



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

October 2016

Fundamental and Priority Recommendations

The content of these guidelines are based on the status of scientific knowledge available at the time of their finalization (2015) as well as on the opinion of the experts who participated in the development of the guidelines. Choices reflected in these guidelines do not preclude the possibility of other approaches or practices also being valid and relevant. Healthcare professionals must at all times use their clinical judgment and consider other factors such as patient preferences and resource availability in applying these recommendations. Moreover, healthcare professionals must at all times respect the legal and normative regulations of the regulatory bodies, in particular with regards to scopes of practice and restricted/protected activities, as these may differ provincially.

SECTION I: Components of the Optimal TBI Rehabilitation System

A – Key Components of TBI Rehabilitation

<p>A 1.1</p> <p>F C</p>	<p>Every individual with traumatic brain injury should have timely, specialized interdisciplinary rehabilitation services. (Adapted from ABIKUS 2007, G2, p. 16)</p>
<p>A 1.2</p> <p>P N B</p>	<p>Rehabilitation interventions should be initiated as soon as the condition of the person with traumatic brain injury allows. (INESSS-ONF, 2015)</p> <p>REFERENCES :</p> <ul style="list-style-type: none"> - ERABI Module 3 - Efficacy and Models of Care Following an Acquired Brain Injury, p. 30, 3.3.2 - Leon-Carrion et al. (2013) - Wagner et al. (2003)
<p>A 1.3</p> <p>F N C</p>	<p>Rehabilitation programs should have clearly stated admission criteria, which include a traumatic brain injury diagnosis, medical stability, the ability to improve through the rehabilitation process, the ability to learn and engage in rehabilitation and sufficient tolerance for therapy duration. (INESSS-ONF, 2015)</p>
<p>A 1.4</p> <p>F C</p>	<p>The assessment and planning of rehabilitation should be undertaken through a coordinated, interdisciplinary team and follow a patient-focused approach responding to the needs and choices of individuals with traumatic brain injury as they evolve over time. (Adapted from NZGG 2007, 4.4, p. 76 and ABIKUS 2007, G1, p. 16)</p>

A – Key Components of TBI Rehabilitation

<p>A 1.5</p> <p>F N C</p>	<p>The traumatic brain injury rehabilitation team should optimally consist of a speech-language pathologist, occupational therapist, physiotherapist, social worker, neuropsychologist (and psychometrist), psychologist (with expertise in behaviour therapy), nurse, physician and/or psychiatrist, rehabilitation support personnel, nutritionist, therapeutic recreationist and pharmacist. (INESSS-ONF, 2015)</p> <p>Note: Specific membership should be based on the individual’s developing needs as determined by initial and ongoing assessments and goal setting with the individual and family.</p>
<p>A 1.6</p> <p>P B</p>	<p>Individuals with traumatic brain injury (TBI) who require rehabilitation should have a case or clinical coordinator appointed at each phase of the continuum of care. (Adapted from NZGG 2007, 4.3.2.1, p. 75)</p> <p>Note: The case coordinator should have clinical experience and specialized training in a TBI-related field, and should assume the following roles:</p> <ul style="list-style-type: none"> · Oversee the planning and delivery of rehabilitation · Coordinate the interdisciplinary team, avoiding duplication of tasks or interventions · Advocate for the needs of the individual with TBI and their caregivers · Plan and coordinate the transition between phases in the continuum of care, providing continuity and good communication between various care providers · Be the key point of contact for the person with TBI, his/her family, the interdisciplinary team, and other resources.
<p>A 1.7</p> <p>F C</p>	<p>Integrated care pathways and protocols should be in place to facilitate a person’s transition from an acute care to a rehabilitation setting and to assist in the management of commonly encountered problems associated with traumatic brain injury. (Adapted from ABIKUS 2007, G5, p. 16)</p>
<p>A 1.9</p> <p>F N B</p>	<p>The rehabilitation plan should be goal-oriented. There should be a high degree of involvement of the person with traumatic brain injury (TBI), their family/caregivers and the rehabilitation team members in goal setting early in the course of rehabilitation, so that they can be monitored throughout the rehabilitation program. (INESSS-ONF, 2015)</p> <p>Note: High-level involvement in goal setting by the person with TBI results in a greater number of goals being maintained at follow-up (two months).</p> <p>REFERENCE :</p> <ul style="list-style-type: none"> - Webb (1994)
<p>A 1.10</p> <p>F N C</p>	<p>In order to support the continuous quality improvement of their services, traumatic brain injury (TBI) rehabilitation programs should monitor the population they serve by collecting and analyzing data pertaining to their clinical and socio-demographic profile. These should include but are not limited to:</p> <ul style="list-style-type: none"> · Volume of referrals · Age · Sex/gender · Race · Etiology of TBI · Severity of TBI · Glasgow Coma Scale · Duration of post-traumatic amnesia · Others <p>(INESSS-ONF, 2015)</p>

A – Key Components of TBI Rehabilitation

<p>A 1.11</p> <p>F N C</p>	<p>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:</p> <ul style="list-style-type: none"> · Injury onset days to start of rehabilitation · Length of stay in rehabilitation · Intensity of services · Measures of functional change progression (ex. FIM, FAM, DRS, MPAI4, CRS-R) · Discharge disposition (return to home, level of services required, etc.) · School/work orientation on discharge · Satisfaction and quality of life <p>(INESSS-ONF, 2015)</p>
<p>A 2.1</p> <p>P C</p>	<p>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.</p> <p>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.</p> <p>(Adapted from NZGG 2007, 14.4, p. 172)</p>
<p>A 2.2</p> <p>P C</p>	<p>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.</p> <p>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.</p> <p>(Adapted from NZGG 2007, 14.3, p. 170)</p>
<p>A 2.3</p> <p>P N B</p>	<p>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. (INESSS-ONF, 2015)</p> <p>REFERENCES:</p> <ul style="list-style-type: none"> - ABIKUS (2007), G 20, p.19 - Behn et al. (2012) - Becker et al. (1993)

B – Management of Disorders of Consciousness

<p>B 1.1</p> <p>P N C</p>	<p>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. (INESSS-ONF, 2015)</p> <p>Note: The interdisciplinary team may include the following core professionals: intensivist, neurologist, neurosurgeon, physiatrist, clinical nutritionist, respiratory therapist, physiotherapist, occupational therapist, neuropsychologist, social worker and speech-language pathologist, etc., as appropriate.</p>
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C – Subacute Rehabilitation

<p>C 2.1</p> <p>P N C</p>	<p>A target length of stay should be established as soon as possible after admission to inpatient rehabilitation, to ensure consistency of care following traumatic brain injury and to facilitate discharge planning and community integration. (INESSS-ONF, 2015)</p> <p>Note: The target length of stay should be established based on individuals with similar functional status and availability of resources in the community, and take into account other factors such as the Glasgow Coma Score in the first few days after injury, intracranial surgery, the degree of initial disability, the presence of fractures of the upper and lower extremities or pelvis, and the person's age.</p>
<p>C 2.3</p> <p>P N B</p>	<p>In order to optimize outcome following traumatic brain injury, inpatient rehabilitation interventions should target advanced cognitive functions, e.g., problem-solving, math skills and memory, where patient capacity permits. (INESSS-ONF, 2015)</p> <p>Note: Research indicates that effort in advanced therapy and time in specific activities improves outcome beyond that attained using only basic level therapy.</p> <p>REFERENCE:</p> <ul style="list-style-type: none"> - Horn et al. (2015)
<p>C 2.4</p> <p>P N B</p>	<p>In order to optimize outcome following traumatic brain injury, inpatient rehabilitation interventions should promote significant involvement of and effort by the person with TBI. (INESSS-ONF, 2015)</p> <p>REFERENCES:</p> <ul style="list-style-type: none"> - Horn et al. (2015) - Seel et al. (2015)
<p>C 2.6</p> <p>P N C</p>	<p>To achieve optimal efficiencies of inpatient rehabilitation, individuals with traumatic brain injury should receive a minimum of 3 hours per day of therapeutic interventions, ensuring focus on cognitive tasks as recommended in C2.3, C2.4 and C2.5. (INESSS-ONF, 2015)</p>
<p>C 3.1</p> <p>P N C</p>	<p>A potential discharge date should be established early in the course of rehabilitation and reviewed regularly as the person's presentation changes to guide the rehabilitation process and prepare the person with traumatic brain injury and his/her family for discharge. (INESSS-ONF, 2015)</p>
<p>C 3.2</p> <p>P C</p>	<p>Planned discharge from inpatient rehabilitation to home for individuals with traumatic brain injury (TBI) provides beneficial outcomes and should:</p> <ul style="list-style-type: none"> · Be an integrated part of treatment programs · Involve the person with TBI and caregivers, primary care team, social services and allied health professionals, as appropriate · Take account of the domestic and social environment of the person with TBI, or if he/she lives in residential or sheltered care. <p>(Adapted from SIGN 2013, 2.3 and 10.4.2)</p>

C – Subacute Rehabilitation

C 3.10



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:

- Electronic health records summary or report detailing the clinical history, examination and any imaging
- The results of all recent assessments
- A summary of progress made and/or reasons for discharge/transfer
- Recommendations for future interventions and follow-up.

(Adapted from ABIKUS, 2007, G87, p. 30)

D – Promoting Reintegration and Participation

D 1.1



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. (Adapted from NZGG 2007, 9.1, p. 130)

D 2.1



Individuals with ongoing disability after traumatic brain injury should have timely access to specialized outpatient or community-based rehabilitation to facilitate continued progress and successful community reintegration. (Adapted from NZGG 2007, 6.6, p. 116)

D 2.2



A peer-supported relationship model of intervention within a community-based program should be available to individuals with traumatic brain injury in order to promote social integration, coping and psychological functioning. (INESSS-ONF, 2015)

REFERENCE:

- [ERABI Module 13 - Community Reintegration, p.17](#)

D 3.1



All individuals with traumatic brain injury should be assessed for their level of independence in activities of daily living (ADLs) and instrumental activities of daily living (IADLs). (INESSS-ONF, 2015)

D 3.3



An individualized life skills training protocol should be developed for each person with traumatic brain injury, to assist them in dealing effectively with the demands and challenges of everyday life. Depending on the needs of the person and his/her impairment profile, life skills training may focus on social skills, activities of daily living / instrumental activities of daily living (ADLs/IADLs), interpersonal skills, job skills, problem-solving skills, decision-making skills, self-advocacy skills, behavioural self-regulation skills, etc. (Adapted from AOTA 2009, p. 83)

D 4.2



Individuals with traumatic brain injury with difficulty undertaking leisure/meaningful activities of their choice should be offered a goal-directed community-based program aimed at increasing participation in leisure/meaningful and social activities. (Adapted from ABIKUS 2007, G97, p. 32)

D – Promoting Reintegration and Participation

D 5.3



If during assessment or treatment of a person with traumatic brain injury (TBI), the interdisciplinary rehabilitation team determines that the person's ability to drive safely may be affected, then they should:

- Provide clear guidance to treating health professionals, the person and family/caregivers about any concerns about driving, and reinforce the need for disclosure and assessment in the event that return to driving is sought later post-injury
- Provide the person with information about the law and driving after TBI
- If applicable, advise the person and/or their advocate that they are obliged by law to inform the relevant government body that the person has suffered a neurological or other impairment and to provide the relevant information on its effects.

(Adapted from ABIKUS 2007, G91, p. 31)

D 6.1



Individuals with traumatic brain injury should be assessed for the need for vocational rehabilitation to assist their return to work or to school, or for entering the workforce for those not previously employed and should include:

- Comprehensive pre-injury history (including educational and work history)
- Current capacities of the person, in particular at the cognitive, psychological and physical levels
- Current social status
- Evaluation of the person's vocational and/or educational needs
- Identification of difficulties which are likely to limit the prospects of a successful return to work or to school and appropriate interventions to minimize them
- Direct liaison with employers (including occupational health services when available) or education providers (teachers, services for disabled students, etc.), to discuss needs and the appropriate action in advance of any return
- Evaluation of environmental factors, workplace and psychosocial aspects including social environment and work culture
- Verbal and written advice about their return, including arrangements for review and follow-up.

(Adapted from NZGG 2007, 6.4, p. 110, ABIKUS 2007, G93, p. 32 and Stergiou-Kita 2011, 2, p.15-16)

D 6.3



Standard vocational rehabilitation interventions offered to individuals with traumatic brain injury, such as cognitive training and behaviour modification, should be monitored for effectiveness, and supported employment should be provided for those who wish to return to work and for whom the standard interventions are insufficiently effective. (Adapted from NZGG 2007, 6.4, p. 110)

D 6.7



Gradual work trial for individuals with traumatic brain injury should include a start date, an indication of how to increase hours and days, limitations and restrictions, as well as recommended accommodations. (INESSS-ONF, 2015)

REFERENCE:

- ERABI Educational Module – Efficacy and Models of Care – 3.5 Vocational Rehabilitation, p. 25

E – Caregivers and Families

E 1.1



Rehabilitation programs for individuals with traumatic brain injury should be developed in collaboration with caregivers to ensure carryover into the community. (Adapted from ABIKUS 2007, G98, p. 33)

E 1.3



Family and caregivers of individuals with traumatic brain injury should be provided with access to ongoing support. Supportive groups and therapies, e.g., associations/peer support/mentoring, mindfulness-based cognitive therapy, yoga, art, pet or music therapy, etc., should be considered. (INESSS-ONF, 2015)

F – Brain Injury Education and Awareness

F 1.1



Individuals who have had a traumatic brain injury (TBI) and individuals who assume the caregiver roles should receive timely, progressive and regular information on TBI that is adapted to age, culture and linguistics, in both written and verbal format. The information should include:

- Common physical, cognitive, behavioural and emotional consequences of TBI
- Reassurance about symptoms and signs which might be expected
- The possibility of long-term problems
- Advice on high-risk situations, safety and self-care measures
- Advice on the interactions between alcohol and psychoactive drugs
- Advice on alcohol or drug misuse for individuals who initially presented with drug or alcohol intoxication
- Rehabilitation services and resources
- Community resources
- The difficulty of detecting TBI-related problems by those who do not know about the injury.

(Adapted from NZGG 2007, 9.2, p. 132)

SECTION II: Assessment and Rehabilitation of Brain Injury Sequelae

H – Comprehensive Assessment of the Person with TBI

H 1.1



All individuals with traumatic brain injury who are conscious, including those in post-traumatic amnesia (PTA), should be assessed for common impairments including:

- Motor impairments, such as weakness, altered tone, balance and incoordination
- Possible missed injuries/fractures
- Pain
- Bulbar problems affecting speech and swallowing
- Sensory dysfunctions that may impact on safety including hearing loss, numbness, visual problems (including reduced acuity, visual field loss, gaze palsies)
- Reduced control over bowels and bladder
- Cognitive dysfunctions such as impairments in attention, orientation and memory
- Behavioural dysregulations including potential emotional/behavioural issues

(Adapted from INCOG, Assess 1, p. 296)

H 1.3



Assessment should include seeking information from family and individuals who may be caring for the person following the traumatic brain injury. (Adapted from INCOG, Assess 5, p. 297)

H 1.5



After emerging from post-traumatic amnesia / post-traumatic delirium (PTA/PTD), all individuals with traumatic brain injury should be assessed for the presence of cognitive impairments in the following areas:

- Attention (including speed of processing)
- Visuospatial function
- Executive function
- Language, social communication
- Social cognition
- Learning and memory
- Awareness of impairments
- Detection/expression of emotion

This assessment may be either standardized or non-standardized depending on a number of factors, such as apparent rate of recovery and need of data for future planning. A formal standardized evaluation should be completed before initiating a cognitive rehabilitation program.

(Adapted from INCOG 2014, Assess 3, p. 296)

I – Disorders of Consciousness

I 1.2



Immediate medical and physical re-evaluation should be conducted when a fall or unexpected change in the Glasgow Coma Scale (GCS) score of more than 2 points (or a fall in another appropriate metric reflecting neurological status, e.g. CRS-R) is observed in a person with disorders of consciousness. (Adapted from NZGG 2006, 2.2.1, p. 37)

Note: Deterioration in the GCS scores or failure to improve as expected with time post-injury should trigger immediate re-evaluation of the clinical situation with investigation urgency and/or urgent referral commensurate with the clinical situation.

I – Disorders of Consciousness

I 2.2



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:

- Maintain a quiet and consistent environment on the ward and avoid overstimulation
- Consider the use of low-stimulation rooms
- Evaluate the impact of visitors, assessment and therapy and limit these activities if they cause agitation or excessive fatigue, allowing rest as needed
- Minimize the use of restraints while facilitating the use of alternate measures in order to allow the person to move around freely
- Have consistent healthcare professionals or trained caregivers working with the person with TBI
- Establish the most reliable means of communication
- Provide frequent reassurance
- Present familiarizing information as tolerated by the person
- Help family members understand PTA and how to minimize triggering agitation

(Adapted from INCOG 2014, PTA 3, p. 314)

J – Cognitive Functions

J 1.1



During assessment of a person with traumatic brain injury, clinicians should consider the possibility of other factors that may be contributing to cognitive performance impairments and functional limitations including:

- Personal factors
- Pre-injury medical conditions
- Injury-related factors and conditions

(Adapted from INCOG 2014, Assess 6, p. 297)

Note:

Personal factors include:

- Cultural background
- Fluency and literacy in language of assessment
- Level of education/academic history/premorbid learning difficulties
- Premorbid intellectual level of functioning
- Occupational/vocational history
- Recreational, hobby history

Pre-injury medical conditions include:

- Substance use/abuse
- Mental health issues
- Psychosocial trauma or abuse
- Neurological disorders (e.g., dementia, seizures)
- Hearing or vision impairment
- Nutritional status

Injury-related factors and conditions include:

- Medical conditions
- Psychiatric conditions, especially mood disorders
- Fatigue
- Sleep-wake disorders
- Medications (pre- and post-injury) including over-the-counter remedies, herbs or supplements
- Seizures
- Sensorimotor changes
- Endocrine dysfunction (e.g., growth hormone deficiency) (High 2010)
- Pain
- Acquired language changes (e.g., aphasia, dysgraphia)
- Injury-related vision or hearing deficits
- Manual limb or oral-motor dysfunction (e.g., weakness, incoordination)
- Consider the possibility of other comorbid factors

J – Cognitive Functions

<p>J 2.1</p> <p>P C</p>	<p>Individuals with persistent cognitive deficits following traumatic brain injury should be offered functionally-oriented cognitive rehabilitation. Treatment must be considered within a framework that considers the person’s pre-injury characteristics, stage of development and recovery, and personally meaningful everyday activities and life contexts. (Adapted from NZGG 2006, 6.1.6, p. 98 and INCOG 2014, Assess 12, p. 299)</p>
<p>J 2.2</p> <p>P B</p>	<p>Cognitive rehabilitation in the acute phase for individuals with traumatic brain injury should be managed in a structured and distraction-free environment. (Adapted from NZGG 2006, 6.1.6, p. 98)</p>
<p>J 2.3</p> <p>P B</p>	<p>To facilitate/achieve generalization of skills/strategies to daily activities for the person with traumatic brain injury, rehabilitation should:</p> <ul style="list-style-type: none"> · Focus on activities that are perceived as meaningful by the person · Include therapy interventions provided in the person’s own environment and/or adapted to the person’s own life. <p>(Adapted from ABIKUS 2007, G34, p. 21)</p>
<p>J 3.1</p> <p>P B</p>	<p>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. (Adapted from ABIKUS 2007, G44, p. 23 and INCOG 2014, Attention 9, p. 331)</p>
<p>J 3.4</p> <p>P A</p>	<p>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. (Adapted from SIGN 2013, 9.2, p. 36)</p> <p>REFERENCE:</p> <ul style="list-style-type: none"> - Giacino et al. (2012)
<p>J 4.1</p> <p>P A</p>	<p>Metacognitive strategy training using functional everyday activities should be considered for individuals with traumatic brain injury, especially those with mild-moderate attention deficits. (Adapted from INCOG 2014, Attention 1, p. 330)</p>
<p>J 4.2</p> <p>P A</p>	<p>Training in dual-tasking for individuals with traumatic brain injury can be used to improve dual-task performance, only on tasks similar to those trained. (Adapted from INCOG 2014, Attention 2, p. 330)</p>
<p>J 4.3</p> <p>P C</p>	<p>Cognitive behaviour therapy should be considered for improving attentional functioning in individuals with traumatic brain injury with attentional deficits thought to be secondary to sleep-wake disorders, pain, fatigue, polypharmacy or anxiety and/or depression. (Adapted from INCOG 2014, Attention 3 and 4, p. 330)</p>
<p>J 5.1</p> <p>P A</p>	<p>Teaching internal compensatory strategies may be used for individuals with traumatic brain injury who have memory impairments. Their use tends to be most effective with individuals who have mild-to-moderate range impairments and/or some preserved executive cognitive skills. These strategies include instructional and/or metacognitive strategies (e.g., visualization/visual imagery, repeated practice, retrieval practice, Preview, Question, Read, State, Test [PQRST], self-cueing, self-generation, self-talk). Using multiple strategies is considered effective, and strategies can be taught individually or in a group format. (INCOG 2014, Memory 1, p. 372)</p>

J – Cognitive Functions

J 5.3



Environmental supports and reminders (e.g., mobile/smartphones, notebooks and whiteboards) are recommended for individuals with traumatic brain injury (TBI) who have memory impairment, and most especially for those who have severe memory impairment. Individuals with TBI and their caregivers must be trained in how to use these external supports. (Adapted from INCOG 2014, Memory 3, p. 372)

Note: The selection of environmental supports and reminders should take into account the following factors regarding the person with TBI:

- Age
- Severity of impairment
- Premorbid use of electronic and other memory devices
- Cognitive strengths and weaknesses (e.g., executive cognitive skills)
- Physical comorbidities

J 5.4



The following practices are recommended to promote learning for individuals with memory impairments following traumatic brain injury (TBI):

- Clearly define intervention goals.
 - Selection of and training of goals that are relevant to the person with TBI (i.e., ecologically valid)
- Allow sufficient time and opportunity for practice.
- Integrate methodologies that allow for breaking down tasks into smaller components such as task analysis when training multistep procedures.
- Use principles of distributed practice.
- Teach strategies using variations in the stimuli/information being presented (e.g., multiple exemplars, practical tasks).
- Promote strategies that allow for more effortful processing of information/stimuli (e.g., verbal elaboration, visual imagery).
- Use teaching strategies that constrain errors (e.g., errorless, spaced retrieval) when acquiring new or relearning information and procedures.

(Adapted from INCOG 2014, Memory 4, p. 373)

J 6.2



Donepezil (5–10 mg/day) is recommended to enhance aspects of memory in individuals with traumatic brain injury. (Adapted from NGWG 2006, p. 1482)

J 7.1



Metacognitive strategy instructions (e.g., goal management training, plan-do-check-review, prediction performance) should be used with individuals with traumatic brain injury (TBI) for difficulty with problem-solving, planning and organization. Common elements of all metacognitive strategies are self-monitoring and incorporation of feedback into future performance. These strategies should be focused on everyday problems and functional outcomes of personal relevance to the person. (Adapted from INCOG 2014, EXEC 1, p. 343)

Note: Metacognitive strategy instruction is optimized when the person with TBI has awareness of the need to use a strategy and can identify contexts in which the strategy should be used.

J 7.2



Strategies to improve the capacity to analyze and synthesize information should be used with individuals with traumatic brain injury who have impaired reasoning skills. (INCOG 2014, EXEC 2, p. 343)

J – Cognitive Functions

J 7.3



Strategies that encourage monitoring of performance and feedback should be used with individuals with traumatic brain injury who have impaired self-awareness. (Adapted from INCOG 2014, EXEC 3, p. 343)

K – Cognitive Communication

K 1.1



Assessment of cognitive communication abilities of individuals with traumatic brain injury should include:

- A survey or broad variety of communication situations, complexities and environments
- A case history
- The consideration of standardized and non-standardized assessments/surveys
- Specific assessments in the following areas:
 - Attention and concentration
 - Orientation
 - Verbal memory and new learning
 - Linguistic organization
 - Auditory comprehension and information processing
 - Hearing and vision
 - Oral expression and discourse
 - Reading comprehension and reading rate
 - Written expression
 - Social communication and pragmatics
 - Reasoning and problem-solving
 - Executive functions and metacognitive processes
 - Insight, awareness and adjustment to disability
 - Speech
 - Nonverbal communication
 - Consideration of visual, perceptual, pain, fatigue, and other physical difficulties
 - Performance in different communication contexts
 - Communication partners' needs and abilities to provide communication support and strategies

(INESSS-ONF, 2015)

REFERENCE:

- College of Audiologists and Speech-Language Pathologists of Ontario (CASLPO) (2015) p.15

K 2.3



A reliable Yes/No response in verbal and non-verbal individuals with traumatic brain injury should be established as soon as possible. This may be facilitated by consistent training and environmental enrichments. (INESSS-ONF, 2015)

REFERENCES:

- Barreca et al. (2003)
- [ERABI Module 7 - Cognitive-Communication Treatments, p.33](#)

K 2.6



A cognitive communication rehabilitation program for individuals with traumatic brain injury should provide the opportunity to rehearse communication skills in situations appropriate to the context in which the person will live, work, study and socialize. (INCOG 2014, Cognitive Communication 4, p. 357)

L – Dysphagia and Nutrition

<p>L 1.1</p> <p>P N B</p>	<p>Individuals with traumatic brain injury should be referred in a timely fashion to an appropriately trained and certified professional for a complete assessment of swallowing function when they present with one or more of the following risk factors for aspiration post-injury:</p> <ul style="list-style-type: none">· Presence of a tracheostomy· Poor cognitive functioning· Hypoactive gag reflex· Reduced pharyngeal sensation· Brainstem involvement· Difficulty swallowing oral secretions· Coughing / throat clearing or wet/gurgly voice quality after swallowing water· Choking more than once while drinking 50 ml of water· Weak voice and cough· Wet-hoarse voice quality· Recurrent lower respiratory infections· Unexplained low-grade fever or leukocytosis· Immunocompromised state <p>(INESSS-ONF, 2015)</p> <p>REFERENCE:</p> <ul style="list-style-type: none">- ERABI Module 5 - Dysphagia & Nutritional Interventions, p.21-22, 5.6.4, table 5.10
<p>L 1.4</p> <p>P N C</p>	<p>Individuals with traumatic brain injury who are tracheotomised and/or ventilator-dependent should have an assessment by an appropriately-trained and certified professional to determine appropriateness for Passy Muir Valve placement or capping of trachea tube in preparation for swallowing assessment to optimize swallow function. (INESSS-ONF, 2015)</p> <p>REFERENCE:</p> <ul style="list-style-type: none">- ERABI Module 5 - Dysphagia & Nutritional Interventions, p.38, 5.6.8
<p>L 2.1</p> <p>P N B</p>	<p>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. (INESSS-ONF, 2015)</p> <p>Note: Individuals should be provided with thorough oral care as a preventative treatment as defined by:</p> <ul style="list-style-type: none">· Oral care prior to each meal· Oral care that includes teeth, tongue, lips, buccal mucosa, and palate· Oral care done more frequently if individual is on a free water protocol <p>A dentist or dental hygienist should be consulted as needed.</p> <p>REFERENCE:</p> <ul style="list-style-type: none">- ERABI Module 5 - Dysphagia & Nutritional Interventions, p.27
<p>L 2.2</p> <p>P N B</p>	<p>Individuals with traumatic brain injury requiring enteral feeding should be converted from nasogastric feeding to gastrostomy feeding as soon as possible if the patient's condition allows, as the risk of developing pneumonia is higher among ventilated individuals fed by a nasogastric tube than among those fed with a gastrostomy tube. (INESSS-ONF, 2015)</p> <p>REFERENCE:</p> <ul style="list-style-type: none">- ERABI Module 5 - Dysphagia & Nutritional Interventions, p.50, 5.8.5

L – Dysphagia and Nutrition

<p>L 3.1</p> <p></p>	<p>All individuals with traumatic brain injury should have their nutrition and hydration status assessed. Nutritional interventions should be initiated as soon as the condition of the patient allows it in order to prevent undernutrition and malnutrition. (INESSS-ONF, 2015)</p> <p>REFERENCE:</p> <ul style="list-style-type: none"> - ERABI Module 5 - Dysphagia & Nutritional Interventions, p.38
<p>L 3.5</p> <p></p>	<p>Early enhanced enteral nutrition is recommended, when appropriate, to reduce the incidence of infection, reduce ventilator dependency and ICU stay, improve hormonal profile and potentially contribute to better outcomes of individuals with traumatic brain injury. (INESSS-ONF, 2015)</p> <p>Note: The diet should be started within the first 24 to 48 hours after admission, if the patient is hemodynamically stable. It should be withheld if high catecholamine doses are administered, alone or in combination with fluid or blood volumes, to restore cell infusion. (this note corresponds to level of evidence C)</p> <p>REFERENCES:</p> <ul style="list-style-type: none"> - ERABI Module 5 - Dysphagia & Nutritional Interventions, p.47, 5.8.2 - McClave et al. (2016)

M – Motor Function and Control

<p>M 2.2</p> <p></p>	<p>Motor therapy programs for individuals with TBI should target the preservation of functional range of motion (ROM) in all phases of care post traumatic brain injury (in the absence of refractory intracranial hypertension), but particularly in the acute and subacute phases, to allow for future motor recovery, functional activities and positioning. Regardless of prognosis, potential for recovery may be adversely affected if contractures are allowed to develop. (INESSS-ONF, 2015)</p> <p>REFERENCE:</p> <ul style="list-style-type: none"> - ERABI Module 4- Motor & Sensory Impairment Remediation
<p>M 2.5</p> <p></p>	<p>Individuals with traumatic brain injury should be given opportunities to practise their motor skills outside of formal therapy. (ABIKUS 2007, G53, p. 24)</p>
<p>M 2.8</p> <p></p>	<p>Specific repetitive training interventions to increase functions post traumatic brain injury are recommended, such as sit-to-stand, functional reaching and balance, and gross motor coordination of the lower extremities. (INESSS-ONF, 2015)</p> <p>REFERENCE:</p> <ul style="list-style-type: none"> - ERABI Module 4- Motor & Sensory Impairment Remediation, p.32, 4.4.2
<p>M 2.9</p> <p></p>	<p>Either virtual-reality-based balance retraining program or a conventional balance retraining program can be used to improve balance post traumatic brain injury. (INESSS-ONF, 2015)</p> <p>REFERENCE:</p> <ul style="list-style-type: none"> - ERABI Module 4- Motor & Sensory Impairment Remediation, p.32, 4.4.2
<p>M 2.13</p> <p></p>	<p>Functional fine motor control retraining activities should be considered to improve fine motor coordination after traumatic brain injury. (Adapted from AOTA 2009, p. 82)</p>

M – Motor Function and Control

<p>M 2.19</p> <p>P A</p>	<p>Exercise training is recommended to promote cardiorespiratory fitness in individuals with traumatic brain injury. (Adapted from ABIKUS 2007, G54, p. 24)</p>
<p>M 4.1</p> <p>P B</p>	<p>Botulinum neurotoxin therapy (BoNT) may be considered to reduce tone and deformity in individuals with traumatic brain injury with focal spasticity. (Adapted from SIGN 2013, 4.2.2, p. 17)</p>
<p>M 5.1</p> <p>P C</p>	<p>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:</p> <ul style="list-style-type: none"> · Be conducted by professionals with expertise in these areas (TBI and assistive devices and technology) · Be conducted on an individual basis and in the environment in which the equipment will be used. <p>(Adapted from NZGG 2006, 6.2, p. 107)</p>
<p>M 6.1</p> <p>P C</p>	<p>The prescription of equipment for individuals with traumatic brain injury should take into account cognitive, communicative and behavioural deficits and how these may constrain the person's ability, or their family/caregivers' ability, to use the equipment safely and appropriately. Where this is in doubt, arrangements should be in place for regular review. (Adapted from ABIKUS 2007, G88, p. 31 and NZGG 2006, 6.2, p. 107)</p>

N – Sensory Impairment

<p>N 1.2</p> <p>P C</p>	<p>Individuals with traumatic brain injury with any visual impairment/deficit should be assessed by a team which includes, but is not limited to:</p> <ul style="list-style-type: none"> · Ophthalmologists · Orthoptists where there are problems with eye movement/double vision · Professionals with expertise in rehabilitation for the visually impaired <p>(Adapted from NZGG 2006, 6.1.4, p. 95)</p>
<p>N 2.1</p> <p>P C</p>	<p>All individuals with traumatic brain injury who present with persistent visual neglect or field defects should be offered specific retraining strategies. (Adapted from NZGG 2006, 6.1.4, p. 95)</p>

O – Fatigue and Sleep Disorders

<p>O 1.1</p> <p>P N C</p>	<p>All individuals who have sustained a traumatic brain injury should be assessed for fatigue and sleep disorders and offered appropriate treatment. (INESSS-ONF, 2015)</p> <p>REFERENCE:</p> <ul style="list-style-type: none"> - ERABI Module 15 - Fatigue and Sleep Disorders
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O – Fatigue and Sleep Disorders

<p>O 2.1</p> <p>P N B</p>	<p>Non-pharmacological interventions should be considered in the treatment of fatigue and sleep disorders for individuals with traumatic brain injury. Interventions may include: cognitive behaviour therapy (CBT) [for insomnia], light therapy, regular exercise, energy conservation strategies and sleep hygiene. (INESSS-ONF, 2015)</p> <p>REFERENCE:</p> <ul style="list-style-type: none">- ERABI Module 15 - Fatigue and Sleep Disorders, p.16-19
<p>O 2.4</p> <p>P N C</p>	<p>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. (INESSS-ONF, 2015)</p> <p>REFERENCES:</p> <ul style="list-style-type: none">- ERABI Module 15 - Fatigue and Sleep Disorders, p.22, 15.4.3- Li Pi Shan and Ashworth (2004)- Kemp et al. (2004)- Aton et al. (2009)

P – Pain and Headaches

<p>P 2.1</p> <p>P C</p>	<p>Rehabilitation programs for individuals with traumatic brain injury should have pain management protocols in place, which include:</p> <ul style="list-style-type: none">• Regular review and adjustment mechanisms• Handling, support and pain relief modalities appropriate to the person's needs• Education of healthcare professionals and caregivers about appropriate handling of paretic upper limbs during transfers, hypersensitivity and neurogenic pain <p>(Adapted from ABIKUS 2007, G74, p. 27)</p>
<p>P 2.2</p> <p>P N B</p>	<p>Cognitive behaviour therapy (CBT) can be considered to reduce pain symptoms in individuals with post-traumatic headaches. (INESSS-ONF, 2015)</p> <p>REFERENCE:</p> <ul style="list-style-type: none">- ERABI Module 4 - Motor & Sensory Impairment Remediation, p.55, 4.7.3.2
<p>P 2.4</p> <p>P N C</p>	<p>Pregabalin may be considered for reducing central neuropathic pain caused by injuries to the brain or spinal column. (INESSS-ONF, 2015)</p> <p>REFERENCE:</p> <ul style="list-style-type: none">- ERABI Module 4 - Motor & Sensory Impairment Remediation, p.58, 4.7.4.1

Q – Psychosocial/Adaptation Issues

<p>Q 1.1</p> <p>P N C</p>	<p>Rehabilitation programs aimed at improving social adaptation and a sense of well-being after traumatic brain injury should actively encourage physical exercise, leisure activities, self-regulation, coping skills, and participation in social support groups. (INESSS-ONF, 2015)</p>
<p>Q 1.2</p> <p>P N C</p>	<p>Participation in personally relevant and meaningful productive activities, including work, should be included as early as possible in the individualized treatment planning of the person with traumatic brain injury, while considering the person's actual capacities. (INESSS-ONF, 2015)</p>

Q – Psychosocial/Adaptation Issues

Q 1.3



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:

- Physical aspects (e.g., positioning, sensory deficits, erectile dysfunction, drugs, disruption to menstrual cycle)
- Psychological aspects (e.g., communication, fears, altered roles, disinhibition, threats to safety, and sense of attractiveness)

(Adapted from NZGG 2006, 6.5, p. 113)

R – Neurobehaviour and Mental Health

R 1.1



During the subacute phase of traumatic brain injury, if the neurobehavioural status of the individual is deteriorating or not progressing as expected, an assessment by a licensed specialist should be made to differentiate neurobehavioural difficulties from symptoms of a comorbid illness or medication side effects. (Adapted from INCOG 2014, Assess 7, p. 298)

Note: Comorbid illness may include seizures, mood and anxiety disorders, personality disorders, metabolic disorders, medication side effects, attention issues, hearing impairment, communication impairment and substance abuse.

R 1.2



In general, an assessment of neurobehavioural issues following traumatic brain injury must address pre-injury vulnerability factors, injury-related factors and postinjury factors. (Adapted from INCOG 2014, Assess 6, p.297)

Note:

Pre-injury vulnerability factors include: Prior medical/neurological conditions, mental health disorders, substance use disorders, temperamental/personality factors, cognitive/intellectual ability, academic/vocational function, psychosocial circumstances

Injury-related factors include: Nature of injury (i.e., severity, focal vs. diffuse), cerebral involvement, anatomic injury location, extent of secondary injury, co-occurring extracranial injury

Post-injury factors include: Psychological response / coping style, cognitive status, social/economic changes, new-onset mental health disorders, medical conditions (such as seizures, sensorimotor changes, endocrine dysfunction, pain, sleep/wake disturbance), medication effects

R 1.4



Any behavioural management plan for individuals with traumatic brain injury must include a consideration of the precipitating factors or triggers possibly leading to the behaviour and reinforcing events. (Adapted from ABIKUS 2007, G24, p. 20)

R 1.5



Individuals who have sustained a traumatic brain injury after a known or suspected incident of self-harm or a suicide attempt should have a risk assessment performed and should be referred as appropriate. (Adapted from NZGG 2006, 3.11, p. 66)

R 2.2



In the case of individuals with significant behavioural problems following traumatic brain injury, especially those with a tendency to wander, the interdisciplinary team should develop an integrated approach to manage behaviour and refer to specialist behavioural management services when necessary and where available. (Adapted NZGG 2006, 6.1.7, p. 103)

R – Neurobehaviour and Mental Health

<p>R 4.1</p> <p>P C</p>	<p>Individuals with traumatic brain injury (TBI) should be screened on a regular basis for depression using an appropriate screening tool. Depression screening tools should not be used as the sole indication for initiation of treatment. Diagnosis should always involve a full assessment as well as the clinical judgment of a specialist experienced in managing individuals with TBI. (Adapted from ABIKUS 2007, G72, p. 27)</p>
<p>R 5.1</p> <p>P B</p>	<p>Individuals with traumatic brain injury who have been diagnosed with a depressive disorder should receive appropriate treatment, which can consist of non-pharmacological treatments including psychological intervention/counselling and exercise. (Adapted from ABIKUS 2007, G70, p. 27)</p>
<p>R 5.2</p> <p>P N A</p>	<p>Mindfulness-based cognitive therapy, adapted for brain injury, should be considered for individuals with traumatic brain injury and depressive symptoms. (INESSS-ONF, 2015)</p> <p>REFERENCES:</p> <ul style="list-style-type: none"> - Bedard et al. (2014) - ERABI Module 8 - Mental Health Issues, p.18, 8.2.4
<p>R 5.4</p> <p>P N B</p>	<p>Cognitive behaviour therapy (CBT) should be considered for individuals with depressive symptoms after traumatic brain injury, in individual, group, and modified telephone-based formats. (INESSS-ONF, 2015)</p> <p>REFERENCES:</p> <ul style="list-style-type: none"> - Arundine et al. (2012) - Bradbury et al. (2008)
<p>R 6.1</p> <p>P N C</p>	<p>Given their favourable side-effect profile, selective serotonin reuptake inhibitors (SSRIs) are recommended as a first-line treatment for depression following traumatic brain injury (TBI). A limited body of evidence supports the efficacy of sertraline (starting at 25 mg; aiming for 50–200 mg/day) and citalopram (starting at 10 mg; aiming for 20–40 mg/day). (INESSS-ONF, 2015)</p> <p>Note: Depression after TBI is amenable to pharmacologic interventions and such treatment may alleviate not only the mood disturbance but also be of benefit for other symptoms.</p> <p>If selective serotonin reuptake inhibitors (SSRIs) have been trialed and are not effective, or have produced unwanted side effects or drug interactions, the individual with TBI should be referred for review to a psychiatrist with expertise in treating individuals with TBI.</p> <p>REFERENCE:</p> <ul style="list-style-type: none"> - ERABI Module 8 - Mental Health Issues, p.18, 8.2.3
<p>R 6.2</p> <p>P N B</p>	<p>Stimulants such as methylphenidate may be considered for depression after traumatic brain injury over the shorter term; they may also be used to augment a partial response to selective serotonin reuptake inhibitors (SSRIs), especially in the setting of cognitive impairments, apathy, and/or fatigue. (INESSS-ONF, 2015)</p> <p>REFERENCE:</p> <ul style="list-style-type: none"> - Lee et al. (2005)
<p>R 7.1</p> <p>P N A</p>	<p>Cognitive behaviour therapy (CBT) is recommended to reduce anxiety post traumatic brain injury. (INESSS-ONF, 2015)</p> <p>REFERENCES:</p> <ul style="list-style-type: none"> - ERABI Module 8 - Mental Health Issues, p.18, 8.2.3 - Arundine et al. (2012) - Bradbury et al. (2008)

R – Neurobehaviour and Mental Health

<p>R 8.1</p> <p>  </p>	<p>Given their favourable tolerability and broad utility, selective serotonin reuptake inhibitors (SSRIs) may be considered for anxiety treatment of individuals with traumatic brain injury (TBI). (INESSS-ONF, 2015)</p> <p>Note: There is a lack of research concerning medication treatment of anxiety disorders after TBI; however, much evidence exists supporting their treatment in the non-TBI population.</p>
<p>R 8.2</p> <p>  </p>	<p>The use of benzodiazepines as first-line therapy for anxiety in individuals with traumatic brain injury (TBI) is NOT recommended due to potential effects on arousal, cognition, and motor coordination. The potential for abuse/dependency associated with these agents is also of concern, given the elevated rates of pre-injury substance use disorders observed among individuals with TBI. Nonetheless, short-term use of these agents may be helpful during periods of crisis or acute distress. (INESSS-ONF, 2015)</p> <p>REFERENCE:</p> <ul style="list-style-type: none"> - Waldron-Perrine et al. (2008)
<p>R 10.3</p> <p>  </p>	<p>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. (INESSS-ONF, 2015)</p> <p>REFERENCE:</p> <ul style="list-style-type: none"> - ERABI Module 8 - Mental Health Issues, p.37-38
<p>R 10.5</p> <p>  </p>	<p>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. (INESSS-ONF, 2015)</p> <p>REFERENCES:</p> <ul style="list-style-type: none"> - Hammond et al. (2014) - Hammond et al. (2015)

S – Substance Use Disorders

<p>S 1.1</p> <p>  </p>	<p>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. (INESSS-ONF, 2015)</p> <p>REFERENCE:</p> <ul style="list-style-type: none"> - Ponsford et al. (2007)
<p>S 2.4</p> <p>  </p>	<p>Secondary prevention of substance use disorders after traumatic brain injury (TBI) should be undertaken in the form of education and information. Materials should be provided to all individuals with TBI and their families in both written and verbal formats. This information should be provided in a timely manner, ideally beginning just after post-traumatic confusion has cleared, and continue across the continuum of care. (INESSS-ONF, 2015)</p> <p>REFERENCE:</p> <ul style="list-style-type: none"> - Corrigan (unknown year)

T – Medical/Nursing Management

<p>T 2.1</p> <p>P C</p>	<p>The rehabilitation plan for urinary incontinence following traumatic brain injury should include:</p> <ul style="list-style-type: none"> · A regular monitoring program · Strategies for alerting the caregivers to the person’s need to pass urine where there are communication problems · A toileting regimen based on reinforcement in cases of cognitive impairment · Bladder re-education <p>(Adapted from NZGG 2006, 6.1.3, p. 93)</p>
<p>T 2.2</p> <p>P C</p>	<p>Individuals with traumatic brain injury with continence problems should not be discharged home until continence aids and services have been arranged at home and caregivers have been adequately prepared. (Adapted from NZGG 2006, 6.1.3, p. 93)</p>
<p>T 3.3</p> <p>P N C</p>	<p>In the event that use of anticonvulsant medications is indicated in the acute and chronic phases of traumatic brain injury, consideration should be given to choosing medications with the most favourable side effect profiles, as these medications have significant neuropsychological and other side effects. (INESSS-ONF, 2015)</p> <p>Note: For example, phenytoin may have negative effects on cognitive performance and recovery, although phenytoin may still be considered a first-line drug for early seizures in the acute period in view of ease of administration and monitoring. Clinicians should be particularly vigilant for adverse cognitive side effects of anticonvulsant medications and not assume that these drugs are without risk of impairment of cognitive, behavioural, physical, and neuroendocrine function, as well as having potential negative impacts on long-term recovery.</p> <p>REFERENCE:</p> <ul style="list-style-type: none"> - ERABI Module 10- Post-Traumatic Seizure Disorder, p.12, 10.4
<p>T 4.1</p> <p>P N B</p>	<p>Venous thromboprophylaxis should be initiated as soon as medically appropriate following traumatic brain injury. (INESSS-ONF, 2015)</p> <p>REFERENCE:</p> <ul style="list-style-type: none"> - Glassner et al. (2013)
<p>T 5.1</p> <p>P N C</p>	<p>Screening of the hypothalamic pituitary axis should occur at 3-6 months post traumatic brain injury (TBI) or when symptoms are suggestive of a hormonal imbalance or deficiency. Screening should include a.m. cortisol, serum glucose, thyroid hormone (Free T4), thyroid-stimulating hormone (TSH), prolactin, estrogen or a.m. testosterone (T), follicle-stimulating hormone (FSH), luteinizing hormone (LH) and insulin-like growth factor-1 (IGF-1). Clinicians should be aware that a low or normal thyroid-stimulating hormone (TSH) does not rule out pituitary insufficiency with thyroid hormone deficiency. (INESSS-ONF, 2015)</p> <p>Note: Hypothalamic pituitary axis dysfunction is common post TBI and may vary in the acute, subacute or chronic phase. This dysfunction may affect the anterior pituitary system, the posterior pituitary, or both. Individuals with severe TBI commonly develop disorders of the anterior pituitary during the acute, subacute or chronic phase post-injury, which results in neuro-hormonal disturbances.</p> <p>REFERENCES:</p> <ul style="list-style-type: none"> - ERABI Module 9-Neuroendocrine Disorders, p.14 - Sesnilo et al. (2007)

T – Medical/Nursing Management

<p>T 6.1</p> <p>P N C</p>	<p>Individuals with traumatic brain injury and hyponatremia should have an assessment of their hydration status, serum electrolytes with urinary electrolytes and sodium excretion. Restricting fluid intake and salt supplementation should be considered in managing the electrolyte disturbance in those with syndrome of inappropriate antidiuretic hormone secretion (SIADH) or hyponatremia due to cerebral salt wasting in individuals. (INESSS-ONF, 2015)</p> <p>REFERENCES:</p> <ul style="list-style-type: none"> - ERABI Module 9-Neuroendocrine Disorders, p.17 - Sesnilo et al. (2007)
<p>T 6.2</p> <p>P N C</p>	<p>Individuals with traumatic brain injury (TBI) with an identified neuroendocrine abnormality on screening should be referred, where appropriate, to an endocrinologist familiar with this TBI population, particularly if stimulation testing may be required to further evaluate complex hormonal imbalance such as growth hormone (GH) deficiency and replacement. (INESSS-ONF, 2015)</p> <p>REFERENCE:</p> <ul style="list-style-type: none"> - ERABI Module 9-Neuroendocrine Disorders, p.30
<p>T 7.1</p> <p>P N C</p>	<p>Individuals with traumatic brain injury (TBI), especially those with severe injury, should be regularly assessed for the possible presence of heterotopic ossification. The sites most frequently affected following TBI are the hips, elbows, shoulders and knees. (INESSS-ONF 2015)</p>
<p>T 8.2</p> <p>P N C</p>	<p>Passive range-of-motion exercises following traumatic brain injury are important to maintain joint range of motion (ROM) and do not worsen heterotopic ossification (HO). ROM must be gentle and within available range, as aggressive ROM beyond the available joint range can exacerbate HO. (INESSS-ONF, 2015)</p> <p>REFERENCE:</p> <ul style="list-style-type: none"> - ERABI Module 11- Heterotopic Ossification and Venous Thromboembolism post ABI, p.9, 11.3.1
<p>T 9.1</p> <p>P N C</p>	<p>Pharmacological treatment of neurobehavioural / mental health symptoms following traumatic brain injury should be based upon individual factors and symptom severity and comorbidity; and will often represent only one component of a multimodal treatment strategy. (INESSS-ONF, 2015)</p>
<p>T 9.2</p> <p>P N C</p>	<p>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. (INESSS-ONF, 2015)</p>
<p>T 9.3</p> <p>P N C</p>	<p>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). (INESSS-ONF, 2015)</p>
<p>T 9.5</p> <p>P N C</p>	<p>The introduction of medications for individuals with traumatic brain injury should be started at the lowest effective dose and be titrated slowly upwards, based upon tolerability, clinical response and situational urgency. Drug trials should allow adequate duration and dosing. Therapeutic goals should be clearly established and serve as indicators for the efficacy. If those goals are not met, ending the use of medication must be considered. (INESSS-ONF, 2015)</p>

NOTES



Many recommendations included in these guidelines have been adapted from already existing CPGs (see table below). New recommendations formulated by the expert panel have been identified with the letter "N" and referenced as INESSS-ONF, 2015.



Fundamental Recommendations are defined as the elements that rehabilitation programs/services need to have in place, in order to build the rest of the system properly. These are primarily for program managers and their leaders as they reflect the service conditions for optimal rehabilitation provision.



Priority Recommendations are clinical practices or processes deemed most important to implement and monitor during the course of rehabilitation for people having sustained a TBI. These practices are most likely to bring on positive outcomes for people with TBI.

A PRIORITY Recommendation meets the following criteria:

- It addresses a clinical practice or process **identified as important to address by the targeted users of the CPG** during the survey process; and/or
- It is supported by strong evidence or strong expert consensus; and/or
- It was **ranked by the expert panel amongst the most important ones to consider or implement** within a specific topic area;
- **Its implementation is deemed important and feasible** by the development team (Scientific Committee) involved in the organization, delivery and monitoring of quality services for TBI in the province of Quebec and Ontario;
- Its implementation and, when possible, its impact on outcome, **can be measured**.

The guideline development team (Scientific Committee) strongly believes that implementation of the priority recommendations would be difficult without the fundamental recommendations in place first.

INESSS-ONF Level of Evidence



Recommendation supported by at least 1 meta-analysis, systematic review, or randomized controlled trial of appropriate size with relevant control group.



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.



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.

ORIGINAL GUIDELINES SOURCES

Authors	Year	Clinical Practice Guidelines
Neurobehavioral Guidelines Working Group (NGWG) (Warden et al.)	2006	Guidelines for the Pharmacologic Treatment of Neurobehavioral Sequelae of Traumatic Brain Injury
Acquired Brain Injury Knowledge Uptake Strategy (ABIKUS)	2007	ABIKUS Evidence Based Recommendations for Rehabilitation of Moderate to Severe Acquired Brain Injury
New Zealand Guidelines Group (NZGG)	2007	Traumatic Brain Injury: Diagnosis, Acute Management and Rehabilitation
American Occupational Therapy Association (AOTA) (Golisz)	2009	Occupational Therapy Practice Guidelines for Adults with Traumatic Brain Injury
Stergiou-Kita	2011	A Guideline for Vocational Evaluation Following Traumatic Brain Injury: A Systematic and Evidence-based Approach
Scottish Intercollegiate Guidelines Network (SIGN)	2013	Brain Injury Rehabilitation in Adults
Royal College of Physicians (RCP)	2013	Prolonged Disorders of Consciousness National Clinical Guidelines
INCOG Team (INCOG) (Bayley et al.)	2014	INCOG Recommendations for Management of Cognition Following Traumatic Brain Injury
INESSS-ONF	2015	Clinical Practice Guideline for the Rehabilitation of Adults with Moderate to Severe Traumatic Brain Injury

REFERENCES

Complete references for the listed sources can found at www.braininjuryguidelines.org or www.guidepratiqueTCC.org