

The presence and persistence of cognitive symptoms following concussion/mTBI can affect an individual's ability to function in everyday life, including work, academic and social activities.<sup>1,2</sup> Mild TBI/concussion is associated with disruptions in cognitive skills that include difficulties with attention/concentration, processing speed, learning/memory and executive function.<sup>3-6</sup> In the acute phase of injury there are changes in cerebral metabolic activity and perfusion, particularly in the frontal lobes associated with cognitive changes.<sup>7-12</sup> Generally, the expected recovery from cognitive-based symptoms following concussion/mTBI ranges from 1 week to 6 months, with more rapid rates of recovery found in young athletes.<sup>6</sup> However, 15%-33% of individuals<sup>3,6,7,13</sup> experience persistent cognitive symptoms beyond the acute phase of recovery, which significantly disrupts their capacity to resume many pre-morbid activities.

Currently, it remains unclear whether persistent cognitive symptoms result from the pathophysiological effects of the injury and/or are influenced by other factors that can impact cognitive functioning such as pain, cognitive fatigue, medications, sleep disturbance, vestibular disturbance, visual changes, pre-morbid personality factors, cognitive reserve, psychological factors and emotional disturbance (i.e., anxiety, irritability and depression).<sup>14-19</sup> Additionally, cognitive symptoms do not typically worsen over time as a sole and direct function of the traumatic injury. When such a pattern of complaints is observed, the relative impact of these additional factors should be considered and addressed.

It is important to document cognitive symptoms in order to characterize the nature of these symptoms and to track progress over time. When cognitive dysfunction does not resolve with treatment of potentially contributing factors or if cognitive symptoms persist past 3 months, practitioners should consider referral for neuropsychological assessment to aid in identifying the nature of cognitive strengths and challenges, setting goals for treatment, career and education planning, or provide information about independent functioning.<sup>7,20</sup> Deficits identified on neuropsychological assessment may be amenable to specific rehabilitation strategies (e.g., compensatory cognitive strategies) as well as cognitive behavioural therapy (CBT) focused on education about the commonality of symptom presentation, facilitation of more effective coping strategies and integration of cognitive compensatory strategies.<sup>20</sup> This combination has demonstrated reductions in the presence of persistent symptoms.<sup>4,7,21,22</sup>

## RECOMMENDATIONS FOR ASSESSMENT OF COGNITIVE DIFFICULTIES

		GRADE
9.1	A patient sustaining a concussion should be evaluated for the presence of cognitive difficulties, and consideration taken to the impact of such difficulties on functional areas such as performance at work or school and completing tasks within the home and community, etc. This can be done through a focused clinical interview regarding symptoms and administration of a validated post-concussion questionnaire [e.g., <i>Rivermead</i> ( <a href="#">Appendix 1.5</a> ), <i>PCSS</i> ( <a href="#">Appendix 1.6</a> ) or <i>SCAT5</i> ( <a href="#">Appendix 3.1</a> )] for the purpose of assessing and tracking symptoms.	<b>B</b>
9.2	Since certain comorbidities can exacerbate cognitive symptoms (e.g., ADHD, learning disabilities, anxiety or mood disorders, pain, fatigue, sleep disturbance, neuroendocrine dysfunction, substance abuse, existing medications) patients should be provided with education highlighting that their cognitive symptoms may be intensified and prolonged by these comorbidities.	<b>B</b>
9.3	<i>A patient with a first-time concussion should be advised through early education, support and/or assurance that a full recovery of symptoms, including cognitive functioning, is typically seen within as early as a few days up to 1 to 3 months post-injury.*</i>	<b>A</b>
9.4	Patients who have cognitive symptoms that are not resolving and continue to interfere in daily functioning (e.g., school or work) beyond 4 weeks should be considered for referral for specialized cognitive assessment (e.g., neuropsychological assessment). The evaluation may assist in clarifying appropriate treatment options based on individual patient characteristics and conditions.	<b>A</b>

\* NOT AN ORIGINAL RECOMMENDATION - REPEAT OF 2.3

There is good evidence that early education intervention is associated with a significant reduction in the persistence and misattribution of symptoms.<sup>5,10,23,24</sup> Related interventions include education about the mechanisms of brain injury, reassurance, and early management strategies that include graduated reintegration into physical activity, work, and school, as well as the understanding that symptoms should typically resolve within 3 to 6 months.<sup>25,26</sup> Therefore, attempts should be made to document the specific cognitive complaints/symptoms in conjunction with other symptoms as early as possible, provide or refer to educational material, and track recovery or reported worsening of symptoms over time. Educational material regarding expected outcome following mTBI is readily available and can be accessed by the individual and/or provided by various practitioners within the area of concussion/mTBI (e.g., occupational therapists, speech-language pathologists, psychologists, family physicians, nursing staff, community therapists).

RECOMMENDATIONS FOR TREATMENT OF COGNITIVE DIFFICULTIES		
		GRADE
9.5	Evidence-based neurorehabilitation strategies should be initiated if: a. The individual exhibits persisting cognitive impairments on formal evaluation, and/or b. To facilitate the resumption of functional activities, work and school.	<b>A</b>
9.6	If persisting cognitive deficits are identified by neuropsychologists or other healthcare professionals, implement temporary work or school accommodations or modifications and provisions for assistance (e.g., implement schedules, avoid excessive anxiety, pace activities, etc.). See <a href="#">Section 12</a> .	<b>C</b>

RESOURCES		
APPENDICES		
1	Rivermead Post Concussion Symptoms Questionnaire	Appendix 1.5
2	Post Concussion Symptom Scale	Appendix 1.6
3	SCAT5	Appendix 3.1
4	Other Useful Links/References for Resources to Consider	Appendix F

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