAGS for acute emergency management: Refer to the emergency department with sudden onset of any of the following:

- **Headaches that worsen**
- **Looks very drowsy/can’t be awakened**
- **Can’t recognize people or places**
- **Neck pain**
- **Seizures**
- **Repeated vomiting**
- **Increasing confusion or irritability**
- **Unusual behavioral change**
- **Focal neurologic signs**
- **Slurred speech**
- **Weakness or numbness in arms/legs**
- **Change in state of consciousness**

### E. Diagnosis (ICD):

- **Concussion w/o LOC 850.0**
- **Concussion w/ LOC 850.1**
- **Concussion (Unspecified) 850.9**
- **Other (854)**

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### F. Follow-Up Action Plan

Complete ACE Care Plan and provide copy to patient/family.

- **No Follow-Up Needed**

- **Physician/Clinician Office Monitoring:** Date of next follow-up __________

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ACE Completed by: ________________________________

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*This form is part of the “Heads Up: Brain Injury in Your Practice” tool kit developed by the Centers for Disease Control and Prevention (CDC)."
ACE Instructions
The ACE is intended to provide an evidence-based clinical protocol to conduct an initial evaluation and diagnosis of patients (both children and adults) with known or suspected MTBI. The research evidence documenting the importance of these components in the evaluation of an MTBI is provided in the reference list.

A. Injury Characteristics:
1. Obtain description of the injury – how injury occurred, type of force, location on the head or body (if force transmitted to head). Different biomechanics of injury may result in differential symptom patterns (e.g., occipital blow may result in visual changes, balance difficulties).
2. Indicate the cause of injury. Greater forces associated with the trauma are likely to result in more severe presentation of symptoms.
3/4. Amnesia: Amnesia is defined as the failure to form new memories. Determine whether amnesia has occurred and attempt to determine length of time of memory dysfunction – before (retrograde) and after (anterograde) injury. Even seconds to minutes of memory loss can be predictive of outcome. Recent research has indicated that amnesia may be up to 4-10 times more predictive of symptoms and cognitive deficits following concussion than is LOC (less than 1 minute). 1
5. Loss of consciousness (LOC) – If occurs, determine length of LOC.
6. Early signs. If present, ask the individuals who know the patient (parent, spouse, friend, etc) about specific signs of the concussion that may have been observed. These signs are typically observed early after the injury.
7. Inquire whether seizures were observed or not.

B. Symptom Checklist: 2
1. Ask patient (and/or parent, if child) to report presence of the four categories of symptoms since injury. It is important to assess all listed symptoms as different parts of the brain control different functions. One or all symptoms may be present depending upon mechanisms of injury. 3 Record “1” for Yes or “0” for No for their presence or absence, respectively.
2. For all symptoms, indicate presence of symptoms as experienced within the past 24 hours. Since symptoms can be present premorbidly/at baseline (e.g., inattention, headaches, sleep, sadness), it is important to assess change from their usual presentation.
3. Scoring: Sum total number of symptoms present per area, and sum all four areas into Total Symptom Score (score range 0-22). (Note: most sleep symptoms are only applicable after the night. Drowsiness may be present on the day of injury.) If symptoms are new and present, there is no lower limit symptom score. Any score >0 indicates positive symptom history.
4. Exertion: Inquire whether any symptoms worsen with physical (e.g., running, climbing stairs, bike riding) and/or cognitive (e.g., academic studies, multi-tasking at work, reading or other tasks requiring focused concentration) exertion. Clinicians should be aware that symptoms will typically worsen or re-emerge with exertion, indicating incomplete recovery. Over-exertion may protract recovery.
5. Overall Rating: Determine how different the person is acting from their usual self. Circle “0” (Normal) to “6” (Very Different).

C. Risk Factors for Protracted Recovery: Assess the following risk factors as possible complicating factors in the recovery process.
1. Concussion history: Assess the number and date(s) of prior concussions, the duration of symptoms for each injury, and whether less biomechanical force resulted in re-injury. Research indicates that cognitive and symptom effects of concussion may be cumulative, especially if there is minimal duration of time between injuries and less biomechanical force results in subsequent concussion (which may indicate incomplete recovery from initial trauma). 4 4
2. Headache history: Assess personal and/or family history of diagnosis/treatment for headaches. Research indicates headache (migraine in particular) can result in protracted recovery from concussion. 4 11
3. Developmental history: Assess history of learning disabilities, Attention-Deficit/Hyperactivity Disorder or other developmental disorders. Research indicates that there is the possibility of a longer period of recovery with these conditions. 5 10
4. Psychiatric history: Assess for history of depression/mood disorder, anxiety, and/or sleep disorder. 3 10
5. D. Red Flags: The patient should be carefully observed over the first 24-48 hours for these serious signs. Red flags are to be assessed as possible signs of deteriorating neurologic functioning. Any positive report should prompt strong consideration of referral for emergency medical evaluation (e.g. CT Scan to rule out intracranial bleed or other structural pathology). 7 17

E. Diagnosis: The following ICD diagnostic codes may be applicable.
850.0 (Concussion, with no loss of consciousness) – Positive injury description with evidence of forcible direct/indirect blow to the head (A1a); plus evidence of active symptoms (B) of any type and number related to the trauma (Total Symptom Score >0); no evidence of LOC (A5), skull fracture or intracranial injury (A1b).
850.1 (Concussion, with brief loss of consciousness < 1 hour) – Positive injury description with evidence of forcible direct/indirect blow to the head (A1a); plus evidence of active symptoms (B) of any type and number related to the trauma (Total Symptom Score >0); positive evidence of LOC (A5), skull fracture or intracranial injury (A1b).
850.9 (Concussion, unspecified) – Positive injury description with evidence of forcible direct/indirect blow to the head (A1a); plus evidence of active symptoms (B) of any type and number related to the trauma (Total Symptom Score >0); unclear/unknown injury details; unclear evidence of LOC (A5), no skull fracture or intracranial injury.

Other Diagnoses – If the patient presents with a positive injury description and associated symptoms, but additional evidence of intracranial injury (A 1b) such as from neuroimaging, a moderate TBI and the diagnostic category of 854 (Intracranial injury) should be considered.

F. Follow-Up Action Plan: Develop a follow-up plan of action for symptomatic patients. The physician/clinician may decide to (1) monitor the patient in the office or (2) refer them to a specialist. Serial evaluation of the concussion is critical as symptoms may resolve, worsen, or ebb and flow depending upon many factors (e.g., cognitive/physical exertion, comorbidities). Referral to a specialist can be particularly valuable to help manage certain aspects of the patient’s condition. (Physician/Clinician should also complete the ACE Care Plan included in this tool kit.)
1. Physician/Clinician serial monitoring – Particularly appropriate if number and severity of symptoms are steadily decreasing over time and/or fully resolve within 3-5 days. If steady reduction is not evident, referral to a specialist is warranted.
2. Referral to a specialist – Appropriate if symptom reduction is not evident in 3-5 days, or sooner if symptom profile is concerning in type/severity.
   • Neuropsychological Testing can provide valuable information to help assess a patient’s brain function and impairment and assist with treatment planning, such as return to play decisions.
   • Physician Evaluation is particularly relevant for medical evaluation and management of concussion. It is also critical for evaluating and managing focal neurologic, sensory, vestibular, and motor concerns. It may be useful for medication management (e.g., headaches, sleep disturbance, depression) if post-concussive problems persist.

 Appendix 1.1: Acute Concussion Evaluation (ACE): Physician/Clinician Office Version

Guidelines for Concussion/mTBI and Persistent Symptoms: 3rd Ed.
Appendix 1.2

Abbreviated Westmead Post Traumatic Amnesia Scale (A-WPTAS)

<table>
<thead>
<tr>
<th>Date:</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Motor

| Obey commands | 6 | 6 | 6 | 6 | 6 |
| Localises    | 5 | 5 | 5 | 5 | 5 |
| Withdraws    | 4 | 4 | 4 | 4 | 4 |
| Abnormal flexion | 3 | 3 | 3 | 3 | 3 |
| Extension    | 2 | 2 | 2 | 2 | 2 |

Eye Opening

| Spontaneously | 4 | 4 | 4 | 4 | 4 |
| To speech     | 3 | 3 | 3 | 3 | 3 |
| To pain       | 2 | 2 | 2 | 2 | 2 |

Verbal

| Oriented ** | 5 | 5 | 5 | 5 | 5 |
| Name         |   |   |   |   |   |
| Place        |   |   |   |   |   |
| Why are you here |   |   |   |   |   |
| Month        |   |   |   |   |   |
| Year         |   |   |   |   |   |

Confused

| 4 | 4 | 4 | 4 | 4 |

Inappropriate words

| 3 | 3 | 3 | 3 | 3 |

Incomprehensible sounds

| 2 | 2 | 2 | 2 | 2 |

None

| 1 | 1 | 1 | 1 | 1 |

GCS Score out of 15

| /15 | /15 | /15 | /15 | /15 |

| Picture 1 | Show pictures (see over) |
| Picture 2 |                              |
| Picture 3 |                              |

A-WPTAS Score out of 18

| /18 | /18 | /18 | /18 |

Use of A-WPTAS and GCS for patients with MTBI

The A-WPTAS combined with a standardised GCS assessment is an objective measure of post traumatic amnesia (PTA). Only for patients with current GCS of 13-15 (<24hrs post injury) with impact to the head resulting in confusion, disorientation, anterograde or retrograde amnesia, or brief LOC. Administer both tests at hourly intervals to gauge patient’s capacity for full orientation and ability to retain new information. Also, note the following: poor motivation, depression, pre-morbid intellectual handicap or possible medication, drug or alcohol effects. NB: This is a screening device, so exercise clinical judgement. In cases where doubt exists, more thorough assessment may be necessary.

Admission and Discharge Criteria:

A patient is considered to be out of PTA when they score 18/18. Both the GCS and A-WPTAS should be used in conjunction with clinical judgement.

Target set of picture cards

Shores & Lammel (2007) - further copies of this score sheet can be downloaded from http://www.psy.mq.edu.au/GCS

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Guidelines for Concussion/mTBI and Persistent Symptoms: 3rd Ed.
GLASGOW COMA SCALE (GCS) AND ABBREVIATED WESTMEAD PTA SCALE (A-WPTAS)

Administration and Scoring

1. Orientation Questions

Question 1: WHAT IS YOUR NAME?
The patient must provide their full name.

Question 2: WHAT IS THE NAME OF THIS PLACE?
The patient has to be able to give the name of the hospital. For example: Westmead Hospital. (NB: The patient does not get any points for just saying ‘hospital’.) If the patient cannot name the hospital, give them a choice of 3 options. To do this, pick 2 other similar sized hospitals in your local area or neighbouring region. In Westmead Hospital’s case the 3 choices are ‘Nepean Hospital, Westmead Hospital or Liverpool Hospital’.

Question 3: WHY ARE YOU HERE?
The patient must know why they were brought into hospital. e.g. they were injured in a car accident, fell, assaulted or injured playing sport. If the patient does not know, give them three options, including the correct reason.

Question 4: WHAT MONTH ARE WE IN?
For emphasis the examiner can ask what month are we in now? The patient must name the month. For example, if the patient answers ‘the 6th month’, the examiner must ask the further question ‘What is the 6th month called?’.

Question 5: WHAT YEAR ARE WE IN?
It is considered correct for patients to answer in the short form ‘08’, instead of ‘2008’. Also, an acceptable alternative prompt (for the rest of the 2000’s) is ‘The year is 2000 and what?’

2. Picture recognition

Straight after administering the GCS (standardised questions), administer the A-WPTAS by presenting the 3 Westmead PTA cards. Picture Cards the first time - T1: Show patients the target set of picture cards for about 5 seconds and ensure that they can repeat the names of each card. Tell the patient to remember the pictures for the next testing in about one hour. Picture Cards at each subsequent time T2-T5: Ask patient, “What were the three pictures that I showed you earlier?” Scoring:

- For patients who free recall all 3 pictures correctly, assign a score of 1 per picture and add up the patient’s GCS (out of 15) and A-WPTAS memory component to give the A-WPTAS score (total = 18). Present the 3 target pictures again and re-test in 1 hour.

- For patients who can not free recall, or only partially free recall, the 3 correct pictures, present the 9-object recognition chart. If patient can recognise any correctly, score 1 per correct item and record their GCS and A-WPTAS score (total = 18). Present the target set of pictures again and re-test in 1 hour.

- For patients who neither remember any pictures by free call nor recognition, show the patient the target set of 3 picture cards again for re-test in 1 hour.
Appendix 1.2: Abbreviated Westmean Post Traumatic Amnesia Scale (A-WPTAS)

Shores & Lammel (2007) - further copies of this score sheet can be downloaded from http://www.psy.mq.edu.au/GCS
Appendix 1.3

Brain Injury Advice Card - Long Version

Important Points about Mild Brain Injury
• You had a mild brain injury or what is sometimes called a concussion. Most people recover quickly following a concussion/mTBI. A few people may experience symptoms over a longer period.
• There is a small risk of you developing serious complications so you should be watched closely by another adult for 24 hours after the accident.
• Please read the following. It outlines what signs to look for after a brain injury/concussion and what you need to do if you have problems.

Warning Signs
If you show any of these symptoms or signs after your brain injury/concussion, or you get worse, go to the nearest hospital, doctor or call 911 immediately.
• Fainting or blacking out, drowsiness, or can’t be woken up
• A constant severe headache or a headache that gets worse
• Vomiting or throwing up more than twice
• Cannot remember new events, recognise people or places (increased confusion)
• Acting strange, saying things that do not make sense (change in behaviour)
• Having a seizure (any jerking of the body or limbs)
• Inability to move parts of your body, weakness in arms or legs, or clumsiness
• Blurred vision or slurred speech
• Being unsteady on your feet or loss of balance
• Continual fluid or bleeding from the ear or nose

The First 24-48 Hours After Injury
• Warning Signs: You should be observed and return to hospital if you develop any of the above warning signs.
• Rest/Sleeping: Rest (both physical and mental) and avoid strenuous activity for at least 24 hours. It is alright for you to sleep tonight but you should be checked every four hours by someone to make sure you are alright.
• Driving: Do not drive for at least 24 hours. You should not drive until you feel much better and can concentrate properly. Talk to your doctor.
• Drinking/Drugs: Do not drink alcohol or take sleeping pills or recreational drugs in the next 48 hours. All of these can make you feel worse. They also make it hard for other people to tell whether the injury is affecting you or not.
• Pain Relief: Use acetaminophen or acetaminophen/codeine for headaches (e.g., Tylenol).
• Sports: Do not return to sports until you have received medical clearance from a healthcare professional.

See your primary care provider or visit the ED if you are not starting to feel better within a few days of your injury.
The First 4 Weeks After Injury
You may have some common effects from the brain injury/concussion which usually resolve in several weeks to three months. These are called **post-concussion symptoms** (see below). Tiredness can exaggerate the symptoms. Return to your normal activities gradually (not all at once) during the first weeks or months. **You can help yourself get better by:**

- **Rest/Sleeping**: Your brain needs time to recover. It is important to get adequate amounts of sleep as you may feel more tired than normal and you need to get adequate amounts of both physical and mental rest.
- **Driving**: Do not drive or operate machinery until you feel much better and can concentrate properly. Talk to your doctor.
- **Drinking/Drugs**: Do not drink alcohol or use recreational drugs until you are fully recovered. They will make you feel much worse. Do not take medication unless advised by your doctor.
- **Work/Study**: You may need to take time off work or study until you can concentrate better. Most people need a day or two off work but are back full-time in less than 2 weeks. How much time you need off work or study will depend on the type of job you do. See your doctor and let your employer or teachers know if you are having problems at work or with study. You may need to return to study or work gradually.
- **Sport/Lifestyle**: It is dangerous for the brain to be injured again if it has not recovered from the first injury. Talk to your doctor about the steps you need to take to gradually increase sports activity and return to play. If in doubt, sit out.
- **Relationships**: Sometimes your symptoms will affect your relationship with family and friends. You may suffer irritability and mood swings. See your doctor if you or your family are worried.

Recovery
- You should start to feel better within a few days and be ‘back to normal’ within about 4 weeks. See your local doctor if you are not starting to feel better.
- Your doctor should monitor these symptoms and may refer you to a specialist if you do not improve over 4 weeks up to 3 months.

Post Concussion Symptoms
There are common symptoms after a mild brain injury/concussion. **They usually go away within a few days or weeks.** Sometimes you may not be aware of them until sometime after your injury like when you return to work.

- **Mild headaches (that won’t go away)**
  Headaches are a common problem after a mild brain injury/concussion. They can be made worse by fatigue and stress. Sleeping, resting or taking a break from activities requiring concentration or effort will usually relieve headaches. Pain relievers may help to break a cycle of headaches - use acetaminophen or acetaminophen/codeine, limited to <15 days per month. If your headache gets worse, or cannot be relieved, see your doctor.

- **Having more trouble than usual with attention and concentration**
  No one can concentrate well when they are tired, so it is not surprising that many people have trouble concentrating for a while after they have had a mild brain injury. Maybe you cannot even concentrate well enough to read the newspaper. If you really need to, just read for a short time, and then come back to it when you have had a break. The same thing applies to other areas where concentration is needed. Leave things that need your complete concentration until you are feeling better. If you need to concentrate on something important, do it when you are feeling fresh.
» Having more trouble than usual with remembering things (memory difficulties/forgetfulness)
You cannot expect your brain to be as good at remembering things as it usually is. Don’t worry if you can’t think of a name or a phone number that you ought to know, or if you go to get something, and then can’t remember what it is. Your memory is only going to be a problem until you recover. In the meantime, get your family and friends to remind you of important dates and appointments, or write things down.

» Feeling dizzy or sick without vomiting (nausea)
Occasionally, people find that they get a sick or uncomfortable feeling if they move or change their position quickly. Usually it is only a problem for a few days. If you find that things seem to spin round if you sit up suddenly after lying down, or if you turn your head sharply, it is best to avoid such sudden movements or changes in position until it clears. If the dizziness persists for more than a week or two, see your doctor.

» Balance problems
You may find that you are a bit more clumsy than usual. Don’t worry if you do find that you are a bit unsteady on your feet, or bump into furniture, or maybe drop things. Just take everything you do a little more slowly. Your brain is the control centre for your whole body. It has to make sense out of all the messages coming in from your eyes and ears and other senses, and to send the right signals to the right muscles for you to be able to do anything. So give yourself more time to do things.

» More difficulty than usual with making decisions and solving problems, getting things done or being organized
You may find you are less able to plan ahead or follow through the steps that are required in carrying out an activity. These kinds of difficulties may cause particular problems during the first few days after a mild brain injury but they are usually temporary in nature. When facing situations that present problems or opportunities to plan, it may help to think things through in a more structured and objective way. For example, you may want to ask yourself a series of questions like:
1. What do I want to achieve?
2. What are the available options?
3. What is the best option?
4. What steps will I need to take to achieve this?
After these questions have been considered and answered, you can then carry out your plan. Writing down a goal, plan or problem also helps to give structure to your thinking and helps to make things clearer. Using a daily and weekly time table, planner, or keeping a diary can provide structure and ensure that plans are made routinely and on an ongoing basis.

» Feeling vague, slowed or ‘foggy’ thinking
Some people who have sustained a mild brain injury find their thinking is a bit slower. This means they might have some difficulty keeping up with conversations or following directions, and things take longer to get done. Encourage others to slow down by asking questions and having them repeat what they have said. Allow yourself extra time to complete tasks and avoid situations where you are under pressure to do things quickly.

» Balance problems
At first, even a little effort may make you feel very tired. Your brain has less energy to spare than it normally does. If you feel sleepy, go to bed. You will probably find that you need several hours more sleep than you usually do. Let your brain tell you when it needs to sleep, even if it is the middle of the day.

» Tinnitus. Ringing in the ears.
Tinnitus is due to damage to the inner ear after brain injury. It is usually described as a whistling, ringing or roaring sound and may be accompanied by some hearing loss. It usually settles on its own within a few weeks after injury. If the ringing in your ears gets worse or does not go away, see your doctor. Reduce your normal intake until you feel fully recovered.
Irritability/mood swings. Losing your temper and getting annoyed easily
Some people who have had a mild brain injury find that they get annoyed easily by things that normally would not upset them. This does not last very long, but it can be difficult for you and for your family. It happens because the brain controls your emotional system as well as the rest of your body. After a mild brain injury your emotions may not be as well controlled as they usually are. There are several ways to deal with this. Some people find that going out of a room, or away from a situation as soon as it begins to get annoying is enough. Others use relaxation techniques (controlled breathing, progressive muscle relaxation) to help them get back on an even keel. You may find that you can stop the irritability from developing by doing an activity that uses up some physical energy like riding an exercise bicycle, if tiredness permits. Irritability will be worse when you are tired, so rest will also help.

Anxiety or depression
Feeling anxious, worried, frightened, angry and low in mood are normal emotions after sustaining a mild brain injury. These feelings often pass in the weeks following the injury, as a person gradually resumes their usual activities. Recognise that emotional upset and worry is a normal part of recovery, even though you may have suffered an injury in the past and not felt like this before. Explain any difficulties that you are experiencing to your family and friends, so that they can understand the effect the injury has had on you and support you in managing your difficulties. Recognise if your worry about symptoms intensifies and a vicious circle develops. If that happens remind yourself of the point above. If symptoms nevertheless do not improve, or if you have suffered from anxiety or depression before the injury and the brain injury has intensified those feelings, visit your doctor.

More sensitive to lights or sounds
You may find that your eyes are sensitive to bright light. Wearing dark glasses in strong light can help to manage this and the need for dark glasses will likely clear up within a few days. When you want to shut out something you don't want to look at, all you have to do is close your eyes. It is much harder to shut your ears. When your brain is fully awake it uses part of its energy to dampen down noises that would interfere with what you are doing. After a mild brain injury your brain may not have enough energy to spare to do this, and you may find that most noises bother you. Explain to your family and friends, and ask them to keep the noise level down if they can.

Change in sleep patterns. Trouble sleeping or sleeping too much.
Don't worry about the sleep disturbance. This is usually temporary and your normal routine will come back gradually. If you are having trouble falling asleep you may try things like reducing stimulation by not watching TV in bedroom or spending long times on the computer, avoiding a large meal before bed, avoiding caffeine, using relaxation techniques (controlled breathing, progressive muscle relaxation), or getting up for about 30 minutes if you are unable to sleep for long periods. It is best to avoid sleep medications but if your sleeping pattern has become very disrupted, discuss with your doctor if a short course of medication may be helpful in re-establishing your sleeping pattern.

Reduced tolerance to alcohol.
After a mild brain injury you may be more sensitive to the effects of alcohol. A small amount may worsen the effects of the brain injury. It can cause unsteadiness and dizziness which may lead to a fall and further injury. It is sensible to avoid alcohol for at least one week after injury and then monitor carefully how alcohol affects you. Reduce your normal intake until you feel fully recovered.

Information included on this advice card was adapted from the Motor Accidents Authority of NSW, Guidelines for Mild Traumatic Brain Injury following Closed Head Injury (MAA NSW, 2008) and the Information about Mild Head Injury or Concussion booklet (Ponsford, Willmott, Nelms & Curran, 2004).
Appendix 1.4

Brain Injury Advice Cards - Short Versions: Example # 1

What to expect after a concussion

A part of CDC’s “Heads Up” Series

For more information about concussion, please visit:
www.cdc.gov/Concussion.

PATIENT INSTRUCTIONS

You have been examined at [name of hospital emergency department] for a head injury and possible concussion. Be sure to let a family member or friend know about your injury. They may notice symptoms before you do and can help you.

Take time off from work or school for ___________ days or until you and your doctor think you are able to return to your usual routine.

Your next appointment with [Doctor's name] is __________________________. [Date and time]
What to Expect Once You’re Home from the Hospital

Most people with a concussion recover quickly and fully. During recovery, you may have a range of symptoms that appear right away, while others may not be noticed for hours or even days after the injury. You may not realize you have problems until you try to do your usual activities again. Most symptoms go away over time without any treatment. Below is a list of some of the symptoms you may have:

**Thinking/Remembering**
- Difficulty thinking clearly
- Feeling slowed down
- Trouble concentrating
- Difficulty remembering new information

**Physical**
- Headache
- Balance problems
- Blurred vision
- Dizziness
- Nausea or vomiting
- Lack of energy
- Sensitivity to noise or light

**Emotional/Mood**
- Irritability
- Nervousness
- Sadness
- More emotional

**Sleep**
- Sleeping more than usual
- Sleeping less than usual
- Trouble falling asleep

How to Feel Better

- Get plenty of rest and sleep.
- Avoid activities that are physically demanding or require a lot of thinking.
- Do not drink alcohol.
- Return slowly and gradually to your routine.
- Ask a doctor when it is safe to drive, ride a bike, or operate heavy equipment.

WHEN TO RETURN TO THE HOSPITAL

Sometimes serious problems develop after a head injury. Return to the emergency department right away if you have any of these symptoms:

- Repeated vomiting
- Worsening or severe headache
- Unable to stay awake during times you would normally be awake
- More confused and restless
- Seizures
- Difficulty walking or difficulty with balance
- Difficulty with your vision
- Any symptom that concerns you, your family members, or friends
Important Points about Mild Brain Injury

- You had a mild brain injury or what is sometimes called a concussion. Most people recover quickly following a mild brain injury/concussion. A few people may experience symptoms over a longer period.
- There is a small risk of you developing serious complications so you should be watched closely by another adult for 24 hours after the accident.
- Please read the following. It outlines what signs to look for after a brain injury and what you need to do if you have problems.

Warning Signs
If you show any of these symptoms or signs after your brain injury/concussion, or you get worse, go to the nearest hospital, doctor or call 911 immediately.

- Fainting or blacking out, drowsiness, or can’t be woken up
- A constant severe headache or a headache that gets worse
- Vomiting or throwing up more than twice
- Cannot remember new events, recognise people or places (increased confusion)
- Acting strange, saying things that do not make sense (change in behaviour)
- Having a seizure (any jerking of the body or limbs)
- Inability to move parts of your body, weakness in arms or legs, or clumsiness
- Blurred vision or slurred speech
- Being unsteady on your feet or loss of balance
- Continual fluid or bleeding from the ear or nose

The First 24-48 Hours After Injury

- Warning Signs: You should be observed and return to hospital if you develop any of the above warning signs.
- Rest/Sleeping: Rest (both physical and mental) and avoid strenuous activity for at least 24 hours. It is alright for you to sleep tonight but you should be checked every four hours by someone to make sure you are alright.
- Driving: Do not drive for at least 24 hours. You should not drive until you feel much better and can concentrate properly. Talk to your doctor.
- Drinking/Drugs: Do not drink alcohol or take sleeping pills or recreational drugs in the next 48 hours. All of these can make you feel worse. They also make it hard for other people to tell whether the injury is affecting you or not.
- Pain Relief: Use acetaminophen or acetaminophen/codeine for headaches (e.g., Tylenol).
- Sports: Do not return to sports until you have received medical clearance from a healthcare professional.

See your primary care provider or visit the ED if you are not starting to feel better within a few days of your injury.
The First 4 Weeks After Injury
You may have some common effects from the brain injury/concussion which usually resolve in several weeks to three months. These are called post-concussion symptoms (see below). Tiredness can exaggerate the symptoms. Return to your normal activities gradually (not all at once) during the first weeks or months. You can help yourself get better by:

- Rest/Sleeping: Your brain needs time to recover. It is important to get adequate amounts of sleep as you may feel more tired than normal and you need to get adequate amounts of both physical and mental rest.
- Driving: Do not drive or operate machinery until you feel much better and can concentrate properly. Talk to your doctor.
- Drinking/Drugs: Do not drink alcohol or use recreational drugs until you are fully recovered. They will make you feel much worse. Do not take medication unless advised by your doctor.
- Work/Study: You may need to take time off work or study until you can concentrate better. Most people need a day or two off work but are back full-time in less than 2 weeks. How much time you need off work or study will depend on the type of job you do. See your doctor and let your employer or teachers know if you are having problems at work or with study. You may need to return to study or work gradually.
- Sport/Lifestyle: It is dangerous for the brain to be injured again if it has not recovered from the first injury. Talk to your doctor about the steps you need to take to gradually increase sports activity and return to play. If in doubt, sit out.
- Relationships: Sometimes your symptoms will affect your relationship with family and friends. You may suffer irritability and mood swings. See your doctor if you or your family are worried.

Recovery
- You should start to feel better within a few days and be ‘back to normal’ within about 4 weeks. See your local doctor if you are not starting to feel better.
- Your doctor will monitor these symptoms and may refer you to a specialist if you do not improve over 4 weeks up to 3 months.

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Appendix 1.5

The Rivermead Post Concussion Symptoms Questionnaire*

After a head injury or accident some people experience symptoms which can cause worry or nuisance. We would like to know if you now suffer from any of the symptoms given below. As many of these symptoms occur normally, we would like you to compare yourself now with before the accident. For each one, please circle the number closest to your answer.

0 = Not experienced at all  
1 = No more of a problem  
2 = A mild problem  
3 = A moderate problem  
4 = A severe problem

Compared with before the accident, do you now (i.e., over the last 24 hours) suffer from:

<table>
<thead>
<tr>
<th>Symptom</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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</thead>
<tbody>
<tr>
<td>Headaches</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Feelings of dizziness</td>
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<tr>
<td>Nausea and/or vomiting</td>
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<tr>
<td>Noise sensitivity, easily upset by loud noise</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Sleep disturbance</td>
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<td></td>
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<tr>
<td>Fatigue, tiring more easily</td>
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<tr>
<td>Being irritable, easily angered</td>
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<tr>
<td>Feeling depressed or tearful</td>
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<tr>
<td>Feeling frustrated or impatient</td>
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<tr>
<td>Forgetfulness, poor memory</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Poor concentration</td>
<td></td>
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<tr>
<td>Taking longer to think</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Blurred vision</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Light sensitivity, easily upset by bright light</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Double vision</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restlessness</td>
<td></td>
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</tr>
</tbody>
</table>

Are you experiencing any other difficulties?

1. _____________________________________________________________ 0 1 2 3 4
2. _____________________________________________________________ 0 1 2 3 4


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### Appendix 1.6

#### Post Concussion Symptom Scale

| Name: _____________________ | Age/DOB: ______________ | Date of Injury: ______________ |

**Post Concussion Symptom Scale**

No symptoms"0"-----Moderate "3"-------Severe"6"

#### Time after Concussion

<table>
<thead>
<tr>
<th>SYMPTOMS</th>
<th>Days/Hrs</th>
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**TOTAL SCORE**

___  ___  ___

Use of the Post-Concussion Symptom Scale: The athlete should fill out the form, on his or her own, in order to give a subjective value for each symptom. This form can be used with each encounter to track the athlete’s progress towards the resolution of symptoms. Many athletes may have some of these reported symptoms at a baseline, such as concentration difficulties in the patient with attention-deficit disorder or sadness in an athlete with underlying depression, and must be taken into consideration when interpreting the score. Athletes do not have to be at a total score of zero to return to play if they already have had some symptoms prior to their concussion.