

VA/DoD CLINICAL PRACTICE GUIDELINE
FOR MANAGEMENT OF CONCUSSION/ MILD TRAUMATIC BRAIN INJURY

Department of Veterans Affairs
Department of Defense

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&

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QUALIFYING STATEMENTS

The Department of Veterans Affairs (VA) and The Department of Defense (DoD) guidelines are based upon the best information available at the time of publication. They are designed to provide information and assist decision-making. They are not intended to define a standard of care and should not be construed as one. Neither should they be interpreted as prescribing an exclusive course of management.

Variations in practice will inevitably and appropriately occur when providers take into account the needs of individual patients, available resources, and limitations unique to an institution or type of practice. Every healthcare professional making use of these guidelines is responsible for evaluating the appropriateness of applying them in the setting of any particular clinical situation.

Introduction

Background

The Centers for Disease Control and Prevention (CDC) has estimated that each year, approximately 1.5 million Americans survive a traumatic brain injury (TBI), among whom approximately 230,000 are hospitalized. Approximately 50,000 Americans die each year following traumatic brain injury, representing one third of all injury-related deaths. The leading causes of TBI are falls (28%), motor vehicle-traffic accidents (20%), struck by/against events (19%) and assaults (11%). It is estimated that of the total reported TBIs, the vast majority (75%-90%) of these fit the categorization of mild-TBI and that approximately ninety percent (90%) of these follow a predictable course and experience few, if any, ongoing symptoms and do not require any special medical treatment. More than 1.1 million patients with mTBI are treated and released from an emergency department each year. Only a small sub-set of these patients (10%) experience post-injury symptoms of a long lasting nature.

The incidence of TBI has significantly increased in the patient population of the DoD and VHA as a result of injuries during recent military and combat operations. In the past 8 years, TBI has emerged as a common form of injury in service men and women serving in Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF). Although penetrating TBI is typically identified and cared for immediately, mTBI may be missed, particularly in the presence of other more obvious injuries. Due to numerous deployments and the nature of enemy tactics, troops are at risk for sustaining more than one mild brain injury or concussion in a short timeframe.

As experience with this condition in OEF and OIF service persons and veterans accumulated, it became clear that screening for possible TBI in OEF and OIF veterans could contribute to ensuring that patients are identified and treatment implemented.

In response to this need, VHA established a task force including members with expertise in Physical Medicine and Rehabilitation, Neurology, Psychiatry, Psychology, Primary Care, Prevention, and Medical Informatics to develop a screening tool and evaluation protocol. Although TBI is a significant public health problem, currently there are no validated screening instruments specific to TBI that are accepted for use in clinical practice. Therefore, the task force reviewed existing literature on screening for TBI, examined the efforts of individual military Medical Treatment Facilities (MTF's) and Department of Veterans Affairs (VA) Medical Centers that had implemented TBI screening locally, consulted with the Defense and Veterans Brain Injury Center (DVBIC), and considered data on the natural history of TBI. Based on these efforts, the task force developed a consensus document that included definitions, classification and taxonomy.

Following the development of a definition document, the task force constructed a screening instrument to assist in identifying OEF and OIF veterans who may be suffering from TBI, and a protocol for further evaluation and treatment of those whose screening tests are positive. Furthermore, a national electronic clinical reminder, VA-TBI Screening, was built incorporating this screening instrument. These protocols have been considered the seed for the development of this Evidence Based Practice Guideline. The DoD has published Clinical Guidance for Management of Mild-TBI in Theater and mTBI in Non-Deployed Medical Activities.

After the VA/DoD Working Group completed the review of the evidence for this guideline an Institute of Medicine (IOM) report addressing long-term consequences of Traumatic Brain Injury was published (IOM, 2009). The IOM committee concluded, on the basis of its evaluation, that there is limited/suggestive evidence of an association between sustaining a mild TBI resulting in loss of consciousness or amnesia and the development of unprovoked seizures, ocular and visual motor deterioration.

The committee found inadequate/insufficient evidence to determine whether an association exists between mild TBI and neurocognitive deficits and long-term adverse social functioning, including unemployment, diminished social relationships, and decrease in the ability to live independently.

For long-term outcomes, the IOM report describes limited/suggestive evidence of an association between mild TBI and Parkinson Disorder and between mild TBI and dementia of the Alzheimer's type when the injury included loss of consciousness. However, insufficient evidence of such association was found in mild TBI without loss of consciousness.

Scope of Guideline

- This Evidence Based Guideline applies to adult patients (18 years or older) who are diagnosed with concussion/mTBI and complain of symptoms related to the injury and who are treated in VA/DoD clinical settings for these symptoms at least 7 days after the initial head injury.
- The guideline is relevant to all healthcare professionals providing or directing treatment services to patients with concussion/mTBI in any VA/DoD healthcare setting, including both primary and specialty care.
- This guideline does not address: management of concussion/mTBI in the acute phase (< 7 days post injury), management of moderate or severe TBI, mTBI presented as polytrauma and managed in an inpatient setting, or mTBI in children.

Development Process

The development process of this guideline follows a systematic approach described in “Guideline-for-Guidelines,” an internal working document of VHA’s National Clinical Practice Guideline Counsel.

The literature search identified publications from 2002 through 2008 that addressed adult patients with mTBI. The initial year (2002) was elected to succeed the World Health Organization, (WHO) systematic review of publications related to mTBI conducted in 2002. The WHO Collaborating Centre for Neurotrauma Task Force on Mild Traumatic Brain Injury (Carroll, et al., 2004) performed a comprehensive search and critical review of the literature published between 1980 and 2002 to assemble the best evidence on the epidemiology, diagnosis, prognosis and treatment of mild traumatic brain injury.

The literature identified by the search was critically analyzed and graded using a standardized format applying the evidence grading system used by the U.S. Preventative Services Task Force. For recommendations that are based on evidence the strength of recommendation grade (SR) is included in brackets following the recommendations. Where existing literature was ambiguous or conflicting, or where scientific data were lacking on an issue, recommendations were based on the clinical experience of the members of the Working Group and are presented without an SR grade.

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Goals of this Guideline

- To promote evidence-based management of patients diagnosed with mild traumatic brain injury (mTBI)
- To promote efficient and effective assessment of patient's complaints
- To identify the critical decision points in management of patients with concussion/mTBI
- To improve local management of patients with concussion/mTBI and thereby improve patient outcomes
- To promote evidence-based management of individuals with (post-deployment) health concerns related to head injury, blast, or concussion
- To accommodate local policies or procedures, such as those regarding referrals to, or consultation with, specialists
- To motivate administrators at each of the Federal agencies and care access sites to develop innovative plans to break down barriers that may prevent patients from having prompt access to appropriate care
- To diagnose concussion/mTBI accurately and in a timely manner
- To appropriately assess and identify those patients who present with symptoms following a concussion/mTBI or other consequences of head injury
- To identify those patients who may benefit from further assessment, brief intervention and/or ongoing treatment
- To improve the quality and continuum of care for patients with concussion/mTBI
- To identify those patients who may benefit from early intervention and treatment to prevent future complications from concussion/mTBI
- To improve health related outcomes for patients with concussion/mTBI
- To reduce morbidity and mortality from concussion/mTBI.

Document Presentation:

- The Guideline is organized around three separate Algorithms:
 - **Algorithm A: Initial Presentation**
 - **Algorithm B: Management of Symptoms**
 - **Algorithm C: Follow-up of Persistent Symptoms**
- Annotations and recommendations in the text match the Box numbers and Letters in the respective algorithms.
- There are a limited number of recommendations that are based on best evidence literature. Therefore, in annotations for which there are evidence based studies to support the recommendations the Strength of Recommendation [SR] based on the level of evidence is presented in brackets for these recommendations. Recommendations that are not based on evidence were derived by consensus of experts. No SR is presented for these recommendations.

Evidence Rating

A	<p>A strong recommendation that the clinicians provide the intervention to eligible patients.</p> <p><i>Good evidence was found that the intervention improves important health outcomes and concludes that benefits substantially outweigh harm.</i></p>
B	<p>A recommendation that clinicians provide (the service) to eligible patients.</p> <p><i>At least fair evidence was found that the intervention improves health outcomes and concludes that benefits outweigh harm.</i></p>
C	<p>No recommendation for or against the routine provision of the intervention is made.</p> <p><i>At least fair evidence was found that the intervention can improve health outcomes, but concludes that the balance of benefits and harms is too close to justify a general recommendation.</i></p>
D	<p>Recommendation is made against routinely providing the intervention to asymptomatic patients.</p> <p><i>At least fair evidence was found that the intervention is ineffective or that harms outweigh benefits.</i></p>
I	<p>The conclusion is that the evidence is insufficient to recommend for or against routinely providing the intervention.</p> <p><i>Evidence that the intervention is effective is lacking, or poor quality, or conflicting, and the balance of benefits and harms cannot be determined.</i></p>

Conventions used in this Guideline:

The terms *concussion* and *mTBI* are used interchangeably. The use of the term *concussion* or history of mild TBI may be preferred when communicating with the patient, indicating a transient condition, avoiding the use of the terms "brain damage" or "brain injury" that may inadvertently reinforce misperceptions of symptoms or insecurities about recovery. The term *concussion/mTBI* will be used throughout this document as a convention.

Two terms commonly used in the literature, Post Concussive Syndrome (PCS) and Post Concussion Disorder (PCD,) also have the potential to reinforce illness behavior and the constellations of symptoms are not accurately described as either a syndrome or disorder. The term Persistent Post-Concussive Symptoms (PPCS) will be used throughout this document as a convention when referring to symptoms related to mTBI that do not remit despite initial treatment.

GUIDELINE KEY POINTS

General

- The management of patients who present with symptoms following a concussion/mTBI injury should focus on promoting recovery and avoiding harm
- A patient-centered approach should be used to provide the needed reassurance and motivation, since patients with prolonged symptoms are suffering, distressed, and in need of guidance, education, support, and understanding
- Currently, there are no universal standard criteria for the definition of concussion/mTBI and the diagnosis is based primarily on the characteristics of the immediate sequelae following the event
- Concussion/mTBI is a common injury, with a time-limited and predictable course. The majority of patients with concussion/mTBI do not require any specific medical treatment
- Experience in contemporary military operations suggests that substantial short-term and long-term neurologic deficits (similar to those following concussion/mTBI) can be caused by blast exposure without a direct blow to the head and may manifested in isolation or part of polytrauma.

Natural Course of disease

- The vast majority of patients who have sustained a concussion/mTBI improve with no lasting clinical sequelae
- Patients should be reassured and encouraged that the condition is transient and full recovery is expected. The term 'brain damage' should be avoided. A risk communication approach should be applied
- The vast majority of patients recover within hours to days, with a small proportion taking longer. In an even smaller minority, symptoms may persist beyond six months to a year
- The symptoms associated with Post-Concussion Syndrome (PCS) are not unique to mTBI. The symptoms occur frequently in day to day life among healthy individuals and are also found often in persons with other conditions such as chronic pain or depression.

Return to Work /Duty Activity

- Patients sustaining a concussion/mTBI should return to normal (work/duty/school/leisure) activity post-injury as soon as possible
- A gradual resumption of activity is recommended
- If physical, cognitive, or behavioral complaints/symptoms re-emerge after returning to previous normal activity levels, a monitored progressive return to normal activity as tolerated should be recommended.

Early intervention

- Early education of patients and their families is the best available treatment for concussion/mTBI and for preventing/reducing the development of persistent symptoms

- A primary care model can be appropriate for the management of Concussion/mTBI when implemented by an interdisciplinary team with special expertise.

Symptom Management

- Treatment of somatic complaints (e.g. sleep, dizziness/coordination problems, nausea, numbness, smell/taste, vision, hearing, fatigue, appetite problems) should be based upon individual factors and symptom presentation
- Headache is the single most common symptom associated with concussion/mTBI and assessment and management of headaches in individuals should parallel those for other causes of headache
- Medication for ameliorating the neurocognitive effects attributed to concussion/mTBI is not recommended
- Medications for headaches, musculoskeletal pain, or depression/anxiety must be carefully prescribed to avoid the sedating properties, which can have an impact upon a person's attention, cognition, and motor performance
- Treatment of psychiatric symptoms following concussion/mTBI should be based upon individual factors and the nature and severity of symptom presentation, and may include both psychotherapeutic and pharmacological treatment modalities
- In patients with persistent post-concussive symptoms (PPCS), which have been refractory to treatment, consideration should be given to other factors including psychiatric, psychosocial support, and compensatory/litigation.

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**VA/DoD Clinical Practice Guideline for
Management of Concussion/mild-Traumatic Brain Injury
A: Initial Presentation**

1 Person injured with head trauma resulting in alteration or loss of consciousness (possible mTBI) (See sidebar 1) [A-1]

Sidebar 1 - Possible Causes for Head Trauma

- Blast or explosion
- Head striking or being struck by object, or fall
- Undergoing acceleration/deceleration movement (e.g., Motor vehicle accident)

[A-1]

2 Urgent/emergent conditions identified? (See sidebar 2) [A-2]

Sidebar 2 - Indicators for Immediate Referral

1. Current altered consciousness
2. Progressively declining neurological exam
3. Pupillary asymmetry
4. Seizures
5. Repeated vomiting
6. Double vision
7. Worsening headache
8. Cannot recognize people or disoriented to place
9. Behaves unusually or confused and irritable
10. Slurred speech
11. Unsteady on feet
12. Weakness or numbness in arms/legs

3 Refer for emergency evaluation and treatment

4 Evaluate for diagnosis of concussion/mild-TBI based on history (See sidebar 3) [A-3]

Sidebar 3 - Diagnostic Criteria for Concussion/mild TBI

- Loss of or a decreased level of consciousness for less than 30 minutes
- Loss of memory for events immediately up to a one day after the injury
- Alteration of consciousness/mental state for 0-24 hours after the injury
- Normal structural imaging
- Glasgow Coma Score: 13-15 (best value within first 24 hours if available)

[A-3]

5 Is the diagnosis moderate or severe TBI?

6 Exit algorithm

7 Are concussion/mTBI with related symptoms present? (See sidebar 4) [A-4]

8 Is person currently deployed on military or combat operation? [A-5]

9 **Follow** guidance for management of mTBI in combat or ongoing military operation (deployment)

10 Is person presenting immediately after injury (within 7 days)? [A-6]

11 **Follow** local guidance or ED protocols for management of acute mTBI in non-deployed/civilian patients

13 Is person currently on treatment for mTBI symptoms? [A-7]

14 **Go to Algorithm C**
Follow-up persistent symptoms of concussion/mTBI

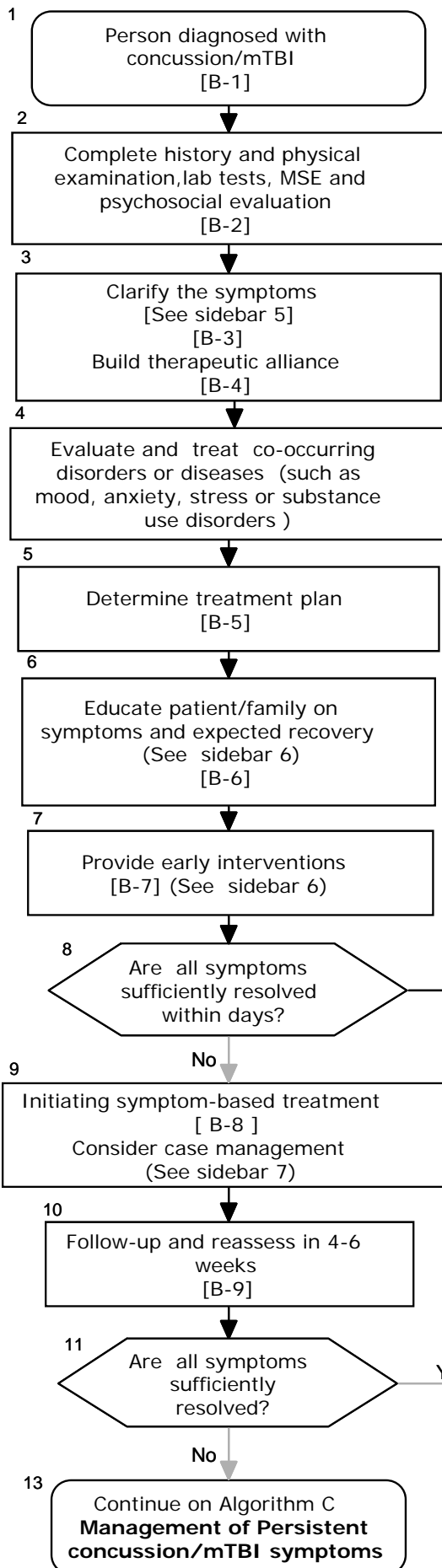
16 Provide education and access information
Screen for:
- Stress disorders
- Substance use disorders
- Mental health conditions
Follow-up as indicated [A-8]

15 **Go to Algorithm B**
Management of concussion/mTBI symptoms

Sidebar 4 - Post-Concussion/mTBI Related Symptoms *		
Physical Symptoms : Headache, dizziness, balance disorders, nausea, fatigue, sleep disturbance, blurred vision, sensitivity to light, hearing difficulties/loss, sensitivity to noise, seizure, transient neurological abnormalities, numbness tingling	Cognitive Symptoms : Attention, concentration, memory, speed of processing, judgment, executive control.	Behavior/Emotional Symptoms : Depression, anxiety, agitation, irritability, impulsivity, aggression.

* Symptoms that develop within 30 days post injury

**VA/DoD Clinical Practice Guideline for
Management of Concussion/mild-Traumatic Brain Injury
B: Management of Symptoms**



Sidebar 5: Symptom Attributes

- Duration of symptom
- Onset and triggers
- Location
- Previous episodes
- Intensity and impact
- Previous treatment and response
- Patient perception of symptom
- Impact on functioning [B-3]

Sidebar 6: Early Intervention

- Provide information and education on symptoms and recovery
- Educate about prevention of further injuries
- Reassure on positive recovery expectation
- Empower patient for self management [B-6]
- Provide sleep hygiene education
- Teach relaxation techniques
- Recommend limiting use of caffeine/tobacco/alcohol
- Recommend graded exercise with close monitoring

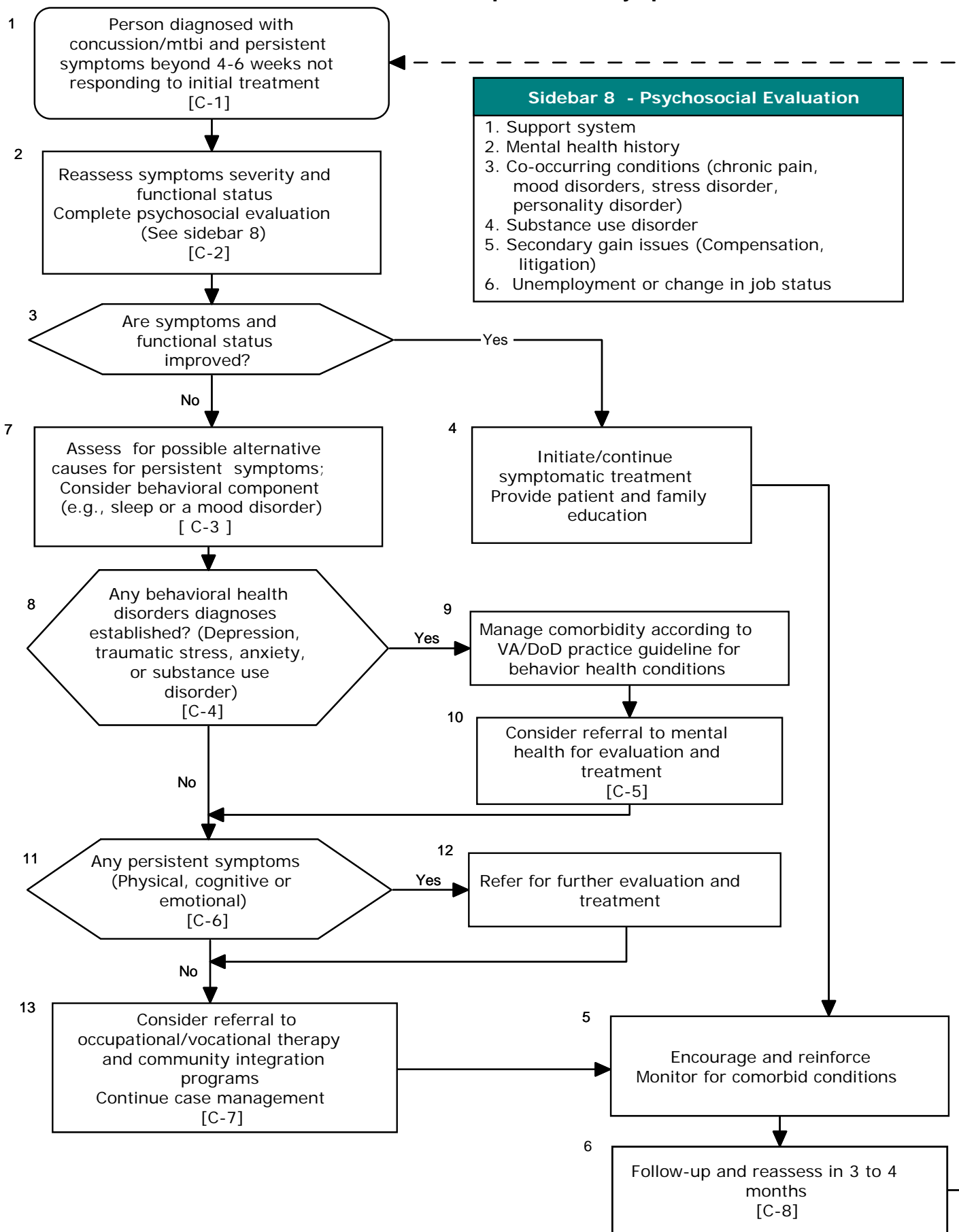
Encourage monitored progressive return to normal duty/work/activity [B-7]

Sidebar 7: Case Management

Assign case manager to:

- Follow-up and coordinate (remind) future appointments
- Reinforce early interventions and education
- Address psychosocial issues (financial, family, housing or school/work)
- Connect to available resources

**VA/DoD Clinical Practice Guideline for
Management of Concussion/mild-Traumatic Brain Injury
C: Follow-up Persistent Symptoms**



Sidebar 8 - Psychosocial Evaluation

1. Support system
2. Mental health history
3. Co-occurring conditions (chronic pain, mood disorders, stress disorder, personality disorder)
4. Substance use disorder
5. Secondary gain issues (Compensation, litigation)
6. Unemployment or change in job status

A: Initial Presentation

Annotation A-1 *Person Injured with Head Trauma Resulting in Possible Alteration or Loss of Consciousness*

1 DEFINITIONS/CLASSIFICATIONS

1.1 Definition of Traumatic Brain Injury

A traumatically induced structural injury and/or physiological disruption of brain function as a result of an external force that is indicated by new onset or worsening of at least one of the following clinical signs, immediately following the event:

- Any period of loss of or a decreased level of consciousness (LOC)
- Any loss of memory for events immediately before or after the injury (post-traumatic amnesia [PTA])
- Any alteration in mental state at the time of the injury (confusion, disorientation, slowed thinking, etc.) (Alteration of consciousness/mental state [AOC])
- Neurological deficits (weakness, loss of balance, change in vision, praxis, paresis/plegia, sensory loss, aphasia, etc.) that may or may not be transient
- Intracranial lesion.

External forces may include any of the following events: the head being struck by an object, the head striking an object, the brain undergoing an acceleration/deceleration movement without direct external trauma to the head, a foreign body penetrating the brain, forces generated from events such as a blast or explosion, or other forces yet to be defined.

The above criteria define the event of a TBI. Not all individuals exposed to an external force will sustain a TBI, but any person who has a history of such an event with immediate manifestation of any of the above signs and symptoms can be said to have had a TBI.

1.2 Severity of Brain Injury Stratification

TBI is further categorized as to severity into mild, moderate, or severe based on the length of LOC, AOC, or PTA (see [Table A- 1 Classification of TBI Severity](#)). Acute injury severity is determined at the time of the injury.

- The patient is classified as mild/moderate/severe if s/he meets any of the criteria in [Table A-1](#) within a particular severity level. If a patient meets criteria in more than one category of severity, the higher severity level is assigned.
- If it is not clinically possible to determine the brain injury level of severity because of medical complications (e.g., medically induced coma), other severity markers are required to make a determination of the severity of the brain injury.
- Abnormal structural imaging (e.g., Magnetic Resonance Imaging or Computed Tomography Scanning) attributed to the injury will result in the individual being considered clinically to have greater than mild injury.

In addition to traditional imaging studies, other imaging techniques such as functional magnetic resonance imaging, diffusion tensor imaging, positron emission tomography scanning; electrophysiological testing such as electroencephalography; and neuropsychological or other standardized testing of function have been used in the evaluation of persons with TBIs, but are not considered in the currently accepted criteria for measuring severity at the time of the acute injury outlined in [Table A -1](#).

The severity level has prognostic value, but does not necessarily predict the patient’s ultimate level of functioning. There is substantial evidence that the epidemiology, pathophysiology, natural history, and prognosis for concussion/mTBI are different than for moderate and severe TBI. For example, moderate and severe TBI are often associated with objective evidence of brain injury on brain scan or neurological examination (e.g., neurological deficits) and objective deficits on neuropsychological testing, whereas these evaluations are frequently not definitive in persons with concussion/mTBI. The natural history and prognosis of moderate and severe TBI are much more directly related to the nature and severity of the injury in moderate and severe TBI, whereas factors unrelated to the injury (such as co-existing mental disorders) have been shown to be the strong predictors of symptom persistence after a concussion/mTBI.

Table A- 1 Classification of TBI Severity

Criteria	Mild	Moderate	Severe
Structural imaging	Normal	Normal or abnormal	Normal or abnormal
Loss of Consciousness (LOC)	0–30 min	> 30 min and < 24 hours	> 24 hrs
Alteration of consciousness/mental state (AOC) *	a moment up to 24 hrs	> 24 hours. Severity based on other criteria	
Post-traumatic amnesia (PTA)	0–1 day	> 1 and < 7 days	> 7 days
Glascow Coma Scale (best available score in first 24 hours)	13-15	9-12	< 9

* Alteration of mental status must be immediately related to the trauma to the head. Typical symptoms would be: looking and feeling dazed and uncertain of what is happening, confusion, difficulty thinking clearly or responding appropriately to mental status questions, and being unable to describe events immediately before or after the trauma event.

Concussion

The terms *concussion* and *mTBI* can be used interchangeably. The use of the term *concussion* or history of mild TBI may be preferred when communicating with the patient, indicating a transient condition, avoiding the use of the terms "brain damage" or "brain injury" that may inadvertently reinforce misperceptions of symptoms or insecurities about recovery. The patient who is told s/he has "brain damage" based on vague symptoms complaints and no clear indication of significant head trauma may develop a long-term perception of disability that is difficult to undo.

The term *concussion/mTBI* will be used throughout this document as a convention.

Annotation A-2	<i>Urgent/emergent conditions identified?</i>
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RECOMMENDATIONS

1. The following physical findings, signs and symptoms (“Red Flags”) may indicate an acute neurologic condition that requires urgent specialty consultation (neurology, neuro-surgical) :
 - a. Altered consciousness
 - b. Progressively declining neurological examination
 - c. Pupillary asymmetry
 - d. Seizures
 - e. Repeated vomiting
 - f. Double vision
 - g. Worsening headache

- h. Cannot recognize people or is disoriented to place
- i. Behaves unusually or seems confused and irritable
- j. Slurred speech
- k. Unsteady on feet
- l. Weakness or numbness in arms / legs

Annotation A-3	<i>Evaluate for Diagnosis of Concussion/mTBI, Based on History</i>
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1.3 Diagnostic Criteria for mTBI

BACKGROUND

In the U.S., the most widely accepted criteria for mild TBI are those proposed by the American College of Rehabilitation Medicine (ACRM, 1993). They are “a physiological disruption of brain function as a result of a traumatic event as manifested by at least one of the following: alteration of mental state, loss of consciousness (LOC), loss of memory or focal neurological deficit, that may or may not be transient; but where the severity of the injury does not exceed the following: post-traumatic amnesia (PTA) for greater than 24 hours, after the first 30 minutes Glasgow Coma Score (GCS) 13 - 15, and loss of consciousness is less than 30 minutes.” There are other criteria used by other medical groups. However, most agree that common criteria include GCS score of 13-15, brief LOC, brief PTA and negative head computed tomography (CT) scan.

RECOMMENDATIONS

1. A diagnosis of mTBI should be made when there is an injury to the head as a result of blunt trauma, acceleration or deceleration forces or exposure to blast that result in one or more of the following conditions:
 - a. Any period of observed or self-reported:
 - Transient confusion, disorientation, or impaired consciousness
 - Dysfunction of memory immediately before or after the time of injury
 - Loss of consciousness (LOC) lasting less than 30 minutes.
 - b. Observed signs of neurological or neuropsychological dysfunction, such as:
 - Headache, dizziness, irritability, fatigue or poor concentration, when identified soon after injury, can be used to support the diagnosis of mild TBI, but cannot be used to make the diagnosis in the absence of loss of consciousness or altered consciousness.
2. The severity of TBI must be defined by the acute injury characteristics and not by the severity of symptoms at random points after trauma.

Annotation A-4	<i>Are Concussion/mTBI with Related Symptoms Present?</i>
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1.4 Symptoms Associated with Concussion/mTBI

Concussion/mTBI is associated with a variety of symptoms that will manifest immediately following the event, and may resolve quickly, within minutes to hours after the injury event, or they may persist longer. The most typical signs and symptoms after concussion fall into one or more of the following three categories:

- a. Physical: headache, nausea, vomiting, dizziness, fatigue, blurred vision, sleep disturbance, sensitivity to light/noise, balance problems, transient neurological abnormalities

- b. Cognitive: attention, concentration, memory, speed of processing, judgment, executive function
- c. Behavioral/emotional: depression, anxiety, agitation, irritability, impulsivity, aggression.

Signs and symptoms may occur alone or in varying combinations and may result in functional impairment.

Although a variety of symptoms can occur in association with TBI, they are *not* part of the definition of TBI, and there are no pathognomonic symptoms or signs. The term “mild TBI” refers only to the initial injury severity and should not be interpreted referring to the level of the severity of the symptoms.

Signs and symptoms, following the concussion, should not be attributed to concussion/mTBI if they are better explained by pre-existing conditions or other medical, neurological, or psychological causes except in cases of an immediate exacerbation of a pre-existing condition.

Symptoms associated with concussion/mTBI are not unique. These symptoms occur frequently in day-to-day life among healthy individuals and are often found in persons with other conditions such as chronic pain, depression or other traumatic injuries. These symptoms are also common to any number of pre-existing/pre-morbid conditions the patient may have had.

Annotation A-5	<i>Is Person Currently Deployed on Combat or Ongoing Military Operation?</i>
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RECOMMENDATIONS

1. Management of service members presenting for care immediately after a head injury (within 7 days) during military combat or ongoing operation should follow guidelines for acute management published by DoD. (See: Recommendations for acute management of concussion/mTBI in the deployed setting, **Defense and Veterans Brain Injury Center Consensus August, 2008**)

(This guidance is not included in this evidence-based guideline.)

Annotation A-6	<i>Is Person Presenting Immediately (Within 7 Days) After Injury? (Non-Military/Civilian Setting)</i>
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RECOMMENDATIONS

1. Management of non-deployed service members, veterans, or civilian patients presenting for care immediately after a head injury (within 7 days) should follow guidelines for acute management. (See Recommendations for acute management in guideline published by the American College of Emergency Medicine and the Center for Disease Control and Prevention (ACEP/CDC, 2008)

(These protocols and guidance are not included in this evidence-based guideline.)

1.5 Post Deployment Delayed Awareness and Delayed Reporting of Symptoms

BACKGROUND

The elapsed time since the exposure to the head injury (trauma) and the self-reporting of symptoms by the patient to their primary care provider may vary. This period is very important in assessing the risk of developing concussion/mTBI symptoms and determining the appropriate intervention.

The concussion/mTBI algorithms are designed to accommodate patients entering the healthcare system at different intervals post-injury. Algorithm A (Initial Presentation) describes a new entry into the healthcare system and is not dependent on the time since injury. It does not follow the traditional acute, sub-acute, and post-acute phases of brain injury. This is particularly important with combat-

related TBI that may inherently lead to delays in seeking treatment due to discounting or misattributing symptoms, and reluctance to report health problems. The initial management of symptoms related to concussion/mTBI is then described in Algorithm B (Management of Symptoms). Algorithm C (Follow-up Persistent Symptoms) will apply to any service person/veteran for whom treatment of concussion symptoms previously had been started.

1.5.1 Initial Stages following mTBI/Concussion

Example: Individual sustains a head injury and presents to a provider two weeks following the injury. The provider uses Algorithm A to diagnose concussion/mTBI, and Algorithm B to initiate the management of symptoms. If the symptoms do not remit within 4 to 6 weeks of the initial treatment, the provider follows Algorithm C to manage the persistent symptoms.

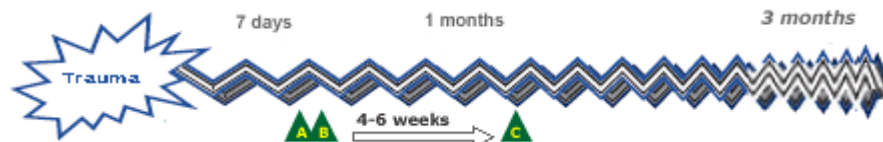


Figure 1. Initial Stages following mTBI/Concussion

1.5.2 Delayed Initial Presentation of Symptoms

Example: Individual sustains a head injury followed by experiencing symptoms. The patient does not access medical care for weeks or months post-injury. Despite the long elapsed time since injury, the provider uses Algorithm A and B for the initial work-up to make the diagnosis and initiate treatment. This initial treatment may be provided in a setting designated for diagnosis and management of mTBI. If the symptoms do not remit within 4 to 6 weeks of the initial treatment, the provider follows Algorithm C to manage the persistent symptoms.

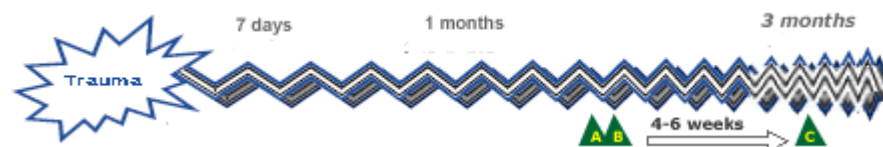


Figure 2 Delayed Initial Presentation of Symptoms

RECOMMENDATIONS

1. Service members or veterans identified by post deployment screening or who present with symptoms should be assessed and diagnosed according to **Algorithm A – Initial Presentation**. The initial evaluation and management will then follow the recommendations in **Algorithm B – Management of Symptoms**.
2. Patients who continue to complain of concussion/mTBI-related symptoms beyond 4 to 6 weeks after treatment has been initiated, should have the assessment for these chronic symptoms repeated and should be managed using **Algorithm C – Follow-up Persistent Symptoms**.
3. Patients who continue to have persistent symptoms beyond 2 years post-injury despite treatment (Algorithm C) do not require repeated assessment for these chronic symptoms and should be conservatively managed using a simple symptom-based approach.
4. Patients with symptoms that develop more than 30 days after a concussion should have a focused diagnostic work-up specific to those symptoms only. These symptoms are highly unlikely to be the result of the concussion and therefore the work-up and management should not focus on the initial concussion.

Annotation A-7 *Is Person Currently on Treatment for mTBI Symptoms?*

1.6 Persistent Symptoms after Concussion/mTBI

BACKGROUND

Most symptoms and signs that occur in the acute period following a single concussion resolve quickly (within hours or days) after the injury. There is debate about the incidence of developing persistent symptoms after concussion, largely due to the lack of an accepted case definition for persistent symptoms and the fact that none of the symptoms are specific to concussion. There is no consensus on a case definition for persistent symptoms attributed to concussion/mTBI and no consensus on the time course when acute symptoms should be considered persistent. As a result, the important focus should be on treating the symptoms rather than on determining the etiology of the symptoms.

RECOMMENDATIONS

1. Persons who complain about somatic, cognitive or behavioral difficulties after concussion/mTBI should be assessed and treated symptomatically regardless of the elapsed time from injury.
2. The assessment of an individual with persistent concussion/mTBI related symptoms should be directed to the specific nature of the symptoms regardless of their etiology.
3. The management of an individual who has sustained a documented concussion/mTBI and has *persistent* physical, cognitive and behavioral symptoms after one month should not differ based on the specific underlying etiology of their symptoms (i.e., concussion vs. pain, concussion vs. stress disorder).
4. In communication with patients and the public, this guideline recommends using the term *concussion* or *history of mild-TBI* and to refrain from using the term ‘brain damage’.

Annotation A-8 *Provide Education and Access Information; Follow-Up as Indicated*

1.7 Follow-Up and Monitoring

It is important to closely monitor the injured person for concussion/mTBI related symptoms and provide supportive education over the initial 30 days. Individuals who sustain a concussion/mTBI and are asymptomatic can be reassured and advised about precautionary measures to prevent future head injury.

RECOMMENDATIONS

1. Individuals who sustain a concussion/mTBI and are asymptomatic should be reassured about recovery and advised about precautionary measures to prevent future head injury.
2. Patients should be provided with written contact information and be advised to contact their healthcare provider for follow-up if their condition deteriorates or they develop symptoms.
3. Individuals who sustain a concussion/mTBI and are asymptomatic should be screened for comorbid mental health disorders (MDD, PTSD, and SUD) and dangerousness.

B: Management of Concussion/mTBI Symptoms

Annotation B-1 *Person Diagnosed with Concussion/mTBI*

2 Initial Presentation

The vast majority of individuals with concussion/mTBI will have no difficulties or complaints lasting more than a couple of weeks following the injury.

Although, early interventions have been shown to prevent symptoms, some persons sustaining a concussion/mTBI during deployment will not receive early diagnosis or will not seek treatment, and therefore their symptoms will be addressed only after a temporal delay. This guideline recommends that these individuals will be first treated following the algorithm and annotations in Algorithms A and B. If treatment has already been rendered for concussion/mTBI related symptoms and despite treatment the patient continues to experience symptoms, the management will follow the recommendations in Algorithm C.

Patients managed in Algorithm B are service persons or veterans identified by post deployment screening, or who present to care with symptoms or complaints related to head injury.

Patients presenting for care immediately after head injury (within 7 days) should follow guidelines for acute management and should not use this algorithm. (See [Annotation A-5](#) and [A-6](#))

Annotation B-2 *Complete a History, Physical Examination; Minimal Mental Examination and Psychosocial Evaluation*

3 Assessment of Symptoms and Severity

3.1 History, Physical Examination, Laboratory Tests, Imaging

BACKGROUND

Although the initial part of the screening process for mild TBI depends on self-report, the second-level assessment relies on obtaining a careful detailed medical history, physical examination, and a psychosocial assessment. The goal of the assessment is to evaluate the symptoms in order to optimize care, to improve outcomes, and ultimately reduce disability following a concussion/mTBI. It is recognized that patients may not present for medical care immediately following concussion/mTBI. Therefore, the purpose of the assessment may vary slightly based on the timing of the presentation following injury. For patients presenting immediately after the injury event, assessment will include the necessity to rule out neurosurgical emergencies. In patients who present with delayed injury-to assessment intervals, the assessment will include confirmation linking the symptoms to the concussive event. Regardless of the time that has elapsed since injury, management should begin with the patient's first presentation for treatment.

3.1.1 History

Taking an accurate history is an essential part of the diagnostic work-up. The first and most critical step in the evaluation of persons with possible concussion symptoms should clearly characterize the initial injury and determine whether the symptoms are temporally related to the event characterized as a concussion/mTBI.

RECOMMENDATIONS

1. Individuals who are presumed to have symptoms related to concussion/mTBI or who are identified as positive for mTBI on the initial screening should receive specific assessment of their symptoms.
2. Medical history should include the following:
 - a. Obtaining detailed information on the patient's symptoms and health concerns.
 - b. Obtaining detailed information of the injury event including mechanism of injury, duration and severity of alteration of consciousness, immediate symptoms, symptom course and prior treatment

- c. Screening for pre-morbid conditions, potential co-occurring conditions or other psychosocial risk factors, such as substance use disorders that may exacerbate or maintain current symptom presentation (using standardized screening tools such as, PHQ-2, Audit-C, PTSD screen)
 - d. Evaluating signs and symptoms indicating potential for neurosurgical emergencies that require immediate referrals
 - e. Assessing of danger to self or others.
3. Patient's experiences should be validated by allowing adequate time for building a provider-patient alliance and applying a risk communication approach.
- (See [Appendix B: Structured Interview for Collecting Head Trauma Event Characteristics](#))

3.1.2 Physical Examination

RECOMMENDATIONS

1. The physical examination of the person sustaining a concussion/mTBI should focus on the following:
 - a. A focused neurologic examination, including a Mental Status Examination (MSE), cranial nerve testing, extremity tone testing, deep tendon reflexes, strength, sensation, and postural stability (Romberg's Test, dynamic standing)
 - b. A focused vision examination including gross acuity, eye movement, binocular function and visual fields/attention testing
 - c. A focused musculoskeletal examination of the head and neck, including range of motion of the neck and jaw, and focal tenderness and referred pain.
2. The following physical findings, signs and symptoms ("Red Flags") may indicate an acute neurologic condition that requires urgent specialty consultation (neurology, neuro-surgical) :
 - a. Altered consciousness
 - b. Progressively declining neurological examination
 - c. Pupillary asymmetry
 - d. Seizures
 - e. Repeated vomiting
 - f. Double vision
 - g. Worsening headache
 - h. Cannot recognize people or is disoriented to place
 - i. Behaves unusually or seems confused and irritable
 - j. Slurred speech
 - k. Unsteady on feet
 - l. Weakness or numbness in arms/legs.

3.1.3 Laboratory Tests

BACKGROUND

Because diagnostic and cognitive tests have limited ability to predict long-term outcomes for persons with concussion/mTBI, investigators are focused on searching for biochemical markers that may be useful in diagnosis and prognosis.

RECOMMENDATIONS

1. Laboratory testing is not necessary to confirm or manage symptoms associated with concussion/mTBI.
2. Laboratory testing may be considered for evaluating other non-TBI causes of the symptoms presented.
3. There is insufficient evidence to support the use of serum biomarkers for concussion/mTBI in clinical practice. [SR = I]

3.1.4 Imaging

BACKGROUND

The role of neuroimaging in diagnosing concussion/mTBI continues to evolve and be debated in the literature. Various neuroimaging modalities can be employed in helping to identify structural neuropathology. Structural imaging modalities include Computed Tomography (CT) Scan, Magnetic Resonance Imaging (MRI) Diffusion Tensor Imaging (DTI). Functional imaging modalities include Single Photon Emission Computed Tomography (SPECT), Positron Emission Tomography (PET) and functional MRI (fMRI). However, many of these modalities are still at the preliminary/research stage of development. Currently, CT scan is the modality of choice as a diagnostic tool for acute concussion/mTBI. The absence of abnormal findings on CT does not preclude the presence of concussion/mTBI.

RECOMMENDATIONS

1. A patient who presents with any signs or symptoms that may indicate an acute neurologic condition that requires urgent intervention should be referred for evaluation that may include neuroimaging studies.
2. Neuroimaging is not recommended in patients who sustained a concussion/mTBI beyond the emergency phase (72 hours post-injury) except if the condition deteriorates or red flags are noted.

3.2 Multiple Concussions

BACKGROUND

Some patients presenting for an initial evaluation may report a history of repeated concussions that have worsened their symptoms. The approach of symptom-based assessment and treatment of repeated concussion should be similar to the management of exposure to a single injury.

RECOMMENDATIONS

1. The management of a patient who has sustained multiple concussions should be similar to the management for a single concussion/mTBI. [SR = I]
2. The patient with multiple concussions and his/her family should be educated to create a positive expectation of recovery. [SR = I]

Annotation B-3	<i>Clarify the Symptoms</i>
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3.3 Assessment of Symptoms

BACKGROUND

Patients who have sustained a concussion/mTBI may complain about post-injury symptoms that can be grouped into three categories: physical, cognitive, and emotional/behavioral. (See [Annotation A-4](#)) The clinical presentation is expected to include at least some elements of the classic constellation of post-concussive symptoms and gradual, although sometimes incomplete, symptomatic improvement over time.

Although post-concussive symptoms (PCS) are most often discussed in the context of mTBI, these terms and their clinical referents are not synonymous with mTBI: mTBI describes a type of injury whereas the post-concussion symptoms describe a set of problems presumably resulting from the injury.

It is particularly important to define clearly the patient's symptoms, as well as the course and resolution (or lack thereof) of those symptoms since the time of injury. Documenting frequency and severity of symptoms is important to set a baseline for monitoring subsequent treatment efficacy or establishment of co-occurring conditions. (See [Table B-1](#))

Patients should be asked about the impact of their symptoms on their daily function. Individuals with a concussion/mTBI are typically independent in basic activities of daily living (ADLs) (e.g., grooming, bathing, dressing, toileting, and mobility). However, a small minority of patients may present with problems in areas of instrumental ADLs (IADLs). These abilities may effect independent functioning in tasks such as driving, home management, childcare, financial management, and performance at work.

Patients with symptoms should be asked open-ended questions to allow them to describe their difficulties. Presenting patients with symptom checklists is not recommended, however, these lists may be useful in documenting symptoms and symptom intensity.

Patient Perception of Symptoms

Patients should be given the opportunity to relate their experiences and complaints at each visit in their own way. As the patient relates the history, important nonverbal clues are often provided. The clinician should observe the patient's attitude, reactions, and gestures while being questioned, as well as his or her choice of words or emphasis. The impact from the symptoms may range from annoying to totally disabling and patient perceptions regarding the cause and impact are important to understand in managing the disorder. Stressors such as occupational and family issues should also be explored.

RECOMMENDATIONS

1. Self-reported symptomatology is an appropriate assessment of the patient's condition in concussion/mTBI when the history is consistent with having sustained an injury event and having a subsequent alteration in consciousness. [SR = C]
2. Assessment of the patient with concussion/mTBI should include detailed questioning about the frequency, intensity and nature of symptoms the patient experiences, and their impact on the patient's social and occupational functioning.
3. Assessment should include a review of all prescribed medications and over-the-counter supplements for possible causative or exacerbating influences. These should include caffeine, tobacco and other stimulants, such as energy drinks.
4. The patient who sustained a concussion/mTBI should be assessed for sleep patterns and sleep hygiene.
5. If the patient's symptoms significantly impact daily activities (such as child care, safe driving), a referral to rehabilitation specialists for a functional evaluation and treatment should be considered.

Clarify the Symptoms

Questions that may prompt patients to provide important attributes of their symptoms are summarized in the following table.

Table B-1. Clarification of Symptoms

Symptom Attributes	Questions
Duration	<ul style="list-style-type: none"> ○ Has the symptom existed for days, weeks, or months? ○ Has the symptom occurred only intermittently? ○ Particularly with regard to pain and fatigue, can the patient define if these symptoms occurred only two or three days per month or constantly? ○ Is the symptom seasonal? ○ Are there times of the day when the symptom is worse?
Onset	<ul style="list-style-type: none"> ○ Can the patient recall exactly how the symptom began? ○ Were there triggering events, either physical or emotional? ○ Was the onset subtle and gradual, or dramatic and sudden? ○ Have the triggering events tended to be the same over time or are there changing patterns?
Location	<ul style="list-style-type: none"> ○ Is the symptom localized or diffuse? ○ Can the patient localize the symptom by pointing to it? ○ If the pain is diffuse, does it involve more than one body quadrant?
Co-morbidity	<ul style="list-style-type: none"> ○ Does the patient have any diagnosed co-existing illnesses? ○ What is the time relationship between the onset and severity of the co-existing illnesses and the symptoms of fatigue and/or pain? ○ What are the symptoms other than pain and/or fatigue? ○ Are there co-morbid diagnoses? ○ Are there changes in the patient's weight, mood, or diet?
Previous episodes	<ul style="list-style-type: none"> ○ If the symptoms are episodic, what is the pattern in regard to timing, intensity, triggering events, and response to any prior treatment?
Intensity and impact	<ul style="list-style-type: none"> ○ How severe are the symptoms (use the 1 to 10 Numerical Rating Scale) ○ Ask the patient to describe any new limitations they have experienced compared to their usual life-style, including limitations in physical endurance or strength (e.g., climbing stairs, shopping, and amount or quality of their sleep).
Previous treatment and medications	<ul style="list-style-type: none"> ○ Exploring this aspect of the history may be complicated and require obtaining prior medical records, or having an authorized telephone conversation with the prior treating clinician. ○ Ask the patient to bring in their medication bottles on a subsequent visit and document the exact names of the medications. ○ Find out which medications have/have not been helpful.
Past medical, surgical and psychological history	<ul style="list-style-type: none"> ○ This area includes chronic and major acute illnesses and injuries, allergies, surgical procedures, and hospitalizations. The psychological history may take several visits to clarify, depending upon the ease with which the patient can articulate their emotional status and past and present issues. Explore stressors such as occupational and family issues.
Patient perception of symptoms	<ul style="list-style-type: none"> ○ Often omitted from the history-taking are questions designed to gain some understanding of what the patient believes is happening. Ask the patient about their hunches and fears.

Annotation B-4 *Build Therapeutic Alliance*

BACKGROUND

Interactions with patients/ families that involve real or suspected mTBI may be highly emotional, with reactions ranging from disbelief to anger to frustration to relief. Some patients will present with diagnosable symptoms, while others may believe they're suffering from mTBI when subsequent medical

assessments may indicate otherwise. In both situations, medical staffs face the difficult challenge of effectively communicating the diagnosis, treatment, and prognosis for recovery to patients/ families, while minimizing and/or avoiding undue anxiety.

The information provided by medical personnel to individuals who have experienced a concussion/mTBI can either amplify and increase their symptoms and distress (iatrogenic factors), or can minimize and normalize their symptoms and reduce distress.

The lack of a definitive diagnosis or single effective treatment can make the management of patients with concussion/mTBI symptoms challenging and may also cause frustration for both the patient and the provider. To counter this, a high level of patient trust and faith in the clinician is required in order to maintain continuity of care and continue patient management through regular follow-up appointments. A therapeutic alliance between the patient and clinician should be established during the initial evaluation.

Risk communication approaches include:

1. **Caring and empathy**, including perceived sincerity, ability to listen, and to see issues from the perspective of others. Of the four factors, patient perceptions of caring and empathy are the most important.
2. **Competence and expertise**, including perceived intelligence, training, experience, education level, professional attainment, knowledge, and command of information. These are the easiest factors to establish because health care providers are automatically perceived by the public to be credible sources of information.
3. **Dedication and commitment**, including perceived altruism, diligence, self-identification, involvement, and hard work. Perceptions of dedication and commitment are influenced by patient perceptions of the health care provider's hard work in the pursuit of health goals.
4. **Honesty and openness**, including perceived truthfulness, candidness, fairness, objectivity, and sincerity. Perceptions of this factor result from both nonverbal cues (i.e., posture, eye contact, facial expressions, interruptions, indirect language) and language that conveys sincerity and concern. Sensitivity to nonverbal cues is especially invaluable in ultimately understanding and communicating effectively with the patient and their family.

Useful strategies to strengthen the partnership with the patient:

- Acknowledge and indicate commitment to understand the patient's concerns and symptoms
- Encourage an open and honest transfer of information that will provide a more comprehensive picture of the patient's concerns and medical history
- Present information regarding a positive outcome and symptom remission to create an expectation of recovery
- Indicate commitment to allocate sufficient time and resources to resolving the patient's concerns
- Avoid open skepticism or disapproving comments in discussing the patient's concerns
- At each patient visit, the clinician should consider the following:
 - Ask if there are unaddressed or unresolved concerns
 - Summarize and explain all test results
 - Schedule follow-up visits in a timely manner
 - Explain that outstanding or interim consultations will be reviewed during the follow-up visits
 - Offer to include the concerned family member or significant other in the follow-up visit.

Annotation B-5 *Determine Treatment Plan*

4 Treatment

4.1 Treatment Plan

BACKGROUND

After the screening, assessment, and diagnosis of concussion/mTBI are completed decisions are made about treatment. Treatment for patients with concussion/mTBI focuses on symptom management and education of patient and family. Education should emphasize recovery, gradual resumption of work and social responsibilities, and teaching compensatory strategies and environmental modifications. Most patients with symptoms following a single concussion/mTBI of recent onset can be successfully managed in the primary care setting without the need for specialty intervention.

Patients should be encouraged to implement changes in life-style including exercise, diet, sleep hygiene, stress reduction, relaxation training, scheduling leisure activities and pacing to improve treatment outcomes.

RECOMMENDATIONS

1. Develop and document a summary of the patient's problems.
2. Develop a potential treatment plan that includes severity and urgency for treatment interventions.
3. Discuss with the patient the general concept of concussion sequelae, treatment options and associated risk/benefits and prognosis of illness to determine the patient's preferences.
4. Emphasizing good prognosis and empowering the patient for self-management.
5. Implement the treatment plan and follow up.
6. Referral to specialty care is not required in the majority of patients with concussion/mTBI, if their symptoms resolve in the early post acute recovery period as expected.
7. Treatment should be coordinated and may include consultation with rehabilitation therapists, pharmacy, collaborative mental health, and social support.

Annotation B-6 *Educate Patient/Family on Symptoms and Expected Recovery of Concussion/mTBI*

4.2 Early Education

BACKGROUND

Education provided to patients and their support system about the nature and common manifestations of concussion/mTBI is a critical aspect of intervention. Communication of health information from providers helps manage patient expectations and can prevent the development of concussion/mTBI symptoms and/or reduce their duration, number, and severity. It is generally recommended that the initial educational intervention occur at the time of establishing the concussion/mTBI diagnosis. Follow-up education should take place at intervals and in a format that is appropriate to the treatment and services provided. Additionally, the patient's learning needs, reading skills, vision or hearing difficulties, cultural and religious beliefs, and emotional or cognitive limitations should be taken into consideration when delivering educational information.

Components of Patient Education

- Provision of information about concussion/mTBI
- Strategies for prevention of further injury
- Education/normalization
- Awareness of limitation
- Self-monitoring of symptoms
- Contact information.

RECOMMENDATIONS

1. Patients who sustain a concussion/mTBI should be provided with information and education about concussion/mTBI symptoms and recovery patterns as soon as possible after the injury. Education should be provided in printed material combined with verbal review and consist of:
 - a. Symptoms and expected outcome. [SR = A]

- b. Normalizing symptoms (education that current symptoms are expected and common after injury event). [SR = A]
 - c. Reassurance about expected positive recovery. [SR = A]
 - d. Techniques to manage stress (e.g., sleep education, relaxation techniques; minimize consumption of alcohol, caffeine and other stimulants). [SR = B]
2. Information and education should also be offered to the patient's family, friends, employers, and/or significant others.
3. Symptomatic management should include tailored education about the specific signs and symptoms that the patient presents and the recommended treatment.
4. Patients should be provided with written contact information and be advised to contact their healthcare provider for follow-up if their condition deteriorates or if symptoms persist for more than 4-6 weeks. [SR = B]

Annotation B-7	<i>Provide Early Interventions</i>
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4.3 Provide Early Intervention

BACKGROUND

Concussion/mTBI can significantly impact some patients' physical, mental and social well-being. Treatment should address these three main areas. Initial interventions expected to improve physical well-being include education, improved sleep habits, a graduated exercise regimen (monitored through physical therapy, exercise trainers, and social supports), and medication (monitored by a clinician). Mental well-being may be improved through stress relief and relaxation, medication, and creating a supportive social network. Social well-being may be improved through resolving legal, financial, occupational, or recreational problems.

RECOMMENDATIONS

1. Provide early intervention maximizing the use of non-pharmacological therapies:
 - a. Review sleep patterns and hygiene and provide sleep education including education about excess use of caffeine/tobacco/alcohol and other stimulants
 - b. Recommend graded aerobic exercise with close monitoring.

4.4 Return to Activity (Duty/Work/School/Leisure)

BACKGROUND

A successful treatment outcome for a patient who has sustained a concussion is the return to duty/work/school or other usual daily activities. Part of the early intervention for concussion/mTBI involves protecting the patient from a secondary insult or further injury by limiting or eliminating their duty status or job requirements until proper recovery is obtained. Although rare, the possibility of second impact syndrome must be prevented by altering a concussed patient's vocational duties when they are high risk for re-injury. Exertional testing prior to the return to work or military duty may help to ensure adequate resolution of symptoms in a high stress state or combat environment.

Return to activity assessment is based on an inventory of symptoms and their severity and the patient's job-specific tasks. With the exception of those activities and duties that are characterized as high-risk for repeat concussions, all individuals with concussion/mTBI should be encouraged to expediently return to activity at their maximum capacity.

Activity restrictions are an important part of the treatment regimen for patients with concussion/mTBI. *Activity restriction does not imply complete bed rest but rather a restful pattern of activity throughout the day with minimal physical and mental exertion.*

RECOMMENDATIONS

1. Immediately following any concussion/mTBI, individuals who present with post-injury symptoms should have a period of rest to avoid sustaining another concussion and to facilitate a prompt recovery.
2. Individuals with concussion/mTBI should be encouraged to expediently return to normal activity (work, school, duty, leisure) at their maximal capacity.
3. In individuals who report symptoms of fatigue, consideration should be given to a graded return to work/activity.
4. In instances where there is high risk for injury and/or the possibility of duty-specific tasks that cannot be safely or competently completed, an assessment of the symptoms and necessary needs for accommodations should be conducted through a focused interview and examination of the patient.
5. If a person's normal activity involves significant physical activity, exertional testing can be conducted that includes stressing the body.
6. If exertional testing results in a return of symptoms, a monitored progressive return to normal activity as tolerated should be recommended.
7. Individually based work duty restriction should apply if:
 - There is a duty specific task that cannot be safely or competently completed based on symptoms
 - The work/duty environment cannot be adapted to the patient's symptom-based limitation
 - The deficits cannot be accommodated
 - Symptoms reoccur.

Annotation B-8

Initiate Symptom-Based Treatment Modalities

5 Symptom Management

Concussion/mTBI is associated with a variety of symptoms that will manifest immediately following the event, and may resolve quickly, within minutes to hours after the injury event, or they may persist longer. Signs and symptoms may occur alone or in varying combinations and may result in functional impairment.

The most typical signs and symptoms following concussion include:

- a. Physical: headache, nausea, vomiting, dizziness, fatigue, blurred vision, sleep disturbance, sensitivity to light/noise, balance problems, transient neurological abnormalities
- b. Cognitive: attention, concentration, memory, speed of processing, judgment, executive control
- c. Behavioral/emotional: depression, anxiety, agitation, irritability, impulsivity, aggression.

There is a complex relationship among concussion/mTBI symptoms (sleep, headache, cognition, and mood) and it is clinically reasonable to expect that that alleviating/improving one symptom may lead to improvement in other symptom clusters. The presence of comorbid psychiatric problems such as a major depressive episode, anxiety disorders (including post-traumatic stress disorder [PTSD]), or substance use disorder (SUD) – whether or not these are regarded as etiologically related to the concussion/mTBI – should be treated aggressively using appropriate psychotherapeutic and pharmacologic interventions.

The expected outcome of an intervention should be to improve the identified problem areas, rather than discover a disease etiology or “cure.” The persistence of some concussion related symptoms despite the effective treatment for others does not necessarily suggest treatment failure, but may instead indicate the need for additional therapies targeting specific residual symptoms.

The following recommended interventions focus on initial management of the physical, cognitive and behavioral symptoms. Patients with symptoms that persist despite these initial treatment interventions should be managed using **Algorithm C: Follow-up Persistent Symptoms**

5.1 Physical Symptoms

BACKGROUND

For purposes of this guideline, physical complaints include headache, pain, sleep disturbances, dizziness, coordination issues, nausea, numbness, smell/taste, vision difficulties (photophobia, phonophobia), hearing difficulties, fatigue, and appetite disturbances. In the majority of cases, these symptoms are markedly improved or have disappeared within 3 months after the injury.

RECOMMENDATIONS

1. Initial treatment of physical complaints of a patient with concussion/mTBI should be based upon a thorough evaluation, individual factors and symptom presentation.
2. The evaluation should include:
 - a. Establishing a thorough medical history, completing a physical examination, and review of the medical record (for specific components for each symptoms see [Table B-2 Physical Symptoms-Assessment](#))
 - b. Minimizing low yield diagnostic testing
 - c. Identifying treatable causes (conditions) for patient's symptoms
 - d. Referring for further evaluation as appropriate.
3. The treatment should include:
 - a. Non-pharmacological interventions such as sleep hygiene education, physical therapy, relaxation and modification of the environment (for specific components for each symptoms see [Table B-3 Physical Symptoms-Treatment](#))
 - b. Use of medications to relieve pain, enable sleep, relaxation and stress reduction.
4. A consultation or referral to specialists for further assessment should occur when:
 - a. Symptoms cannot be linked to a concussion event (suspicion of another diagnosis)
 - b. An atypical symptom pattern or course is present
 - c. Findings indicate an acute neurologic condition that requires urgent neurologic/neuro-surgical intervention (see Section [3.1.2 – Physical Examination](#))
 - d. There are other major co-morbid conditions requiring special evaluation.

Table B-2. Physical Symptoms – ASSESSMENT

Common Symptoms Following Concussion/mTBI *	Meds Review	Assess for HTN	Physical Examination					Sleep Review	Depression Screen	Differential Diagnoses Include:
			GI	Neuro	Musc.	Vision	Otological			
Headaches	√	√		√	√	√	√		<i>Pre-existing headache disorder (migraine, tension)</i> <i>Cervical spine or musculature abnormality or pain</i> <i>CSF leak or pressure abnormality</i> <i>Sinus infection</i> <i>Visual acuity issues (needs glasses)</i>	
Feeling dizzy - Loss of balance - Poor coordination - Clumsy	√			√	√	√	√		<i>Inner ear infection</i> <i>Labyrinthitis</i> <i>CSF leak or pressure abnormality</i> <i>Meniere's disease</i> <i>Orthostatic hypotension</i> <i>Central medication effect</i>	
Nausea	√		√		√	√	√		<i>GI ulcer</i> <i>GERD</i> <i>Medication effect</i>	
Change in appetite	√		√						<i>Nasal polyps</i> <i>Sinus infection</i> <i>Traumatic injury to olfactory or lingual nerves</i>	
Sleep disturbance - Difficulty falling or staying a sleep (insomnia)	√						√	√	<i>Behavioral health issues</i> <i>Sleep disorders</i> <i>Pain</i>	
Vision problems - Blurring - Trouble seeing - Sensitivity to light	√				√	√	√	√	<i>Retinal detachment</i> <i>Traumatic injury to lens</i> <i>Corneal abrasion</i> <i>Optic nerve damage</i>	
Hearing difficulty - Sensitivity to noise	√						√		<i>Inner ear infection</i> <i>Ear drum inflammation</i> <i>Ear drum injury</i> <i>Traumatic auditory nerve injury</i>	

* Other less common symptoms following concussion/mTBI include:

- **Numbness or tingling on parts of the body** – Review of medications, neurological exam and EMG to rule out *stroke, multiple sclerosis, spinal cord injury, peripheral neuropathy, or thoracic outlet syndrome*
- **Change in taste and/or smell** – neurological exam to rule out nasal polyps, sinus infection, or traumatic injury to olfactory or lingual nerves

Table B-3. Physical Symptoms – TREATMENT

Common Symptoms Following Concussion/mTBI	Pharmacologic Treatment	Non Pharmacologic Treatment
Headaches	- Non narcotic pain meds - NSAIDs - Triptans (migraine type)	- Sleep hygiene education - Physical therapy - Relaxation
Feeling dizzy	- Antibiotics, decongestants for infections and fluid	- -
Loss of balance Poor coordination	-	- Physical therapy
Nausea	- Antiemetics	- Sleep hygiene education
Change in appetite	-	-
Sleep disturbances - Difficulty falling or staying asleep (insomnia)	- Sleep Medications	- Sleep hygiene education
Vision problems - Blurring - Trouble seeing - Sensitivity to light	-	- Sleep hygiene education - Light desensitization - Sunglasses
Hearing difficulty - Sensitivity to noise	-	- Environmental Modifications

5.2 Cognitive Symptoms

BACKGROUND

Although initial cognitive complaints and problems are common in the first hours and days after a concussion/mTBI, the vast majority of individuals recover within one to four weeks. Early psychoeducational, supportive, and stress management interventions have been shown to increase rate and extent of recovery from somatic, cognitive and behavioral symptoms. As rapid recovery is expected, patients should always be provided with positive expectations.

See [Table B-4: Behavioral and Cognitive Symptoms – ASSESSMENT](#) and [B-5: Behavioral and Cognitive Symptoms – TREATMENT](#)

RECOMMENDATIONS

1. All individuals who sustain a concussion/mTBI should be provided with information and education about concussion/mTBI symptoms and recovery patterns as soon as possible after the injury [SR = A] (See Early Education, Section 4.2)
2. A patient sustaining a concussion/mTBI should be evaluated for cognitive difficulties using a focused clinical interview. [SR = C]
3. Comprehensive neuropsychological/cognitive testing is not recommended during the first 30 days post injury. [SR = D]
4. If a pre-injury neurocognitive baseline was established in an individual case, then a post injury comparison may be completed by a psychologist but should be determined using reliable tools and test-retest stability should be ensured. [SR = B]

5.3 Behavioral Symptoms

BACKGROUND

Depending upon diagnostic criteria (ICD-9 versus DSM-IV) the following behavioral or personality changes may be considered part of the post-concussion syndrome: irritability, depression, anxiety, emotional lability, fatigue, insomnia, reduced alcohol tolerance, personality changes such as increases in socially inappropriate behaviors, and apathy or lack of spontaneity. Anxiety and depression and other mental health problems also have been associated with concussion/mTBI.

The presence of comorbid psychiatric problems such as a major depressive episode, anxiety disorders (including post-traumatic stress disorder), or substance abuse – whether or not these are regarded as etiologically related to the mild TBI – should be treated aggressively using appropriate psychotherapeutic and pharmacologic interventions.

See [Table B-4: Behavioral and Cognitive Symptoms – ASSESSMENT](#) and [B-5: Behavioral and Cognitive Symptoms – TREATMENT](#)

RECOMMENDATIONS

1. Patients with concussion/mTBI should be screened for psychiatric symptoms and co-morbid psychiatric disorders (Depression, Post Traumatic Stress, and Substance Use).
2. Treatment of psychiatric/behavioral symptoms following concussion/mTBI should be based upon individual factors and nature and severity of symptom presentation, and include both psychotherapeutic [SR = A] and pharmacological [SR = I] treatment modalities.
3. Individuals who sustain a concussion/mTBI and present with anxiety symptoms and/or irritability should be provided reassurance regarding recovery and offered a several week trial of pharmacologic agents (See Appendix E) .[SR = I]

Table B-4. Behavioral and Cognitive Symptoms – ASSESSMENT

Common Symptoms Following Concussion/mTBI	Review Medications	Lab Tests: Electrolytes CBC TFT	Review Sleep Habits	Screen for: Depression PTSD SUD	Differential Diagnosis or Comorbid Conditions Include:
Fatigue - Loss of energy - Getting tired easily					<ul style="list-style-type: none"> - Anxiety disorders - Chronic Fatigue Syndrome - Chronic pain - Depression or other mood disorders - Insomnia - Metabolic disorders - Sleep Apnea - Stress disorders - Substance use
Cognitive difficulties - Concentration - Memory - Decision-making					
Feeling anxious					
Emotional difficulties - Feeling depressed - Irritability - Poor frustration tolerance					

Key: CBC-complete blood count; TFT-thyroid function test; PTSD-post-traumatic stress disorder; SUD-substance use disorder

Table B- 5. Behavioral and Cognitive Symptoms – TREATMENT

Common Symptoms Following Concussion/mTBI	Job Review	Pharmacologic Treatment	Non Pharmacologic Treatment	Referral after failed response to initial intervention
Fatigue - Loss of energy - Getting tired easily		*	Reassurance	- Mental Health
Cognitive difficulties - Concentration - Memory - Decision-making		SSRI *	Encourage regular scheduled aerobic exercise	Consider referral to: - Cognitive rehabilitation - Mental Health - TBI specialist
Feeling anxious		Anxiolytic (short term) SSRI	Activity restriction adjustment	<ul style="list-style-type: none"> - Mental Health - Social support
Emotional difficulties - Feeling depressed - Irritability - Poor frustration tolerance		Anti epileptics SSRI	Sleep hygiene Education Sleep study	

* Consider in the specialty care setting after ruling out a sleep disorder

5.4 Pharmacotherapy

BACKGROUND

At present, there is no clinically validated specific brain targeted pharmacotherapy that will ameliorate the neurocognitive effects attributed to TBI (e.g., enhancing memory and attention, recovering from the brain injury). No medication has received approval from the United States Food and Drug Administration (FDA) for the treatment of any neurological or psychiatric consequence of mTBI.

There are a number of effective adjunctive treatments for symptoms, that when used appropriately and cautiously can improve neurological and functional outcome. While there is little empiric evidence, some experts prescribe medications for attention, irritability, sleep, and mood disorders.

Table B-6. Considerations in Using Medication for Treatment of Symptoms

- Avoid medications that lower the seizure threshold (e.g., bupropion or traditional antipsychotic medications) or those that can cause confusion (e.g., lithium, benzodiazepines, anticholinergic agents).
- Before prescribing medications, rule out social factors (abuse, neglect, caregiver conflict, environmental issues).
- Unless side effects prevail, give full therapeutic trials at maximal tolerated doses before discontinuing a medication trial. Under-treatment is common. Start low and go slow with titration trials.
- Brain injured patients are more sensitive to side effects: watch closely for toxicity and drug-drug interactions.
- Limit quantities of medications with high risk for suicide as the suicide rate is higher in this population.
- Educate patients and family/care givers to avoid the use of alcohol with the medications.
- Minimize caffeine and avoid herbal, diet supplements such as “energy” products as some contain agents that cross-react with the psychiatric medications and lead to a hypertensive crisis.
- Avoid medications that contribute to cognitive slowing, fatigue or daytime drowsiness.

For suggested classes of medication treatment for specific symptoms, see [Tables B-3 and B-5](#). For selected agents, dosages, and pharmacological data, see [Appendix E](#).

RECOMMENDATIONS

1. Medication for ameliorating the neurocognitive effects attributed to concussion/mTBI is not recommended.
2. Treatment of concussion/mTBI should be symptom-specific.
3. Medications may be considered for headaches, musculoskeletal pain, depression/anxiety, sleep disturbances, chronic fatigue or poor emotional control or lability.
4. Appropriate and aggressive pain management strategies should be employed.
5. When prescribing any medication for patients who have sustained a concussion/mTBI, the following should be considered:
 - a. Review and minimize all medication and over-the-counter supplements that may exacerbate or maintain symptoms
 - b. Use caution when initiating new pharmacologic interventions to avoid the sedating properties that may have an impact upon a person's attention, cognition, and motor performance.

- c. Recognize the risk of overdose with therapy of many medication classes (e.g., tricyclics). Initial quantities dispensed should reflect this concern.
- d. Initiate therapy with the lowest effective dose, allow adequate time for any drug trials, and titrate dosage slowly based on tolerability and clinical response.
- e. Document and inform all those who are treating the person of current medications and any medication changes.

5.5 Physical Rehabilitation

BACKGROUND

Therapeutic exercise has been shown to positively impact the vast majority of disabilities. These exercises can be general and directed at an overall improvement in cardiopulmonary health, physical strength and power and overall well-being; or focused at specific musculoskeletal, sensory or neuromuscular impairments that limit performance of daily activities. Following concussion/mTBI, those individuals that have persistent symptoms will often lapse in their overall conditioning. This will in turn result in a decrease in short- and long-term global health (physical and behavioral) and put them at an elevated risk for disability, pain, and handicap (i.e., difficulty with return to work, maintaining peer networks.)

RECOMMENDATIONS

1. There is no contraindication for return to aerobic, fitness and therapeutic activities after concussion/mTBI. Non-contact, aerobic and recreational activities should be encouraged within the limits of the patient's symptoms to improve physical, cognitive and behavioral complaints and symptoms after concussion/mTBI. [SR = B]
2. Specific vestibular, visual, and proprioceptive therapeutic exercise is recommended for dizziness, disequilibrium, and spatial disorientation impairments after concussion/mTBI. (See [Appendix D](#))
3. Specific therapeutic exercise is recommended for acute focal musculoskeletal impairments after concussion/mTBI.

5.5.1 General Exercise

Symptoms of concussion/mTBI amenable to general fitness programs are multiple somatic complaints without specific identified mechanisms of injury and an absence of physical findings. The type of exercise (strength training, core stability, aerobic activities, ROM) is no different than those recommended for individuals without concussion/mTBI. However, one should consider a gradual increase in duration and intensity due to the activity intolerance and fatigue that is commonly associated with concussion/mTBI. Implementation of a scheduled daily routine and incorporation of peer networks may improve compliance.

5.5.2 Focused Exercise

Focal impairments (e.g., upper cervical root entrapment, impaired gaze stability, oculomotor dysfunction) benefit from tailored exercise programs that promote adaptation of or compensation for the affected systems (vestibular, visual, and proprioceptive) or specific musculoskeletal/neuromuscular impairments (decreased ROM, weakness, timing). The exercises that are commonly prescribed for these systems/impairments will be warranted. It is the delivery of instruction, guidance and follow-up needs that will be greater for those with mTBI. As well, the duration and intensity level may need to be considered when looking at the overall presentation of the individual.

5.6 Alternative Modalities

BACKGROUND

The vast majority of individuals with concussion/mTBI will have no difficulties or complaints following injury. While early interventions have been shown to prevent and treat persistent somatic, cognitive and behavioral deficits, certain individuals will have persistent difficulties. Additionally, a

significant percentage of individuals with concussion/mTBI will not receive early diagnosis or will not seek treatment, and therefore their symptoms will be addressed only after a temporal delay. In many of these individuals with chronic persistent symptoms after mTBI, traditional medical interventions are less than successful. Complementary alternative medicine (CAM) may be sought by the patient or patient's family. CAM interventions may assist in the treatment of certain symptoms associated with concussion/mTBI. An evidence-based approach to the implementation of complementary medicine strategies will be useful to prevent over- or underutilization of CAM.

- Acupuncture
- Bio-feedback

Novel therapy (hyperbaric oxygen, nutritional supplements) modalities in the management of concussion/mTBI are being explored in the field as potential treatment approaches. It is the recommendation of the Working Group that interventions which lack sufficient empirical support should occur only under the auspices of an IRB reviewed protocol. However, complementary techniques such as acupuncture may be used at the discretion of the provider and patient.

RECOMMENDATIONS

1. Complementary-alternative medicine treatments may be considered as adjunctive treatments or when requested by individuals with concussion/mTBI. [SR = I]

Annotation B-9

Follow-Up and Assess in 4-6 Weeks

6 Follow-Up

RECOMMENDATIONS

1. All patients should be followed up in 4 – 6 weeks to confirm resolution of symptoms and address any concerns the patient may have.
2. Follow-up after the initial interventions is recommended in all patients to determine patient status. The assessment will determine the following course of treatment:
 - a. Patient recovers from acute symptoms – provide contact information with instructions for available follow-up if needed.
 - b. Patient demonstrates partial improvement (e.g., less frequent headaches, resolution of physical symptoms, but no improvement in sleep) – consider augmentation or adjustment of the current intervention and follow-up within 4-6 weeks.
 - c. Patient does not improve or status worsens – Focus should be given to other factors including psychiatric, psychosocial support, and compensatory/litigation. Referral to a specialty provider should be considered.

C: Follow-Up Management of Persistent Concussion/mTBI Symptoms

Annotation C-1 *Person Diagnosed with Concussion/mTBI and Persistent Symptoms Beyond 4-6 Weeks Follow-Up*

The vast majority of individuals with concussion/mTBI will have no difficulties or complaints following injury. While early interventions have been shown to prevent physical, cognitive and behavioral deficits, certain individuals will have persistent difficulties. Additionally, a significant percentage of individuals with concussion/mTBI will not receive early diagnosis or will not seek treatment, and therefore their symptoms will be addressed only after a temporal delay. This guideline recommends that these individuals should first be treated following the algorithm and annotations in the sections addressing initial presentation and diagnosis. For patients with symptoms that do not respond to initial treatment, the recommendations in this section will apply. This section also includes suggestions for further evaluations and for referrals to specialty providers.

Annotation C-2 *Reassess Symptom Severity and Functional Status Complete Psychosocial Evaluation*

7 Assessment of Persistent Symptoms

BACKGROUND

In patients with persistent post-concussive symptoms that have been refractory to treatment, consideration should be given to other factors including behavioral health (e.g., stress disorders, mood disorders, and substance use disorders), psychosocial support, and compensation/litigation.

RECOMMENDATIONS

1. Follow-up after the initial interventions is recommended in all patients with concussion/mTBI to determine patient status and the course of treatment.
2. Evaluation of patients with persistent symptoms following concussion/mTBI should include assessment for dangerousness to self or others.
3. In assessment of patients with persistent symptoms, focus should be given to other factors including psychiatric, psychosocial support, and compensation/litigation issues and a comprehensive psychosocial evaluation should be obtained, to include:
 - a. Support systems (e.g., family, vocational)
 - b. Mental health history for pre-morbid conditions which may impact current care
 - c. Co-occurring conditions (e.g., chronic pain, mood disorders, stress disorder, personality disorder)
 - d. Substance use disorder (e.g., alcohol, prescription misuse, illicit drugs, caffeine)
 - e. Secondary gain issues (e.g., compensation, litigation)
 - f. Unemployment or/change in job status
 - g. Other issues (e.g., financial/housing/legal).

DISCUSSION

Table C-1 includes key domains of functional assessment and suggested questions to guide the patient assessment.

Table C-1. Functional Assessment

Work	<ul style="list-style-type: none"> • Have there been any changes in productivity? • Have co-workers or supervisors commented on any recent changes in appearance, quality of work, or relationships? • Is there an increase in tardiness, loss of motivation, or loss of interest? • Has the patient been more forgetful, easily distracted?
School	<ul style="list-style-type: none"> • Have there been changes in grades? • Have there been changes in relationships with friends? • Has there been a recent onset or increase in acting-out behaviors? • Has there been a recent increase in disciplinary actions? • Has there been increased social withdrawal? • Has there been a change in effort required to complete assignments?
Family Relationships	<ul style="list-style-type: none"> • Have there been negative changes in relationship with significant others? • Is the patient irritable or easily angered by family members? • Has there been a withdrawal of interest in or time spent with family? • Has there been any violence within the family?
Housing	<ul style="list-style-type: none"> • Does the patient have adequate housing? • Are there appropriate utilities and services? • Is the housing situation stable?
Legal	<ul style="list-style-type: none"> • Are there outstanding warrants, restraining orders, or disciplinary actions? • Is the person regularly engaging in, or at risk to be involved in, illegal activity? • Is the patient on probation or parole? • Is the patient seeking litigation for compensation? • Is there family advocacy/Department of Social Services (DSS) involvement?
Financial	<ul style="list-style-type: none"> • Does the patient have the funds for current necessities including food, clothing, and shelter? • Is there a stable source of income? • Are there significant outstanding or past-due debts, alimony, child support? • Has the patient filed for bankruptcy? • Does the patient have access to healthcare and/or insurance?
Unit/Community Involvement	<ul style="list-style-type: none"> • Does the patient need to be put on profile, MEB, or limited duty? • Is the patient functional and contributing in the unit environment? • Is there active/satisfying involvement in a community group or organization?

Annotation C-3 Assess for Possible Alternative Causes for Persistent Symptoms

7.1 Risk Factors for Persistent Post-Concussive Symptoms

BACKGROUND

Identifying risk factors for persisting symptoms and understanding the relationship between risk factors and short- and long-term outcomes can help enhance assessment and treatment. Some risks are pre-existing factors that may predispose an individual to worse outcomes following a concussion/mTBI; others are potentially directly causative (e.g., the injury itself or medical/legal iatrogenic factors); and still others are potentially perpetuating factors which may occur during the peri-injury or post-injury timeframe.

Table C-2. Risk Factors for Persistent Symptoms and/or Poorer Overall Outcomes

Pre-injury	Peri-injury	Post-injury
<ul style="list-style-type: none"> - Age (older) - Gender (female) - Low SES - Less education / Lower levels of intelligence - Pre-neurological conditions - Pre- or co-occurrence of mental health disorders (depression, anxiety, traumatic stress, or substance use) 	<ul style="list-style-type: none"> - Lack of support system - Acute symptom presentation (e.g., headaches, dizziness, or nausea in the ER) - Context of injury (stress, combat-related, traumatic) 	<ul style="list-style-type: none"> - Compensation - Litigation (malingering, delayed resolution) - Co-occurrence of psychiatric disorders - Co-occurrence of chronic pain conditions - Lack of support system - Low education

Bold text indicates support of Level C evidence

RECOMMENDATIONS

1. Assessment of the patient with concussion/mTBI should include a detailed history regarding potential pre-injury, peri-injury, or post-injury risk factors for poorer outcomes. These risk factors include:
 - a. *Pre-injury*: older age, female gender, low socio-economic status, low education or lower levels of intellectual functioning, poorer coping abilities or less resiliency, pre-existing mental health conditions (e.g., depression, anxiety, PTSD, substance use disorders).
 - b. *Peri-injury*: lower levels of or less available social support
 - c. *Post-injury*: injury-related litigation or compensation, comorbid mental health conditions or chronic pain, lower levels of or less available social support,
2. Any substance abuse and/or intoxication at the time of injury should be documented.
3. Establish and document if the patient with concussion/mTBI experienced headaches, dizziness, or nausea in the hours immediately following the injury.

7.2 Compensation Seeking/Non-Validated Symptoms

BACKGROUND

The majority of people with concussion/mTBI will have no difficulties or complaints following injury. However, a minority of patients will continue to have ongoing symptoms that may result in a disability. Though these symptoms lose specificity with time and may be wrongly attributed to the mTBI/concussion, they may also interfere with an individual's recovery. Even after a careful differential diagnosis, it remains a challenge for providers to quantify non-specific, subjective complaints for the purposes of disability compensation.

RECOMMENDATIONS

1. Symptom exaggeration or compensation seeking should not influence the clinical care rendered, and doing so can be counter-therapeutic and negatively impact the quality of care.
2. Focus of the provider-patient interaction should be on the development of a therapeutic alliance (SR=C).

7.3 Persistent Post-Concussive Symptoms (PPCS)

BACKGROUND

For concussion/mTBI patients, most symptoms and signs that occur in the acute period resolve quickly (within hours or days) after the injury. There is debate about the incidence of developing persistent symptoms after concussion, largely due to the lack of an accepted case definition for persistent symptoms and the fact that none of the symptoms are specific to concussion. There is no consensus on a case definition for persistent symptoms attributed to concussion/mTBI and no consensus on the time course when acute symptoms should be considered persistent.

See discussion in Section 1.6 [Persistent Symptoms after Concussion](#) and [Table C-3 Post-Concussion Symptoms](#).

Table C-3. Post-Concussion Symptoms

Somatic Symptoms	Psychological	Cognitive
<ul style="list-style-type: none"> ○ Headache * ○ Fatigue * ○ Sensitivity to light/noise * ○ Insomnia & sleep disturbances * ○ Drowsiness * ○ Dizziness * ○ Nausea & vomiting * ○ Vision problems * ○ Transient neurological abnormalities ○ Seizures ○ Balance problems 	<ul style="list-style-type: none"> ○ Problems controlling emotions * ○ Irritability * ○ Anxiety * ○ Depression * 	<ul style="list-style-type: none"> ○ Problems with memory * ○ Cognitive disorders * ○ Problems with concentration * ○ Functional status limitations *

* In common with Post Concussive Syndrome (PCS)

RECOMMENDATIONS

1. For clinical treatment purposes the use of post-concussion syndrome, post-concussive syndrome (PCS) or post-concussion disorder (PCD) as a diagnosis is not recommended. The unique individual pattern of symptoms should be documented and be the focus of treatment.

For the purpose of this CPG, the term *persistent post-concussive symptoms* will be used.

Annotation C-4 *Any Behavioral Health Diagnosis Established?*

7.4 Persistent Behavioral Symptoms

BACKGROUND

Patients with persistent post-concussive symptoms have a higher incidence of co-occurring mental health conditions (e.g., Stress disorders [ASD, PTSD]), other anxiety disorders, mood disorders, Substance Use Disorders[SUD]) and a pre-injury history of mental health conditions.

In patients with persistent post-concussive symptoms (PPCS), that have been refractory to treatment, a referral to mental health may help elucidate other factors which may be involved in the exacerbation or maintenance of concussion symptoms. These include prior psychiatric history, lack of psychosocial support, financial compensation/litigation, chronic pain, and somatoform spectrum disorders.

See [Table C-6: Behavioral Symptoms – TREATMENT](#)

RECOMMENDATIONS

1. Patients with persistent symptoms following concussion/mTBI should be re-evaluated for psychiatric symptoms and co-morbid psychiatric disorders.
2. Treatment of psychiatric symptoms following concussion/mTBI beyond the acute phase should still be based on individual factors and nature and severity of symptom presentation, including psychotherapeutic [SR = A] and pharmacologic [SR = I] treatment modalities.
3. In patients with persistent post-concussive symptoms (PPCS), which have been refractory to treatment, consideration should be given to other factors including psychiatric disorders, lack of psychosocial support, and compensation/litigation.

Annotation C-5 *Consider Referral to Specialty Care*

8 Consultation and Referral

RECOMMENDATIONS

1. A consultation or referral to specialists should occur in a patient with concussion/mTBI who complains of persistent or chronic symptoms when:
 - a. An atypical pattern or course (worsening or variable symptom presentation) is demonstrated
 - b. The patient is experiencing difficulties in return to pre-injury activity (work/duty/school)
 - c. Problems emerge in the role of the patient in family or social life.
2. Patients with multiple problems may benefit from an interdisciplinary approach to include occupational therapy, recreation therapy, social work, psychology and/or psychiatry, neurology, ENT, ophthalmology or audiology, based on individual symptoms. The patient's provider should remain involved in the patient's care.
3. Referral to mental health specialty of patients with persistent behavioral symptoms should be considered.

See [Table C-4 Indications for Referral to Mental Health](#)

Table C-4. Indications for Referral to Mental Health

- Failure to respond to acute supportive interventions
- Worsening of stress related symptoms
- High potential for dangerousness
- Development of PTSD
- Exacerbation of pre-existing psychiatric conditions
- Deterioration in function
- New onset stressors, poor social supports or inadequate coping skills
- Impairment in family or vocational role function

Annotation C-6 *Any Persistent Symptoms (Physical, Cognitive or Emotional)?*

8.1 Persistent Physical Symptoms

RECOMMENDATIONS

1. Patients who are refractory to treatment of physical symptoms in the initial care setting should be referred to specialty care for further evaluation and management ([See Appendix D – Treatment of Physical Symptoms](#)).

See [Table C-5 Persistent Physical Symptoms – TREATMENT](#)

8.2 Persistent Cognitive Difficulties

BACKGROUND

Although initial cognitive complaints and problems are common in the first hours and days after a concussion/mTBI, the vast majority of individuals recover within one to four weeks. However, a small minority either continue to report cognitive problems or report worsening symptoms over the months and even years post-injury. This subgroup frequently has premorbid or comorbid conditions such as depression, anxiety, poor health, and chronic pain or poor psychosocial support or other coping resources.

Assistive technology for cognition (ATC) refers to a subset of assistive technology used to compensate for cognitive impairments in memory, attention, and executive function. Devices in this category are also known as memory aids or cognitive prostheses. They are designed to assist individuals with concussion/mTBI to carry out everyday tasks by providing cues or limiting demands on impaired cognitive skills. Devices can range from simple electronic tools, such as a wrist watch with an alarm function to sophisticated personal digital assistants and global positioning systems. Successful long-term utilization of ATC by persons with concussion/mTBI requires selection of appropriate devices and effective training using the device in real-life contexts.

See [Table C-6 Persistent Cognitive Symptoms – TREATMENT](#)

RECOMMENDATIONS

1. Patients who have cognitive symptoms that do not resolve or have been refractory to treatment should be considered for referral for neuropsychological assessment. The evaluation may assist in clarifying appropriate treatment options based on individual patient characteristics and conditions. [SR = B]
2. Neuropsychological testing should only be conducted with reliable and standardized tools by trained evaluators, under controlled conditions, and findings interpreted by trained clinicians. [SR = C]

3. Individuals who present with memory, attention, and/or executive function problems which did not respond to initial treatment (e.g., reassurance, sleep education, or pain management) may be considered for referral to cognitive rehabilitation therapists with expertise in TBI rehabilitation (e.g., speech and language pathology, neuropsychology, or occupational therapy) for compensatory training [SR = C]; and or instruction and practice on use of external memory aids such as a PDA. [SR = C]

Table C-5. Persistent Physical Symptoms – TREATMENT

Common Symptoms Following concussion/mTBI	Pharmacologic Treatment	Non Pharmacologic Treatment	Referral After Failed Response to Initial Treatment
Headaches	- Non narcotic pain meds - NSAIDs - Triptans (migraine type)	- Sleep education - Physical therapy - Relaxation	Neurology Pain clinic
Feeling dizzy	- Antibiotics, decongestants for infections and fluid	-	Dizzy : ENT/Neurology after ENT interventions
Loss of balance Poor coordination	-	- Physical therapy	Neurology
Nausea	- Antiemetics	- Sleep education	GI
Change in appetite	-	-	Consider Mental Health
Sleep disturbances - Difficulty falling or staying a sleep (insomnia)	- Sleep Medications	- Sleep education	Mental health PM&R Neurology
Vision problems - Blurring - Trouble seeing - Sensitivity to light	-	- Sleep education - Light desensitization - Sunglasses	Optometry Ophthalmology **
Hearing difficulty - Sensitivity to noise	-	- Environmental modifications	Audiology ENT Sensitivity to Noise : Speech and Language Pathology

** Depending on the local resources, impaired vision may be referred in some facilities to neuro-ophthalmologists. Note that the impaired vision may be due to problems with oculomotility as well as due to disorders of the retina and visual pathways.

Table C-6. Persistent Behavioral and Cognitive Symptoms – TREATMENT

Common Symptoms Following Concussion/mTBI	Job Review	Pharmacologic Treatment	Non Pharmacologic Treatment	Referral After Failed Response to Initial Intervention
Fatigue - Loss of energy - Getting tired easily		Stimulant*	Reassurance	- Mental Health
Cognitive difficulties - Concentration - Memory - Decision-making		SSRI Stimulant*	Encourage regular scheduled aerobic exercise	- TBI specialist for cognitive rehabilitation or mental health
Feeling anxious		Anxiolytic (short term) SSRI	Activity restriction adjustment	
Emotional difficulties - Feeling depressed - Irritability - Poor frustration tolerance		Anti epileptics SSRI	Sleep hygiene Education Sleep study	- Mental Health - Social support

* Consider in the specialty care setting after ruling out a sleep disorder

Annotation C-7 *Consider Referral to Occupational or Vocational Therapy and Community Integration Programs (Continue Case Management)*

9 Rehabilitation of Patients with Persistent Post-Concussive Symptoms (PPCS)

BACKGROUND

Role of Consultants

For patients who will be referred to specialty care, treatment will be provided by the specialty consultant as recommended in the management of specific symptoms or other clinical practice guidelines. The referring care provider is expected to serve as the focal point for an inter-disciplinary approach to treatment that may span the continuum of care. With patient consent, it may be found useful to involve the patient’s employer/supervisor, spouse, and friends and significant others within the patient’s social support network.

In patients with persistent post-concussive symptoms (PPCS), the role of mental health providers (psychiatry, psychology, neuropsychology, social work, and others) will be more essential in providing input into implementing psychotherapeutic treatment in the outpatient setting. Social workers should help build family and social support networks, or recommend changes in the patient’s living situation, in order to create a positive support network.

9.1 Case Management in the Care of Patients with mTBI

BACKGROUND

Patients presenting with symptoms should be considered both initially and on an ongoing basis for referral to case management. Whether the patient has recently returned from deployment or combat, or is a veteran who has sustained non-combat related head trauma, the need for a collaborative and coordinated approach to comprehensive care is necessary.

2. Patients who have not successfully resumed pre-injury work duties following injury should be referred for a vocational evaluation by clinical specialists with expertise in assessing and treating concussion/mTBI.
3. For patients with persistent symptoms following concussion/mTBI, return to full work/duty in the jobs they have previously performed may not be possible. Patients may need to proceed through medical or disability evaluation processes. This process should follow national and local regulations and is beyond the scope of the guideline.

Community participation

4. A referral to a structured program that promotes community integration may be considered for individuals with residual persistent post-concussive symptoms that impede return to pre-injury participation in customary roles.

Annotation C- 8	<i>Follow-Up and Reassess in 3-4 Months</i>
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10 FOLLOW-UP

BACKGROUND

The goal of follow-up visits is to monitor the severity of symptoms, impact of the symptoms on activities, effects of treatments, and presence of adverse effects to treatments, and to assess patients for new symptoms suggestive of other diagnoses.

Although natural improvement is generally expected, recovery can be prolonged and a minority of patients still have symptoms at 6 months. The use of telephonic and other distance technologies may be used to monitor the recovery process, reinforce education, and prevent development of secondary problems.

RECOMMENDATIONS

1. Scheduled follow-up visits are recommended. The amount of time between visits will vary depending on a number of factors, including the following:
 - a. Quality of the provider/patient relationship
 - Distress of the patient
 - Need for refinement of the treatment plan or additional support
 - Presence or absence of psychosocial stressors.
 - b. Severity of the symptoms
 - Initially, a follow-up at two to three weeks would be appropriate
 - As soon as the patient is doing well, then follow-up every 3 to 4 months would be recommended
 - Telephone follow-up may be sufficient to evaluate resolution of symptoms and reinforce education.
 - c. For concussion/mTBI patients with complicated histories, comorbidities, and lack of social support consider case management.
2. Continually re-evaluate the patient for worsening of chronic symptoms or presence of new symptoms suggestive of other diagnoses.

