MDGuidelines®

RESEARCH BRIEF

Traumatic Brain Injury

May 2023

Treating traumatic brain injury

Impact of TBI

In the United States, approximately 1.7 million people sustain a traumatic brain injury (TBI) annually and 1 in 3 injury-related deaths involve a TBI.[1] Although most TBI is considered mild (usually concussions), research shows that 20–50% of patients still experience limitations 3–12 months after the injury, including fatigue, headaches, the inability to maintain previous workloads, and behavioral issues.[2–4]
TBIs occur when an external force causes damage to the brain, often from an accident or trauma. TBIs are categorized according to seriousness:

- mild (concussion, no loss of consciousness [LOC], or up to 30 minutes of LOC)
- moderate (30+ minutes of LOC)
- severe (30+ minutes of LOC and significant brain damage)

According to the Mayo Clinic, symptoms of mild TBI include headache, nausea, fatigue, problems with speech, dizziness, sensitivity to light or sound, memory or concentration problems, and mood swings. Moderate and severe TBI can include all symptoms of mild TBI, plus seizures, dilated pupils, clear fluids draining from the nose or ears, and combativeness or other unusual behavior.[5] Long-term effects of TBI may include slowed mental processing, decreased attention span, long-term memory, and problem-solving ability, impaired social functioning, and behavioral changes.[6] TBI can also result in death.

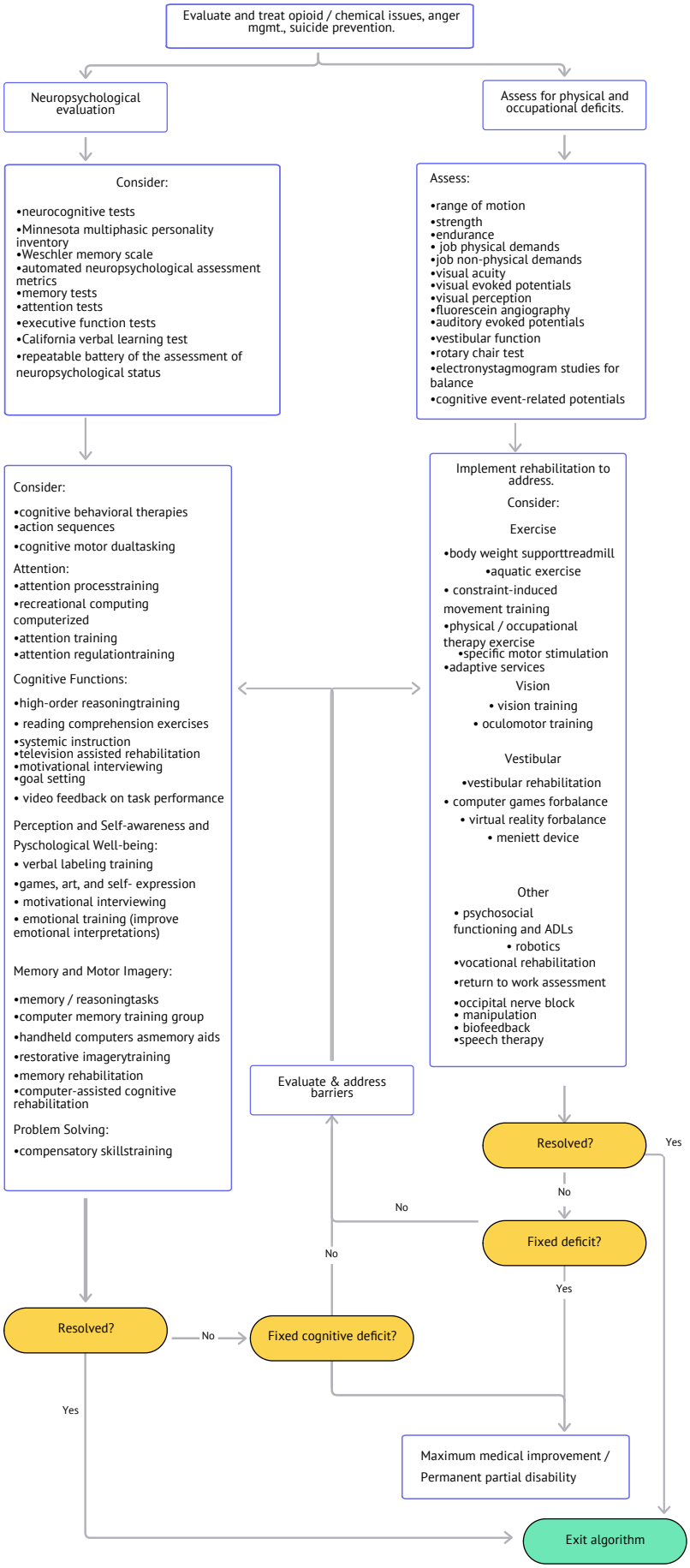
Work-related TBI accounts for about 18% of all TBI and is usually seen in the education, healthcare, construction, manufacturing, and transportation industries.

These cases are often caused by falls, being struck, vehicle crashes, and assaults.[7] A study of the Washington state workers' compensation program found that 60% of work-related TBI injuries resulted in death or disability, with an average cost of $171,000 per case.[8]

A map to success

In each American College of Occupational and Environmental Medicine (ACOEM) guideline, a sequential summary map of major clinical decision points is outlined in the workflows (also known as algorithms). ACOEM recommends that clinicians use this evidence-based map as a starting point to plan treatment and manage patient expectations. The ACOEM workflows help to standardize care, provide greater decision support about treatment options, and showcase what to look out for when seeing a patient, such as red flags. These workflows can also help case managers to review where their patient might be in the recovery timeline and what are the next steps in care.

There are three workflows in the ACOEM guideline for TBI: acute, severe, and rehabilitation assessment and treatment. The workflow for acute TBI provides recommendations for determining severity, treating symptoms, and planning follow-up care. The workflow for severe TBI focuses on the management of patients with dire symptoms, including considerations for elevated intracranial pressure.



ACOEM Clinical Practice Guideline workflow for Acute TBI - Rehabilitation Assessment and Treatment

The rehabilitation assessment and treatment workflow (pictured left) outlines the mental and physical tests and treatments that should be considered for patients with TBI.

Just from looking at the algorithm, you can see there are a variety of options. Patients with TBI have a range of symptoms as well as a variability in their tolerance, which is the ability to experience symptoms but power through activities aimed at recovery. Clinicians must toe the line by pushing their patients to perform activities that will help them get better, such as physical therapy, but not past endurance where they are physically or mentally unable to cope.

In the ACOEM workflows, the arrows often flow cyclically, with constant evaluation of both progress and barriers to recovery. Returning to normal activity levels is often an ongoing process. Setting expectations about care with patients may help them deal with setbacks they may encounter as well as adjust their own outlooks. Every patient wants to get well so that they can return to their normal lives; however, with TBI, recurrent symptoms or long-term effects are a concern and patients may never return to their previous activity levels.

How are treatments currently applied?

At the 2023 American Occupational Health Conference, hosted by ACOEM, Kerri Wizner (Assistant Director of Epidemiology for MDGuidelines) partnered with Dr. Shane Journeay (Dalhousie Medicine New Brunswick, University of Toronto, and Dalhousie University) and Dr. Dan Jolivet (The Standard) to discuss their ongoing TBI research.

Their study reviewed 10 years of workers' compensation claims for mild TBI from the state of California. Nearly 50% of prescribed pharmaceuticals given to this cohort had no ACOEM recommendation because there was no evidence in the literature to support the use for acute TBI. This included nonsteroidal anti-inflammatory drugs (NSAIDs), which have never conclusively been determined to either help or harm patients in clinical trials. There are few pharmaceuticals to treat TBI, especially mild TBI, and new research is exploring the importance of the therapeutic time window for the impact of medications.[9]

In this research cohort, 11% of the received services (non-pharmaceutical treatments or diagnostics) were prescribed against ACOEM recommendations in the literature, although the overall evidence base is weak. Clearly, more research is needed to determine which treatments are most effective for supporting a patient's return to health after TBI.

Beyond treatment

Resuming normal activities after an injury or illness can help mental, physical, and financial health by reestablishing the patterns of life before the disability.[10] Return to work is a major milestone on the path to recovery, and it should begin as soon as possible based on risk, capacity, and tolerance. Often, modified work tasks or accommodations can be utilized before full duty is achieved, such as reduced work hours, more frequent breaks, different tasks, or a flexible schedule.

The Job Accommodation Network has outlined recommended modifications that are specific to TBI, with a focus on partnering effectively with supervisors and making changes to the work environment. For instance, if a person is having communication difficulties, an aid, mentor, or writing software can make it easier for them to work, even when the person has not yet achieved total recovery.[11]

Whether you see TBI patients every day or hardly ever in your practice, the following themes can be applied across many health conditions:

1. Starting with a map of care decision points can take the guesswork out of recovery plans.
2. Providing evidence-based care should be a priority for everyone in health management.
3. Employers can support a gradual return to activity as soon as possible, even if full recovery may take a while (or never occur).

References

1. Faul M, Xu L, Wald M, et al. TBI in the US: Emergency Department Visits, Hospitalizations and Deaths 2002-2006. CDC. 2010.
2. Nelson L, Temkin N, Dikmen S, et al. Recovery after Mild TBI in Patients Presenting to US Level I Trauma Centers. *JAMA Neurol*. 2019;76(9):1049-1059.
3. Cooksley R, Maguire E, Lannin NA, et al. Persistent symptoms and activity changes three months after mild TBI. *Aust Occup Ther J*. 2018;65(3):168-175.
4. Benedictus M, Spikman J, Van Der Naalt J. Cognitive and behavioral impairment in TBI related to outcome and RTW. *Arch Phys Med Rehabil.* 2010;91(9):1436-1441.
5. Mayo Clinic. TBI. https://www.mayoclinic.org/diseases-conditions/traumatic-brain-injury/symptoms-causes/syc-20378557.
6. MDGuidelines. TBI. https://app.mdguidelines.com/health-advisor/mda%2Ftraumatic-brain-injury.
7. Toccalino D, Colantonio A, Chan V. Update on the epidemiology of work-related TBI: a systematic review and meta-analysis. *Occup Environ Med.* 2021;78(10):769-776.
8. Wrona R. The use of state workers' compensation administrative data to identify injury scenarios and quantify costs of work-related TBI. *J Safety Res.* 2006;37(1):75-81.
9. Mohamadpour M, Whitney K, Bergold P. The importance of therapeutic time window in the treatment of TBI. *Front Neurosci.* 2019;13(JAN):1-10.
10. Wizner K, Harrell M, Berenji M, Gaspar F, Christian J. Managing work disability to help patients return to the job. *J Family Practice.* 2021;70(6):264-269.
11. Ask Jan Network. Brain Injury. https://askjan.org/disabilities/Brain-Injury.cfm