



Neurobehavioral Issues of Traumatic Brain Injury: An Introduction

Prepared by the
National Association of State Head Injury Administrators'
Neurobehavioral Health Committee

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The National Association of State Head Injury Administrators assists State government in promoting partnerships and building systems to meet the needs of individuals with brain injuries and their families.

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Executive Summary

In the United States, traumatic brain injury (TBI) is a major public health concern and the leading cause of death and disability among children and young adults. Injuries to the brain are characterized by a) high cost of hospitalization and rehabilitative treatment, b) permanence of the resulting disability, and c) more frequent occurrence in children and youth.

TBI is not a single, unified disorder with a clear, consistent set of symptoms but a multi-dimensional syndrome. The cognitive, social, emotional and behavioral issues that frequently arise are often cited as the greatest impediment to the individual's reintegration into the home, community, and workplace. This constellation of symptoms is often referred to as the neurobehavioral cluster.

The purpose of this document is to provide State Agency administrators and providers (often focused on other areas of disability) with an introduction to TBI-related neurobehavioral health issues and to offer a glimpse at what some States are doing to address these issues from a systems perspective.

Part I and Part II provide an introduction to TBI and its neurobehavioral issues, respectively. Part III discusses how interdisciplinary treatment teams develop effective treatment plans. Part IV describes how certain professions play key roles in neurobehavioral assessment and intervention. Part V shares several States' successes and lessons learned around their systems development initiatives. Part VI instructs professionals how to work effectively within the mental health, substance abuse, and criminal justice systems.

The committee offers these recommendations to further neurobehavioral systems development:

1. Increased identification and awareness of neurobehavioral residuals is needed.
2. Collaboration between all constituents is a requirement...not just a nice idea.
3. Every single support dollar available is needed to address the TBI problem.
4. Professionals need to be responsive, work as a team, and advocate to identify cohesive approaches at both individual and systems levels.
5. Collaborative systems of service and support must be strengthened by real technological innovations that contribute to functional outcome in the lives of persons with TBI.
6. Applicable, detailed, and creative protocols are needed to orient and promote relevant practices within systems.
7. A new, innovative, and pervasive plan is needed to promote public/legislative awareness of the long-term consequences of brain injury.

Part III: Organizing the Treatment Team

While brain injury can impact a wide variety of human functions, we are focusing on the neurobehavioral issues in this document. Considering that no model currently exists for assessing and treating brain injury-related neurobehavioral issues, guidelines are needed to assist us in identifying and accessing appropriate assistance. Professionals from a variety of service and support systems (e.g., Mental Health, Mental Retardation/Developmental Disabilities, and Chemical Dependency) may frequently interact with persons with brain injury. Unless they are aware of the neurobehavioral issues associated with TBI, their efforts may lead to development of ineffective treatment plans. Furthermore, while medications may be used to address a variety of neurobehavioral issues, careful monitoring is necessary to ensure they do not negatively impact cognitive, physical, and perceptual functioning. Simply put, you must get to the source of medical, cognitive, and behavioral symptoms before developing the treatment plan.

Some acknowledged best practices in assessment include:

- An examination of the person’s pre-injury lifestyle that includes input from the individual with brain injury, his or her family members, friends, and coworkers.
- Evaluations by a neurologist, neuropsychologist, neuropsychiatrist, and physiatrist to assess the impact of the injury on functional abilities and the need for services and supports.
- Evaluations by other professionals such as physical, occupational, behavioral, and speech/language therapists, a vocational rehabilitation counselor, and social worker.
- Use of an interdisciplinary team to develop a treatment plan which may include an array of services, such as:

Psychological/Behavioral	Specialized Medical Equipment
Acute/Post-Acute Inpatient Treatment	Case Management
Consumer-Directed Attendant Care	Respite
Family Counseling and Training	Supported Community Living
Home and Vehicle Modifications	Supported Employment
Medical Monitoring and Treatment	Transportation
Personal Emergency Response System	Prevocational
Physical, Occupational, or Speech Therapy	Personal Care
Residential Habilitation/Rehabilitation	Adult Day Care
- Provision of a supportive environment that teaches new skills and strategies to assist the individual in overcoming lost skills and developing independence, being careful *not* to underestimate the person’s current knowledge base/skill set or take into account their individual clinical needs.

Tools and techniques critical to proper identification of TBI

Brain injury awareness and identification is critical since many persons with TBI will need access to behavioral health services. In many cases, these individuals will present with various diagnoses and not have a documented brain injury diagnosis. In situations

where individual behavior suggests the possibility of brain injury, screening for brain injury is absolutely necessary. This may require partnering or consulting with colleagues in the brain injury field to facilitate the provision of effective interventions and supports.

Professionals: their roles and practices in assessing and treating TBI

The involvement of a variety of professionals is often necessary to begin meeting the needs of individuals with neurobehavioral health issues. However, it is most important to involve the individual with TBI and, when possible, their family members. Too many specialized behavioral treatment environments spend far too much time assessing and designing behavioral interventions and far too little time including the recipient of their services in the design and implementation of their own treatment. In many ways, it is no longer about having a professional team design and implementing a behavior management plan. It is more about designing an inclusive team that assists the individual in intervening more effectively on his or her own behalf.

In many situations, family members either receive too little or too complex information from providers on their roles in the rehabilitation process. Family members have a natural tendency to withdraw or avoid situations where they either feel frightened or ill-equipped to contribute in a safe and meaningful way. But not involving family members as a vital part of the treatment team can have dramatic effects on the outcome. Translating complex terminology into language that can be understood and used by the family may be the most important way that the team can facilitate family involvement.

A number of different human service professionals may need to participate in the assessment and treatment of a person with TBI. Collaboration between disciplines is essential in order to affect the best outcome. However, it is important that a professional's experience in assessing and treating individuals with non-TBI-related, neurobehavioral health issues **not** have a major influence on his or her, or your, recommendations.

In addition to the individual and their family members, here's a list of professionals that play a critical role on the treatment team:

Behavior Analyst	Occupational Therapist
Direct Care Staff	Physiatrist
Neurologist	Physical Therapist
Neuropsychiatrist	Social Worker/Case Manager
Neuropsychologist	Speech/Language Pathologist
Nurse	Vocational Rehabilitation Counselor

The neurologist, neuropsychologist, neuropsychiatrist, and physiatrist give the first level of assessment to determine the impact of injury on functional abilities. Assessment should include proper evaluation, treatment recommendations, and referral to other specialties. The role of these four specialists is defined below. A glossary of other specialties (listed above) is included as Appendix D.

Neurologist. A neurologist is a medical doctor or osteopath trained in the diagnosis and treatment of nervous system disorders, including diseases of the brain, spinal cord, nerves, and muscles. Neurologists perform examinations of the nerves in the head and neck, muscle strength and movement, balance, ambulation, and reflexes. They also test for sensation, memory, speech, language, and other cognitive abilities.

Neuropsychologist/Psychologist. A clinical neuropsychologist is a professional within the field of psychology with special expertise in the applied science of brain-behavior relationships. Clinical neuropsychologists use this expertise in the assessment, diagnosis, treatment, and/or rehabilitation of people of all ages. He or she evaluates patients' neurocognitive, behavioral, and emotional strengths and weaknesses and their relationship to normal and abnormal central nervous system functioning. They also assist with planning and implementing intervention strategies to improve functioning. If the services of a neuropsychologist are not available, a psychologist can be contacted to furnish diagnostic, assessment, preventive, and therapeutic services focusing on helping individuals resolve problems.

Neuropsychiatrist/Psychiatrist. Neuropsychiatry is the connecting area between psychiatry and neurology. This is a specialized medical discipline that addresses the behavioral or psychological difficulties associated with known or suspected neurological conditions. Neuropsychiatrists are trained to evaluate neurobehavioral complications, including problems with mood regulation, impulse control, irritability or anger management, and psychosis. Another area of their expertise is the behavioral effects of medications. When the services of a neuropsychiatrist are not available, a psychiatrist can be consulted to assist with the diagnosis and treatment of emotional issues or bona fide mental illness following brain injury.

Physiatrist. A physiatrist is a medical doctor who focuses on restoring physical function. He or she is a specialist in diagnosing and treating in three major areas:

- musculoskeletal injuries and pain syndromes;
- electrodiagnostic medicine; and
- rehabilitation of patients with severe impairments resulting from catastrophic events or neurologic disorders.⁵

⁵ Association of Academic Physiatrists, www.physiatry.org.

Part IV: Neurobehavioral Assessment and Intervention

Certain professions are likely to play key roles in the assessment and design of formal interventions for persons with TBI-related behaviors. We will focus here on a few, not intending to minimize the contribution of others. It was the desire of NASHIA's Neurobehavioral Health Committee to solicit the expertise of experienced practitioners. The information presented here is written by different contributing authors for each discipline represented.

Neurology

By Colin Hall, M.D.

A neurological evaluation of individuals with traumatic brain injury usually serves one of two purposes. The first is to identify acute measures that may stabilize or reverse brain damage, such as the administration of medication or surgical intervention, at and around the time of the injury. Some neurological studies performed at this time may also provide information on the likelihood of immediate survival and, less reliably, the degree of long-term disability. The second is to assess residual dysfunction and to aid in the design of rehabilitation strategies during and/or after the convalescent period.

In the acute stages, the bedside neurological examination by a trained clinician remains essential. In all but the most minimal trauma, the individual should also have some form of imaging study. Plain x-ray of the skull is used less commonly than previously, because of the greater efficacy of computer-assisted tomography (CT) or magnetic resonance imaging (MRI) scanning. CT scans are generally the study of choice. The head is positioned in a halo-shaped device. X-ray images of the head are taken from various points in the halo, and then fed into a computer to reconstruct images of the brain. Taking only a few minutes, the CT scan is particularly helpful in identifying blood clots in or around the brain and the need for acute surgical intervention. It can also identify brain swelling, foreign objects such as bullet fragments, and infections resulting from penetrating wounds. CT may also be helpful in establishing brain death. Recent developments in CT technology make it possible to compare the volume and rate of blood flow in different areas of the brain, and this is likely to become another helpful tool in assessment.

Although an MRI allows for more sophisticated evaluation of the brain and may identify nerve cell damage too subtle to be seen on a CT, for many MRI is more difficult to obtain on an immediate basis, and is also considerably more expensive. Instead of x-rays, the MRI machine delivers a magnetic pulse that causes the molecules in the brain to vibrate. Different tissues vibrate differently and the computer uses this to display again a detailed image of the brain. The MRI scanner is a cylindrical machine, which encases the upper body with only a few inches of free space above and at the sides. The patient must remain completely still for a few minutes. Some patients find this very claustrophobic and may require sedation. With many MRI machines, the patient must weigh less than 300 pounds to be able to fit into the machine.

The Alaska Experience

Circumstances leading to development of a TBI program

In 1998 Alaska's Division of Public Health received funding from the U.S. Centers for Disease Control and Prevention to initiate traumatic brain injury (TBI) surveillance. Soon, it began to systematically quantify what had previously been perceived as a significant and growing public health problem. Around this same time, an Alaskan chartered State affiliate of the Brain Injury Association of America (BIAA) was established and became known statewide. Individuals with TBI and family members progressively organized and provided testimony to a variety of statewide planning bodies, administrators, legislators, congressional delegations, and anyone who would listen.

The Alaska Mental Health Board (AMHB), one of Alaska's planning bodies, acknowledged some responsibility for people with Organic Brain Syndrome (OBS) (which includes TBI) in their planning document, *A Shared Vision II: A Strategic Plan for Mental Health Services in Alaska 1999-2003*. The AMHB called for 1) a cogent plan for the population, 2) a responsible State Agency clearly defined and funded to serve people with OBS, 3) a multi-agency steering group to address pooled funding, community-based, person-centered services, and wide application of screening tools to enhance identification, 4) specialized training based in science and best practices, and 5) a guide for funding and services.

Working together the Brain Injury Association of Alaska, the AMHB, the Governor's Council on Disabilities and Special Education, and the Division of Mental Health and Developmental Disabilities secured funding from the Alaska Mental Health Trust Authority to pilot community-based, neurocognitive rehabilitation and to strengthen a State of Alaska application for Federal funding for TBI from the Health Resources and Services Administration (HRSA).

All of these events led to the State of Alaska, Department of Health and Social Services, Division of Mental Health and Developmental Disabilities (now known as Division of Behavioral Health), successful application for HRSA planning and implementation grants under project leadership of Leonard Abel, Ph.D., Community Mental Health Services Administrator. The Division of Behavioral Health has become Alaska's lead State Agency for TBI.

Through the process of conducting a statewide needs and resources assessment, Alaska learned that a significant percentage of individuals with TBI were/are not reaching their vocational, housing, and social goals due to disabling neurobehavioral sequelae. Alaska, therefore, began its TBI systems work on neurobehavioral issues.