Guidelines for MILD TRAUMATIC BRAIN INJURY Following Closed Head Injury

Acute/Post-acute Assessment and Management





This publication is endorsed by:

NSW Faculty of Australasian College of Emergency Medicine





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1. Preface

The Motor Accidents Authority NSW (MAA) and the NSW Brain Injury Rehabilitation Directorate (BIRD) have developed guidelines for the early identification and management of mild traumatic brain injury (MTBI).

MTBI has been associated with a variety of adverse cognitive, physical, behavioural and social consequences in the short term, although some patients with MTBI demonstrate long-term limitations⁴³ ⁷¹. Limited research has been conducted on the economic and social costs of the consequences of MTBI. The data that is available, through the World Health Organisation (WHO) systematic review and other reports on costs, indicates that the total costs for MTBI are high and that indirect costs (such as sick leave, loss of productivity) are the main expenses^{9, 60}.

The MTBI guidelines target the early diagnosis of MTBI and the management of adults (> 16 years) with MTBI during the first six months following closed head injury.

The MTBI guidelines provide recommendations to clinicians in three practice settings: prehospital, emergency departments and general practice. The MTBI guidelines complement the following two existing clinical practice guidelines:

- Adult Trauma Clinical Practice Guidelines, Initial Management of Closed Head Injury in Adults. Dr Duncan Reed, 2007, NSW Institute of Trauma Management (ITIM) (http://www.itim.nsw.gov.au/go/publications); and
- Clinical Practice Guidelines for the Care of People Living with Traumatic Brain Injury in the Community. University of Sydney, 2006, (http://www.health.usyd.edu.au/shdg/completed/traumatic_brain_injury.php).

The MTBI guidelines have been developed through the review of these two Australian guidelines and other international guidelines for MTBI, together with a systematic review and appraisal of relevant literature from 1996–2007. Research articles were appraised using an expanded version of the National Health and Medical Research Council (NHMRC) Appraising the Evidence checklist⁶¹. Two reviewers appraised each article for quality. The NHMRC "interim" levels for the strength of evidence and grading system for guideline recommendations⁶² were used. Details of the method and the tables of evidence are provided in the accompanying Technical Report. The research evidence was presented to the working party.

The MTBI guidelines are informed by the framework of the International Classification of Functioning, Disability and Health⁹⁹ (ICF; refer to Appendix 3). The ICF framework is based on the biopsychosocial model of health, which synthesises the medical, psychological and social aspects of health and recognises the impact of contextual factors of an individual and the environment.

2. Executive Summary

MTBI following closed head injury is estimated to comprise 70–90% of all hospital-treated adult traumatic brain injuries¹⁸. The negative impacts of MTBI can involve adverse cognitive, physical and behavioural symptoms, which impact on an individual's activities and participation in life roles. The early diagnosis and management of patients with MTBI facilitates good outcomes. The MTBI guidelines were developed to provide guidance to ambulance officers, emergency department clinicians and general practitioners.

The MTBI guidelines provide a definition of MTBI, recommendations for the assessment and diagnosis, management and prognosis of this patient group. Clinicians should assess, interpret and subsequently manage symptoms, taking into consideration other potential preinjury, injury and post injury biopsychosocial factors and conditions that may have contributed to an individual's symptoms. Acute assessment should include standardised assessment of post traumatic amnesia (PTA). Management of the patient should include assessment and monitoring of post concussive symptoms, education, and reassurance that the symptoms are normal and generally resolve within days to three months. Furthermore, guidance should be provided on the gradual resumption of usual activities and life roles.

The recommendations relevant to all three practice settings are outlined in the first part of each section. The second part of each section provides recommendations specific to each practice setting. Resources include assessment tools, a patient advice sheet and guidance for patient management in the community.

3. Flow Charts

The following flow charts have been developed to assist clinical management of MTBI. The flow charts should be used in conjunction with the complete MTBI guidelines.

- 1. Prehospital/Ambulance Service initial management of mild head injury in adults
- Emergency Department initial management of mild head injury in adults (Glasgow Coma Scale (GCS) 14–15/15)
- 3. Emergency Department initial management of moderate head injury in adults (GCS 9–13/15)
- 4. Community/General practitioner initial management of mild head injury in adults (no previous hospital or emergency department assessment; GCS 13–15/15)
- 5. Community/General practitioner initial management of mild head injury in adults (following discharge from emergency/ongoing; GCS 13–15/15)

1. PREHOSPITAL/AMBULANCE SERVICE

Initial management of mild head injury in adults





Initial GCS 14/15 or 15/15 on arrival following blunt trauma. Stabilise ABCDE's then assess risk factors If GCS 9–13/15 refer to flow chart 3 (moderate) as these patients have a higher risk of structural intracranial injury.





NOTES FOR FLOW CHART 2 – Clinical judgement required

- *1 Clinical suspicion of skull fracture includes history of focal blunt assault or injury, large scalp lacerations or haematomas, signs of base of skull fracture (haemotympanum/CSF leak/racoon eyes/ Battle's sign)
- *2 Post traumatic seizures prolonged, focal, or delayed seizures are significant risk factors for intracranial injury; however, brief generalised seizures immediately following head injury are less concerning.
- *3 Assessment of PTA is an objective measure of cognition.
- *4 Age > 65 years elderly patients have increased risk of significant intracranial injury and routine CT scanning is recommended unless patient is asymptomatic with no other risk factors.
- *5 Multi-system trauma significant head injuries are easily missed in patients with unstable vital signs or distracting injuries.
- *6 Dangerous mechanisms include MVA ejection/rollover; pedestrians/ cyclists hit by vehicle; falls > own height or five stairs; falls from horses/cycles, etc; focal blunt trauma, e.g., bat/ball/club
- *7 Clinically obvious drug or alcohol intoxication in individuals with altered mental status is an indication for CT scanning; however, drug or alcohol ingestion in individuals with normal mental status is not.
- *8 Known neurosurgery/neurological impairment conditions such as hydrocephalus with shunt, AVM or tumour, or cognitive impairment from any cause, make clinical assessment less reliable and may increase risk of intracranial injury.
- *9 Delayed presentation or re-presentation consider both structural intracranial injury and post concussion symptoms. Have a low threshold for CT scanning patients with delayed presentation and those re-presenting patients who did not have an initial normal CT scan. Clinical judgement is required for patients re-presenting following an initial normal CT scan.
- *10 Use clinical judgement for discharge for home observation if GCS 15/15, CT scan normal and clinical signs have improved but A-WPTAS score < 18. Consider impact of pre existing cognitive impairment, other contributing factors (e.g., patient is a non-English speaker or the patient needed to be woken up for the assessments, thus not paying full attention to the questions).
- *11 Discharge from hospital after 2 hours observation but 4 hours **post time of injury**, may be considered if all discharge criteria are met.

Abbreviations:

AVM, arteriovenous malformation; A-WPTAS, Abbreviated Westmead Post Traumatic Amnesia Scale; CT scan, computed tomography scan; GCS, Glasgow Coma Scale; PTA, post traumatic amnesia.



3. EMERGENCY DEPARTMENT Initial management of mild head injury in adults (GCS 9-13/15)



MOTOR ACCIDENTS AUTHORITY

NOTES FOR FLOW CHART 3 – Clinical judgement required

- *1. Assessment of PTA is an objective measure of cognition.
- *2. Minimum period of observation is 4 hours post injury. Use clinical judgement for discharge for home observation if GCS 15/15, CT scan normal and clinical signs have improved but A-WPTAS score < 18. Consider impact of pre existing cognitive impairment, other contributing factors (e.g., patient is a non-English speaker or the patient needed to be woken up for the assessments, thus not paying full attention to the questions).</p>
- *3 Clinical suspicion of skull fracture includes history of focal blunt assault or injury, large scalp lacerations or haematomas, signs of base of skull fracture (haemotympanum/CSF leak/racoon eyes/ Battle's sign).
- *4 Post traumatic seizures prolonged, focal, or delayed seizures are significant risk factors for intracranial injury; however, brief generalised seizures immediately following head injury are less concerning.
- *5 Known neurosurgery/neurological impairment conditions such as hydrocephalus with shunt, AVM or tumour, or cognitive impairment from any cause make clinical assessment less reliable and may increase risk of intracranial injury.

Abbreviations:

AVM, arteriovenous malformation; A-WPTAS, Abbreviated Westmead Post Traumatic Amnesia Scale; CT scan, computed tomography scan; GCS, Glasgow Coma Scale; PTA, post traumatic amnesia.



4. COMMUNITY/GENERAL PRACTITIONER

Initial management of mild head injury in adults

(No previous hospital or emergency department assessment - GCS 13-15/15)



MOTOR ACCIDENTS AUTHORITY

NOTES FOR FLOW CHART 4– Clinical judgement required

- *1 Clinical suspicion of skull fracture includes history of focal blunt assault or injury, large scalp lacerations or haematomas, signs of base of skull fracture (haemotympanum/CSF leak/racoon eyes/ Battle's sign)
- *2 Post traumatic seizures prolonged, focal, or delayed seizures are significant risk factors for intracranial injury; however, brief generalised seizures immediately following head injury are less concerning.
- *3 Assessment of PTA is an objective measure of cognition.
- *4 Age > 65 years elderly patients have increased risk of significant intracranial injury and routine CT scanning is recommended unless patient is asymptomatic with no other risk factors.
- *5 Multi-system trauma significant head injuries are easily missed in patients with unstable vital signs or distracting injuries.
- *6 Dangerous mechanisms include MVA ejection/rollover; pedestrians/ cyclists hit by vehicle; falls > own height or five stairs; falls from horses/cycles, etc; focal blunt trauma, e.g., bat/ball/club
- *7 Clinically obvious drug or alcohol intoxication in individuals with altered mental status is an indication for CT scanning; however, drug or alcohol ingestion in individuals with normal mental status is not.
- *8 Known neurosurgery/neurological impairment conditions such as hydrocephalus with shunt, AVM or tumour, or cognitive impairment from any cause, make clinical assessment less reliable and may increase risk of intracranial injury.
- *9 Delayed presentation or re-presentation consider both structural intracranial injury and post concussion symptoms. Have a low threshold for CT scanning patients with delayed presentation and those re-presenting patients who did not have an initial normal CT scan. Clinical judgement is required for patients re-presenting following an initial normal CT scan.
- *10 Use clinical judgement for discharge for home observation if GCS 15/15, CT scan normal and clinical signs have improved but A-WPTAS score < 18. Consider impact of pre existing cognitive impairment, other contributing factors (e.g., patient is a non-English speaker or the patient needed to be woken up for the assessments, thus not paying full attention to the questions).
- *11 Discharge after 2 hours observation but 4 hours **post time of injury**, may be considered if all discharge criteria are met.

Abbreviations:

AVM, arteriovenous malformation; A-WPTAS, Abbreviated Westmead Post Traumatic Amnesia Scale; CT scan, computed tomography scan; GCS, Glasgow Coma Scale; PTA, post traumatic amnesia.



COMMUNITY/GENERAL PRACTITIONER

5.

Initial management of mild head injury in adults

(following discharge from emergency/ongoing - GCS 13-15/15)



4.1 Purpose of the MTBI guidelines

Research has identified that early diagnosis and appropriate management of patients who have sustained a MTBI following a closed head injury, facilitates good outcomes for individuals and their families. The MTBI guidelines are intended to assist prehospital clinicians, emergency department clinicians and general practitioners with the early identification and management of adult patients who have sustained a nonpenetrating MTBI following closed head injury.

4.2 Defining mild traumatic brain injury

The terms concussion, closed head injury and brain injury are often used interchangeably in practice. However, there are differences in meaning for these terms. Throughout these MTBI guidelines the term "brain" injury is used in preference to the term "head" injury because "head" injury does not necessarily include injury to the brain, and might also be used in reference to non-brain injuries (such as injuries to the eye, face and scalp). A diagnosis of concussion is typically made on the basis of self-reported symptoms, whereas MTBI is diagnosed through neurological measures (GCS, PTA) and self-reported symptoms. For definitions of closed head injury, MTBI, concussion and post concussion symptoms refer to Appendix 1. It is recommended that these standardised definitions are adopted.

The WHO definition of MTBI (2004)¹⁵ has been used in the MTBI guidelines with modification (qualification for GCS 13). That is:

Mild traumatic brain injury is an acute brain injury resulting from mechanical energy to the head from external forces.

Criteria include:

- a) One or more of the following: confusion or disorientation, loss of consciousness for 30 minutes or less, post traumatic amnesia < 24 hours, and/or other transient neurological abnormalities e.g., focal signs, seizures, intracranial lesion not requiring surgery
- b) GCS of 14–15/15 30 minutes post injury or later upon presentation for health care

c) GCS of 13/15 at 30 minutes post injury or later upon presentation for health care and a normal CT scan

These manifestations of MTBI must not be due to drugs, alcohol, medications, or be caused by other injuries or treatment for other injuries (e.g., systemic injuries, facial injuries or intubation), caused by other problems (e.g., psychological trauma, language barrier or coexisting medical conditions) or caused by penetrating cranio-cerebral injury.

4.3 When to consult these guidelines

The MTBI guidelines are relevant to consult when an adult sustains a mechanical injury or blow to the head from external forces.

The MTBI guidelines do not cover the diagnosis or management of:

- Complicated closed head injury
- Moderate/severe traumatic brain injury
- Acquired brain injury
- Cerebral haemorrhage
- Skull fracture.

4.4 Intended users and publications

The mild traumatic brain injury (MTBI) guidelines provide a general guide for the diagnosis and early management of adults who have sustained a MTBI following closed head injury. The MTBI guidelines are intended to inform and guide the diagnosis and first six months of management of an individual with MTBI. The MTBI guidelines are not intended to be rigidly prescriptive or replace clinical judgement, rather they inform and guide clinicians to facilitate management.

The intended users of the MTBI guidelines are clinicians from the following practice settings:

- 1. Prehospital/accident scene
- 2. Emergency Department
- 3. General Practice

The publications in this series include:

- Guidelines for Mild Traumatic Brain Injury Following Closed Head injury Acute/post-acute assessment
 and management
- Summary Guidelines for Mild Traumatic Brain Injury Following Closed Head injury for general practitioners
- Resources
- Technical Report for the Guidelines for Mild Traumatic Brain Injury Following Closed Head injury.

4.5 Incidence of MTBI

A systematic review of the international research, conducted by the WHO, showed that 70–90% of all hospital-treated adults with traumatic brain injuries could be classified as mild. On the basis of the WHO international review of MTBI¹⁸, an estimate of the incidence of MTBI (70–90%) from all hospital-treated traumatic brain injuries in Australia is 75-96 per 100,000 population.

The actual incidence is probably higher when mild traumatic brain injuries not treated at hospital are considered. Incidence rates are higher for males compared to females, particularly in adolescents and young adults¹⁸.

In Australia, the most recent analysis of acquired brain injury was conducted in 2007 by the Australian Institute of Health and Welfare⁵ using multiple sources of data. The average rate of traumatic brain injury (mild to severe) (and excluding acquired brain injury not caused by a traumatic event) in 2004-2005 across the eight states and territories of Australia was 107 per 100,000 population (in NSW it was 77.8 per 100,000 in 2003). Of these, 63% were of working age (16–64 years), with the highest rate of 23% occurring in individuals aged 15–24 years. Males comprised more than two thirds (69%). Higher rates of TBI occurred in males of all age groups. There was a 15% increase in the TBI hospitalisation rate for people age 45-64 years old in 2004-2005 compared to 1999-2000.

In Australia, a previous analysis by Fortune and Wen in 1999³¹ identified differences that exist in the standardised rates of hospital attendance for culturally and linguistically diverse individuals with traumatic brain injury (mild to severe). Hospital attendance for individuals born overseas in non-English speaking countries were substantially lower (77 per 100,000) than the average rate of attendance. However, for people born overseas in an English speaking country, the rate increased to 106 per 100,000.

The incidence of traumatic brain injuries for Indigenous individuals in 1996–1997 was substantially higher (343 per 100,000) compared to non-indigenous individuals³¹. Thirty percent of the Indigenous population of Australia live in NSW (Aboriginal and Torres Strait Islander)⁹⁰.

4.6 Evidence for recommendations

A detailed explanation of the methods used to develop the MTBI guidelines is provided in the Technical Report (http://www.maa.nsw.gov.au/default.aspx?MenuID=148).

Research identified through the literature search was assessed for relevance and then critically appraised to determine the level of evidence (levels I–IV) and quality of the research. Only those articles considered to be of good or reasonable quality were used in the development of the guidelines.

The strength of the body of evidence for each recommendation (articles combined) was determined using the interim NHMRC matrix and grading system⁶². The four grades of evidence used are described in Table 1.

Details of the research evidence are provided in the Technical Report in tables for assessment/diagnosis, intervention, and prognosis.

Table 1. Grades for Recommendations

Grade of recommendation	Description
A	Body of evidence can be trusted to guide practice Several level I or II studies with low risk of bias and all studies consistent, or inconsistency can be explained
В	Body of evidence can be trusted to guide practice in most situations One or two level II studies with low risk of bias or a systematic review/ multiple level II studies with low risk of bias with most studies consistent or inconsistencies can be explained
С	Body of evidence provides some support for recommendation/s; however, care should be taken in its application to individual clinical and organisational circumstances Some inconsistency reflecting some uncertainty
D	Body of evidence is weak and recommendation must be applied with caution Evidence is inconsistent
Consensus	The working party utilised the limited literature available, the best available clinical expertise and practices to reach a consensus on the recommendation

5.1 Recommendations relevant to all three practice settings

Diagnosis of mild traumatic brain injury

Prompt diagnosis is important in the acute management of MTBI. Early diagnosis and identification of problems helps avoid chronic sequelae, and also has the potential to minimise financial costs¹⁰, social costs and human suffering⁹ ^{19,} ^{43, 55, 82, 97}.

Recommendation 1	Grade
MTBI following closed head injury should be diagnosed early as it will positively impact on health outcomes for patients.	A

The population of patients with MTBI is heterogeneous, with variation in signs and symptoms, individual patient needs and comorbidities.

The literature was searched for early diagnostic tests or screening procedures for MTBI. A recent literature review on neuropathology and MTBI with persistent post concussive symptoms, suggests that there can be structural damage ⁸. However, a systematic review conducted by the WHO¹⁰ reported that confirmatory studies of diagnostic imaging procedures in MTBI are limited. The research on imaging is of varying quality and sample sizes are often small.

There is limited research on:

- Functional imaging [such as positron emission tomography (PET), single photon emission computed tomography (SPECT)]
- Biochemical marker tests
- Structural imaging techniques [such as computed tomography scanning (CT scanning) and magnetic resonance imaging (MRI)].

Evidence for functional imaging as a useful screening tool for MTBI is inconsistent. The research was graded C for the strength of the body of evidence, which was considered insufficient to recommend the routine use of SPECT in assessing individuals with suspected MTBI (refer to the Technical Report and the evidence table for assessment and diagnosis). This may be reconsidered when further research evidence is available. The use of biochemical marker tests as a potential screening tool to confirm neuropathology associated with MTBI was also reviewed. Biochemical markers (e.g., serum levels) are indicative of intracranial pathology and correlate with clinical outcome (the severity of primary and secondary brain damage). The research on these tests was graded B for the strength of the body of evidence (refer to the Technical Report and the evidence table for assessment and diagnosis). However, at present, these biochemical tests are not routinely available in hospitals in NSW. Therefore, at this stage, it is not practical to include biochemical markers as a recommended screening tool for MTBI.

Structural imaging techniques, such as CT scans, can be used in the acute management of patients with suspected MTBI to identify complications. CT scans are typically used to identify the presence of clinically significant intracranial post traumatic lesions or the need for neurosurgical intervention⁴⁹. The current MTBI guidelines recommend the use of CT scans to screen patients with a GCS of 13/15 or high-risk patients with GCS 14–15/15⁸⁴ (refer to flow charts 3 and 2, respectively) because these patients have an elevated risk of death or severe disability six months after injury²⁹.

Various studies have also demonstrated that MRI is more sensitive to the neuropathology of MTBI than CT, particularly if performed soon after injury⁴⁹. Recent research suggests that there may be an emerging role for imaging techniques of brain white matter in the diagnosis of MTBI⁸⁰.

There is a need for further studies to improve the diagnosis of MTBI ^{10, 8} and to assist with the assessment of persisting symptoms and disability. Additionally, the availability and cost of imaging procedures, limits the option of imaging for clinicians at present, particularly in rural and remote areas. The research evidence consistently emphasises that at present, in the absence of routine imaging techniques to confirm neuropathology, clinicians should use the assessment of clinical factors and symptoms for predicting intracranial lesions and post concussion or ongoing symptoms in the MTBI adult population^{10, 24, 29, 38, 46, 52, 63, 64, 67, 71, 72, 74, 82, 86}

Clinical factors and acute symptoms that should be assessed and observed include:

- Period of loss of consciousness
- Level of consciousness (Glasgow Coma Scale)
- Memory (retrograde/anterograde amnesia)
- Neurological signs (e.g., unsteadiness in walking, sensory impairments)
- Presence of skull fracture
- Seizures (if present and frequency)
- Post traumatic amnesia (ability to retain new information)
- Nausea/vomiting
- Presence and intensity of headache
- Balance impairment
- High risk factors for intracranial complications:
 - Persistent GCS < 15 at 2 hours post injury
 - Deterioration of GCS
 - ° Focal neurological deficit
 - ^o Clinical suspicion of skull fracture
 - Prolonged loss of consciousness > 5 mins
 - Prolonged anterograde/retrograde amnesia > 30 mins
 - Post traumatic seizure
 - Persistent abnormal alertness/behaviour/ cognition
 - Persistent abnormal Abbreviated Westmead Post Traumatic Amnesia Scale (A-WPTAS) score < 18/18
 - ^o Persistent vomiting (2 or more occasions)
 - ^o Persistent severe headache
 - Known coagulopathy (e.g., warfarin, alcoholic)
 - Age > 65 years
 - Multisystem trauma
 - Dangerous mechanisms (e.g., motor vehicle accident ejection/roll over)
 - ° Clinically obvious drug or alcohol intoxication
 - ° Known neurosurgery/neurological impairment
 - ^o Delayed presentation or representation.

Recommendation 2	Grade
Diagnosis of MTBI should be performed through a combined assessment of clinical factors and	A
symptoms.	

Post traumatic amnesia

PTA refers to a period of disorientation or confusion and a disturbed ability to hold new continuous information (anterograde memory) that occurs in individuals after neurotrauma. It is defined as "an interval during which the patient is confused, amnesic for ongoing events and likely to evidence behavioural disturbance" (Levin et al 1979, p. 675)⁴⁵. The main purpose of assessing PTA is to assist clinical judgement and early management of MTBI.

The assessment of PTA is more strongly correlated with neuropsychological function than the GCS. It is a good predictor of outcome, and a more informative clinical measure for patients with MTBI^{10, 14, 25, 69, 71, 86, 87, 96}. The assessment of PTA is important to enable those patients requiring follow-up to be identified.

In Australia, the two most commonly used standardised PTA tests are the Oxford Post Traumatic Amnesia Scale (OPTAS); or the Modified Oxford Post Traumatic Amnesia Scale (MOPTAS)) and the Westmead Post Traumatic Amnesia Scale (WPTAS). These two tests are considered particularly sensitive to diagnosing PTA in individuals with MTBI because they assess new memories more directly compared to other tests, such as the Galveston Orientation and Amnesia Test (GOAT), which does not include a test of new memory and focuses on orientation^{69, 93}.

In NSW hospitals, the standard WPTAS is typically used; however, this requires reassessment over a 24 hour period. Recent research in Australian emergency departments has led to the development of revised⁶⁹ and abbreviated^{86,87} versions of the WPTAS. The most recent research published in 2008 demonstrated that the revised WPTAS has greater concurrent validity with the neuropsychological measures than the GCS, with increased prediction of patients with MTBI with cognitive impairment⁸⁷. Since this research, the Revised WPTAS has been refined and is referred to as the Abbreviated WPTAS (A-WPTAS). The test procedures for the A-WPTAS involve retesting new memory within one hour of the assessment of MTBI^{69, 86} and standardising the verbal and orientation component of the GCS in one assessment^{86, 87}.

The A-WPTAS is a brief standardised bedside assessment of cognition (see page 45). It involves three additional questions for new learning, and includes standardised and specific orientation questions included in the verbal component of the Glasgow Coma Scale. There is negligible additional time (one minute) required to complete the test. PTA assessment can, in specific circumstances, reduce the observation time required, including the time a patient spends in the emergency department.

Recommendation 3	Grade
The standardised prospective measurement of post traumatic amnesia should be routinely performed to assist with the monitoring, diagnosis, early management and prognosis of patients with MTBI.	A
Recommendation 4	
Clinicians should use the recent version of the revised WPTAS – the Abbreviated Westmead Post Traumatic Amnesia Scale (A-WPTAS) for assessment of cognition to identify patients with MTBI.	Consensus

Post concussion symptoms

Post concussion symptoms are commonly reported by patients with MTBI. The most difficult problem in the diagnosis of post concussion symptoms/ syndrome or disorder (refer to definitions in Appendix 1) is attributing residual symptoms to MTBI. Research has identified that the presence of acute post concussion symptoms are not specific or exclusive to MTBI^{14, 41} and may also be seen in trauma patients⁵², individuals with substance abuse problems³⁸, those who have taken opioid analgesia⁵³, or individuals with chronic pain³⁹.

Recommendation 5	Grade
Clinicians should assess and monitor somatic, cognitive and emotional	А
post concussion symptoms.	

Clinicians should carefully study the history, progression of the symptoms and the problems observed or reported by the patient.

There are several self report questionnaires available for clinical use. The Rivermead Post Concussion Symptoms Questionnaire (RPQ) is considered to have good reliability^{28, 42}, including test and retest reliability, and adequate external construct validity³⁶ when split into two the subscales, RPQ-3 and RPQ-13^{28, 72} (see page 49).

Recommendation 6	Grade

Clinicians should use the Rivermead Consensus Post Concussion Symptoms Questionnaire as part of their assessment and monitoring post concussive symptoms. Clinicians should attempt to systematically exclude the most obvious differential diagnosis or competing explanations for the symptoms.

MTBI and post concussive symptoms should be assessed and understood in context and consideration of:

- 1. Personal factors preinjury and post injury factors e.g., personality, life stressors and coping skills, lifestyle, physical and mental health, demographics, patient's response to pain, other health issues/differential diagnosis
- 2. Injury variables such as other musculoskeletal or traumatic injuries, the influence of administered medication or other drugs, the severity of the injury, nature of the injury
- **3. Environmental factors** reaction of family/ support systems, family circumstances and demands from the home, cultural factors and environmental context (legal – litigation, work situation, financial concerns)

Grade

А

Recommendation 7

Clinicians should assess and interpret the symptoms in the light of other potentially contributing biopsychosocial factors and conditions (personal factors, injury related variables and environmental influences).

5.2 Recommendations relevant to prehospital clinicians

Refer to flow chart 1 (page 7). Refer to recommendations 1–7.

The current policy and practice of Ambulance Service NSW paramedics when attending to individuals with closed head injury is to conduct an initial assessment, then transport the patient to the emergency department of a hospital for further assessment and treatment. If the patient declines transport to hospital, they are required to sign an acknowledgement that they have been offered and have declined. If transport to hospital is declined, then standard procedures apply and the patient advice sheet is provided to the individual or other person accompanying the injured individual.

Upon arrival at the scene, the paramedic should perform their usual procedures for assessment. This includes use of two scales to measure the consciousness of a patient. Typically the paramedic uses AVPU (Alert, Voice, Pain and Unresponsive) as an initial broad assessment. This should be followed by assessment with the GCS⁹⁴ using standard orientation questions similar to those on the A-WPTAS.

Consistent with current procedure, the paramedic would then measure the GCS twice – once on initial contact and care (after clear airway established) and then on arrival at the emergency department of the hospital^{10, 12}. Both measurements should be recorded. Accurate measurement should be made after initial assessment and care, and, when possible, before administration of sedative or paralytic agents¹². The prehospital measurement of the GCS is a significant and reliable indicator of risk^{9, 12}, in association with repeat and subsequent scoring.

Recommendation 8	Grade
The initial (prehospital) assessment with the Glasgow Coma Scale should be used as a risk classification or indicator of risk.	В
Recommendation 9	
Subsequent Glasgow Coma Scale scores taken 30 minutes or more after the time of injury should be considered reliable indicators of severity and therefore should be used for classification of the severity of traumatic brain injury.	В

5.3 Recommendations relevant to emergency department clinicians

Refer to flow charts 2 and 3 (pages 8 & 10). Refer to recommendations 1–9.

The NSW Institute of Trauma and Injury Management (NSW ITIM) developed evidence-based clinical practice Guidelines for the Initial Management of Closed Head Injury in Adults in 2007⁷⁴. The NSW ITIM guidelines were developed for closed head injuries ranging from mild to severe. The NSW ITIM clinical guidelines (http://www.itim.nsw.gov.au/go/ publications) relevant to MTBI have been adopted for these MTBI guidelines with the addition of:

- An objective and accurate assessment of cognition. This involves hourly assessment of PTA in the emergency department using the A-WPTAS.
- Guidance on A-WPTAS score parameters for discharge and follow up, from four hours post time of injury
- Guidance on considerations for discharge from emergency when there has been < 4 hours observation but it is ≥ 4 hours post time of injury
- Increased emphasis on noting clinical signs at discharge (which are strongly associated with the prediction of post concussive symptoms) and the need for active emergency department referral to the GP.

The criteria for CT scans are outlined in flow charts 2 and 3.

A standardised prospective measurement of cognitive status should be performed in emergency departments using the A-WPTAS. The test should be conducted hourly, together with the GCS and when other clinical observations are taken.

Recommendation 10	Grade
Hourly clinical observation should occur until at least four hours post injury. If the patient meets recommended discharge criteria at four hours post time of injury, they should be considered for discharge	Consensus
Recommendation 11	
At four hours post time of injury, if the patient is GCS 15, clinically improving and with normal CT scan and A-WPTAS scores < 18, clinical judgement is required to determine whether the patient should be discharged home before a normal A-WPTAS score is achieved.	Consensus
If the patient re-presents to the emergency department assessment the same flow charts (flow charts 2 a 8 & 10).	gency ts, the should follow nd 3, see pages
Recommendation 12	Grade
 If the patient re-presents to medical services, the following should be conducted: Full re-assessment A-WPTAS assessment CT scan, if indicated, particularly if not performed at the first 	Consensus y

presentation
Emphasis and encouragement to the patient to attend their GP for follow-up after discharge

5.4 Recommendations relevant to general practitioners

Refer to flow charts 4 and 5 (pages 12 & 14). Refer to recommendations 1–12 and medical screening checklist page 43.

The general practitioner (GP) may assess a patient who has sustained a traumatic brain injury at some stage **after discharge from the emergency department**. At other times the GP may be the **first clinician to assess** a patient when the individual has not attended a hospital or emergency department. Assessment by the GP will vary depending on whether the patient has been discharged from an emergency department.

The GP is well placed to manage, support and guide the patient during their recovery from MTBI.

Research has identified key predictive and prognostic factors, which are important to the GP, who typically assesses the patient > 24 hours post injury.

Recommendation 13	Grade
The clinician should consider that an individual who has sustained a MTBI is likely to experience reduced cognitive functioning post injury which may resolve in a few days or continue for months before resolving, including problems with recall of material, speed of information processing, concentration and	A
attention.	

GENERAL PRACTITIONER ASSESSMENT

1. The patient has NOT been assessed in emergency

Refer to flow chart 4 (page 12).

The patient should be assessed using the same procedures used by the emergency department clinicians. If the GCS on arrival following blunt trauma is 14/15 or 15/15, risk factors should be assessed. PTA should be assessed using the A-WPTAS (refer to recommendation 4). If risk factors are low, the patient may be observed for up to four hours post injury and action taken in accordance with the clinical signs and symptoms.

Recommendation 14	Grade	
If the patient is assessed as being in PTA, the GP should arrange for hourly observations and reassessment using the A-WPTAS for up to four hours post time of injury.	A	
Recommendation 15		
When the patient's GCS is 14/15 and "high risk mild head injury" features are present, the patient should be transported to hospital for further assessment.	В	
Recommendation 16		
If the patient's GCS on presentation is \leq 13, immediate transport to	Consensus	

2. A patient HAS been assessed and discharged from an emergency department or it is > 24 hours after the injury

Refer to flow chart 5 (page 14).

hospital should be arranged.

The patient with MTBI may visit a GP for further assessment or review a day or more following discharge from an emergency department.

Recommendation 17	Grade
On presentation the GP should conduct a comprehensive review of every patient who has sustained a MTBI.	A
Recommendation 18	
The GP's assessment should include taking a history, examination,	A

include taking a history, examination, cognitive screen, post concussive symptom assessment and review of mental health.

a. History

GP history taking includes information on:

- Time since discharge from hospital
- Mechanism of current injury
- Protective equipment at time of injury
- Loss of consciousness, concussion
- Symptoms
- PTA period of amnesia
- Previous incidence/s of loss of consciousness or concussion.

b. Examination

Recent research indicates there are benefits to assessing dizziness, balance/postural instability and/ or motor performance in emergency departments as a predictor of persistent post concussion symptoms ^{24, 35, 51, 82}. A standardised assessment of postural stability is the modified Balance Error Scoring System (BESS) test^{33, 76} (refer to page 57).

Recommendation 19	Grade
Clinical testing of balance should be conducted as it offers additional information about the presence of ongoing symptoms of concussion and assists in the subsequent management of patients who have sustained a MTBI.	С
Recommendation 20	
Clinicians should use the modified Balance Error Scoring System for assessment of postural stability.	С

GP assessment of impairments in body function/ structure includes:

- General (blood pressure, pulse, temperature, etc)
- Neurological
- Headache
- Balance/dizziness
- Nausea.

c. Brief global cognitive screen

Cognitive functioning in patients who have sustained a MTBI should be assessed with respect to problems with recall of material, speed of information processing, concentration and attention^{25, 71}.

It is appropriate that the GP conduct brief global cognitive screening at the first assessment and at subsequent reviews (e.g., two to three weeks post injury, two to three months post injury) until symptoms resolve.

GP brief global cognitive screen includes:

- PTA (if the patient has not attended hospital or undergone PTA testing) using the (A-WPTAS)
- Five word recall (immediate)
- Stating months in reverse order
- Stating digits backwards
- Five word recall (delayed).

Refer to Resources section for details on A-WPTAS and SCAT tools.

The cognitive screen can be performed using the Sport Concussion Assessment Tool (SCAT), which includes orientation, stating digits backwards, five word recall and stating months in reverse order (see page 51). The test for new memory abilities is performed with the A-WPTAS (refer to Resources section). Repeat cognitive ability screening assists in monitoring an individual's recovery of symptoms. Interpreting an individual's cognitive complaints and attributing symptoms to MTBI should be informed by consideration of valid screening tools, contributing factors and the exclusion of coexisting conditions (e.g., mental health concerns).

Recommendation 21	Grade
The GP should perform a brief cognitive screen using the Sport Concussion Assessment Tool, or a similar screening tool involving recall of information (new memory), information processing (stating months in reverse order and digits backwards).	A

d. Post concussive symptoms

It is appropriate that the patient complete a self report post concussive symptoms questionnaire before leaving the surgery. The results may be used as a baseline measure and can be compared with symptoms reported on subsequent visits to monitor progress. The recommended tool for this is the RPQ (see page 49) and **refer to recommendation 6**.

e. Mental health

Initial screening or first review post emergency department discharge may not require the GP to screen for mental health problems. It is important to consider, exclude and treat other contributing or confounding mental health factors before ascribing symptoms to MTBI. Most tools for anxiety and depression have not been validated on a population of individuals with MTBI.

GPs may consider using the tools detailed in the medical screening checklist on page 43.

f. Neuropsychological assessment

Where there are ongoing cognitive difficulties, it is appropriate to consider a repeat CT scan or preferably an MRI and referral for a neuropsychological assessment. There is little evidence for the diagnostic validity of detailed cognitive testing for MTBI less than two to three months post injury^{10, 16, 27, 59, 64}

Recommendation 22	Grade
When there are ongoing cognitive difficulties, the GP should consider specialised cognitive assessment. A neuropsychological assessment is appropriate at least three months post injury when:	В
 there are persistent symptoms of traumatic brain injury, the diagnosis is in doubt or clinical questions have not been answered; and 	
 other etiological clinical conditions (anxiety, depression, etc) have been identified and considered. 	

6.1 Recommendations relevant to all three practice settings

The underlying principles for clinicians to understand and manage patients with MTBI involve consideration of biopsychosocial⁷⁸, contextual⁹⁹ and temporal factors that impact on the outcomes of patients with MTBI **(refer to recommendations 5, 7, 12 and 26)**. Examples of these factors include:

Preinjury

- a. Personality
- Life stressors/life roles and demands e.g., whether in a carer role or whether preinjury work/study extended the patient to the limit of their resources
- c. Coping skills and motivation
- d. Preinjury lifestyle
- e. Preinjury physical and mental health, treatment and time frames
- f. Demographics.

Injury

- a. Severity of the injury, presence of PTA
- b. Other musculoskeletal injuries
- c. Nature/impact of other injuries.

Post injury

- a. Time elapsed since injury
- b. Post concussive symptoms (number, duration, severity, time since injury)
- c. Patient education and management provided since the injury
- d. The patients response to the symptoms
- e. Environmental, e.g., reaction of the family, support available, work situation, financial concerns, litigation, life stressors
- f. Health issues/differential diagnosis
- g. Medication side effects
- h. Language and cultural considerations.

Recommendation 23	Grade
Clinicians should consider the	А
biopsychosocial, contextual and	
temporal preinjury, injury and post	
injury factors in the management of	
patients with MTBI.	

1. Patient education

There is substantial research evidence that suggests that most patients make a good recovery with the provision of appropriate information within weeks to the first few months after sustaining a MTBI without additional intervention^{13, 37, 56, 70, 71, 96}. In particular, patients who have experienced PTA benefit from routine follow-up contact, which provides education and information⁹⁶. The patient needs education; however, the education does not need to be intensive⁹.

The education should provide information on the nature of MTBI symptoms, and reassurance that these symptoms are likely to resolve. If the patient with MTBI and their family understand the range of potential symptoms and difficulties, the impact of these symptoms may be reduced. Education and information may reduce the potential for frustration, anxiety or depression, exacerbation of symptoms or the impact of symptoms on life roles (e.g., loss of job or breakdown of relationships).

Education and reassurance should be provided as soon as possible following injury^{13, 63}. First stage education should commence on discharge from medical services or within one week following injury. Subsequent management should then focus on providing guidance and structure to encourage the individual to gradually resume activities and participation in life roles. If there are ongoing symptoms, further education (second stage) should be provided one to two months later.

Recommendation 24	Grade
Education about symptoms and reassurance that symptoms are likely to resolve should be provided to all patients with MTBI.	A
Recommendation 25	
Education should be provided within one week after injury.	А
Recommendation 26	
A patient experiencing reduced cognitive functioning in the first few days following injury, with education and support, should be expected, in the majority of cases, to have these symptoms resolve and preinjury cognitive functioning return within days, up to three months.	A

2. Patient advice sheet

There are a range of head or brain injury advice sheets/cards distributed by services throughout NSW. However, many of these do not have appropriate information on the warning signs, instructions on what to do, or descriptions of post concussive symptoms. Others are difficult to read or contain language or terms that require a high level of education. Fung et al (2006)³² has evaluated 15 hospital emergency department instruction forms and identified key parameters to be considered in the design of advice sheets for patients with MTBI.

These MTBI guidelines have revised the NSW ITIM⁷⁴ discharge advice sheet, with consideration of Fung's parameters and the language used, and have developed a patient advice sheet appropriate for wider use. The MTBI guidelines patient advice sheet (refer to page 41) has been assessed and modified for readability and education level requirements. In addition, it has been revised after presentation to and feedback from over 60 patients and health professionals.

Recommendation 27 Grade

Paramedics, emergency department Consensus personnel, GPs and communitybased clinicians should give patients with MTBI the evidence-based patient advice sheet developed for the MTBI guidelines. The patient advice sheet is available in the following most common languages spoken in Australia, other than English⁴:

- Arabic
- Chinese
- Greek
- Hindi
- Italian
- Vietnamese.

A more detailed education booklet is available for the adult and paediatric patient with mild head injury. The booklet was developed by Professor Jennie Ponsford at Monash University (Victoria). The booklet "Information on Mild Head Injury or Concussion" can be downloaded from:

http://www.med.monash.edu.au/spppm/research/ merrc

3. Cultural and language issues

NSW has the highest Indigenous population of all states in Australia (30% of the total Indigenous population of Australia). Seventy percent of Indigenous people in NSW live in regional or remote areas⁹⁰. NSW is also the most culturally and linguistically diverse of all the Australian states²³.

The management approach used in MTBI requires consideration of cultural and language issues (when present) that may impact on the patient/patient's family's understanding of MTBI and recovery. This includes Indigenous culture and differences arising from other cultural and linguistic diversity.

Communication is important in the management of any patient with MTBI. The clinician needs to ensure that information and advice are understood. Poor communication can directly or indirectly impact on the outcome for patients, particularly for those patients from a non-English speaking background or a patient of Indigenous heritage (including where English is their second language). Patients may hold cultural assumptions that can influence the presentation of symptoms or the patient/family's response to diagnosis and treatment⁸⁸. For example:

- People differ in what they see as a symptom
- The definition of family may involve extended family.
- Concepts of pain management or self management differ between cultures (related to individualism).

The health professional should not assume the patient shares the same concepts related to health, symptoms, time/frequency and the role of the family even if the patient seems fluent in conversational English. Education on cross cultural issues in communication for health professionals, and the use of interpreters, assists to minimise the potential for miscommunication.

Recommendation 28	Grade
The clinician should consider	Consensus
any additional issues, potential	
disadvantages or need for additional	
resources for the patient with MTBI	
and their family if the patient is of	

Strait Islander) heritage.

Indigenous (Aboriginal or Torres

A patient who identifies themselves Consensus as Indigenous should be considered for referral to, or be offered the option of being linked with, local Aboriginal Health Services to assist with management.

The resource Improving Communication in Indigenous Health Care http://www. sharingtruestories.com/dsp_home.cfm provides useful guidelines for the clinician. This was as a result of a project funded by the Co-operative Research Centre for Tropical and Aboriginal Health and the Australian Council for Safety and Quality in Health Care. Guidelines on appropriate terminology can be located at http://www.nswrecon.com/resources/ resource_categories/protocols/aboriginalterminology.pdf

There are also resources and information on cross cultural issues related to health care for patients from cultural and linguistically diverse backgrounds. A range of support tools - practice guides, handbooks and resources for health professionals can be downloaded from the Queensland Government, Department of Health. http://www.health.qld.gov.au/ multicultural/health_workers/support_tools.asp

In particular there is a resource on socio-cultural information for health professionals, which also reinforces the need for the health worker to avoid stereotyping.

http://www.health.qld.gov.au/multicultural/health_ workers/cultdiver_guide.asp. A Guide to Practice can be located at http://www.health.qld.gov.au/ multicultural/health_workers/guide_pract.asp

Recommendation 30	Grade
The clinician should consider any additional issues, potential disadvantages or need for additional resources for patients with MTBI from culturally and linguistically diverse backgrounds and their families.	Consensus
Recommendation 31	Grade

6.2 Recommendations relevant to prehospital clinicians

Refer to flow chart 1 (page 7).

In cases where a patient is not transported, the paramedic/s should advise the patient to attend a hospital if their condition changes or deteriorates. The paramedic/s should provide the patient and/or their carer with the patient advice sheet. (Refer to recommendations 23–31).

Recommendation 32	Grade
The paramedic should provide the MTBI evidence based patient advice sheet to a patient with head injury and/or their carer if the individual declines transport to hospital.	Consensus

6.3 Recommendations relevant to emergency department clinicians

Refer to flow charts 2 and 3 (pages 8 & 10). (Refer to Recommendations 23–31).

Patients who have experienced PTA should be considered more likely to experience post concussive symptoms^{10, 24, 25, 69, 71, 86, 96}, although research has not established the length of PTA (< 24 hours) to be a factor in managing MTBI⁷⁰. Patients who have a GCS of \leq 13/15 that recovers rapidly are also more likely to experience post concussive symptoms due to the severity of the injury. Research has suggested that the presence of persistent headache⁸⁵, dizziness or nausea in the emergency department is strongly associated with the presence and severity of post traumatic symptoms for up to one month or more post injury^{30, 35, 43, 82}. Follow-up assessment, screening and review of medication in the community is recommended when these factors are present⁸².

Recommendation 33 Grade

В

The emergency department should routinely refer the patient to the GP at discharge where

- Initial GCS 13/15
- A-WPTAS score < 18/18 at any stage
- Poor balance/dizziness and/or severe headache and/or nausea were present in the emergency department.

For guidance notes on key information to be included in the discharge letter to the GP, see page 48.

6.4 Recommendations relevant to general practitioners

Refer to flow charts 4 and 5 (pages 12 & 14). (Refer to Recommendations 23–31).

The University of Sydney developed Clinical Practice Guidelines for the Care of People Living with Traumatic Brain Injury in the Community (2006)⁹⁵, which are available at: http://www.health.usyd.edu. au/shdg/completed/traumatic_brain_injury.php

The guidelines were developed for GPs in particular. The University of Sydney guidelines relate to the range of traumatic brain injury (TBI) from mild to severe and the management of:

- Common health issues
- Mental health care
- Cognitive and behavioural problems
- Lifestyle issues and quality of life
- Substance abuse

Some of the information on health issues relevant to MTBI in the Clinical Practice Guidelines for the Care of People Living with Traumatic Brain Injury in the Community has been included in the MTBI guidelines and *this information is provided in italics*. The MTBI guidelines have undertaken an additional review of the literature for some health issues, such as mental health and cognitive impairment.

Recommendation 34	Grade
GPs should refer to the Clinical	Consensus
Practice Guidelines for the Care of	
People Living with Traumatic Brain	
Injury in the Community (2006)	
for information about somatic	
complaints, mental health concerns,	
memory, behaviour and medication,	
and refer to additional information on	
the management of these and other	
health concerns provided in the	
MTBI guidelines.	

The management of a number of additional health concerns, activity limitations and participation restrictions have been considered and a detailed search and appraisal of research on specific topics in these domains (fatigue, driving, return to work/study, return to sport following MTBI) has been conducted for the MTBI guidelines.

The GP is often the primary health-care provider for patients with MTBI. A thorough assessment of the patient needs to be conducted (refer to recommendations 3, 4, 15–22).

Subsequent management during a patient's recovery involves ongoing support, education, reassurance that the presence of symptoms is normal, and that these will likely resolve (refer to recommendations 1–2, 5–7, 23–32). The cornerstone of management involves minimising the impact of symptoms and guiding a gradual return to preinjury lifestyle, as symptoms allow.

Recommendation 35	Grade
Management of patients with MTBI by GPs should involve guidance on strategies to minimise the impact of symptoms and to gradually resume activity and participation in life roles.	A

For patients who have persistent symptoms, there are additional management considerations. Other investigations or referral to specialist services may be considered where symptoms persist.

Recommendation 36	Grade
The GP should consider referral of	
a patient with MTBI to specialist	Consensus
services when symptoms and	
concerns persist. For example,	
referral to a local brain injury	
rehabilitation service/occupational	
therapist for memory strategies	
or referral to a psychologist or	
psychiatrist for mental health	
concerns.	

1. MANAGEMENT OF PERSISTENT HEALTH CONCERNS – IMPAIRMENT OF BODY FUNCTION/STRUCTURE

a. Somatic complaints

(refer to *Clinical Practice Guidelines for the Care* of *People Living with Traumatic Brain Injury in the Community* (2006) p.p10–12; key points relevant to MTBI are outlined)

Headaches, dizziness, pain and sleep disturbances are more common in people with TBI than the general population, although these complaints are also common in people with chronic illness and disability. There is no evidence for the effective management of headaches and sleep disturbance specific to TBI patients.

Assessment of headaches may be performed using the Visual Analogue Scale (VAS) and a comparison of the severity of the headache with preinjury status. The VAS may be downloaded from the MAA http://www.maa.nsw.gov.au/default. aspx?MenuID=188#174). A headache of >7/10 may indicate a poor prognosis for persistent pain or post concussion symptoms³⁰.

b. Mental health care

(refer to *Clinical Practice Guidelines for the Care* of *People Living with Traumatic Brain Injury in the Community* (2006) p.p 16–22; key points relevant to MTBI are outlined)

Additional research published since the Clinical Practice Guidelines for the Care of People Living with Traumatic Brain Injury in the Community includes a recent study published in 2006 on the relationship of psychological and cognitive factors in patients with MTBI⁵³. This research suggests that psychological factors may be present early in the development of post concussive symptoms. The study assessed patients with MTBI five days after injury and noted more psychological symptoms were present in those with post concussive symptoms compared to those who did not report post concussive symptoms. In another recent study, non-organic factors (including preinjury personality traits and post injury psychological reactions to disability and trauma) were found to be implicated in the commencement and maintenance of psychiatric disorders post TBI 77. The clinician should consider the influence of pre existing conditions and other factors such as the patient's response to the context of the injury.

The GP may use a mental health screening tool such as the DASS: http://www2.psy.unsw.edu.au/groups/ dass//

or HADS http://dop.hawaii.edu/resources/ Hospital%20Anxiety%20and%20Depression%20 Scale.doc

or refer to the guidelines on Managing anxiety following motor vehicle accidents (http://www.maa. nsw.gov.au/default.aspx?MenulD=141)

Depression

"Feelings of hopelessness, difficulty enjoying activities and feeling worthless" are the most distinguishing symptoms of depression in [patients with] TBI. Depression will resolve in more than half [of patients with] TBI (range from mild to severe TBI).

Some patients may experience depressive symptoms but do not meet diagnostic criteria for major clinical depression. Referral to a psychologist/psychiatrist for detailed assessment and treatment may be considered if symptoms persist or worsen.

Research on TBI suggests that major depression is a frequent complication, although the prevalence of depression may not be related to injury severity^{44,} ^{57, 77}. In patients with MTBI the highest frequency of depression occurs in the first 6–12 months post injury, although in some patients the onset may be more prolonged. The researchers suggest that the depression may be initiated by neurotrauma (with pathology noted on imaging for patients with persistent depression following MTBI²¹); however, the continuation of the depression may be attributable to non-organic factors, such as awareness of disability, social disruption, secondary gain and other contributing psychological responses^{44, 71, 77}. The research evidence is inconsistent about whether depression influences cognitive functioning, such as verbal/nonverbal memory, information processing speed and flexibility in problem solving^{44, 81}.

Recommendation 37	Grade
The GP should consider the risk of depression or other mental health disorders in patients with MTBI and that the emergence and maintenance of symptoms may be influenced by maladaptive psychological responses to the injury.	В

Some literature suggests that improving fitness may help to minimise depression. Since the publication of the *Clinical Practice Guidelines for the Care of People Living with Traumatic Brain Injury in the Community* (2006), a Cochrane systematic review has been conducted ³⁴ on fitness training for cardiorespiratory conditioning after traumatic brain injury. The review, which identified six studies involving individuals with severe TBI, concluded that there was insufficient evidence to draw any conclusions about the effects of fitness training on depression³⁴.

No research on MTBI and/or fitness, or MTBI and/or fitness and/or depression was located. However, a large body of evidence exists for the healthy population suggesting that improved fitness enhances general health and a sense of well being.

Anxiety (including acute distress disorder and post traumatic stress disorder PTSD)

No TBI-specific measures for diagnosing anxiety disorders were found. The estimated prevalence of anxiety disorders in (mild to severe) TBI is affected by the variability in measurement and diagnosis. It appears that anxiety disorder may increase initially after injury, but gradually reduce over time.

The research indicates that in most cases, a patient

who has required hospital treatment and who has been involved in or witnessed a motor vehicle accident may experience some initial anxiety and distress, but will not develop acute anxiety disorder or PTSD. However, 15% will develop acute stress disorder and 10-30% will develop post traumatic stress disorder ⁵⁸. Research on the incidence of acute stress or post traumatic stress disorder following an assault or fall is not available. GPs may refer to the clinical guidelines Managing anxiety following a motor vehicle accident - A General practitioners guide, for recommendations on initial screening tools and treatment. It can be downloaded from the MAA website at: http://www.maa.nsw.gov. au/default.aspx?MenuID=141. If anxiety is diagnosed refer to a psychologist for ongoing treatment.

c. Cognitive impairment

Memory

(refer to *Clinical Practice Guidelines for the Care* of *People Living with Traumatic Brain Injury in the Community* (2006) p.p 25–28; key points relevant to MTBI are outlined)

Memory aids/devices (e.g., calendar, diary, personal digital device), memory prompts (e.g., using visual cues or allocating a place for items such as keys) or reminder devices (e.g., mobile phone alarm), can reduce the frequency of memory failures in TBI patients.

Psychological or cognitive rehabilitation using a cognitive behavioural approach may assist to reduce anxiety, which has the potential to influence memory^{9, 68, 95}.

A recent systematic review conducted by the WHO⁹ identified one study suggesting that the treatment of depression in patients with MTBI¹⁶ may improve cognitive function.

Refer to recommendation 36 regarding referral to specialist services when symptoms persist.

d. Medication

There is little evidence to support the effectiveness of pharmacological treatment for cognitive or post concussive symptoms following MTBI⁹.

There is insufficient evidence on the effectiveness of homeopathy to recommend it as a treatment for any specific condition in patients with MTBI. However, there is also insufficient evidence to suggest changing or cessation of treatment where homeopathy is the chosen treatment^{65, 68}.

e. Fatigue

Fatigue in patients with TBI is related to a decreased ability to conduct a physical or mental activity. There is an imbalance in the patient's ability, utilisation or retrieval of physiological or psychological resources required to perform an activity. This fatigue is differentiated from fatigue experienced by the non-TBI population, which is related to a feeling of weariness from excess physical or mental effort applied to a task. Research confirms that in the TBI population, fatigue is related to mental effort to compensate for slowed processing, or attention limitations^{7, 92, 101}.

Fatigue, sleep disturbance/insomnia and irritability (closely associated with fatigue) are some of the most common post injury symptoms reported by patients with MTBI^{11, 19, 46, 53, 92, 101}. Fatigue is the first symptom reported in 43–73% of TBI patients^{7, 28} and is not significantly related to injury severity^{7, 11, 100}, or age¹⁰⁰, although higher levels of fatigue are associated with greater time since injury¹⁰⁰.

Assessment of fatigue typically relies on self report. The RPQ (refer to page 49) includes a rating on fatigue.

The management of fatigue reported by patients with MTBI involves structuring regular rest breaks within daily activities/work/study, increasing rest periods and/or sleep¹¹. Other strategies include pacing of daily activities (e.g., complete the lawn mowing over two days rather than over one day), minimising complex, demanding or protracted activity where possible (e.g., deferring or reducing study program, taking public transport to work rather than driving) or rearranging the order of tasks so that less demanding tasks are completed later in the day/week. The management of fatigue is important to **prevent failure** in the resumption of pre injury life roles.

Recommendation 38	Grade
When managing a patient's fatigue, the GP should consider strategies such as increased rest breaks (at work/study), increasing periods of rest/sleep, pacing activities, minimisation/restructure of demanding or protracted activity.	Consensus

2. MANAGEMENT OF ACTIVITY LIMITATIONS AND/OR PARTICIPATION IN LIFE ROLES

a. Behaviour

(refer to the *Clinical Practice Guidelines for the Care* of *People Living with Traumatic Brain Injury in the Community* (2006) p.p 29–31; key points relevant to MTBI are outlined)

The more common behavioural issues following TBI (mild to severe) are irritability, impatience and socialisation difficulties. There is insufficient evidence to support the use of drug therapy for behavioural problems in TBI.

b. Driving

Refer to Guidance for returning to driving page 55.

Driving is a complex task requiring a reasonably high level of cognitive and physical skills. The assessment for return to driving should be based on an assessment of risks, i.e., the likelihood of an event/accident and the severity of the consequences of that event/accident.

The occurrence of persistent functional disturbances or post concussive symptoms that may impact on driving requires careful assessment to determine the time frames for returning to driving (particularly for commercial vehicle drivers). A driving assessment (on and off road) by a driver trained occupational therapist may be a consideration.

Recommendation 39	Grade
A person who sustains a minor head injury should not drive for at least 24 hours and may require medical assessment.	Consensus
An extension of the recommended 24 hour time period is advised if there are symptoms or complications that result in loss of good judgement, decreased intellectual capacity (including slowed thinking), post traumatic seizures, visual impairment or loss of motor skills. If there are complications, a medical assessment is required before an individual returns to driving.	Consensus

c. Return to work/study

Refer to Return to work/study considerations page 53.

Research indicates that even when individuals who have sustained MTBIs return to work, up to 10–15% typically experience one or more symptoms at one to three years post injury^{89, 96}. A typical patient with MTBI, where symptoms are short term or do not interfere or limit work capacity, will return to work within three to seven days⁹⁸ post injury. Most patients with MTBI, including those with more significant symptoms, have generally returned to work within six months post injury¹³.

It is beneficial for the GP to contact the workplace prior to the patient returning to work (if possible), to discuss issues with the employer.

There is limited research on return to work management strategies for MTBI. However, there are patient-related and contextual variables that have been identified in research and through best available clinical expertise, which should be considered in the management of a return to work. These are:

Patient-related variables

Physical difficulties arising from the injury

- Dizziness²⁰; dizziness has been identified to be an independent predictor of a return to work.
 Dizziness is also closely linked with psychological distress at six months post injury
- Fatigue.

Psychosocial

- Reduced social interaction (compared to preinjury)⁷⁹
- Preinjury work motivation
- Coping strategies
- Malingering.

Cognitive impairment

- Cognitive impairments^{26, 66, 79}
 - o Attention
 - o Speed of information processing
 - o Mental fatigue.

Cultural/contextual issues that may be related to outcome

- Cultural factors at home/work
- Drug or alcohol use
- Social support
- Low preinjury earnings
- Police record/criminal record
- Preinjury work history⁴⁷
- Litigation^{47, 75} or seeking compensation.

A number of patient related variables have been identified that the research does not consider to be related to return to work outcomes⁶⁶:

- Age
- Sex
- Severity variables (GCS, WPTAS score or duration of retrograde amnesia or total symptoms on presentation at emergency ward).

Recommendation 40

When managing a patient's return to Consensus work/study, the GP should consider patient-related and contextual variables. These include physical difficulties arising from the injury, psychosocial issues, cognitive impairment, cultural or work-related contextual factors.

Grade

Work-related variables Preinjury work hours

- Quantity
- Hours per day/shift
- Shift times (morning/afternoon/evening)
- Rest breaks (fixed or self determined).

Pace of work

- Time on task
- Self paced/regulated
- Machine paced (e.g., conveyor line or operating machinery)
- Productivity demands
- Team bonus system.

Work tasks

- Cognitive and/or physical work task balance
- Whether tasks are routine or highly variable
- Memory or concentration demands
- Decision making demands
- Responsibility/seniority and support from supervisor
- Multitasking or competing simultaneous demands
- Communication demands (frequency and with how many people)
- Vigilance with machinery.

Work environment

- Light and noise
- Inside/outside (impact of ambient temperature and climate control affects physical fatigue).

Transport to/from work

- Public/private transport
- Others in the vehicle e.g., co-worker, children being dropped off to care/school.

Driving (for commercial or heavy vehicle drivers³) http://www.onlinepublications.austroads.com.au/ script/Details.asp?DocN=AR0000041_1004

- Business requirements e.g., rosters (shifts) driver training, contractual demands
- Legal requirements e.g., log books, licensing procedures
- Vehicle and vehicle load issues including, size, stability, load distribution (problem solving)
- Duty of care to passengers (e.g., bus driver)
- Risks associated with carriage of dangerous goods

- Skills required to manage the vehicle (e.g., turning and braking long vehicles)
- Demands associated with long periods spent on the road.

Recommendation 41	Grade
When managing a patient's return to work/study, the GP should consider the variables associated with the work tasks performed by the individual, the workplace and transport or driving issues.	Consensus

Return to work/study strategies

Graduated or modified return to work/study may be considered and negotiated with the employer/ educational institution. Variables that may be modified include:

- Hours (e.g., days of the week, shifts, number of hours)
- Tasks (e.g., range of tasks, frequency of tasks, productivity demands, order of tasks). For a return to study negotiation for less assignments, defer or delay exams, extended exam time, note taker or recording lectures in audio
- Workplace (e.g., work site change may reduce travel time, work pressures, quantity of tasks, responsibilities) or work hour parameters can be changed (quantity or time of day e.g., change from night shift to day shift where there is more support, less body clock adjustment), or tasks or intensity/quantity of tasks (productivity)
- Increase rest breaks, change study timetable.

Recommendation 42

Grade

When managing graduated or modified return to work/study, the Consensus GP should consider a range of variables including hours, tasks, workload, responsibilities, shifts and rest breaks.

d. Sport concussion and return to sport

Refer to SCAT for medical practitioners

page 51

In sport, the term concussion is typically used to refer to temporary disruption of neurological function subsequent to a blow to the head, face, neck or body. The assessment is typically based on temporary symptoms or signs of functional disturbance rather than structural injury/neurological measures (although structural injury may result through sport concussion).

The definition of concussion is provided in Appendix 1.

Signs and symptoms of sport related concussion^{48,51}

The signs and symptoms of sport relatd concussion are listed in Table 2.

Table 2 Signs and symptoms of sport related concussion

Cognitive features	Physical Signs
Unaware of period, opposition, score of game	Loss of consciousness/impaired conscious state
Confusion	Poor coordination or balance
Amnesia	Concussive convulsion/impact seizure
Loss of consciousness	Gait/unsteadiness/loss of balance
Somatic Symptoms	Slow to answer questions or follow directions
Headache or pressure in the head	Easily distracted, poor concentration
Balance problems or dizziness	Displaying inappropriate emotions e.g., laughing, crying
Nausea	Vomiting
Feeling "dinged", "foggy", stunned or "dazed"	Vacant stare/glassy eyed
Visual problems e.g., "seeing stars", flashing lights, double vision	Slurred speech
Hearing problems e.g., ringing in the ears	Personality changes
Irritability or emotional changes	Inappropriate playing behaviour e.g., running in wrong direction
Subjective feelings of slowness and fatigue	Significantly decreased playing ability

There is limited evidence on managing a return to playing sport after MTBI²⁷, the incidence of MTBI following sport-related concussion^{1, 91} and the effects of multiple sport-related concussion⁶⁴. At the 2nd International Symposium on Concussion in Sport⁵¹ in 2004, the participants developed a standardised tool that could be used for patient education on sport concussion and by medical practitioners. The SCAT has been developed using the combination of eight existing checklists and evaluation forms and subsequent checking for face and content validity on the basis of the scientific literature⁵¹.

Recommendation 43	Grade				
All sport-related concussion should be evaluated by a medical practitioner before the patient returns to play.	Consensus				
Recommendation 44					
The medical assessment of sport- related concussion should include review of cognitive function, balance testing and history (including previous concussions or injuries).	Consensus				
Recommendation 45					
The Sport Concussion Assessment Consensu Tool is recommended for use by medical practitioners for assessment following sport-related concussion.					
Research indicates that the appearance symptoms may be delayed for several h the concussion ⁵¹ . It is important to cons medication/drugs given for other injuries the symptoms of concussion.	e of nours after sider that s may mask				
Recommendation 46	Grade				
A player should never return to play while symptomatic. "If in doubt, sit them out".	Consensus				
Recommendation 47					
The concussed athlete should not return to play on the same day of injury. When returning to play, an athlete should be guided in a stepwise symptom-limited return to play program.	Consensus				
- · · · ·					

Refer to Information on sport concussion for coaches page 56.

7. **Prognosis**

7.1 Recommendations relevant to all three practice settings

"Recovery is a multidimensional process involving improvements in mental and physical health and not necessarily a fixed endpoint indicating "recovered" (Cassidy et al 2004, p. 16)¹⁷.

The clinician will more appropriately manage and advise patients if there is an understanding of the predictive factors and the usual path to recovery from MTBI. An understanding of the prognosis enables the clinician to recognise:

- When recovery is not occurring as expected •
- Preinjury and injury related factors and how these may influence clinical judgement
- Factors that have an impact on recovery and outcome

"Functional outcome following MTBI is determined by the complex interaction of neurological, physical, and psychological factors, the injured individuals' premorbid personality and coping style, environmental demands and expectations and support from others". (Kay (1993) cited in Ponsford et al 2000, p. 577)63.

7.2 Common post concussive symptoms (cognitive and somatic)

There are clinically significant cognitive changes that may often result from MTBI in the acute phase. These include information processing speed (slowed thinking), concentration, and memory. Research indicates that cognitive functioning recovers most rapidly in the first few weeks following MTBI22, 71, 83, 85, 96

The majority of patients with MTBI who experience reduced cognitive functioning in the first few days following injury can be expected to have these symptoms resolve and preinjury cognitive functioning return within days to three months (refer to recommendations 13 and 26). Recovery from MTBI is considered to be prolonged¹⁶ if symptoms do not resolve within three months, although this period is not a definitive threshold.

Common self-reported symptoms include headache, dizziness, fatigue, memory/forgetfulness and sleep difficulties, difficulties learning new tasks ^{16, 19, 30, 40, 43,} ^{46, 53, 71, 85}. These symptoms are not unique to patients with MTBI and are evident in patients with chronic pain³⁹, the general population⁴¹ and equally present in non-brain injured trauma patients⁵². The research

evidence suggests that anxiety/distress and pain must be considered to contribute to the development of post concussive symptoms (including cognitive deficits) occurring after MTBI^{14, 16, 73}. Interpreting a patient's physical, cognitive and psychological complaints and attributing symptoms to MTBI should be informed by consideration of the contributing factors and the exclusion of coexisting conditions (refer to recommendation 7).

The literature (with control or comparison groups) suggests that 22–86%²⁸ of adult patients who have sustained a MTBI may experience a range of post concussion symptoms in the first day after injury or in the first weeks of the acute stage^{28,} ^{36, 82}. The symptoms usually resolve within a few weeks to three months in the majority of patients^{19,} ⁸⁵. At three months, research indicates that about 25% of patients will have ongoing symptoms^{6, 19,} ^{46, 71}, with others recovering within 12 months^{16, 28,} ^{66, 37} and about 10–15% continuing to experience symptoms beyond 12 months post injury⁶⁶. A minority of patients with MTBI will have persistent symptoms beyond 12 months^{89, 96}. In a large prospective controlled study (Level II), Jakola et al (2007)³⁷ reported significantly more post concussive symptoms five to seven years after injury in patients who sustained a MTBI compared to age- and sexmatched controls from the normal population.

It is important to investigate other contributing or confounding factors when a patient has prolonged and significant complaints after MTBI.

Recommendation 48	Grade
The patient should be advised that they are likely to experience one or more post concussion symptoms for a short period and that this is normal.	A
Recommendation 49	
The patient should be advised that a full recovery of symptoms is expected.	А
Recommendation 50	
Where there are prolonged and significant complaints after MTBI, other contributing or confounding factors should be investigated.	A

7. Prognosis

7.2 Indicators for the presence or persistence of symptoms

The research evidence and opinion on the prediction of persistent symptoms and their severity is variable. There is some evidence on factors that influence the presence or persistence of symptoms. The information is detailed below in terms of outcome, the presence and severity of symptoms and factors that influence the reporting of symptoms under the ICF domains of body function/structure and contextual factors (environment, personal or psychosocial factors). These are:

a) Red flags – factors within the domain of body function and structure (impairment or pathology)

Factors indicative of poorer outcome:

- Post traumatic amnesia^{71, 86}
- Previous traumatic brain injury^{16, 24, 71}
- Previous physical limitations^{16, 39}
- History of previous neurological or psychiatric problems^{16, 37, 69, 71}
- Higher number of symptoms reported in the early post injury phase⁴⁶
- Skull fracture fracture is a risk factor for intracranial lesions^{10, 82}
- Early onset of pain and in particular headache within 24 hours after injury^{16, 24, 30, 85, 52}
- Females who have experienced trauma/ stress at the time of the injury ⁷¹(the difference between males and females may be due to acute psychobiological reactions following acute stress)⁵².

Factors influencing the rate of recovery:

- Confounding effects of other health related issues – for example, pain medications, disabling effects of associated injuries, emotional distress, memory^{16, 17, 71}
- Presence of post injury symptoms nausea or memory problems and the percentage of body in pain after the injury.^{16, 85}

Factors influencing the severity of symptoms:

- Presence of headaches, dizziness, or nausea in the emergency department ^{17, 24, 30}
- Acute balance deficits.

There is no suggestion in the evidence that the severity of injury (within the MTBI group with a GCS 14–15/15¹⁶), the severity of GCS^{17, 82}, nor onset of seizures are prognostic of post concussive symptoms. There is limited evidence that the length of PTA^{16, 71} is prognostic of the presence of post concussive symptoms, slower recovery or prolonged symptoms following MTBI. Those with a GCS of 13/15 have increased rates of disability^{18, 71}.

b) Yellow flags – contextual factors (personal, psychosocial or environmental factors)

Factors indicative of poorer outcome:

 Injury sustained as a result of a motor vehicle accident^{16, 71}

Factors influencing the rate of recovery:

- Strong evidence (meta-analysis of 17 studies) indicates financial compensation and those not at fault in a motor vehicle accident have predicted longer term symptoms/delayed recovery and delayed return to work (compensation/litigation factors, and related motivational issues)^{16, 17, 39, 54}. However, it should not be assumed that settling a claim will result in quick recovery from symptoms.
- Not returning to work (delays in return to work after the injury resulted in slower symptom recovery)^{16, 17}
- Presence of life stressors at the time of the injury^{37, 39, 71}
- Being a student^{16, 71}
- > 20% of body in pain reported by patient results in longer case closure (where compensation claim applicable) using a pain mapping diagram.¹⁷

Factors influencing the severity of symptoms:

- Higher levels of symptom reporting is associated with mood symptoms and heightened self awareness (greater awareness of their deficits) irrespective of compensation status⁶⁷
- The tendency to blame others (e.g., claimants or a person with a compensable injury) appears to be associated with less effective coping and higher number of symptoms reported.⁶⁷

7. Prognosis

c) Inconsistent evidence

There is inconsistent evidence on the influence of the following factors on outcome:

- Substance abuse problems and/or poor general health^{37, 39,52}
- Age (> 40 years old) results in a poorer outcome^{16, 71}
- Being female^{16, 24,52 52}
- Marital status; some studies indicate that being married resulted in a slower recovery and single patients had a quicker recovery^{16, 17}. However, other studies have found being single was a feature of having symptoms in the longer term.⁷¹

Recommendation 51	Grade
The medical assessment should include screening for red and yellow flags to identify patients for increased	В
risk of persistent symptoms.	

8. Resources

Mild head injury advice sheet	41
General practitioner – medical screening checklist for mild traumatic brain injury	43
Abbreviated Westmead PTA Scale (A-WPTAS)	45
Guidance on the discharge letter to the GP from the emergency department	48
Rivermead Post Concussion Symptoms Questionnaire (RPQ)	49
Sport Concussion Assessment Tool for medical practitioners (SCAT)	51
General practitioner guide – return to work/study considerations	53
Guidance for returning to driving	55
Information on sport concussion for coaches	56
Modified postural stability assessment (BESS)	57

Important points about Mild Head Injury

You had a mild head injury. Most people recover rapidly following a mild head injury. A few people may suffer from 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 out for after a head injury and what you need to do if you have problems.

Warning Signs

If you show any of these symptoms or signs after your head injury, or you get worse , go to the nearest hospital, doctor or telephone an ambulance immediately.

- Fainting or drowsiness or you can't wake up
- Acting strange, saying things that do not make sense (change in behaviour)
- 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)
- Pass out or have a blackout or a seizure (any jerking of the body or limbs)
- Cannot move parts of your body or clumsiness
- Blurred vision or slurred speech
- Continual fluid or bleeding from the ear or nose

The first 24-48 hours after injury

2	Warning Signs	You should be observed and return to hospital if you develop any of the above warning signs.
	Rest / Sleeping	Rest 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.
A	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.
Ys	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.
Ð	Pain Relief	Use paracetamol or paracetamol/codeine for headaches. Do not use aspirin or anti inflammatory pain reliever such as ibuprofen or naproxen (NSAIDs), which may increase the risk of complications.
	Sports	Do not play sports for at least 24 hours.

MOTOR ACCIDENTS AUTHORITY

See your local doctor if you are not starting to feel better within a few days of your injury.

Adapted from "Mild Head Injury Discharge Advice" author Dr Duncan Reed (2007) Director of Trauma Gosford Hospital. NSW Institute of Trauma and Injury Management

The first 4 weeks after injury

You may have some common effects from the head injury which usually resolve in several weeks to three months. These are called **post concussive 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.
	Driving	Do not drive or operate machinery until you feel much better and can concentrate properly. Talk to your doctor.
Y	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 is 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 it 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.

Post Concussion Symptoms

There are common symptoms after a mild head injury. **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)
- Having more trouble than usual with attention & concentration
- Having more trouble than usual with remembering things (memory difficulties/forgetfulness)
- Feeling dizzy or sick without vomiting (nausea)
- Balance problems
- More difficulty than usual with making decisions and solving problems, getting things done or being organised
- Feeling vague, slowed or "foggy" thinking

- Feeling more tired than usual and lacking energy (fatigue)
- Irritability. Losing your temper and getting annoyed easily
- Mood swings
- Anxiety or depression
- Mild behavioural change
- More sensitive to sounds or lights
- Change in sleep patterns. Trouble sleeping or sleeping too much
- Reduced tolerance to alcohol

Local service information

General practitioner – medical screening checklist for mild traumatic brain injury

SCREENING

1. History

- Time since discharge from hospital
- Mechanism of current injury
- Protective equipment at time of injury
- Loss of consciousness, concussion or symptoms
- Post traumatic amnesia period of amnesia
- Previous incidence/s of loss of consciousness or concussion.

2. Examination

- General (BP, pulse, temperature, etc)
- Neurological
 - o Headache
 - o Balance (resource : http://www.maa.nsw.gov.au/default.aspx?MenuID=148)
 - o Dizziness
 - o Nausea.

3. Cognitive Screen

- Sport Concussion Assessment Tool (SCAT) (http://www.maa.nsw.gov.au/default.aspx?MenuID=148)
 - o Five word recall (immediate)
 - o State months in reverse order
 - o State digits backwards
 - o Five word recall (delayed)
- Post traumatic amnesia (PTA) (if the patient has not attended hospital or undergone PTA testing) Abbreviated Westmead Post Traumatic Amnesia Scale – (recall over 1 hour) http://www.maa.nsw.gov.au/default. aspx?MenulD=148

4. Post concussive symptoms

Rivermead Post Concussion Symptoms Questionnaire (RPQ) http://www.maa.nsw.gov.au/default. aspx?MenuID=148

5. Mental health

Mental health screening may not be appropriate at the first review. However, it is important to consider, exclude and treat other contributing or confounding factors before attributing mental health symptoms to MTBI. Screening and assessment can be performed using the screening tools listed or others considered appropriate. Most tools have not been validated on a population of individuals with MTBI.

- a. Managing anxiety following motor vehicle accidents: A General Practitioners guide for recommendations on initial screening and chronic anxiety (> 3 months) download from http://www.maa.nsw.gov.au/default. aspx?MenulD=141 under Anxiety Guidelines.
- b. Depression, Anxiety Stress Scale (full questionnaire or a shortened version DASS 21) available for download on http://www2.psy.unsw.edu.au/groups/dass// The DASS 21 is freely available in 13 languages other than English (Arabic, Chinese, Dutch, French, German, Hungarian, Icelandic, Japan, Norwegian, Persian, Spanish, Taiwanese, Vietnamese)
- c. Hospital Anxiety and Depression Scale (HADS) from http://shop.nfer-nelson.co.uk/icat/ hospitalanxietyanddepression and the calculator from http://www.patient.co.uk/showdoc/40002439/

TREATMENT

The primary treatment involves:

- Reassurance and education about post concussive symptoms; many patients experience post concussive symptoms. These usually resolve within days/few weeks up to three months with 15% having symptoms extending beyond three months. Provide patient with patient advice sheet for head injuries (http://www.maa.nsw.gov.au/default.aspx?MenuID=148). Follow-up or more detailed information for patients with MTBI can be downloaded at: http://www.med.monash.edu.au/spppm/research/merrc/
- Encourage gradual resumption of usual activities (including driving, domestic duties, study, work, and sport), as symptoms allow, and to avoid fatigue, which may precipitate psychosocial sequelae.

Factors that research indicates do influence outcome, severity or the rate of recovery for individuals with MTBI include:

Red flags (pathology)

- Experienced PTA
- History of previous neurological or psychiatric problems, previous traumatic brain injury or physical limitations
- Higher number of symptoms reported early post injury
- Skull fracture
- Severe headache within 24 hours and pain severity > 4/10 on visual analogue scale
- Reduced balance, dizziness in acute stage
- Confounding effects of other health related issues, e.g., pain medications, emotional distress
- Presence of nausea or memory problems post injury.

Yellow flags (contextual factors - personal, psychosocial or environmental factors)

- Injury sustained in a motor vehicle accident
- Insurance system claimant, but not at fault; settling a claim will not necessarily result in resolution of symptoms
- Not returning to work or significant delays in returning to work following the injury (being off work longer delays recovery)
- Being a student
- Presence of concurrent life stressors
- Percentage of body in reported pain where compensation claim applicable (> 20% body in pain = delays recovery)
- Tendency to blame others compared to a patient with MTBI who was at fault (e.g., motor vehicle accident)
- Higher levels of symptom reporting associated with mood symptoms and greater patient awareness of deficits.

ABBREVIATED WESTMEAD PTA SCALE (A-WPTAS) GCS & PTA testing of patients with MTBI following mild head injury

Abbreviated Westmead PTA Scale (A-WPTAS) incorporating Glasgow Coma Scale (GCS)

Date:		T1	T2	Т3	T4	T5	Use of A-WPTAS and GCS for patients w
Time							The A-WPTAS combined with a standardised Ge assessment is an objective measure of post trau
Motor	Obeys commands	6	6	6	6	6	amnesia (PTA). Only for patients with <u>current GCS of 13-15 (<2</u> post injury) with impact to the head resulting in
	Localises	5	5	5	5	5	disorientation, anterograde or retrograde amnes
	Abnormal flexion	4	4	4	4	4	LOC. Administer both tests at hourly intervals
	Withdraws	3	3	3	3	3	information. Also, note the following : poor mot
	Extension	2	2	2	2	2	depression, pre-morbid intellectual handicap or
	None	1	1	1	1	1	medication, drug or alcohol effects. NB: This is a
Eye Opening	Spontaneously	4	4	4	4	4	doubt exists, more thorough assessment may b
	To speech	3	3	3	3	3	necessary.
	To pain	2	2	2	2	2	Admission and Discharge Criteria:
	None	1	1	1	1	1	Admission and Discharge Chiena.
Verbal	Oriented ** (tick if correct)	5	5	5	5	5	A patient is considered to be out of PTA when the 18/18.
	Name						Both the GCS and A-WPTAS should be used in with clinical judgement.
	Place		님	님	님	님	Patients scoring 18/18 can be considered for dis
	Why are you here Month						For patients who do not obtain 18/18 re-assess further hour.
	Year						Patients with persistent score $< 18/18$ at 4 hours
	Confused	4	4	4	4	4	of injury should be considered for admission.
	Inappropriate words	3	3	3	3	3	Clinical judgement and consideration of pre-exis
	Incomprehensible sounds	2	2	2	2	2	of A-WPTAS is abnormal but the GCS is normal
	None	1	1	1	1	1	 Referral to GP on discharge if abnormal PTA wa provide patient advice sheet.
GCS	Score out of 15	/15	/15	/15	/15	/15	
	Picture 1	Show					Target set of picture cards
	Picture 2	pictures (see					
	Picture 3	over)					

** must have all 5 orientation questions correct to score 5 on verbal score for GCS, otherwise the score is 4 (or less).

Picture 3

Score out of 18

PUPIL T1 T2 TЗ T4 Τ5 REACTS + = ASSESSMENT BRISKLY R L R L R L R L R L SL = SLUGGISH Size С CLOSED = Reaction NIL = _

/18

/18

/18

/18

Comments

A-WPTAS

ith MTBI

CS umatic

24hrs confusion. ia, or brief s to gauge retain new ivation, possible a screening where е

ney score

conjunction

scharge.

after a

post time

sting omponent (15/15).

s present,

Pupil Size (mm) 8 2 З 4 5 6 7

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

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 can not 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.

Shores & Lammel (2007) - further copies of this score sheet can be downloaded from http://www.psy.mq.edu.au/GCS Research and development of the A-WPTAS supported by the Motor Accidents Authority NSW

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

Guidance on key information to be included in the discharge letter to the GP from the emergency department

MILD TRAUMATIC BRAIN INJURY

Clinical assessment

- Time of injury
- Period of loss of consciousness
- GCS on arrival and discharge
- A-WPTAS (initial and discharge)
- CT scan and other tests performed.

Symptom observation

- Headache
- Nausea
- Vomiting (including frequency)
- Post traumatic seizure
- Difficulty with attention/concentration
- Dizziness/balance problems.

Potential complicating factors or factors that may influence outcome

- Experience PTA or continuing PTA
- Acute balance deficits
- Clinically obvious intoxication (drug or alcohol)
- Age > 65 years
- History of previous neurological or psychiatric conditions
- Comorbid conditions
- Significant pain reported or higher proportion of body in pain than before injury.

Rivermead Post Concussion Symptoms Questionnaire

Modified (Rpq-3 And Rpq-13)⁴² Printed With Permission: Modified Scoring System From Eyres 2005 ²⁸

Name:

Date:

After a head injury or accident some people experience symptoms that can cause worry or nuisance. We would like to know if you now suffer any of the symptoms given below. Because many of these symptoms occur normally, we would like you to compare yourself now with before the accident. For each symptom listed below please circle the number that most closely represents 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:

	not experienced	no more of a problem	mild problem	moderate problem	severe problem
Headaches	0	1	2	3	4
Feelings of dizziness	0	1	2	3	4
Nausea and/or vomiting	0	1	2	3	4
Noise sensitivity (easily upset by loud noise)	0	1	2	3	4
Sleep disturbance	0	1	2	3	4
Fatigue, tiring more easily	0	1	2	3	4
Being irritable, easily angered	0	1	2	3	4
Feeling depressed or tearful	0	1	2	3	4
Feeling frustrated or impatient	0	1	2	3	4
Forgetfulness, poor memory	0	1	2	3	4
Poor concentration	0	1	2	3	4
Taking longer to think	0	1	2	3	4
Blurred vision	0	1	2	3	4
Light sensitivity (easily upset by bright light)	0	1	2	3	4
Double vision	0	1	2	3	4
Restlessness	0	1	2	3	4
Are you experiencing any other d	fficulties? Pleas	se specify, and	rate as above.		
1.	0	1	2	3	4

Administration only:

2.

RPQ-3 (total for first three items)	
RPQ-13 (total for next 13 items)	

1

2

З

0

4

Modified (Rpq-3 And Rpq-13)⁴² Printed With Permission: Modified Scoring System From Eyres 2005 ²⁸

Administration only

Individual item scores reflect the presence and severity of post concussive symptoms. Post concussive symptoms, as measured by the RPQ, may arise for different reasons subsequent to (although not necessarily directly because of) a traumatic brain injury. The symptoms overlap with broader conditions, such as pain, fatigue and mental health conditions such as depression⁷².

The questionnaire can be repeated to monitor a patient's progress over time. There may be changes in the severity of symptoms, or the range of symptoms. Typical recovery is reflected in a reduction of symptoms and their severity within three months.

Scoring

The scoring system has been modified from Eyres, 2005²⁴.

The items are scored in two groups. The first group (RPQ-3) consists of the first three items (headaches, feelings of dizziness and nausea) and the second group (RPQ-13) comprises the next 13 items. The total score for RPQ-3 items is potentially 0–12 and is associated with early symptom clusters of post concussive symptoms. If there is a higher score on the RPQ-3, earlier reassessment and closer monitoring is recommended.

The RPQ-13 score is potentially 0–52, where higher scores reflect greater severity of post concussive symptoms. The RPQ-13 items are associated with a later cluster of symptoms, although the RPQ-3 symptoms of headaches, dizziness and nausea may also be present. The later cluster of symptoms is associated with having a greater impact on participation, psychosocial functioning and lifestyle. Symptoms are likely to resolve within three months. A gradual resumption of usual activities is recommended during this period, appropriate to symptoms. If the symptoms do not resolve within three months, consideration of referral for specialist assessment or treatment services is recommended.

References:

Eyres, S., Carey, A., Gilworth, G., Neumann, V., Tennant, A. (2005). Construct validity and reliability of the Rivermead Post Concussion Symptoms Questionnaire. *Clinical Rehabilitation*, 19, 878-887.

King, N. S., Crawford, S., Wenden, F.J., Moss, N.E.G. Wade, D.T. (1995). The Rivermead Post Concussion Symptoms Questionnaire: a measure of symptoms commonly experienced after head injury and its reliability *Journal of Neurology*, 242, 587-592.

Potter, S., Leigh, E., Wade, D., Fleminger, S. (2006). The Rivermead Post Concussion Symptoms Questionnaire *Journal of Neurology*, October 1-12.

Sport Concussion Assessment Tool for medical practitioners - SCAT

A

This tool represents a standardized method of evaluating people after concussion in sport. This Tool has been produced as part of the Summary and Agreement Statement of the Second International Symposium on Concussion in Sport, Prague 2004

Sports concussion is defined as a complex pathophysiological process affecting the brain, induced by traumatic biomechanical forces. Several common features that incorporate clinical, pathological and biomechanical injury constructs that may be utilized in defining the nature of a concussive head injury include:

- Concussion may be caused either by a direct blow to the head, face, neck or elsewhere on the body with an 'impulsive' force transmitted to the head.
- Concussion typically results in the rapid onset of short-lived impairment of neurological function that resolves spontaneously.
- Concussion may result in neuropathological changes but the acute clinical symptoms largely reflect a functional disturbance rather than structural injury.
- Concussion results in a graded set of clinical syndromes that may or may not involve loss of consciousness. Resolution of the clinical and cognitive symptoms typically follows a sequential course.
- 5. Concussion is typically associated with grossly normal structural neuroimaging studies.

Post Concussion Symptoms

Ask the athlete to score themselves based on how they feel now. It is recognized that a low score may be normal for some athletes, but clinical judgment should be exercised to determine if a change in symptoms has occurred following the suspected concussion event.

It should be recognized that the reporting of symptoms may not be entirely reliable. This may be due to the effects of a concussion or because the athlete's passionate desire to return to competition outweighs their natural inclination to give an honest response.

If possible, ask someone who knows the athlete well about changes in affect, personality, behavior, etc.

Remember, concussion should be suspected in the presence of ANY ONE or more of the following:

- Symptoms (such as headache), or
- Signs (such as loss of consciousness), or
- Memory problems

Any athlete with a suspected concussion should be monitored for deterioration (i.e., should not be left alone) and should not drive a motor vehicle.

For more information see the "Summary and Agreement Statement of the Second International Symposium on Concussion in Sport" in the: Clinical Journal of Sport Medicine 2005; xx(xx): xxx-x British Journal of Sports Medicine 2005; xx(xx): xxx-x Neurosurgery 2005; ; xx(xx): xxx-x

Physician and Sportsmedicine 2005; xx(xx): xxx-x This tool may be copied for distribution to teams, groups and organizations.

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FIFA

The SCAT Card (Sport Concussion Assessment Tool) Athlete Information *<i>JIIHF*

What is a concussion? A concussion is a disturbance in the function of the brain caused by a direct or indirect force to the head. It results in a variety of symptoms (like those listed below) and may, or may not, involve memory problems or loss of consciousness.

How do you feel? You should score yourself on the following symptoms, based on how you feel now.

Post Concu	issio	n Sy	mptor	n Sc	ale			
	None		Mo	Moderate			Severe	
Headache	0	1	2	3	4	5	6	
"Pressure in head"	0	1	2	3	4	5	6	
Neck Pain	0	1	2	3	4	5	6	
Balance problems or dizzy	0	1	2	3	4	5	6	
Nausea or vomiting	0	1	2	3	4	5	6	
Vision problems	0	1	2	3	4	5	6	
Hearing problems / ringing	0	1	2	3	4	5	6	
"Don't feel right"	0	1	2	3	4	5	6	
Feeling "dinged" or "dazed"	0	1	2	3	4	5	6	
Confusion	0	1	2	3	4	5	6	
Feeling slowed down	0	1	2	3	4	5	6	
Feeling like "in a fog"	0	1	2	3	4	5	6	
Drowsiness	0	1	2	3	4	5	6	
Fatigue or low energy		1	2	3	4	5	6	
More emotional than usual	0	1	2	3	4	5	6	
Irritability	0	1	2	3	4	5	6	
Difficulty concentrating	0	1	2	3	4	5	6	
Difficulty remembering		1	2	3	4	5	6	
(follow up symptoms onl	y)							
Sadness	0	1	2	3	4	5	6	
Nervous or Anxious	0	1	2	3	4	5	6	
Trouble falling asleep	0	1	2	3	4	5	6	
Sleeping more than usual	0	1	2	3	4	5	6	
Sensitivity to light	0	1	2	3	4	5	6	
Sensitivity to noise	0	1	2	3	4	5	6	
Other:	0	1	2	3	4	5	6	

What should I do?

Any athlete suspected of having a concussion should be removed from play, and then seek medical evaluation.

Signs to watch for:

Problems could arise over the first 24-48 hours. You should not be left alone and must go to a hospital at once if you:

- Have a headache that gets worse
 Are very drowsy or can't be awakened (woken up)
- Are very drowsy or can't be awakened (woken up)
- Can't recognize people or places
- Have repeated vomiting
- Behave unusually or seem confused; are very irritable
- Have seizures (arms and legs jerk uncontrollably)
- Have weak or numb arms or legs

Are unsteady on your feet; have slurred speech

Remember, it is better to be safe. Consult your doctor after a suspected concussion.

What can I expect?

Concussion typically results in the rapid onset of short-lived impairment that resolves spontaneously over time. You can expect that you will be told to rest until you are fully recovered (that means resting your body and your mind). Then, your doctor will likely advise that you go through a gradual increase in exercise over several days (or longer) before returning to sport.

Sport Concussion Assessment Tool for medical practitioners - SCAT (cont.)

HA WIHF The SCAT Card (Sport Concussion Assessment Tool) Medical Evaluation Name: Date	68	000			Instruct
The SCAT Card (Sport Concussion Assessment Tool) Medical Evaluation Strington Str	FIFA	COD .		通 IIHF	physioth
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(Sport Concusion Assessment Tool) Control Medical Evaluation Modified Evaluation Name:		The SCAT C	ard		strongly
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Name: Date not Sport/Team: Mouth guard? Y N Muth guard? Y N 1) SIONS Was there solcure or convulsive activity? Y N Was there solcure or convulsive activity? Y N As Was there a balance problem / unsteadiness? Y N Y 2) MEMORY Modified Maddocks questions (check correct) Mit At what venue are we? ;; Who half is it? ;; Who scored last? Wit What team did we play last? ; Did we win last game? ? Re 3) SYMPTOM SCORE Total number of positive symptoms (from reverse side of the card) = mit Yord 1		Medical Evalu	lation		the begi
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Any neurologic screening abnormality necessitates formal neurologic or hospital assessment 6) RETURN TO PLAY Athletes should not be returned to play the same day of injury. When returning athletes to play, they should follow a stepwise symptom-limited program, with stages of progression. For example: 1. rest until asymptomatic (physical and mental rest) 2. light aerobic exercise (e.g. stationary cycle) 3. sport-specific training 4. clear Fin 5. sport-specific training	Gait Assessment				from mi
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a non contact training daile least light reactions a	3. sport-spec	itic training	et light see's	tanco training)	should i
full contact training drills (start light resistance training)	 non-contact full contact 	training after medi	cal clearant	ce (raining)	L

6. return to competition (game play)

There should be approximately 24 hours (or longer) for each stage and the athlete should return to stage 1 if symptoms recur. Resistance training should only be added in the later stages. Medical clearance should be given before return to play.

ons:

of the card is for the use of medical doctors, erapists or athletic therapists. In order to the information gathered from the card, it is suggested that all athletes participating in ports complete a baseline evaluation prior to ning of their competitive season. This card ested guide only for sports concussion and is t to assess more severe forms of brain ease give a COPY of this card to the or their information and to guide followssment.

or each of these items and circle r N (no).

y 5 words (an example is given). Avoid related words such as "dark" and "moon" n be recalled by means of word association. ch word at a rate of one word per second. te should not be informed of the delayed memory (to be done after the reverse nd/or digits). Choose a different set of ch time you perform a follow-up exam with candidate.

ration / Attention:

thlete to recite the months of the year in order, starting with a random month. Do not December or January. Circle any months d in the correct sequence.

backwards, if correct, go to the next string incorrect, read trial 2. Stop after incorrect rials.

gic Screening:

nedical personnel must administer this ion. These individuals might include medical physiotherapists or athletic therapists. hould be assessed for fluency and lack of Eye motion should reveal no diplopia in any lanes of movement (vertical, horizontal and onal planes). The pronator drift is performed the patient to hold both arms in front of ms up, with eyes closed. A positive test is the forearm, dropping the arm, or drift away line. For gait assessment, ask the patient to y from you, turn and walk back.

o Play:

red, graded exertion protocol should be d; individualized on the basis of sport, age oncussion history of the athlete. Exercise or hould be commenced only after the athlete is symptomatic with physical and cognitive rest. ision for clearance to return to competition eally be made by a medical doctor.

For more information see the "Summary and Agreement Statement of the Second International Symposium on Concussion in Sport" in the: Clinical Journal of Sport Medicine 2005; in press British Journal of Sports Medicine 2005; 39:196-204 Neurosurgery 2005; in press Physician and Sportsmedicine 2005; in press

General practitioner guide - return to work/study considerations

The range of factors to consider when a patient returns to work or study is similar. There needs to be adequate assessment and onwards referral where indicated. Return to work/study is managed in conjunction with a gradual return to other home/ family, social and sporting activities. It is beneficial for the GP to contact the workplace prior to the patient returning to work (if possible), to discuss issues with the employer.

A patient may return to work within a few days of injury (typically 3–7 days with simple concussion), although on average patients with MTBI require three to four weeks off work. Frequently there are residual symptoms affecting the patient at home and/or in the workplace, although some symptoms may not become evident until the patient returns to work/ study. Recovery continues over weeks and in some instances months.

Principles for management:

- Provide information and reassurance routinely to assist the individual to understand their injury – symptoms generally resolve within weeks or months.
- 2. **Don't wait for failure.** Early intervention and a gradual return to work/study assists in preventing secondary sequelae (e.g., anxiety subsequent to failure).
- 3. Provide active management of a gradual process for an individual to return to activities and life roles (including driving, work, study, sport).
- 4. Encourage support from the family or significant others (e.g., work supervisor, university counsellor).
- 5. Provide treatment for specific symptoms as appropriate (headaches, depression).
- 6. It is essential that the medical practitioner understands the type of work/study the patient performs and the demands that work requires to safely assist a patient to return to work/ study. The name of an individual's occupation is insufficient. For example, truck driver – may involve driving short local distances and have materials handling demands, or may involve driving a large multi-axle truck long distances interstate with minimal materials handling demands.

A. PATIENT RELATED VARIABLES TO ASSESS

Post concussive symptoms

- How many
- What are they
- Duration and intensity
- Which symptom/s have resolved (if any)
- Do the specific symptoms have the potential to impact on the individual's specific work tasks
- Whether fatigue is a symptom
- Whether cognitive symtpoms present (e.g attention).

Physical difficulties or injury

 Dizziness; dizziness has also been closely linked with psychological distress at six months post injury

Psychosocial

- Reduced social interaction (compared to preinjury)
- Preinjury work motivation
- Coping strategies.

Cultural/contextual issues

- Cultural factors at home/work
- Drug or alcohol use
- Social support
- Low preinjury earnings
- Police record/arrest record
- Preinjury work history.

B. WORK RELATED VARIABLES TO CONSIDER Preinjury work hours

- Quantity
- Hours per day/shift
- Shift times (morning/afternoon/evening).
- rest breaks (fixed or self determined)

http://www.maa.nsw.gov.au/default.aspx?MenuID=148

General practitioner guide - return to work/study considerations (cont.)

Pace of work

- Self paced/regulated
- Machine paced (e.g., conveyor line or operating machinery)
- Productivity demands
- Bonus system.

Work tasks

- Cognitive and/or physical work task balance
- Whether tasks are routine or highly variable
- Memory or concentration demands
- Decision making demands
- Multitasking or competing simultaneous demands
- Communication demands (frequency and with how many people)
- Vigilance with machinery
- Responsiblity/seniority and support from supervisor.

Work environment

- Light and noise
- Inside/outside (impact of ambient temperature and climate control affects physical fatigue).

Transport to/from work

- Public/private transport
- Others in the vehicle, e.g., coworker, children. being dropped off to care/school

Driving (for commercial or heavy vehicle drivers³)

- Business requirements, e.g., rosters (shifts) driver training, contractual demands
- Legal requirements e.g., log books, licensing procedures
- Vehicle or vehicle load issues including, size, stability, load distribution (problem solving)
- Duty of care to passengers (e.g., bus driver)
- Risks associated with carriage of dangerous goods
- Skills required to manage the vehicle (e.g., turning and braking long vehicles)
- Demands associated with long periods spent on the road.

C. RETURN TO WORK/STUDY STRATEGIES

Graduated or modified return to work/study may be considered and negotiated with the employer/ educational institution. Variables that may be modified include:

- Hours (e.g., days of the week, shifts, number of hours)
- Tasks (e.g., range of tasks, frequency of tasks, productivity demands, order of tasks). For a return to study - negotiation for less assignments, defer or delay exams, acquiring note taker or recording lectures in audio
- Workplace (e.g., work site change may reduce travel time, work pressures, quantity of tasks, responsibilities) or work hour parameters can be changed (quantity or time of day, e.g., change from night shift to day shift where there is more support, less body clock adjustment), or tasks or intensity/quantity of tasks (productivity)
- Increase rest breaks, change study timetable.

Guidance for returning to driving

A person who sustains a minor head injury should not drive for at least 24 hours and may require medical assessment.

An extension of the recommended 24 hour time period is advised if there are symptoms or complications that result in a loss of good judgement, decreased intellectual capacity (including slowed thinking), post traumatic seizures, visual impairment or loss of motor skills. If there are complications, a medical assessment is required before an individual can resume driving.

Persisting functional disturbances or post concussive symptoms may impact on an individual's driving skills and require careful assessment to determine the time frames for returning to driving (particularly for commercial vehicle drivers).

Additional considerations in the assessment of commercial or heavy vehicle drivers include:

- Business requirements e.g., rosters (shifts) driver training, contractual demands
- Legal requirements e.g., log books, licensing procedures
- Vehicle and vehicle load issues including, size, stability, load distribution (problem solving)
- Duty of care to passengers (e.g., bus driver)
- Risks associated with carriage of dangerous goods
- Skills required to manage the vehicle (e.g., turning and braking long vehicles
- Demands associated with long periods spent on the road.

Responsibilities³

- In NSW the driver is responsible for reporting any condition to the Roads and Traffic Authority (RTA) that is likely to affect their ability to drive safely in the long term. If the driver continues to drive despite the doctor's advice, does not report the condition to the RTA and continues to drive, he/ she may be prosecuted and insurance may not be valid if the health condition was a contributing factor to a motor vehicle accident.
- The clinician has the responsibility to advise the patient to report their condition to the RTA if it is likely to affect their ability to drive in the long term.
- In the case of temporary conditions, which may affect driving ability in the short term, the examining clinician should provide appropriate advice to an individual about not driving for a period. Notification to the RTA is not required in such instances.

Information on sport concussion for coaches

Adapted from the Sport Concussion Assessment Tool (SCAT). Clinical Journal of Sport Medicine (2005)

What should I do?

Athletes suspected of having a concussion should be removed from play and then medical evaluation should be sought.

Warning signs to watch for:

Problems could arise over the first 24–48 hours. The athlete should not be left alone and must be taken to a hospital at once if he/she:

- Has a headache that gets worse
- Is very drowsy or can't be woken up
- Can't recognise people or places
- Has repeated vomiting
- Behaves unusually or seems confused; is very irritable
- Has seizures (arms and legs jerk uncontrollably)
- Has weak or numb arms or legs
- Is unsteady on their feet; has slurred speech

Post concussion symptoms

The blow or force to the head may have caused a temporary disturbance in the function of the brain that resulted in concussion. This temporary disturbance may affect an athlete for several weeks. Common post concussion symptoms are listed below.

- Headache, pressure in the head or neck pain
- Balance problems or dizziness
- Nausea and/or vomiting
- Vision or hearing problems (ringing in the ears)
- Feeling dazed, "not right"
- Confusion
- Feeling slowed down
- Feeling like they are "in a fog"
- Drowsiness
- Fatigue or low energy
- More emotional than usual
- Irritability
- Difficulty concentrating
- Difficulty remembering

What should happen next?

It is better to be safe, consult a doctor after a suspected concussion.

WHEN IN DOUBT SIT IT OUT

Athlete to be given patient advice sheet http://www.maa.nsw.gov.au/default.aspx?MenuID=148

(Balance Error Scoring System (BESS)) (Developed by the University of North Carolina – adapted from descriptors in Gruskiewicz (2001)³³

Administration

All tests are performed for 20 second trials. The score is calculated by adding one (1) point for each error. For example, an error in the left single leg stance position (eyes closed), the patient opens their eyes after 4 seconds and then steps or stumbles after 6 seconds, resumes the test posture left single leg stance eyes closed in 3 seconds (only error if < 5 seconds delay) – the score is one point for each error = 2. The patient is asked to resume the testing posture as quickly as possible.

A higher score equates to a worse performance. Best performance = 0. The total score is the sum of all the errors. The score is compared for each individual over time. There is no normative data.

* All eight test positions are recommended. However, a simple less sensitive balance screen involves three items of the BESS, which may be selected if time is limited. The items include double leg (eyes closed), single leg (non-dominant foot), heel-toe/ tandem stance with non-dominant foot at the rear.

	(feet narrow hands of	A Vly together, on hips)			3		(non-domina real	The foot to the ary
TYPES of ERRORS	Double leg eyes open (A)	*Double leg eyes closed (A)	*Left leg eyes open (B)	Left leg eyes closed (B)	Right leg eyes open (B)	Right leg eyes closed (B)	*Tandem stance eyes open (C)	Tandem Stance eyes closed (C)
Lifting hands off the iliac crest								
Opening the eyes (when inappropriate)								
Stepping, stumbling, or falling								
Moving the hip more than 30 deg. of flexion or abduction								
Lifting the forefoot or heel								
Remaining out of the testing position > 5 seconds								
TOTAL								

http://www.maa.nsw.gov.au/default.aspx?MenuID=148

Appendices

Appendix 1 Definitions and terms

a. Closed head injury

A closed head injury is any injury to the scalp, skull, or brain resulting from mechanical energy to the head from external forces. These injuries can range from a minor bump on the skull to serious brain injury.

Head injury is classified as either open (penetrating the scalp and skull) or closed. A closed head injury may or may not lead to a traumatic brain injury.

b. Mild traumatic brain injury (MTBI)

Mild traumatic brain injury (MTBI) is an acute brain injury resulting from mechanical energy to the head from external forces. Criteria include:

- a. One or more of the following: confusion or disorientation, loss of consciousness for 30 minutes or less, post traumatic amnesia < 24 hours, and/or other transient neurological abnormalities e.g., focal signs, seizure, intracranial lesion not requiring surgery
- b. GCS of 14–15/15 at 30 minutes post injury or later upon presentation for health care, or
- c. GCS of 13/15 at 30 minutes post injury or later upon presentation for health care and a normal CT scan.

These manifestations of MTBI must not be due to drugs, alcohol, medications, or be caused by other injuries, treatment for other injuries (e.g., systemic injuries, facial injuries or intubation), other problems (e.g., psychological trauma, language barrier or coexisting medical conditions), or penetrating cranio-cerebral injury.

c. Concussion

(Adapted from the Agreement Statement of the 2nd International Conference on Concussion in Sport, Prague 2004)

Concussion is a complex pathophysiological process affecting the brain, induced by traumatic biomechanical forces. Concussion typically results in the rapid onset of short-lived impairment of neurological function that resolves spontaneously. The acute symptoms largely reflect a functional disturbance rather than **structural** injury.

Simple concussion

In simple concussion, an individual suffers an injury that progressively resolves without complication over 7–10 days.

Complex concussion

Complex concussion encompasses individuals who suffer from persistent symptoms (including persistent symptom recurrence with exertion), specific sequelae (such as concussive convulsions), prolonged loss of consciousness (more than one minute), or prolonged cognitive impairment after the injury. Complex concussion may also include individuals who suffer multiple concussions over time or where repeated concussions occur with progressively less impact or force.

Second impact syndrome (SIS)

Second impact syndrome occurs when an individual sustains a concussion or mild TBI before the first TBI has resolved.

d. Post concussion

The terms post concussion, post concussion syndrome and post concussion disorder are defined in this document as:

- Post concussion symptom is used when symptoms exist for up to three months (refer to section C in text box below for examples of somatic and behavioural symptoms). There may or may not be cognitive deficits involved (refer to B in text box below).
- Post concussion syndrome is an overarching term that may be used when more than one symptom exists for up to three months.
- Post concussional disorder refers to a DSM-IV 4th edition² set of clinical criteria adopted for diagnosis when symptoms continue after three months. In order for the diagnosis to apply, all criteria should be met *.

DSM-IV clinical criteria

- A. A history of head trauma that has caused cerebral concussion.
- B. Evidence from neuropsychological testing or quantified cognitive assessment of patient shows that they have difficulty in attention (concentrating, shifting focus of attention, performing simultaneous cognitive tasks) or memory (learning or recalling information).
- C. Three (or more) of the following occur shortly after the trauma and last at least three months:
 - becoming fatigued easily
 - disordered sleep
 - headache
 - vertigo or dizziness
 - irritability or aggression on little or no provocation
 - anxiety, depression or affective lability
 - changes in personality (e.g., social or sexual inappropriateness)
 - apathy or lack of spontaneity.
- D. Symptoms in criteria B and C have their onset following head trauma, otherwise they represent a substantial worsening of pre existing symptoms.
- E. The disturbances cause significant impairment in social or occupational functioning and represent a decline from a previous level of functioning.
- F. The symptoms do not meet criteria for other disorders and are not better accounted for by another mental disorder.

* The term post concussional syndrome is used in the International Classification of Diseases (ICD) which provides a different diagnostic criteria set to the DSM-IV. The research comparing the two criteria sets does not identify a preference⁵⁰.

Appendix 2

Abbreviations

A-WPTAS	Abbreviated Westmead Post Traumatic Amnesia Scale
BESS	Balance Error Scoring System
BIRD	Brain Injury Rehabilitation Directorate
CT	Computed Tomography
GP	General Practitioner
GCS	Glasgow Coma Scale
ICF	International Classification of Functioning Disability and Health
MRI	Magnetic Resonance Imaging
MTBI	Mild Traumatic Brain Injury
MOPTAS	Modified Oxford Post Traumatic Amnesia Scale
MAA	Motor Accidents Authority
NHMRC	National Health and Medical Research Council

NSW ITIM	New South Wales Institute of Trauma and Injury Management
PET	Positron Emission Tomography
PTSD	Post Traumatic Stress Disorder
RPQ	Rivermead Post Concussion Symptoms Questionnaire
PTA	Post Traumatic Amnesia
SPECT	Single Photon Emission Computed Tomography
SCAT	Sport Concussion Assessment Tool
VAS	Visual Analogue Scale
WHO	World Health Organisation
WPTAS	Westmead Post Traumatic Amnesia Scale

Appendix 3

Framework

The ICF provides an international standard language and framework for the description of health conditions and health related domains. These domains comprise body function/structure, activity/participation and consider the contextual factors of the environment and the person. The ICF provides a broader scope for communicating information about MTBI because it is inclusive of an individual's activities, participation and the environment after injury.

Diagram 1 represents the model that is the basis for the ICF⁹⁹. The diagram identifies three levels of human functioning classified by ICF, i.e., functioning at the level of body or body part, the whole person (activity) and the whole person in a social context (participation).

Undergraduate training and professional experience results in each clinician focusing on domains of health that are appropriate to their discipline. Paramedics, emergency department clinicians and some regional or remote GPs are involved with subacute and acute management of patients with MTBI. In the acute stages, the clinician deals with the patient's health functioning at the level of body or body part (body function or structure). The GP and other clinicians working with patients in the community also assess body function and structure; however, their focus is on other areas of health – the whole person, the patient's activity limitations and participation restrictions within the context of the patient's environment and personal factors.

An example of a patient (Peter) and his activity limitations and participation restrictions is provided in Diagram 1. Peter, who is a university student, sustained a MTBI and experiences post concussive symptoms one month after the injury.

An explanation of the terminology is provided in Table 3.

Table 3. Explanation of Terminology

Body functions are physiological functions of body systems (including psychological functions). Body structures are anatomical parts of the body, such as organs, limbs and their components. Impairments are problems in body function or structure, significant deviation from or loss of normal capacity. Activity is the execution of a task or action by an individual.

Participation is involvement in a life situation.

Activity limitations are difficulties an individual may have in executing activities.

Participation restrictions are problems an individual may experience during involvement in life situations. **Environmental factors** make up the physical, social and attitudinal environment in which people live and conduct their lives.

Appendix 4

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