



Understanding Traumatic Brain Injury

**A HANDBOOK FOR THE REHABILITATION OF ADULTS
WITH MODERATE TO SEVERE TRAUMATIC BRAIN INJURY**

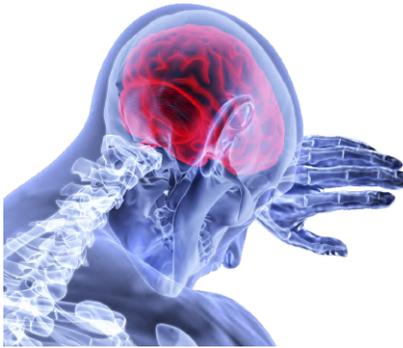
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The information provided in this handbook is based upon best practices and research evidence as of the date of publication. The recommendations may not reflect the services that are available in all regions.

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TRAUMATIC BRAIN INJURY REHABILITATION



Every person with traumatic brain injury (TBI) should receive timely, specialized, and interdisciplinary rehabilitation services. Appropriate rehabilitation intervention can begin once the person is medically stable and/or their condition allows.

What is Traumatic Brain Injury?

Traumatic brain injury (TBI) is caused by an external force to the brain. A moderate to severe TBI involves a change in state of consciousness. TBI can lead to temporary and/or permanent changes in thinking, movement, emotions, and communication.

The Role of Rehabilitation

Rehabilitation is the process of using training and therapy to bring people back to health after an injury. It also helps people regain their independence and return to daily life. Sometimes people with TBI need multiple health care providers and specialists to help them recover and rehabilitate from their injury.

The Rehabilitation Team

The assessment of injury and planning of rehabilitation is done by a coordinated team of health care providers with different specialties. The team members depend on the person's needs at each stage of their recovery. Here are some examples of health care providers on TBI rehabilitation teams:

- Case coordinator/manager
- Nurse
- Nutritionist
- Occupational Therapist
- Pharmacist
- Physiatrist
- Physician
- Rehabilitation Facilitator
- Physiotherapist
- Psychologist/Neuropsychologist
- Psychiatrist/Neuropsychiatrist
- Rehabilitation Support Personnel
- Social Worker
- Speech-language Pathologist
- Therapeutic Recreationist

Collaboration between health care providers and services is important for successful TBI recovery. Since every person is different and has unique needs, a case coordinator is helpful to organize and oversee the TBI rehabilitation program. The case coordinator connects people with TBI to the right health care providers and services to meet their recovery goals.



Setting Rehabilitation Goals

People who are actively involved in setting recovery goals for TBI see more improvement than those that do not. Regular meetings between the rehabilitation team and the person with TBI are important to discuss progress on recovery goals.

The Rehabilitation Setting

The setting of rehabilitation programs and therapies can impact recovery. The environment should be favourable to the person with TBI and their recovery. This may include a quiet space, familiar and regular routines, short visits from family and friends, and appropriate sleep hygiene. Experiencing too much stimulus at once may bring on symptoms and/or feel overwhelming. A person with TBI and their family can consult with the rehabilitation team to create an appropriate environment for recovery.

HELPFUL RESOURCES

Glossary of Terms

<https://braininjuryguidelines.org/modtosevere/guideline-components/glossary/>

Brain Injury Guideline Recommendations

<https://braininjuryguidelines.org/modtosevere/guideline-components/recommendations/>

Ontario Brain Injury Association (OBIA)

<http://obia.ca>

Referral Database

<http://concussionsontario.org/standards/tools-resources/referral-indicators/>

Sunnybrook Mild to Moderate TBI Clinic

<https://sunnybrook.ca/content/?page=bsp-traumatic-brain-injury-clinic>



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ASSESSMENT AND RECOVERY



Every person with TBI will go through several assessments. Most adults with TBI experience different stages of recovery. The length and outcome of each stage is unpredictable and does not follow a specific time frame. Since no single tool can get the full picture of a person's strengths, challenges, and needs, many assessments are used to measure the stages and severity of TBI. Examples of assessments for TBI include:

- Changes in balance, strength, and coordination
- Problems affecting speech, communication, and swallowing
- Sensory changes including hearing loss, numbness, and visual problems
- Reduced control over bowels and bladder
- Changes in attention, memory, and cognitive functions
- Behavioral changes with emotions and social interactions
- Mood and psychosocial functioning

Health care providers gather information from the person with TBI directly (when possible) and their family to understand their abilities and limitations before the injury. Educating family members about recovery stages and strategies can help them understand the rehabilitation process and better support the person with TBI. The following are examples of assessment tools that people with TBI and their family members may see during the stages of recovery,



Glasgow Coma Scale

The Glasgow Coma Scale (GCS) is a tool used to assess level of consciousness. An initial test is done as soon as possible after the injury to set baseline. After that, tests are done frequently to see any changes in consciousness, and to establish a pattern. The GCS looks at verbal, eye-opening, and motor response. In early stages, individuals may respond better to their families and loved ones than health care providers, so families can play an active role during this time.

Levels of Cognitive Functioning Scale

The Rancho Los Amigos is a scale used to assess how people with TBI are recovering. This scale was created to help family members of people with TBI understand what to expect during stages of recovery and share a common language between health care providers.

A person with TBI goes through different levels of recovery according to the Rancho Los Amigos scale. Recovery depends on several factors:

- Severity of the brain injury
- Length of time it took to receive medical attention
- Severity of other injuries and complications
- Age and general health before the injury
- Their support system



Post-Traumatic Amnesia

After a TBI, some people temporarily have trouble storing memories. This is called Post Traumatic Amnesia (PTA). During this time a person with TBI cannot remember day-to-day events. The length of this phase is important for understanding the severity of the injury.

Challenging Behaviours

Some people experience new or changing behaviours after TBI. These behaviors are not willful or under the control of the person with TBI. Challenging behaviors occur in approximately 25-50% of individuals and can include:

- Lack of cooperation with treatment
- Anger
- Agitation
- Verbal and/or physical aggression
- Depression and anxiety
- Not recognizing consequences of behaviour
- Apathy
- Perservation (repetition of word/answer)
- Confabulation (false memory)

Some people may experience challenging behaviours in early stages of recovery that resolve, others experience these behaviours long-term. Behavior management techniques can reduce or remove unwanted behaviours. Educating family members and modifying the environment can also help in manage difficult behaviors.

Supporting Caregivers and Families

Caregivers and family members are important to the recovery of a person with TBI. These individuals may also need ongoing support and/or therapy, which they can access through community programs or associations.

HELPFUL RESOURCES

Glasgow Coma Scale

<https://www.glasgowcomascale.org>

Rancho Los Amigos Levels of Cognitive Functioning Scale

<https://sunnybrook.ca/content/?page=rancho-scale-brain-injury-recovery>

Caregiving and TBI

<https://sunnybrook.ca/content/?page=rancho-scale-brain-injury-recovery>

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ROAD TO RECOVERY



Rehabilitation should focus on activities that are meaningful to the person with TBI. Therapy adapted to the specific needs of the person with TBI's daily routine and delivered in their own environment improves recovery. The rehabilitation plan should consider pre-injury characteristics, stage of development, and state of recovery and activities of daily living.

Cognitive Functions

Cognitive functions are mental processes that affect our thinking and understanding. They include things like learning, remembering, and problem-solving. People with TBI may have many cognitive issues and limitations. These impairments could be due to personal factors, from medical conditions that existed before TBI, or caused by the TBI. Cognitive issues could also appear as a side effect of medication prescribed to people with TBI. For example, seizure medication can make a person feel foggy or dull. It is important that health care providers consider all possibilities when they assess cognitive functions of people with TBI.

Medication

Medication can help people with TBI treat the side effects of their injury. Medications should only be used with a prescription from a medical doctor or nurse practitioner, and may not be beneficial for everyone. Types of medications that may be prescribed to people with TBI are:



- Antidepressants or mood stabilizers to improve irritability by increasing serotonin or adrenaline in the brain
- Risperidone or donepezil to help with memory issues by increasing acetylcholine in the brain
- Stimulants, such as methylphenidate, to help with fatigue and attention issues by increasing dopamine and adrenaline in the brain
- Amantadine to improve status of people in long-term coma-like states
- Anticonvulsants to help people who experience seizures

Nutrition and Dysphagia

People with dysphagia have trouble swallowing foods and/or liquids, or may not be able to swallow at all. Speech language pathologists and dietitians can assess people with TBI for risk factors of dysphagia. Dehydration and malnutrition can be issues for people with dysphagia. Supplementation may be needed if the person has low levels of vitamins and/or minerals. Oral and/or dental care may also be needed. People with TBI may require a rehabilitation plan that considers:

- Positioning
- Feeding strategies
- Medical status
- Medication(s)
- Cognitive impairments
- Behavior
- Comfort
- Nutritional status

Motor Function and Control

TBI can cause a wide range of physical limitations. This can include changes in muscle tone, balance, walking pattern, and reduced aerobic fitness. Recommended treatment approaches will focus on balance, gait (walking), positioning, and exercise training for improved strength and endurance. Treatment approaches should encourage practice and repetition both in and outside of formal therapy.



A trained health care professional assesses the injury, then designs and supervises therapy to improve the motor functions of people with TBI. These health care providers could be physiatrists, occupational therapists, physiotherapists, chiropractors, or vestibular therapists. The rehabilitation team should include professionals with expertise in seating, orthotics, assistive technology, and equipment to address the range of potential motor impairments and physical limitations.



Sensory Impairment

TBI can result in sensory impairment, which may affect vision, perception, sensation, and balance. People with TBI should be screened for these impairments since they can affect mobility and ability to function. Ophthalmologists and orthoptists are health care professionals that can assess problems with eye movements and double vision. A vestibular rehabilitation therapist may be helpful for someone who is experiencing issues with balance or dizziness.

Sleep Disorders and Fatigue

TBI frequently affects sleep. Some people sleep more, while others have difficulty sleeping. Practicing good sleep hygiene, spending time outdoors and/or exercising can help. Other treatments may include cognitive behavioural therapy (CBT) for insomnia, light therapy, and adding magnesium and zinc supplements to the diet. If sleep continues to be a problem, it's important to discuss with a medical practitioner and have sleep formally assessed for other underlying issues. Sleeping pills should only be considered under medical supervision and for a short period of time.



Fatigue often occurs after TBI, even with good sleep, and is often caused by the extra effort required for cognitive functions. Strategies such as planning and pacing, short naps (up to 30 minutes) and good sleep hygiene are beneficial. Therapies could include CBT, light therapy, regular exercise, planning and pacing, proper diet, and adding a vitamin B supplement.

Medications such as stimulants should only be considered for persistent fatigue where TBI is believed to be the main cause.

Pain and Headaches

People with TBI may experience different types and sources of pain. Pain might present as agitation, cognitive or communication issues, non-verbal psychomotor restlessness (moving without meaning to), or worsening spasticity (muscle contraction causing stiffness and tightness). It is important that health care providers and family members pay close attention to non-verbal signs of pain. Pain management strategies include:

- Regular review and adjustment mechanisms
- Individualized handling, support, and pain relief strategies



Cognitive behavioral therapy may reduce pain symptoms in individuals with post-traumatic headaches. Biofeedback treatments can also reduce pain symptoms in individuals with post-traumatic headaches.

Relationships and Social Skills

Participation in meaningful, productive activities, including work, should be included as early as possible in rehabilitation programs for people with TBI. Programs aimed at improving social adaptation and sense of well-being after TBI should actively encourage physical exercise, leisure activities, self-regulation, coping skills, and participation in social support groups. Programs must also consider and plan for the person's actual capacities. Rehabilitation for social communication challenges may also be helpful.

Depending on symptoms, a discussion with trained clinicians (psychologist, occupational therapist, social worker) about sexuality may be necessary following TBI. Topics may include:

- Physical aspects (positioning, sensory deficits, erectile dysfunction, drugs, disruption to menstrual cycle)
- Psychosocial aspects (communication, fears, threats to safety, self esteem)



Learning and Memory

Many support devices can help for individuals experiencing memory impairments. These devices include mobile or smartphones devices, notebooks, and whiteboards. Selecting the appropriate support depends on:

- Age
- Severity of impairment
- Cognitive strengths and weaknesses
- Physical limitations

It is important to allow plenty of time and opportunities to practice. Having clearly defined goals will allow the individual to learn pacing, break down tasks into smaller components, and schedule time for practice.



Mental Health and Substance Misuse

People with TBI are at risk for mental health (anxiety, depression, and mood disorders) and substance misuse issues. It is important that the person with TBI, as well as their family, friends, and rehabilitation team are aware of this risk, and that the necessary supports and resources are in place to help manage any challenges that happen during recovery.



Screening for signs of mental health and substance misuse issues should happen right at the start of treatment and continue regularly throughout the TBI rehabilitation process. A health care provider or specialist, such as a psychologist, psychiatrist, neuropsychologist, or neuropsychiatrist, can do a full assessment and clinical judgment to make a diagnosis.

Treatment for mental health and substance misuse issues should take a holistic approach. A combination of counselling, mindfulness and behavioural cognitive therapies adapted for brain injury, and exercise can help people with TBI manage mental health. In some cases, medication may be considered for individuals with TBI experiencing symptoms of depression.

HELPFUL RESOURCES

The ABCs of Brain Injury

<http://obia.ca/brain-injury-information/>

What is Balance and Vestibular Rehabilitation Therapy?

<https://www.brainline.org/article/what-balance-and-vestibular-rehabilitation-therapy>

Interventions for Behavioural Problems After Brain Injury

<https://www.brainline.org/article/interventions-behavioral-problems-after-brain-injury>

Traumatic Brain Injury and Sleep

https://msktc.org/lib/docs/Info_Comics/MSKTC_SleepComic_508.pdf

Fatigue and Traumatic Brain Injury

<https://msktc.org/tbi/factsheets/fatigue-and-traumatic-brain-injury>

Positive Coping with Health Conditions

<https://psychhealthandsafety.org/pcwhc/>

Transforming Depression with Mindfulness-Based Cognitive Therapy for ABI

<https://www.youtube.com/watch?v=QVIfthdcKU>

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Receiving support through motivational interviewing, goal setting, reassurance, and problem-solving can help people with TBI reintegrate and participate in society. Professionals who provide these services are limited and may only be available through specific organizations. If interested, people with TBI can speak with their primary health care provider for more information.

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Community Rehabilitation

Individuals with ongoing disability after TBI may require specialized outpatient or community-based rehabilitation to reach successful community reintegration. Peer support within community-based programs helps promote social integration, coping, and psychological functioning. Access to interval care (re-entry to care or intensification of services) is determined by the person's needs, goals, and potential benefit from services, rather than the time since injury or history of previous treatment.



Optimizing Daily Living

Individuals with TBI should be assessed for their level of independence in activities of daily living (ADL) and instrumental activities of daily living (IADL). These are tasks and activities needed to live independently.

ADLs include basic self-care tasks such as walking, grooming, dressing, and bathing. IADLs are more complex and require higher level thinking and organizational skills (e.g., transportation, meal preparation, home maintenance, managing finances, and managing medications). Assessment of ADLs and IADLs should be realistic and appropriate, with the opportunity for people with TBI to practice in natural settings outside therapy sessions.

Life skill training can help people with TBI deal with the demands and challenges of everyday life. Life skill training may focus on:

- Social skills
- Activities of daily living (ADL)
- Instrumental activities of daily living (IADL)
- Interpersonal skills
- Job skills
- Self-advocacy skills
- Behavioral self-regulation skills
- Decision-making skills
- Problem-solving skills



Leisure and Recreation

Participating in leisure and meaningful activities can improve rehabilitation outcomes and allow the individual with TBI to achieve their short-term and long-term goals. Assessing a person's level of participation in activities before TBI, and addressing barriers that inhibit participation after TBI is important for rehabilitation and reintegration. A goal-directed, community-based program that increases involvement in leisure and social activities can benefit people with TBI.

Return to Work or School

Before returning to work or school, people with TBI should consider and/or assess:

- Comprehensive pre-injury history
- Current cognitive, physical, and psychological capacities
- Identify challenges to a successful return and appropriate interventions to minimize them
- Discuss needs with employers or educators
- Evaluation of environmental factors

Return to work or school supports include cognitive, communicative, physical and behavioral strategies, work simulation activities, and on-site training. A gradual work or school trial may benefit people with TBI. It is helpful to identify or address these factors in advance:

- A start day
- How to increase hours and days
- Limitations and restrictions
- Recommended accommodations



If the person with TBI is unable to engage in paid employment, they may need assistance to explore other avenues for productivity. This could include activities that promote community integration, like volunteer work.

Driving

By law, health care providers must give information and documentation on the effects of neurological impairments to the appropriate government body (e.g., Ministry of Transportation). In accordance with local legislation, an assessment by a health care provider may be required for people with TBI who wish to drive.

HELPFUL RESOURCES

The Ministry of Transportation Medical Review Process Fact Sheet

<http://www.mto.gov.on.ca/english/safety/pdfs/fact-sheet-the-medical-review-process.pdf>

Peer Support Groups at Local Brain Injury Associations

<http://obia.ca/abi-associations/>

Factsheet for Driving After Traumatic Brain Injury

<http://www.msktc.org/tbi/factsheets/Driving-After-Traumatic-Brain-Injury> Online Caregiver

Conversations Group

<http://obia.ca/online-caregiver-conversations-group/>