

11 Fatigue

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Fatigue has been conceptualized as an experience of weariness or tiredness following mental or physical exertion, often resulting in a reduced capacity for work and limited efficiency to respond to stimuli. Fatigue can be caused by psychological or physiological forces¹ and can be central or peripheral, which in lay terms is experienced as cognitive fatigue and physical fatigue or weariness.²⁻⁴ Fatigue is one of the most pervasive symptoms following concussion/mTBI, with 27.8% of individuals experiencing persistent fatigue at 3 months post-injury.⁵ The perception of fatigue can be out of proportion to exertion or may even occur without any exertion.⁶ One study reported a level of fatigue in patients with concussion/mTBI comparable to that of individuals with multiple sclerosis, a condition which is known to be associated with clinically-significant disease-related fatigue levels.⁷ Fatigue is multidimensional and can affect physical, cognitive, motivational and psychological (i.e., depression, anxiety) spheres.⁸ Individuals with fatigue can experience poorer problem-solving and coping skills, which then increases stress, depression which creates an ongoing cycle that contributes to disability.⁷ For instance, a state of chronic stress may be present following mTBI, which compromises the biological stress system and increases the likelihood for fatigue and stress-related disorders.⁹ Fatigue following TBI has also been found to significantly impact well-being and quality of life, and is strongly associated with somatic symptoms and perceived situational stress.^{8,9}

Due to its prevalence and effects, it is recommended that all patients be assessed for fatigue through a personal history with the patient and/or support person. A review of the relevant items from the *Rivermead Post Concussion Symptoms Scale* ([Appendix 1.5](#)) and/or a specific measure of fatigue, such as the *Barrow Neurological Institute (BNI) Fatigue Scale*¹⁰ ([Appendix 11.1](#)). The *Fatigue Severity Scale*¹¹ ([Appendix F](#)), the *Fatigue Impact Scale*¹² ([Appendix F](#)) or the *Mental Fatigue Scale*¹³ ([Appendix F](#)) can also assist with this.

Post-concussion/mTBI fatigue can be persistent and has been shown to still be present up to five years post-injury.⁸ Those who experience fatigue at three months post-injury are increasingly likely to continue to experience fatigue beyond six months post-injury.¹¹ Due to the relationship between pituitary dysfunction, specifically growth hormone deficiency, and fatigue some have suggested a relation between the two; however recent literature has not found a significant relationship.¹⁴⁻¹⁶ As certain medications can cause fatigue, the practitioner should also conduct a thorough review of the patient's medications. If the patient has been prescribed a medication that is associated with fatigue, alternatives that produce the same treatment effect without inducing fatigue should be considered. A list of medications commonly associated with fatigue can be found in [Appendix 11.2](#). As persistent fatigue may cause other symptoms to worsen, early intervention is required in order to prevent interference with the patient's ability to participate in rehabilitation therapies.^{8,17} Patients should also be provided with advice on how to cope with fatigue (see [Appendix 11.3](#)), such as general stress management techniques.⁸ If debilitating fatigue persists, consider referral to an interdisciplinary concussion clinic.

Research into treating fatigue has revealed few studies varying from non-pharmacological to pharmacological treatment. Methylphenidate has been found to improve mental fatigue and processing speed in patients with persistent post-concussion symptoms,^{18,19} including up to 6 months post-treatment.²⁰ Caution is recommended in the use of stimulants however; as clinical experience has identified that some individuals report that stimulants provide a burst of energy followed by increased fatigue. Some non-pharmacological treatments such as exercise (e.g., aquatic therapy), mindfulness-based stress reduction, cognitive behavioural therapy²¹ and blue-light therapy²² could potentially be helpful in treating fatigue however more research is needed.²³

RECOMMENDATIONS FOR ASSESSMENT AND MANAGEMENT OF FATIGUE		
		GRADE
11.1	Determine whether cognitive and/or physical fatigue is a significant symptom by taking a focused history and reviewing the relevant items from administered questionnaires (see Appendix 11.1).	C
11.2	Characterize the dimensions of fatigue (e.g., physical, mental, impact on motivation) and consider alternative or contributing, treatable causes that may not be directly related to the injury. Please refer to Table 11.1 for further information about primary and secondary causes, as well as appropriate treatment strategies for different types of fatigue.	C

11.3	After a brief period of rest during the acute phase (24–48 hours) after injury, patients can be encouraged to become gradually and progressively more active as tolerated (i.e., activity level should not bring on or worsen their symptoms).*	C
11.4	<p>If identified as a significant symptom, some key considerations that may aid in the management of persistent fatigue can include:</p> <ul style="list-style-type: none"> • Aiming for a gradual increase in activity levels (see Appendix 11.4) that will parallel improvement in energy levels, including exercise below symptom threshold. • Reinforce strategies of cognitive and physical activity pacing (see Appendix 2.6) and fragmentation across the day to help patients achieve more without exceeding tolerance levels. • Encouraging good sleep hygiene (especially regularity of sleep-wake schedules, and avoidance of stimulants and alcohol), and proper relaxation times. • Using a notebook or a diary to plan meaningful goals, record activity achievement and identify patterns of fatigue. • Acknowledging that fatigue can be exacerbated by low mood or stress. • Provide patients with a pamphlet containing advice on coping strategies for fatigue (see Appendix 11.3). 	C

* NOT AN ORIGINAL RECOMMENDATION - REPEAT OF 4.5

Table 11.1 Fatigue: Assessment and Management Factors for Consideration

Characteristics	<ul style="list-style-type: none"> • Frequency • Intensity • Time of day • Aggravating factors
Assessment	<ul style="list-style-type: none"> • Focused history • Physical examination • <i>Barrow Neurological Institute (BNI) Fatigue Scale</i> to assess fatigue (Appendix 11.1) • Consider blood test screening if appropriate (CBC, TSH, electrolytes)
Secondary Causes of Fatigue	<ul style="list-style-type: none"> • Affective disorder, including depression, anxiety • Sleep disorder post-concussion/mTBI • Metabolic causes, including hypothyroidism, anemia • Electrolyte abnormality (e.g., hyponatremia, hypocalcemia, etc.) • Polypharmacy or medication adverse effect

RESOURCES

APPENDICES

1	Rivermead Post Concussion Symptoms Questionnaire	Appendix 1.5
2	Barrow Neurological Institute (BNI) Fatigue Scale	Appendix 11.1
3	List of Medications Associated with Fatigue, Asthenia, Somnolence, and Lethargy from the Multiple Sclerosis Council (MSC) Guideline	Appendix 11.2
4	Patient Advice Sheet on Coping Strategies for Fatigue	Appendix 11.3
5	Increasing Physical Activity to Better Manage Fatigue	Appendix 11.4
6	Parkwood Pacing Graphs	Appendix 2.6
7	Other Useful Links/References for Resources to Consider	Appendix F

TABLES

1	Fatigue: Assessment and Management Factors for Consideration	Table 11.1
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References

1. Aaronson LS, Teel CS, Cassmeyer V, et al. Defining and measuring fatigue. *Image J Nurs Sch*. 1999;31(1):45-50.
2. Chaudhuri A, Behan PO. Fatigue and basal ganglia. *J Neurol Sci*. 2000;179(S 1-2):34-42.
3. Chaudhuri A, Behan PO. Fatigue in neurological disorders. *Lancet*. 2004;363(9413):978-988.
4. Leavitt VM, DeLuca J. Central fatigue: issues related to cognition, mood and behavior, and psychiatric diagnoses. *PM R*. 2010;2(5):332-337.
5. Mollayeva T, Kendzerska T, Mollayeva S, Shapiro CM, Colantonio A, Cassidy JD. A systematic review of fatigue in patients with traumatic brain injury: the course, predictors and consequences. *Neurosci Biobehav Rev*. 2014;47:684-716.
6. Dijkers MP, Bushnik T. Assessing fatigue after traumatic brain injury: an evaluation of the HIV-Related Fatigue Scale [corrected]. *J Head Trauma Rehabil*. 2008;23(1):3-16.
7. Juengst S, Skidmore E, Arenth PM, Niyonkuru C, Raina KD. Unique contribution of fatigue to disability in community-dwelling adults with traumatic brain injury. *Arch Phys Med Rehabil*. 2013;94(1):74-79.
8. Cantor JB, Ashman T, Gordon W, et al. Fatigue after traumatic brain injury and its impact on participation and quality of life. *J Head Trauma Rehabil*. 2008;23(1):41-51.
9. Bay E, de-Leon MB. Chronic stress and fatigue-related quality of life after mild to moderate traumatic brain injury. *J Head Trauma Rehabil*. 2011;26(5):355-363.
10. Borgaro SR, Gierok S, Caples H, Kwasnica C. Fatigue after brain injury: initial reliability study of the BNI Fatigue Scale. *Brain Inj*. 2004;18(7):685-690.
11. Krupp LB, LaRocca NG, Muir-Nash J, Steinberg AD. The fatigue severity scale. Application to patients with multiple sclerosis and systemic lupus erythematosus. *Arch Neurol*. 1989;46(10):1121-1123.
12. Fisk JD, Ritvo PG, Ross L, Haase DA, Marrie TJ, Schlech WF. Measuring the functional impact of fatigue: initial validation of the fatigue impact scale. *Clin Infect Dis*. 1994;18 Suppl 1:S79-83.
13. Johansson B, Starmark A, Berglund P, Rödholm M, Rönnbäck L. A self-assessment questionnaire for mental fatigue and related symptoms after neurological disorders and injuries. *Brain Inj*. 2010;24(1):2-12.
14. Englander J, Bushnik T, Oggins J, Katznelson L. Fatigue after traumatic brain injury: Association with neuroendocrine, sleep, depression and other factors. *Brain Inj*. 2010;24(12):1379-1388.
15. Bushnik T, Englander J, Katznelson L. Fatigue after TBI: association with neuroendocrine abnormalities. *Brain Inj*. 2007;21(6):559-566.
16. Schnieders J, Willemsen D, de Boer H. Factors contributing to chronic fatigue after traumatic brain injury. *J Head Trauma Rehabil*. 2012;27(6):404-412.
17. Norrie J, Heitger M, Leathem J, Anderson T, Jones R, Flett R. Mild traumatic brain injury and fatigue: a prospective longitudinal study. *Brain Inj*. 2010;24(13-14):1528-1538.
18. Johansson B, Wentzel AP, Andréll P, Mannheimer C, Rönnbäck L. Methylphenidate reduces mental fatigue and improves processing speed in persons suffered a traumatic brain injury. *Brain Inj*. 2015;29(6):758-765.
19. Johansson B, Wentzel AP, Andréll P, Odenstedt J, Mannheimer C, Rönnbäck L. Evaluation of dosage, safety and effects of methylphenidate on post-traumatic brain injury symptoms with a focus on mental fatigue and pain. *Brain Inj*. 2014;28(3):304-310.
20. Johansson B, Wentzel AP, Andréll P, Rönnbäck L, Mannheimer C. Long-term treatment with methylphenidate for fatigue after traumatic brain injury. *Acta Neurol Scand*. 2017;135(1):100-107.
21. Nguyen S, McKay A, Wong D, et al. Cognitive Behavior Therapy to Treat Sleep Disturbance and Fatigue After Traumatic Brain Injury: A Pilot Randomized Controlled Trial. *Arch Phys Med Rehabil*. 2017;98(8):1508-1517 e1502.
22. Sinclair KL, Ponsford JL, Taffe J, Lockley SW, Rajaratnam SM. Randomized controlled trial of light therapy for fatigue following traumatic brain injury. *Neurorehabil Neural Repair*. 2014;28(4):303-313.
23. Xu GZ, Li YF, Wang MD, Cao DY. Complementary and alternative interventions for fatigue management after traumatic brain injury: a systematic review. *Ther Adv Neurol Disord*. 2017;10(5):229-239.