

**CLINICAL PRACTICE GUIDELINE**  
FOR THE REHABILITATION OF ADULTS  
WITH MODERATE TO SEVERE TBI

# IMPLEMENTATION SURVEY SUMMARY REPORT

Ontario and Québec



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*Institut national  
d'excellence en santé  
et en services sociaux*

Québec 

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## ACRONYMS

CPG	Clinical Practice Guideline
INESSS	Institut national d'excellence en santé et en services sociaux
LHIN	Local Health Integration Network
ONF	Ontario Neurotrauma Foundation
TBI	Traumatic Brain Injury

## BACKGROUND

- Ontario Neurotrauma Foundation (ONF) and the Institut national d'excellence en santé et en services sociaux (INESSS) have recently developed and released a clinical practice guideline for the rehabilitation of adults with moderate-to-severe traumatic brain injury (<https://braininjuryguidelines.org>).
- The Clinical Practice Guideline (CPG) was developed using a rigorous methodology that rated the best evidence available. The guideline contain 266 recommendations; 109 of these were identified by experts as being most relevant priorities for improving the quality and efficacy of TBI rehab services.
- It is divided in two sections: Section 1: Key Components of TBI Rehabilitation and Section 2: Assessment and Rehabilitation of Brain Injury Sequelae and each recommendation includes the level of evidence currently available in support of the recommendation
- In order to inform implementation planning in Québec and Ontario, INESSS and ONF consulted the main target users of the CPG to identify key recommendations that were not implemented.

## IMPLEMENTATION SURVEY PROCESS

- In collaboration with key professionals from their teams, TBI Program Managers were asked to review the subset of 109 priority and fundamental recommendations and complete an electronic survey asking:
  1. the actual level of implementation of the recommendations in their program (i.e. “fully implemented” to “not implemented”);
  2. for those not fully implemented, the degree of priority and feasibility to implement;
  3. the potential obstacles to the implementation of #2.
- Completed surveys were analyzed in the service provider context (Acute and Rehabilitation) and the provincial context (Ontario and Québec)

## ANALYSIS OF THE IMPLEMENTATION SURVEY

- In Québec, the survey was sent to 24 healthcare providers across 15 administrative regions.
  - 16 provided either specialized traumatic brain injury (TBI) rehabilitation or general rehabilitation to a range of patients including those with TBI, and 8 provided acute care.
  - 26 completed surveys were received (two sites each filled out two surveys as they provided both acute and rehabilitation programmes and completed a separate survey for each programme): 18 from rehabilitation sites and 8 from acute sites.
- In Ontario, the survey was sent to 27 healthcare providers across 12 of the 14 Local Health Integration Networks (LHINs). Two LHINs did not have facilities that provided either acute or rehabilitative care to persons who had sustained a traumatic brain injury; residents in these LHINs would be sent to facilities in neighbouring LHINs for care.

- 12 provided specialized brain injury rehabilitation, 7 provided general rehabilitation to a range of patients including those with brain injury and 8 provided acute care.
- 18 completed surveys were received: 12 from rehabilitation sites (8 from specialized rehabilitation and 4 from general rehab) and 6 from acute sites.
- A response was received from 10 out of the 12 LHINs.

For the data analysis we dichotomized all the answers regarding implementation as follows:

Answer Option	Dichotomized Category
1 = Fully Implemented	<b>Implemented</b>
2 = Mostly Implemented	<b>Implemented</b>
3 = Partially Implemented	<b>Not Implemented</b>
4 = Occasionally Implemented	<b>Not Implemented</b>
5 = Not Implemented	<b>Not Implemented</b>

The Rehabilitation sites from both provinces and the Acute sites from Québec responded for all 109 recommendations but the Acute sites from Ontario responded for a subset of 44 recommendations identified by consensus as being relevant for rehabilitation within an Acute setting. For each recommendation the **median** response was used to represent the grouped level of implementation for the type of site within each province. The percentages in the table do not add up to 100% as for some of the recommendations the median response was “Not Applicable”.

	Percentage of recommendations “Implemented”	Percentage of recommendations “Not Implemented”
Ontario – Acute (N=6)	70%	27%
Québec – Acute (N=8)	59%	17%
Ontario – Rehabilitation (N=12)	80%	16.5%
Québec – Rehabilitation (N=18)	62%	19%

The tables below present the recommendations for which at least 50% of respondents from either Acute care or Rehabilitation facilities and from either Ontario or Québec indicated that a recommendation was “Not Implemented” as per the dichotomous category (“Partially”, “Occasionally” or “Not Implemented”) in their settings. In addition to providing the full recommendation, the tables also indicate which Section of the guideline the Recommendations are from: Section 1: Components of the Optimal TBI Rehabilitation System or Section 2: Assessment and Rehabilitation of Brain Injury Sequelae.

## ONTARIO – ACUTE SITES (N=6)

Not implemented Recommendations for at least 50% of the respondent sites (Level of Evidence)	% of sites for which this rec is not implemented (Acute N=6)	% of sites for which this rec is a priority (if not implemented)	% of sites for which this rec is feasible (if a priority)
<b>Sec 2: J 3.1</b> Methylphenidate (initiated at a dose of approximately 0.10mg/kg and increased gradually to a target of 0.25–0.30 mg/kg bid) is recommended in adults with traumatic brain injury to enhance attentional function and speed of information processing. (Level of evidence: B)	80% (4/5)*	50% (1/2)*	100% (1/1)*
<b>Sec 2: T9.3</b> Careful drug selection and monitoring are required when initiating pharmacological interventions to minimize potential adverse effects on arousal, cognition, motivation and motor coordination following traumatic brain injury. Use of medications that target more than one brain-injury-related symptom/syndrome is recommended, if possible (e.g., one agent targeting both mood and insomnia, or headache and insomnia). (Level of evidence: C)	80% (4/5)	100% (4/4)	100% (3/3)
<b>Sec 2: J 3.4</b> Amantadine may be considered to enhance arousal and consciousness and accelerate the pace of functional recovery in individuals in vegetative or minimally responsive state following traumatic brain injury. (Level of evidence: A)	75% (3/4)	66% (2/3)	100% (2/2)
<b>Sec 2: J6.2</b> Donepezil (5–10 mg/day) is recommended to enhance aspects of memory in individuals with traumatic brain injury. (Level of evidence: B)	67% (2/3)	0% (0/0)	NA
<b>Sec 1: A 2.3</b> Health care professionals working with individuals having sustained a traumatic brain injury (TBI) should be trained in behaviour disorders specific to TBI in order to apply consistent neurobehavioural change strategies. (Level of evidence: B)	67% (4/6)	75% (3/4)	100% (3/3)
<b>Sec 2: R10.3</b> Either propranolol or pindolol is recommended for the treatment of aggression after traumatic brain injury, particularly for individuals in post-traumatic amnesia (PTA). Studies have reported the efficacy of both propranolol (maximum dose 420–520 mg/day) and pindolol (maximum dose 40–100 mg/day) in the treatment of aggression in this population, if there are no medical contraindications. (Level of evidence: A)	50% (3/6)	0% (0/2)	NA
<b>Sec 2: L 2.1</b> Individuals with traumatic brain injury, and particularly those with dysphagia, should have access to specialized oral and dental care. Serial assessment and meticulous oral and dental care should be undertaken during both the acute and rehabilitation stages post brain injury.	50% (3/6)	100% (3/3)	100% (3/3)

Not implemented Recommendations for at least 50% of the respondent sites (Level of Evidence)	% of sites for which this rec is not implemented (Acute N=6)	% of sites for which this rec is a priority (if not implemented)	% of sites for which this rec is feasible (if a priority)
<p>Note: Individuals should be provided with thorough oral care as a preventative treatment as defined by:</p> <ul style="list-style-type: none"> <li>• Oral care prior to each meal</li> <li>• Oral care that includes teeth, tongue, lips, buccal mucosa, and palate</li> <li>• Oral care done more frequently if individual is on a free water protocol A dentist or dental hygienist should be consulted as needed.</li> </ul> <p>(Level of evidence: B)</p>			
<p><b>Sec 2: I 2.2</b> To minimize agitation and confusion associated with post-traumatic amnesia (PTA), individuals with traumatic brain injury (TBI) should remain in a secure and supervised environment until they have emerged from PTA. It is recommended to:</p> <ul style="list-style-type: none"> <li>• Maintain a quiet and consistent environment on the ward and avoid overstimulation</li> <li>• Consider the use of low-stimulation rooms</li> <li>• Evaluate the impact of visitors, assessment and therapy and limit these activities if they cause agitation or excessive fatigue, allowing rest as needed</li> <li>• Minimize the use of restraints while facilitating the use of alternate measures in order to allow the person to move around freely</li> <li>• Have consistent healthcare professionals or trained caregivers working with the person with TBI</li> <li>• Establish the most reliable means of communication</li> <li>• Provide frequent reassurance</li> <li>• Present familiarizing information as tolerated by the person</li> <li>• Help family members understand PTA and how to minimize triggering agitation</li> </ul> <p>(Level of evidence : C)</p>	<p>50% (3/6)</p>	<p>100% (3/3)</p>	<p>67% (2/3)</p>
<p><b>Sec 1: B 1.1</b> All individuals with a disorder of consciousness should be periodically assessed throughout the first year post-injury, by an interdisciplinary team with specialized experience in traumatic brain injury.</p> <p>Note: The interdisciplinary team may include the following core professionals: intensivist, neurologist, neurosurgeon, physiatrist, clinical nutritionist, respiratory therapist, physiotherapist, occupational therapist,</p>	<p>50% (2/4)</p>	<p>100% (2/2)</p>	<p>100% (2/2)</p>

Not implemented Recommendations for at least 50% of the respondent sites (Level of Evidence)	% of sites for which this rec is not implemented (Acute N=6)	% of sites for which this rec is a priority (if not implemented)	% of sites for which this rec is feasible (if a priority)
neuropsychologist, social worker and speech language pathologist, etc., as appropriate. (Level of evidence: C)			
<b>Sec 2: J7.3</b> Strategies that encourage monitoring of performance and feedback should be used with individuals with traumatic brain injury who have impaired self-awareness. (Level of evidence: A)	50% (2/4)	50% (1/2)	100% (1/1)
<b>Sec 2: M 5.1</b> Individuals with traumatic brain injury (TBI) should be assessed to determine whether equipment or adaptations could increase their safety, independence, communication and quality of life. This assessment should: <ul style="list-style-type: none"> <li>• Be conducted by professionals with expertise in these areas (TBI and assistive devices and technology)</li> <li>• Be conducted on an individual basis and in the environment in which the equipment will be used.</li> </ul> (Level of evidence: C)	50.00% (3/6)	66% (2/3)	100% (2/2)

\*Note: The variation in denominator is explained by a number of factors. First, not every site provided an answer for every recommendation. Second, the “don’t know” and “not applicable” answers were not included in the analysis. Third, the configuration of the survey allowed only the sites whose answer on a recommendation was “Not Implemented” (i.e. according to our dichotomized categorization where an answer of either “Partially”, “Occasionally”, or “Not Implemented” on the survey was categorized as “Not Implemented”) to provide an answer for degree of Priority; likewise if a recommendation was identified as a “High” or “Moderate” Priority the survey allowed for the provision of an answer with regard to degree of Feasibility. Thus it is possible for the denominator to become considerably less than the number of respondents and to vary considerably across recommendations.

## QUÉBEC – ACUTE SITES (N=8)

Not implemented Recommendations for at least 50% of the respondent sites (Level of Evidence)	% of sites for which this rec is not implemented (Acute N=8)	% of sites for which this rec is a priority (if not implemented)	% of sites for which this rec is feasible (if a priority)
<b>Sec 2: S 1.1</b> All individuals with traumatic brain injury should be screened for history of substance use, intoxication at time of injury, and current substance use. An appropriate screening tool should be used as indicated along the continuum of treatment. Positive screening should lead to full assessment by a qualified professional. (Level of evidence: C)	86% (6/7)*	100% (6/6)*	100% (6/6)*
<b>Sec 2: T 9.2</b> Specific target symptoms/behaviours should be clearly defined and monitored during pharmacological treatment following traumatic brain injury (TBI), along with expected treatment outcomes. The serial use of validated rating scales appropriate for TBI and other methods of objective assessment are recommended. (Level of evidence: C)	83% (5/6)	80% (4/5)	100% (4/4)
<b>Sec 2: R 10.3</b> Either propranolol or pindolol is recommended for the treatment of aggression after traumatic brain injury, particularly for individuals in post-traumatic amnesia (PTA). Studies have reported the efficacy of both propranolol (maximum dose 420–520 mg/day) and pindolol (maximum dose 40–100 mg/day) in the treatment of aggression in this population, if there are no medical contraindications. (Level of evidence: A)	71% (5/7)	100% (5/5)	100% (4/4)
<b>Sec 2: J 6.2</b> Donepezil (5–10 mg/day) is recommended to enhance aspects of memory in individuals with traumatic brain injury. (Level of evidence: B)	67% (4/6)	67% (2/3)	67% (2/3)
<b>Sec 1: A 2.1</b> Collaboration and continuity mechanisms should be established with mental health services and programs in order to develop optimal management strategies for individuals with comorbid traumatic brain injury (TBI) and mental health issues. The collaboration mechanisms should involve cross-training and education for professionals of mental health care services on the recognition and understanding of issues particular to individuals with TBI. (Level of evidence: C)	57% (4/7)	100% (4/4)	100% (4/4)
<b>Sec 2: J 3.1</b> Methylphenidate (initiated at a dose of approximately 0.10mg/kg and increased gradually to a target of 0.25–0.30 mg/kg bid) is recommended in adults with traumatic brain injury to enhance attentional function and speed of information processing. (Level of evidence: B)	57% (4/7)	67% (2/3)	0% (0/1)



## ONTARIO – REHABILITATION SITES (N=12)

Not implemented Recommendations for at least 50% of the respondent sites (Level of Evidence)	% of sites for which this rec is not implemented (Rehab N=12)	% of sites for which this rec is a priority (if not implemented)	% of sites for which this rec is feasible (if a priority)
<p><b>Sec 1: A 2.2</b> Collaboration and continuity mechanisms should be established with addiction /substance use services and programs in order to develop optimal management strategies for individuals with comorbid traumatic brain injury (TBI) and addiction /substance use issues. The collaboration mechanisms should involve cross-training and education for addiction /substance use service professionals on the recognition and understanding of issues particular to individuals with TBI. (Level of evidence: C)</p>	83% (10/12)*	80% (8/10)*	100% (6/6)*
<p><b>Sec 1: A 2.1</b> Collaboration and continuity mechanisms should be established with mental health services and programs in order to develop optimal management strategies for individuals with comorbid traumatic brain injury (TBI) and mental health issues. The collaboration mechanisms should involve cross-training and education for professionals of mental health care services on the recognition and understanding of issues particular to individuals with TBI. (Level of evidence: C)</p>	82% (9/11)	89% (8/9)	88% (7/8)
<p><b>Sec 2: R10.5</b> The use of amantadine 100 mg bid or methylphenidate can be considered for individuals with traumatic brain injury when impaired arousal and attention is suspected as a factor in agitation. (Level of evidence: B)</p>	67% (6/9)	60% (3/5)	66% (2/3)
<p><b>Sec 2: Q 1.3</b> A discussion about sexuality should be carried out with individuals following traumatic brain injury. The discussion should be initiated by an appropriately trained clinician and should cover the following aspects of sexuality:</p> <ul style="list-style-type: none"> <li>• Physical aspects (e.g., positioning, sensory deficits, erectile dysfunction, drugs, disruption to menstrual cycle)</li> <li>• Psychological aspects (e.g., communication, fears, altered roles, disinhibition, threats to safety, and sense of attractiveness).</li> </ul> <p>(Level of evidence: C)</p>	64% (7/11)	50% (3/6)	100% (3/3)
<p><b>Sec 2: J6.2</b> Donepezil (5–10 mg/day) is recommended to enhance aspects of memory in individuals with traumatic brain injury. (Level of evidence: B)</p>	56% (5/9)	40% (2/5)	100% (2/2)

Not implemented Recommendations for at least 50% of the respondent sites (Level of Evidence)	% of sites for which this rec is not implemented (Rehab N=12)	% of sites for which this rec is a priority (if not implemented)	% of sites for which this rec is feasible (if a priority)
<p><b>Sec 2: O2.4</b> Benzodiazepines (lorazepam) and other non-benzodiazepine hypnotic (zopiclone) medications should be considered as last resort for the treatment of sleep disorders in individuals with traumatic brain injury, and it should be prescribed for no longer than 7 days. (Level of evidence: C)</p>	55% (6/11)	33% (2/6)	100% (2/2)
<p><b>Sec 1: A 2.3</b> Health care professionals working with individuals having sustained a traumatic brain injury (TBI) should be trained in behaviour disorders specific to TBI in order to apply consistent neurobehavioural change strategies. (Level of evidence: B)</p>	50% (6/12)	100% (5/5)	100% (5/5)
<p><b>Sec 1: C 3.10</b> Copies of both the discharge report and the patient care plan should be provided to the person with traumatic brain injury, and, with his or her consent, to the family/caregivers, as well as all professionals relevant to the person’s rehabilitation in the community, especially the general practitioner. These reports should include:</p> <ul style="list-style-type: none"> <li>• Electronic health records summary or report detailing the clinical history, examination and any imaging</li> <li>• The results of all recent assessments</li> <li>• A summary of progress made and/or reasons for discharge/transfer</li> <li>• Recommendations for future interventions and follow-up.</li> </ul> <p>(Level of evidence: C)</p>	50% (6/12)	50% (3/6)	100% (3/3)
<p><b>Sec 2: T9.2</b> Specific target symptoms/behaviors should be clearly defined and monitored during pharmacological treatment (Level of evidence: C)</p>	50% (5/10)	80% (4/5)	100% (4/4)
<p><b>Sec 2: R10.3</b> Either propranolol or pindolol is recommended for the treatment of aggression after traumatic brain injury, particularly for individuals in post-traumatic amnesia (PTA). Studies have reported the efficacy of both propranolol (maximum dose 420–520 mg/day) and pindolol (maximum dose 40–100 mg/day) in the treatment of aggression in this population, if there are no medical contraindications. (Level of evidence: A)</p>	50% (5/10)	75% (3/4)	100% (3/3)

## QUÉBEC – REHABILITATION SITES (N=18)

Not implemented Recommendations for at least 50% of the respondent sites (Level of Evidence)	% of sites for which this rec is not implemented (Rehab N=18)	% of sites for which this rec is a priority (if not implemented)	% of sites for which this rec is feasible (if a priority)
<p><b>Sec 1: A 2.1</b> Collaboration and continuity mechanisms should be established with mental health services and programs in order to develop optimal management strategies for individuals with comorbid traumatic brain injury (TBI) and mental health issues. The collaboration mechanisms should involve cross-training and education for professionals of mental health care services on the recognition and understanding of issues particular to individuals with TBI. (Level of evidence: C)</p>	100% (17/17)*	100% (17/17)*	87% (13/15)*
<p><b>Sec 1: A 2.2</b> Collaboration and continuity mechanisms should be established with addiction /substance use services and programs in order to develop optimal management strategies for individuals with comorbid traumatic brain injury (TBI) and addiction /substance use issues. The collaboration mechanisms should involve cross-training and education for addiction /substance use service professionals on the recognition and understanding of issues particular to individuals with TBI. (Level of evidence: C)</p>	78% (14/18)	79% (11/14)	100% (10/10)
<p><b>Sec 2: Q 1.3</b> A discussion about sexuality should be carried out with individuals following traumatic brain injury. The discussion should be initiated by an appropriately trained clinician and should cover the following aspects of sexuality:</p> <ul style="list-style-type: none"> <li>• Physical aspects (e.g., positioning, sensory deficits, erectile dysfunction, drugs, disruption to menstrual cycle)</li> <li>• Psychological aspects (e.g., communication, fears, altered roles, disinhibition, threats to safety, and sense of attractiveness).</li> </ul> <p>(Level of evidence: C)</p>	78% (14/18)	64% (9/14)	100% (9/9)
<p><b>Sec 1: D 1.1</b> All individuals with traumatic brain injury (TBI) discharged from a specialized TBI rehabilitation program (inpatient, outpatient, residential) should have access, if needed, to scheduled telephone follow-up contact with a professional skilled in motivational interviewing, goal setting, providing reassurance and problem-solving support. (Level of evidence: B)</p>	78% (14/18)	50% (7/14)	83% (5/6)

Not implemented Recommendations for at least 50% of the respondent sites (Level of Evidence)	% of sites for which this rec is not implemented (Rehab N=18)	% of sites for which this rec is a priority (if not implemented)	% of sites for which this rec is feasible (if a priority)
<b>Sec 2: R 5.2</b> Mindfulness-based cognitive therapy, adapted for brain injury, should be considered for individuals with traumatic brain injury and depressive symptoms. (Level of evidence: A)	71% (12/17)	75% (9/12)	100% (7/7)
<b>Sec 1: A 1.11</b> In order to support the continuous quality improvement of their services, traumatic brain injury rehabilitation programs should monitor key aspects of their processes and efficiency, including but not limited to: <ul style="list-style-type: none"> <li>• Injury onset days to start of rehabilitation</li> <li>• Length of stay in rehabilitation</li> <li>• Intensity of services</li> <li>• Measures of functional change progression (ex. FIM, FAM, DRS, MPAI4, CRS-R)</li> <li>• Discharge disposition (return to home, level of services required, etc.)</li> <li>• School/work orientation on discharge</li> <li>• Satisfaction and quality of life.</li> </ul> (Level of evidence: C)	56% (10/18)	100% (9/9)	100% (9/9)
<b>Sec 1: A 2.3</b> Health care professionals working with individuals having sustained a traumatic brain injury (TBI) should be trained in behaviour disorders specific to TBI in order to apply consistent neurobehavioural change strategies. (Level of evidence: B)	50% (9/18)	78% (7/9)	100% (6/6)
<b>Sec 2: J 6.2</b> Donepezil (5–10 mg/day) is recommended to enhance aspects of memory in individuals with traumatic brain injury. (Level of evidence: B)	50% (7/14)	100% (4/4)	100% (4/4)

## SUMMARY

- Many of the Fundamental and Priority Recommendations are already implemented across the settings and provinces
- There are both system and specific clinical recommendations where implementation is not consistent and thus can inform implementation efforts
- It would seem as if collaboration among different types of providers and settings and access to providers with specialized knowledge and training in brain injury could be improved in both provinces ( Section A recommendations)
- Particularly in the acute settings, many of the Priority and Fundamental Recommendations concerning medications potentially helpful to manage TBI seem not to be implemented and this suggests an area to target for further discussion about implementation

## RECOMMENDATIONS AND NEXT STEPS

- Plans are currently under development to specify how ONF and INESSS will assist implementation efforts within each province, and collaboration across provinces will occur where possible.
- Tools will be identified for use and new ones developed to facilitate implementation activities.
- The overall goal is that TBI rehabilitation service providers can increase the level of implementation for the priority and fundamental recommendation from the guidelines.

## APPENDIX

The Clinical Practice Guideline is available at: <https://braininjuryguidelines.org>. If you have any questions or comments you can contact us through the website or directly:

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### Level of evidence INESSS-ONF

- LEVEL A -** Recommendation supported by at least 1 meta-analysis, systematic review, or randomized controlled trial of appropriate size with relevant control group.
- LEVEL B -** Recommendation supported by cohort studies that at minimum have a comparison group, well-designed single subject experimental designs, or small sample size randomized controlled trials.
- LEVEL C -** Recommendation supported primarily by expert opinion based on their experience, though uncontrolled case series without comparison groups that support the recommendations are also classified here.