

KENTUCKY DEPARTMENT OF EDUCATION

TECHNICAL ASSISTANCE
MANUAL ON BRAIN INJURY

ACKNOWLEDGEMENTS

With the advancement of medical technology, more students are surviving traumatic brain injuries. Statistics indicate that over a million children in our nation sustain a traumatic brain injury each year. Many of them will return to school requiring special educational programs and services. To plan for appropriate educational programming for these students, a task force was established. From the work of this group came a statutory definition for traumatic brain injury, evaluation and eligibility criteria to determine whether a child is in need of special education and related services under the Individuals with Disabilities Education Act and this technical assistance document.

The purpose of the technical assistance document is to provide important information and knowledge about traumatic brain injury in order for schools to appropriately meet the individual needs of students who have sustained such injuries.

The Kentucky Department of Education (KDE) wishes to extend its gratitude to those individuals who provided their expertise, time and effort into its development.

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INTRODUCTION

In October 1990, Public Law (P.L.) 101-476, the Individuals with Disabilities Education Act (IDEA) was signed into law and has since been amended to IDEA Amendments of 1997. This amendment to the Education of the Handicapped Act (P.L. 94-142) made some major changes in the Act, including the addition of traumatic brain injury (TBI) as a separate educational disability category under the IDEA. This decision requires state and local education agencies to make available a free, appropriate public education (FAPE) to all individuals who have educational disabilities including traumatic brain injuries caused by accidents or abuse. Prior to the decision to create a separate category for students with traumatic brain injuries, these students had been identified and provided services under other categories such as specific learning disability, emotional/behavioral disability, mental disability, or other health impairment. Since students with traumatic brain injuries have unique characteristics and needs, identifying children under the new category should facilitate the provision of more appropriate education program planning and services for this particular population.

Following the signing of the Individuals with Disabilities Education Act, the Kentucky Department of Education formed a task force to develop the following: 1) a statutory definition of traumatic brain injury for the state, 2) the evaluation and eligibility criteria for identification purposes, and 3) a technical assistance document for local school districts.

The following definition for traumatic brain injury recommended by the task force is now in Kentucky statute.

"Traumatic brain injury" means an acquired impairment of the neurological system resulting from an insult to the brain which adversely affects educational performance and causes temporary or permanent and partial or complete loss of cognitive functioning, physical ability, communication or social-behavioral interaction. The term DOES NOT include brain injuries that are congenital or degenerative, or brain injury induced by birth trauma.

The remainder of this technical assistance document provides information to enable districts to better understand the characteristics and changing nature of this disability. This document is written for local school district personnel (i.e., administrators, evaluators, guidance counselors, regular and special education teachers and home/hospital instruction staff) who are evaluating, identifying, and providing specially designed instruction and related services to students with a traumatic brain injury. It is also anticipated that this document will assist parents in understanding the federal and state regulations which the local district is required to follow. Finally, as Kentucky's higher education institutions prepare future teachers, it is hoped that information from this document will be useful in the design of preservice programming.

This technical assistance document provides the following information:

1. TBI Concept - Including: 1) anatomy of the brain and its functions, 2) how the brain gets injured, 3) effects of traumatic brain injury, 4) rate and nature of recovery, 5) recovery, 6) emotional reactions, 7) long-term family adaptation, 8) return to the community, 9) educational services, and 10) return to school.
2. Evaluation - The evaluation and eligibility criteria for identifying an individual as having an educational disability due to a traumatic brain injury is described. There is a discussion of the need for collaboration among differing disciplines, qualifications of examiners, assessment instruments, assessment interpretation and service delivery recommendations.

3. Service Delivery Options - Suggestions for service delivery options, case management planning, related services and interagency collaboration are discussed to facilitate the provision of appropriate specially designed instruction and related services.
4. Interventions - Descriptions of typical functioning areas affected by a traumatic brain injury are outlined. These areas are: motor, sensory, and physical; cognitive, perceptual, and communication; and psychosocial and behavior. For each area, characteristics are identified and teaching strategies are suggested.
5. Implications for family, siblings and peers - This section elaborates on the importance of the following beliefs: 1) The family members are important to the educational planning team and should be involved in the assessment, identification, placement and instructional planning of the student. 2) The family can offer a wealth of information as to the student's needs and the types of intervention strategies that have been successful since the injury. 3) Planning for interaction with peers is essential to ensure that the school offers an environment in which the student will be accepted and be able to continue to learn. 4) School personnel will need to be attentive to the siblings of the student as adjustments are made to the changes due to the injuries.
6. Resources - A listing of books, periodicals, articles, agencies and support groups is provided.
7. Glossary - The glossary includes vocabulary associated with a traumatic brain injury that the reader may encounter in medical and/or assessment reports and when collaborating with professionals and family members.

Chapter One

THE BRAIN AND INJURIES

The Brain

The brain is the consistency of cream cheese at room temperature. It is made up of many nerve cells and controls the mental and physical activities of the body. The three main sections of the brain are the cerebral hemispheres (right/left) covered by the cerebral cortex, cerebellum, and the brain stem. The cerebral hemispheres are divided into sections called lobes. Each lobe is responsible for special functions, and these sections work together. (See figure 1)

How the Brain is Injured

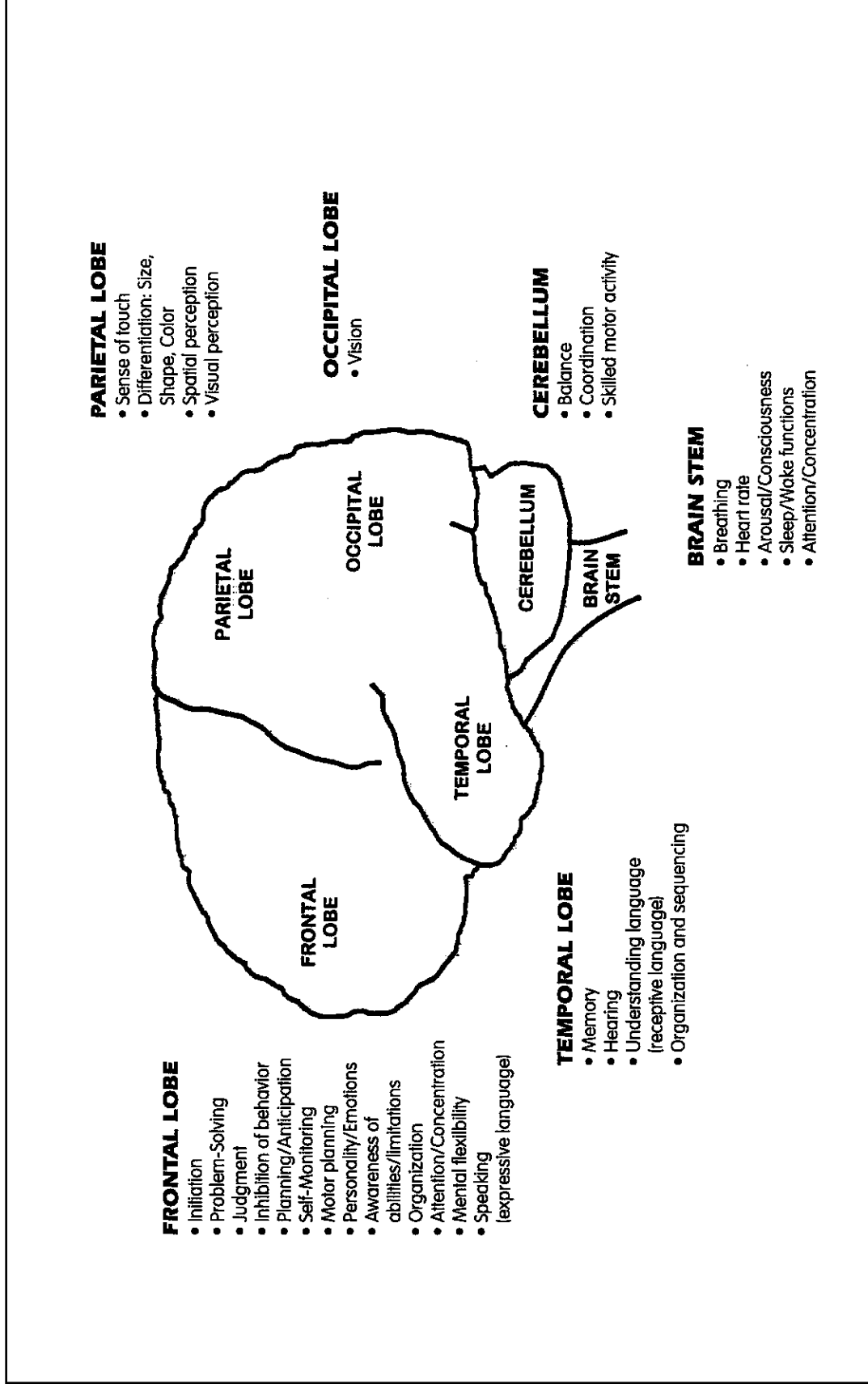
While the brain is protected by several layers of membrane, fluid and bone, it is an organ that can be damaged. A traumatic brain injury (TBI) is when the head strikes an object, an object strikes the head, or when the head is forcefully thrown about such as during a car accident, fall, sport injury, assault, or violent shaking (Shaken Baby Syndrome). However, there are other ways that the brain can acquire an injury (ABI). Some examples are poisoning, infection, aneurysm, stroke, tumor, near drowning, and oxygen deprivation.

While a brain injury occurs from a variety of events, most injuries are results of bleeding, twisting, or tearing of brain tissue. Some develop from increased pressure due to swelling, further bleeding, disruption of blood flow, blood clots or lack of oxygen (Wagner, et. al., 2000). The most severe type of head injury is diffuse in nature, in other words, there is a shearing within the brain.

The Effects of Brain Injury

After a brain injury, there can be local or widespread damage. Not all head injuries will produce significant deficits. Whereas some trauma can lead to permanent and severe deficits, others will result in negligible or no deficits. The degree to which the injury affects functioning depends, on the type of injury incurred by the individual. The types of brain dysfunction that occur depend on the location(s) of the injury (See Figure 2).

Figure 1: Simplified Brain-Behavior Relationships



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Figure 2: General Patterns of Dysfunction By Site of Injury

<p><u>DIFFUSE INJURY</u></p> <p>Reduced Thinking Speed Increased Confusion Reduced Attention and Concentration Increased Fatigue</p>	
<p><u>LEFT SIDE OF BRAIN</u></p> <p>Poor Connection of Ideas Over Time Reduced Automatic Thinking Stuck (Perseverative) Receptive/Expressive Language Deficits Depression Reduced Tolerance Anxiety Slow and Cautious Behavior Low Self-Esteem Overestimate Impairments Underestimate Strengths Right Side of Body Limitations (<i>Weakness, Lack of Coordination</i>) Impaired Memory</p>	<p><u>RIGHT SIDE OF BRAIN</u></p> <p>Impaired Time Concept Mental Image May Collapse To a Small Number of Fragments Visual-Spatial Limitations Underconcerned Denial of Deficits Distractibility Impaired Written Mathematics Impaired Reading Comprehension and Retention Left Side of Body Limitations (<i>Weakness, Lack of Coordination</i>) Impaired Integration and Judgement Overestimates Ability</p>
<p><u>FRONT OF BRAIN</u></p> <p>Reduced Complex Reasoning Concreteness Changes in Affect Reduced Self-Monitoring, Mental Readiness, and Integration/Perspective</p>	<p><u>BACK OF BRAIN</u></p> <p>Sensory Impairments Disturbed Integration Across Sensory Modalities Intellect Consolidation Memory Functions</p>

Adapted from: D. Brooks and L. Meinert, 1998

Chapter Two

THE REHABILITATION PROCESS

Rehabilitation of individuals with brain injuries is primarily concerned with helping these individuals to regain abilities which have been lost as the result of traumas to the brain. In order to restore abilities, rehabilitation specialists attempt to help patients relearn specific abilities, behaviors or cognitive processes based upon what is known about the brain and the origination of cognition and behavior. Approaches used in the various rehabilitation programs range from housing groups of patients with brain injury in transitional treatment centers to providing therapy in the patient's home and incorporating the help of family members. In the former, the hope is to minimize cost by treating many individuals at one time while allowing the individual patients to learn from others with similar disabilities. The goal of the latter is to provide rehabilitation in a familiar environment with family members who can offer specific information about the patient and assist in the rehabilitation regimen.

The most prevalent types of brain injury rehabilitation programs are Acute Brain Injury Programs in a Rehabilitation Hospital or Center, Skilled Nursing Facility Based Acute Rehabilitation Programs and Residential-Behavioral-Transitional Living Programs. The Acute Brain Injury Programs in a Rehabilitation Hospital or Center treats the majority of patients from the time that they emerge from a coma until discharge to a caregiver (parents or family members) and outpatient therapies. These programs are staffed by a complete interdisciplinary team that includes neuropsychologists, physical therapists, occupational therapists, and speech therapists.



The Skilled Nursing Facility Based Acute Rehabilitation Specialty Programs provide services aimed at assisting the low level, severely injured patients with brain injuries to reach minimal levels of functioning to ready them for the acute rehabilitation center. These facilities also care for severely injured patients who are making slow or negligible progress.

The final type of rehabilitation, Residential-Behavioral-Transitional Living Programs, are usually the last step in the formal rehabilitation process. These programs vary from full day intensive treatment from an interdisciplinary team to single discipline outpatient therapy.

Rehabilitation programs vary for each individual and are developed based upon the specific injury and needs of the patient. The recovery period following a brain injury can last for years with some patients making steady advancements throughout while others show rapid improvements followed by periods of no improvement.

Despite the setting in which the individual finds him or her self following a brain injury, there will be some degree of contact with a wide variety of specialists (depending upon the severity of the injury). Below is a listing of the members of the rehabilitation team that will be working with the student. For each of the specialists, the educational/training requirements as well as the duties are listed here to provide a better understanding of the rehabilitation process.

1. **Student:** The student is a critical member of the treatment team. The progress during rehabilitation will dictate the course of further interventions.
2. **Family and Friends:** The student's family and friends can provide information about the student's past that can be very valuable to the other members of the rehabilitation team. In addition, family and friends may be able to pick up on subtle changes in the student that may occur outside of the formal rehabilitation setting.
3. **Communication Therapist (Speech/Language/Hearing Therapist):** *Educational/Training Requirements:* Professional with a Master's degree and specialized training and supervised practice. *Duties:* To diagnose and treat speech, language, and hearing skills as related to educational, medical, social, and psychological factors. Uses a variety of techniques to develop or correct speech and language patterns to enable the individual to communicate with others. Services include diagnostic testing, and treatment using electronic devices, computers and concrete learning materials.
4. **Neuropsychologist:** *Educational/Training Requirements:* Doctorate plus internship and specialized knowledge in brain/behavior relationships. *Duties:* The neuropsychologist uses testing to diagnose and treat brain related mental and emotional problems. The information collected is used to coordinate the services provided by the brain injury rehabilitation team.
5. **Occupational Therapist:** *Educational/Training Requirements:* Bachelor's degree and specialized training and supervised practice. *Duties:* The occupational therapist evaluates and assists individuals with activities of daily living including dressing, bathing, and meal preparation. Occupational therapists offer assistance to individuals with memory and organizational skills deficits and assistance with the use of adaptive devices that promote independence.
6. **Physical Therapist:** *Educational/Training Requirements:* Bachelor's degree and specialized training and supervised practice. *Duties:* The physical therapist evaluates and treats patients to improve muscle strength, muscle tone, posture, coordination, endurance, and mobility. The physical therapist develops treatment regimens composed of exercises, activities, and interventions involving heat, cold, light, water, electricity, massage, ultrasound, and manipulation.
7. **Psychologist:** *Educational/Training Requirements:* Completion of a doctoral program in psychology and board licensed. *Duties:* Evaluates, educates and offers psychotherapy to patients and family members who are coping with various personal issues.
8. **Nurses:** *Educational/Training Requirements:* Associate or Bachelor's degree. *Duties:* The nurses are responsible for the patient's hygiene, comfort, safety, as well as maintaining medical charts and observing the patient's condition. In addition, nurses will work with the patient and the patient's family regarding eating, toileting, bathing and other changes in daily care.
9. **Social Worker:** *Educational/Training Requirements:* Master's degree in social work. *Duties:* Assists the patient and/or family with referrals to community based agencies and provides information regarding eligibility requirements for funding services. If licensed, may assist with the counseling of friends and family members.

Need for Medication

Following a traumatic brain injury, there is often the need for the primary care physician to administer medication. Classifications and side effects of some of the medications used for the care of patients following traumatic brain injuries are listed. It is important for school staff to familiarize themselves with the individual medications prescribed to the student and the potential side effects that might be observed in school.

1. Antianxiety Agents (Ativan, Valium, Xanax):

Reduction of anxiety and agitation.

Side effects: blurred vision, dizziness/light headedness, drowsiness, dry mouth, impaired short-term memory.

2. Antidepressants (Amitriptyline, Clomipramine, Doxepin, Prozac, Wellbutrin, Zoloft):

Treatment of depression and to promote sleep.

Side effects: chills, drowsiness, dry mouth, headaches, elevated blood pressure, nausea, and sweating.

3. Anticonvulsants (Depakote, Dilantin, Klonopin, Tegretol):

Control of seizures.

Side effects: drowsiness, gum overgrowth and bleeding, increased body hair, nausea.

4. Antipsychotics (Clozaril, Haldol, Thorazine):

Control of agitation, hallucinations and aggressiveness.

Side effects: low blood pressure, sedation, and seizures.

5. Antispasticity Agents (Dantrium, Valium):

Control of muscle spasm and increased muscle tone.

Side effects: drowsiness, dizziness, dry mouth.

6. Beta Blockers (Inderal, Colgard):

Reduction of anxiety and the control of blood pressure.

Side effects: fatigue/lethargy, sexual impotence, weakness.



Chapter Three

MOTOR, SENSORY & PHYSICAL IMPAIRMENTS

Fatigue

Motor Movement Impairment

Seizures

Vision Impairment

Hearing Impairment

Impairment of Touch

Taste/Smell Impairment

Other Physical Impairments

Traumatic brain injury (TBI) can affect a student's motor, sensory, and physical abilities. This chapter discusses a variety of impairments that might occur because of the injury and provides characteristics and strategies for school staff.

Fatigue

Characteristics and Behaviors	Teaching Strategies
<p>Fatigue in both mental and physical perseverance and endurance may be a common problem. The person may complain of faintness, listlessness, or depletion of energy after working or concentrating for a short period of time.</p>	<p>When such behavior occurs, the teacher should speak with the student to remind the student of potential consequences of actions, which are appropriate to the situation. The student should be given the opportunity to express opinions and other possible consequences of actions. Change a schedule to have more demanding courses in the morning or drop a class. Build in a rest period so the student can take a nap. Sometimes the student may need to be on a shortened school day.</p>

Motor/Movement Impairment

Characteristics and Behaviors	Teaching Strategies
<p>Motor or movement impairments occur from damage to nerve cells or fiber tracts. The impairment can cause a spastic pattern of movement. Spasticity produces tightness and discomfort, sometimes leading to contractures which limit the full range of movement of an extremity, neck, or trunk. Damage to the motor cortex, basal ganglia or cerebellum may also produce tremors, an uncontrollable rhythmic movement of a part or all of the body. Ataxia can occur with cerebellar damage which affects the fine tuning of motor coordination and movement. Apraxias can occur with the cortical motor damage which affects the ability to carry out a planned organized, sequential motor action. Kinesthetically-based dysfunction can affect the ability of the individual to systematically coordinate and modulate the smoothness of motor responses among jointly operating limbs and extremities. Oral musculature, such as the mouth and tongue, which are used for articulation and speech, can frequently become impaired. Oculomotor control deficits from brain stem injuries can significantly affect visual information processing.</p>	<p>The student may need to relearn how to perform certain motor acts, if possible given the injury. The physical therapist can offer numerous suggestions on how best to deal with a variety of motor problems. Slow, labored, or illegible writing may require the use of a word processor for written assignments. The student may require more time to complete written work assignments and tests in class and at home. She or he may need more time to travel between classes. Taping lectures can be one way to overcome an inability to take class notes as can having someone take notes for the student. It might also be useful to provide the student with prepared notes/papers to eliminate the need for taking notes. In cases where oral musculature is not working properly, it may be necessary for the student to use a communication device. A clipboard may help the student to keep papers in place.</p> <p>[Information on various types of adaptive devices (i.e., the touch talker) can be obtained by calling the Job Accommodation Network (800) 526-7234 and Kentucky Assistive Technology Service (KATS) Network (800) 327-5287] [See Appendix A].</p> <p>Information on Occupational/Physical Therapy needs can be found in, <i>Guidelines for Determining the Need for Occupational Therapy and Physical Therapy Services in Educational Settings</i>, published by the Kentucky Department of Education, (502) 544-4970.</p>

Seizures

Characteristics and Behaviors	Teaching Strategies
<p>Five percent of individuals with severe brain injuries experience seizures. If there is localized damage as the result of acute hemorrhaging, depressed skull fracture, penetrating tissue wounds, or infection, then the risk of future seizures may rise as high as fifty percent. Often as a precaution students with severe injuries are placed on anti-seizure medication. Seizures may develop several years after a brain injury. On the other hand, the risk of seizures decreases with the passage of time. Anti-seizure medications may have sedating side effects on brain functioning, thus interfering with cognition and learning.</p>	<p>In the event a seizure occurs, prompt medical/ nursing care may be needed. All school staff should be familiar with the appropriate actions which need to be taken. Family and school personnel should meet prior to a student's return to school to discuss procedures to be followed. A class discussion about seizures may be helpful.</p> <p>If the student has an aura or warning that a seizure is going to occur, he/she may be able to find a safe place where he/she will not be hurt during the convulsion. An area away from public view is preferable. If a convulsion occurs without warning, injury can be prevented during the fall and during the violent movements of the seizure by keeping the student from falling against sharp objects and cushioning the fall to the floor. Tight clothing, especially at the neck, should be loosened. Saliva should be wiped away from the mouth during the seizure so that it is not inhaled. Help to insure an adequate airway; however do not pry the jaw open. Try to protect the student from injuring him /her self by pushing aside objects. Protect his/her head from floor, rails, etc. Do not restrain his/her movements during the seizure.</p> <p>On recovery from a seizure, the student is often very confused. Spontaneous passage of urine may occur. Embarrassment can be minimized by reassurance that all is well. Whenever seizures become more frequent or change in character, a physician should be consulted promptly.</p> <p>(See <i>Kentucky's Services for Students with Special Health Care Needs: Guidelines for Local School Districts</i>, KDE)</p>

Vision Impairment

Characteristics and Behaviors	Teaching Strategies
<p>The visual pathways from the eye to the back of the brain are extensive. These pathways are susceptible to damage along with the visual cortex at the most posterior part of the brain. Varying degrees of visual losses may occur. Many individuals sustain a loss of half of their visual fields (known as hemianopsia). Another common reaction may be a lack of attention or awareness to one side of the environment, known as a visual neglect. Double vision and blurred vision are also common.</p>	<p>The student may need to be reminded to view the entire visual field if neglect or major field cut is present. He or she may need special training for improved visual scanning and searching of the environment. The use of a straight edge or masking device which shows only one line or one word may be useful for those with scanning difficulties. Large print books can be helpful. Know the student's visual field and make sure that materials are properly placed. Place visual cues (i.e., arrows) on page to orient and allow longer viewing time. An emphasis on auditory learning may be needed (books on tape). Describe visual instructions for the student in concrete terms. Limit the amount of visual information on a page. Alternate eye patching may be recommended by the ophthalmologist. Consultation with a teacher of the visually impaired may be helpful. Remember not to disregard the obvious, simply moving a student closer to the front of the room may be all that is necessary.</p>

Hearing Impairment

Characteristics and Behaviors	Teaching Strategies
<p>Auditory pathways from the outer ear to the auditory cortex are also rather extensive and susceptible to injury. Total sensory loss or auditory impairments can occur from lesions at any point along this pathway. Balance and equilibrium problems can also occur due to middle ear damage or brain stem damage.</p>	<p>A visually oriented approach to learning may be needed. It will be important for the teacher to insure that the student is facing the primary source of information. Having friends assist the student with a hearing impairment in potentially dangerous situations may be needed. Consultation with a teacher of the hearing impaired may be beneficial.</p>

Impairment of Touch

Characteristics and Behaviors	Teaching Strategies
<p>Tactile sensation including touch, pain, temperature and perception of body position is also critical to consider. There may be a total or partial loss of sensation in a limb or body area. These deficits can lead to undetected skin ulcers. Tactile sensory deficits can also contribute to impairments and the loss of a possible compensatory channel of communication if other sensory modalities are not operating efficiently.</p>	<p>The teacher will need to remind the student to shift position periodically during a class session. A picture or written reminder taped on the student's desk may also be helpful. For writing, a loss of sensation may require that the teacher retrain the student to write using an eye-hand coordination technique where all letters are drawn, as was done when writing was initially learned.</p>

Taste/Smell Impairment

Characteristics and Behaviors	Teaching Strategies
<p>The senses of taste and smell are also susceptible to damage from brain injury. Dysfunction in these primary sense areas can be very uncomfortable and disconcerting to the student.</p>	<p>When possible, the use of extra seasoning for food and strongly scented materials may help to some degree.</p>

Other Physical Impairments

Characteristics and Behaviors	Teaching Strategies
<p>Other physical impairments may include bowel and bladder dysfunction, poor regulation of appetite and thirst, sexual response dysfunction and respiratory complications.</p>	<p>Many students will return to school wearing incontinence garments, urinary catheters, etc. Arrangements to care for personal hygiene needs should be discussed between the family and appropriate personnel prior to returning to school. If the student requires personal hygiene assistance, attend to the student's needs according to the prearranged protocol which should require the assistance of at least one other school professional.</p> <p>Posting a schedule for snack and lunch breaks may help a student to relearn the need to delay eating and drinking.</p> <p>Inappropriate sexual behavior must be handled openly and on a level understandable to the student.</p>

Chapter Four

COGNITIVE/PERCEPTUAL/COMMUNICATION IMPAIRMENTS

Attention/Concentration

Communication

Conceptualization

Executive Functioning

Insight

Memory

Pragmatics

Spatial Reasoning

Speed of Thinking

Traumatic brain injury (TBI) can affect a student's cognitive, perceptual, communication abilities. Some students with a brain injury had other disabilities prior to the brain injury so that issues related to cognitive, perceptual and communication may be due to pre-existing conditions. Other deficits may be newly acquired due to the injury. The type of deficit is most typically dependent upon the location of the injury in the brain and the degree to which that brain region is utilized in the overall processing of information. By understanding the cognitive, perceptual and communication impairments, staff can better assist the student with TBI within the educational environment.

Attention/Concentration

Characteristics and Behaviors	Teaching Strategies
<p>Individuals with TBI exhibit deficits in attention and concentration. They are easily distracted by extraneous stimuli and have difficulty focusing their attention. Without adequate attending skills, it is impossible to engage in the learning process. Attention and concentration may fluctuate, depending upon a variety of variables which need to be closely monitored. Variables include medications, sleep patterns, nutrition, time of day and fatigue. The individual may be unable to sit still for long periods of time. The individual may also go from one assignment to the next unable to complete either one and may skip around while doing an assignment, completing only parts of the assignment.</p>	<p>Create and maintain a quiet, non-distracting environment. Breaking larger tasks into smaller ones is also helpful, as well as redirecting the student's attention back to the task. The teacher can demonstrate or explain the task and then ask the student to either demonstrate or to explain the task in return. Allow breaks during or between tasks to reduce fatigue from extended attending. Use memory aids. Reward "on task" behaviors and avoid punishment. Other suggestions would be to structure the day, present directions in short segments, develop a cue system, and use novel activities to stimulate.</p>

Communication (Listening)

Characteristics and Behaviors	Teaching Strategies
<p>Receptive and expressive language skills are essential to an individual's understanding and interaction with others. Language functioning not only involves writing, reading, speaking and listening but also includes one's internal language system. A breakdown in language abilities can occur in any or all of these functions.</p>	
<p>1) The individual may have difficulty comprehending spoken messages which are lengthy, presented rapidly or are in complex terms. The individual may be easily overwhelmed by large amounts of information presented and may be unable to sort out and note important parts of discussions.</p> <p>2) The individual may misunderstand satire, jokes, puns, etc. and may appear to be unaware of what is so funny.</p>	<p>1) The teacher might use short, simple sentences, emphasizing key points by voice variations, intonations, etc., and use pauses when giving classroom instructions to allow the student to process information. The teacher might also use advance and post organizers to alert the student to the important topic being discussed. Other suggestions would be to provide pre-printed notes; use operational language (i.e., sit down and stop talking rather than "behave"), allow classes to be taped for later review; and encourage questions from the student.</p> <p>2) Refrain from satire, jokes and puns when presenting important information, teaching, or trying to correct the student's behavior. Explanations of the meaning of idioms, figurative language, ambiguous phrases, etc., may be required.</p>

Communication (Speaking)

Characteristics and Behaviors	Teaching Strategies
<p>The student may have difficulty expressing him or her self verbally. He or she may:</p> <ol style="list-style-type: none">1) Have dysarthria characterized by slurred speech, abnormally slow or fast rate, and hypernasal resonance.2) Have word retrieval problems in that the student's answers contain a high use of "this", "that", "those things" and "whatchamacallits." The student might have difficulty providing answers on fill-in-the-blank tests.3) Exhibit a reduced ability to use abstractions in conversation (ambiguity, satire, inferences, drawing conclusions). The student may say things that classmates interpret as satirical, funny, or bizarre when these comments were not intended to be satirical, funny, or bizarre4) Exhibit conversation which is tangential in nature as exhibited by conversations that tend to ramble with no acknowledgment of the listener's interest or attention. Conversation may be topic related but not exactly what is desired or key to the discussion.5) Demonstrate a difference between communication in informal situations and formal situations. He/she may answer the teacher's questions at a surface level and when pressed to give reasons or more detail, the student is unable to provide more information. While appearing to do quite well conversationally during social situations, the classroom speaking lacks detail and depth.	<p>To help the student with expressive communication the teacher can:</p> <ol style="list-style-type: none">1) Encourage the student to speak more slowly and enunciate his or her words to increase speech intelligibility.2) Encourage the student to use association skills or to give definitions of words he/she cannot recall. Teach memory strategies (rehearsal association, visualization, mnemonics, etc.). Use oral exams where knowledge can be more accurately assessed. Provide a word bank to use when completing a fill-in-the-blank test.3) Teach the student common phrases used for satire, idioms, puns, etc. Encourage the student to seek feedback from others about conversation.4) When the student begins to deviate from the topic, either provide a non-verbal cue or stop him so he doesn't continue in front of classmates. Teach the student to recognize nonverbal behaviors indicating the listener's lack of interest. (Work with this skill during private conversations with the student.) Stop the student's response and restate the original question, while focusing the student's attention on the key issues.5) Direct the amount and type of information provided by the student. Encourage conversations to develop by giving instructions such as "Tell me more"; "How many did you see..." Role play formal conversations in small groups.

Communication (Reading)

Characteristics and Behaviors	Teaching Strategies
<p>The individual's reading skills may not be at the same skill level as before the injury.</p> <ol style="list-style-type: none">1) The speed of reading may be decreased because of problems with decoding and impaired memory may interfere with retention of information.2) Visual perception problems may interfere with reading abilities.	<ol style="list-style-type: none">1) Allow more time for in-class reading assignments. Having the student outline what is read as it is read might be helpful. Use audio tapes or voice text computers or "study buddies". Provide easier reading materials and reading instruction.2) See "Visual Impairment" section in Chapter 3 for strategies.

Communication (Writing)

Characteristics and Behaviors	Teaching Strategies
<p>The individual's writing abilities may not be of the same skill level as before the injury.</p> <ol style="list-style-type: none">1) The structure and content of the individual's writing may have simplistic sentence structures and syntactic disorganization.2) Content of writing is very literal, devoid of figurative language; contains irrelevancies and unsubstantiated information.3) Speed, legibility and accuracy of writing may be decreased.4) There may be poor planning of use of space on the paper.	<ol style="list-style-type: none">1) Give the student time to go over written work with a partner or instructional aide to find and correct errors. Provide the student with instructions to increase vocabulary, grammar and proofreading skills. Use Edit Check lists and computer grammar and spell check applications.2) Allow the student to verbally state ideas, tape record, and write from dictation. Present the student with "question cards" indicating the specific issues that are to be addressed in an essay or discussed in a theme. Accept that there will be a difference in skill level pre and post injury. Work at the student's current level and ability.3) Check work for accuracy. Allow the student to complete assignments; reduce or alter the requirements. Encourage the use of a computer, voice text computer or a scribe for written work. Reduce writing assignments.4) Understand that physical capabilities may be limiting writing skills. Reteach if appropriate for age and grade and make use of products such as raised line paper. Use technology or visual organizers such as mapping and webbing.

Conceptualization

Characteristics and Behaviors	Teaching Strategies
<p>Conceptualization involves the ability to categorize, sequence, abstract, prioritize, and generalize information. Following a TBI, an individual's thinking may often be quite concrete and stimulus-bound, disallowing generalization. Often, pieces of a puzzle may be identified, but putting them together to make a whole is difficult. Truly for the individual with TBI, it may be difficult to "see the forest for the trees."</p> <p>The individual may exhibit difficulty with any of the following:</p> <ol style="list-style-type: none">1) Inability to mentally organize information presented verbally or in written form.2) Inability to analyze and integrate information received. Executes written directions in an unorganized and incomplete manner.3) Difficulty understanding or recognizing a sequence of events. Even after being back to school for a while, still gets lost in the daily routine.4) Unable to describe events in appropriate detail and sequence when relating an experience. Details are out of order, confused, or overlapping.5) Unable to determine the specific aspects of questions that need to be asked.6) No recognition of due dates or amount of time it would take to complete a project. Cannot predetermine materials needed for completing projects (i.e., material, thread, scissors for a sewing project).7) Decreased ability to generalize learned information to new or different situations. Unable to perform tasks or take tests where newly learned information must be applied or generalized. Recognize that this ability may not improve.	<ol style="list-style-type: none">1) Provide the student with written step sequences to sort and organize. Do not allow the student to skip steps in a demonstration even if he says he knows what to do. Teach mapping and webbing skills. Use visual organizers during instruction.2) Directions should be written in ordered steps (i.e., 1, 2, 3, etc.) rather than in paragraph form. Use a limited number of steps in directions.3) Provide the student with a written or audio taped schedule of his school routine and map of the rooms he must get to. Provide visible route markers in the halls. Assign a peer as a student escort especially when there is a schedule change or fire or disaster drill.4) Teach sequencing skills. Direct the context of the student's responses by providing verbal cues (i.e., "first, second, what happens next, finally"). Teach student to listen for main ideas and supporting details.5) Ask questions which will elicit the student's recall of important facts.6) Help the student formulate and use a system for maintaining organization. Require the student to carry a written log of activities, schedule of classes, list of assignments and due dates, and map of room locations. Frequently monitor the student's use of the organization system.7) Alter the format of the tests (i.e., use questions that are objective and concrete).

Executive Functions

Characteristics and Behaviors	Teaching Strategies
<p>Goal setting, planning and working towards a desired outcome in a flexible manner are aspects of executive functions. An individual must be able to perceive and understand a problem, develop a hypothesis to solve it, test it, and modify the hypothesis based on the results. In many cases, the individual with TBI has difficulty with this process, especially when frontal lobe injuries are involved. It may be difficult for the individual to even recognize that a problem exists. Yet without adequate reasoning and problem-solving skills, it will be difficult to return to a level of independent functioning.</p> <p>1) The individual may arrive at a correct answer to a problem presented but not be able to recite the steps followed to solve the problem.</p> <p>2) Solutions to situations may not be carefully thought through.</p> <p>3) The individual may display decreased judgment which can be exhibited by the following:</p> <ul style="list-style-type: none">a. Easily persuaded by others (can be convinced by others to act inappropriately; abuse drugs and alcohol).b. Speaks out of turn, gets up and moves about the room or leaves the room.c. Careless about safety., (i.e., does not look before crossing streets, makes poor decisions when using kitchen appliances and exercise equipment).d. Unreasonable demands to be unsupervised (i.e., wants to begin driving again too soon). <p>4) The individual may not self-initiate or start tasks easily.</p>	<p>1) Teach inductive and deductive reasoning at appropriate age levels. Privately (not during classroom situations or in front of peers) ask the student to explain answers and provide reasons. Use planners/organizers. Assist with planning. Use timers and checklists. Provide cues. Break tasks into smaller steps. Do not ask open ended questions, give choices (i.e., "How do you do this?" vs. "Which of these steps goes first?")</p> <p>2) Ask questions designed to help the student identify the problem, plan out and organize implementation of a solution.</p> <p>3)</p> <ul style="list-style-type: none">a. Set up a classroom buddy system with several buddies to keep the student aware of instructions, class rules, appropriate social conduct.b. Schedule special time for freedom of movement and informal conversation.c. Establish specific rules for behavior in certain places and times of the day; practice implementation frequently in controlled situations before allowing the student to do something independently.d. Make the student aware of the need for supervision (e.g., motor problem, safety, etc.). Establish small steps for progress toward greater independence.

Insight (decreased)

Characteristics and Behaviors	Teaching Strategies
<p>The individual may lack insight and may not understand the rationale behind another person's reaction to his/her behavior. Paranoia may be present. The individual is unable to plan for the future. There may be no recognition that there is a physical or cognitive problem or that there would be limitations when performing tasks.</p>	<p>Explain the cause for the other person's reaction. Explain what would have been a better way to behave (need simplistic explanations; reasoning will not help). Do not react or respond as if you need to prove a point; avoid confrontation; avoid "buying into" the argument. Plan activities which are similar in nature to what other classmates are doing, but adjust the level of complexity to the student's limitations. Build on successes rather than make the student feel that he or she has failed. Use terms such as strength and needs rather than deficits or weaknesses. Have the individual verbalize specific needs. Use the individual's strengths to work on the needs. Establish a designated space for all of the student's materials.</p>

Memory: Short-term and Long-term Memory

Characteristics and Behaviors	Teaching Strategies
<p>Memory deficits are probably the most common characteristics of individuals with TBI. The conflict between short-term and long-term memory is a source of continual frustration. The primary difficulty experienced is short-term memory consolidation problems (i.e., the inability to store information from the immediate moment so that it may be used some time in the future). Because of this difficulty the individual with brain injury has poor recollection of the present moment. Consequently, the individual has trouble acquiring new information, a significant impediment to successful reeducation and new learning. However, for some, long-term memory or previously acquired knowledge, remains relatively intact (except for a typically well-defined period of time before the accident which is wiped out -- known as retrograde amnesia). The individual with a brain injury usually has relatively good recollection of the past--his or her former abilities and hobbies--but poor understanding and awareness of the present and future. This results in memory gaps, confusion and confabulation.</p>	<p>Teach the student to categorize, associate, rehearse, and/or chunk information. Require the student to write information down to assist with recall. Assign a student buddy to monitor and check what has been written. Have a daily structured routine which the student follows. If writing is not possible, allow use the of audio taping for later review.</p> <p>By keeping a daily diary, the student will have a cue system for reviewing classroom material and also a guide for discussing daily events with parents.</p>

Visual Memory

Characteristics and Behaviors	Teaching Strategies
<p>Memory deficits are often dependent upon the modality through which information is presented. Visual memory is the person's ability to recall information that is presented through the visual channel and requires the spatial perception of data. It includes memory of geometric designs, shapes and figures, facial features and directional orientation. The individual may not remember people or objects.</p>	<p>Use auditory/verbal learning or multisensory input. Assemble photo albums with labeled photographs of familiar people and objects.</p>

Semantic Memory

Characteristics and Behaviors	Teaching Strategies
<p>Semantic memory involves the encoding of language information, and is usually presented orally. It includes remembering names, a list of words, details within a story and oral directions. Frequently, there may be a differential bias toward the retention of visual versus semantic data, or vice versa. The bias is often associated with right versus left hemisphere injuries, respectively.</p>	<p>Emphasize a visual or multisensory approach to learning. Use cue checklists and memory devices (i.e., word banks, cue cards, or labels).</p>

Storage and Retrieval Problems

Characteristics and Behaviors	Teaching Strategies
<p>Storage refers to the ability to record information within the "memory bank." Storage ability is considered a function of the areas of the brain responsible for arousal and memory consolidation. Individuals with TBI have difficulty organizing and retaining incoming information. An individual may also experience difficulty retrieving stored information. It is important to differentiate whether a memory problem is due to an inability to store knowledge or an inability to retrieve, or access knowledge which has been stored away.</p>	<p>Use visual and auditory cues to draw attention to details (i.e., highlight /underline text or use reference pictures). Provide contextual or emotional cues if needed. Try using a recognition format (i.e., choosing from a list of potential answers to a question), instead of a recall format.</p>

Fact and Procedural Memory

Characteristics and Behaviors	Teaching Strategies
<p>Memory for facts concerns the ability of the person to retain a specific piece of data from moment to moment. Procedural memory refers to an informational process, (i.e., a type of strategy used to solve a problem). Frequently, an individual with brain injury may forget a specific fact or even whether he or she has ever done a certain activity before. Yet, he or she is able to retain the process of doing the activity so that his or her performance improves after each exposure. In other words, even though an individual may not remember doing a certain procedure, he or she is able to exhibit retention of that procedure over time. In this way, learning and memory may occur even though the individual doesn't acknowledge that learning took place.</p>	<p>Teachers should stress recognition memory instead of recall. Try verbal or visual or visual-verbal association learning. Allow increased time for rehearsal of to-be-learned information. Use cue cards for procedural steps and factual pieces of information.</p>

"Hot" and "Cold" Memory

Characteristics and Behaviors	Teaching Strategies
<p>Individuals have a higher chance of remembering things that are important to them. These things are referred to as being affectively "hot." Conversely, things that are unimportant, boring or meaningless, (i.e., affectively "cold") are most likely not going to be remembered.</p>	<p>In order to enhance memory functioning in students with memory disorder, it is important to keep the learning process "hot." Provide assignments that connect to the student's interests.</p>

Pragmatics

Characteristics and Behaviors	Teaching Strategies
<p>Sometimes the language channels are spared, but the pragmatics of language are impaired. Pragmatics problems include interrupting, difficulty taking turns, dominating discussions, speaking too loudly or rudely, standing too close to the listener, etc.</p>	<p>Use pre-established nonverbal cues to alert the student that his behavior is inappropriate. Explain what was wrong with the behavior and what would have been appropriate. Teach the student to concentrate on the comments of others. Nonverbally, cue the student to discontinue interruptive behaviors.</p>

Spatial Reasoning

Characteristics and Behaviors	Teaching Strategies
<p>Spatial reasoning skills involve the individual's ability to interpret, coordinate, and manipulate information related to object, space and constructional relationships. These skills are associated with left and right hemisphere functioning. Deficits in this area may affect an individual's ability to recognize the shape of objects, judge distances accurately, navigate without getting lost, or read a map. Spatial reasoning skills also encompass mechanical thinking skills such as understanding how parts fit together, design, shape or color. It may also include how things fit together in space. The individual may also have difficulty visualizing images. Deficits in these areas can be a frustrating impediment to interacting with the environment and utilizing visually or spatially oriented instructional programs or materials.</p>	<p>Allow student to use a hands-on approach for learning new skills (e.g., "on-the-job" training or learning by doing). Provide as many cues as possible. If possible, simplify visual-spatial information available to student as well as provide verbal instructions.</p>

Speed of Thinking

Characteristics and Behaviors	Skills and Teaching Strategies
<p>Many individuals with cognitive deficits from acquired brain injury take considerably longer than average to process information. While speed-of-thinking deficits may affect reaction time, speed of response, and speed of data integration, it is important to realize that the degree of accuracy may not be impaired. Often, the individual with TBI, however slow in processing and responding to data, may be capable of accurate awareness and output if given adequate time.</p>	<p>Allow extra time for the student to discuss and explain. Avoid asking too many questions.</p>

Chapter Five

PSYCHOSOCIAL BEHAVIOR IMPAIRMENTS

Decreased Affect (facial displays of emotion)

Anxiety

Apathy/Decreased Initiation

Denial

Depression/Withdrawal

Disorganization

Disinhibition/Social Judgment

Euphoria

Excessive Talking

Fatigue

Flexibility

Frustration Tolerance (decreased)/Anger

Decreased Personal Hygiene

Impulsivity

Irritability/Restlessness

Lability

Sexual Dysfunction

Deficits in psychosocial behavioral functioning after acquired brain injury can be devastating. Of all the possible consequences, psychosocial and behavioral deficits can be the most damaging for long-term reintegration into home and community life. Behavioral and social deficits follow a longer, more complex pattern of change compared with physical and cognitive deficits. Therefore, it is critical to understand the common types of psychosocial and behavioral disabilities frequently seen after brain injury. Whenever possible, it is important to distinguish between the organic (i.e., due to physical damage to the emotional control or executive function units) or functional (i.e., reaction to the brain injury) nature of the problem. Unfortunately, this is not always easy to accomplish. In addition, if psychosocial problems existed prior to the brain injury, this may further complicate the remediation process. It is important to realize that everyone exhibits these behaviors at some time in life. The individual who has experienced a TBI, however, exhibits a magnification of these behaviors.

Decreased Affect (facial displays of emotion)

Characteristics and Behaviors	Teaching Strategies
<p>Many times, after a TBI, an individual will exhibit difficulty showing appropriate facial expressions to express happiness, sadness, anger, etc. Facial expression may be consistently flat or decreased in range. Because of this, it is difficult to determine the individual's reactions to statements and general mood.</p>	<p>Talking with the student is very important to determine thoughts and feelings regarding issues. Relying on facial expressions may not be adequate because the student's affect can be misinterpreted by staff. Role playing different emotional situations may be beneficial.</p>

Anxiety

Characteristics and Behaviors	Teaching Strategies
<p>An anxiety reaction can be the result of many factors after a brain injury. Individuals with brain injuries often become anxious when confronted with changes or a new situation. Sometimes the anxiety can be pinpointed to specific situational concerns such as ongoing medical conditions, stress in returning to the family unit or to school or feelings of being overwhelmed in a large group or social situation. Many individuals with brain injuries, however, suffer from a pervasive anxiety disorder which develops as a generalized reaction to coping with the effects of trauma. Obsessive orderliness can develop as a method of retaining control over the external world in order to cope with internal disarray. The major contributors to anxiety are a fear of the unknown and the stress involved in completing day-to-day tasks, which previously were taken for granted.</p>	<p>Creating a structured environment in which the student can feel "secure" is important and maintaining a regular structure can help alleviate anxiety. Often times, a quiet room or spot to which the student can "escape" provides a useful outlet for anxiety. Periodic reassurance may be necessary. Students with pervasive problems which cannot be managed through environmental and behavioral modifications may require counseling or medication for anxiety reduction. Do not require more than the student is capable of doing. Remember that tasks that may have been easily accomplished before a brain injury may prove difficult for the student following a brain injury even though there is no apparent physical change.</p>

Apathy/Decreased Initiation

Characteristics and Behaviors	Teaching Strategies
<p>A serious functional deficit may be evidenced by the individual's lack of initiative towards or involvement with a given activity. Here the person has a hard time "getting into first gear" and seems to need external prompting and cuing to engage. Ironically, the individual may even recognize and verbalize what needs to be done and express a desire to accomplish it, but has difficulty starting. Remember that this characteristic is due to the brain injury and NOT a lack of motivation.</p>	<p>Create a structure within the student's day and also within specific tasks. Share this written plan with the student and monitor the work. Develop with the student a daily written assignment sheet indicating dates and times assignments are due. If there are large tasks to be completed, the teacher should assist with breaking them into small, discrete tasks. Give the student a choice between one task and another. Develop plans that delineate the steps for completion.</p>

Denial

Characteristics and Behaviors	Teaching Strategies
<p>Denial is the refusal or inability of the individual to acknowledge personality changes, emotional problems, physical disabilities, cognitive deficits and/or social inadequacies. It is one of the more difficult problems that a person with TBI must overcome and it tends to peak soon after acute injuries stabilize. Initially, it may serve as a useful coping mechanism to avoid emotional pain and depression. However, it may continue beyond an adaptive usefulness by interfering with progress toward specific goals. Unless the individual is willing to admit that a problem exists, it is difficult to get the person motivated to do anything about it.</p>	<p>Firm but gentle confrontation and feedback that forces the student to deal directly with the deficit can be a useful technique. It is critically important, however, that emotional support be provided throughout this process. The process can begin by providing the student with guaranteed successes followed by increasingly difficult tasks which will lead to partial and ultimately total failures. This can allow the student to gradually see limitations. From this point, the need to learn compensatory and coping strategies will take place.</p>

Disorganization

Characteristics and Behaviors	Teaching Strategies
<p>The individual who has a brain injury may have difficulty doing tasks in an organized manner.</p>	<p>Dividing larger tasks into smaller ones or “chunking” helps with organization. The student would also benefit from a very structured day and from keeping daily routines as similar as possible. The student's work can be monitored with suggestions made to help improve organization. The use of three ring binders, folders, calendars and notebooks can assist the student with organization. Providing cues, flow charts and graphic organizers may help. Limiting the number of steps in a task will decrease the difficulties for the student. Identify the main ideas and details.</p>

Depression/Withdrawal

Characteristics and Behaviors	Teaching Strategies
<p>Depression after a brain injury is a common reaction due to grief and a sense of loss over personal changes resulting from the trauma. Typically, the victim loses (to varying degrees) the ability to return to a previous lifestyle, living arrangements, job or educational experience, and/or social relations. Losses sometimes involve the death of loved ones from the same traumatic event. Even guilt over the circumstances surrounding the traumatic event may be contributing to grief and despair.</p> <p>To cope with these depressive feelings, the individual may withdraw and become isolated. The individual may lack the desire to develop or redevelop social contacts and acquaintances because things are not the same. The individuals may tend to anticipate rejection or failure and avoid situations in order to avoid emotional pain. Unfortunately, withdrawal and depression can lessen an individual's rehabilitation potential because social and cognitive interaction with the environment is restricted.</p>	<p>Some depression following a brain injury is a good sign that the student is appropriately in touch with the reality of what has happened to him/her as well as what may occur in the future. However, when depression leads to withdrawal and isolation, it can interfere with all aspects of life. If significant depression is suspected, the student should be referred to a professional for treatment (i.e., medication and psychotherapy) as untreated depression can lead to suicide attempts.</p> <p>When a lesser degree of depression is present, typified by some withdrawal but NOT tearfulness, brooding, psychomotor slowing and diminished pleasure in all activities, the teacher can encourage friends of the student to be persistent in efforts to include the student in activities. The teacher may also provide a structure to ensure successes in school and help the student to focus on abilities rather than how the student was before the injury. Active listening techniques will be crucial.</p>

Disinhibition/Social Judgment

Characteristics and Behaviors	Teaching Strategies
<p>An acquired brain injury may cause a breakdown in the person's ability to control and monitor his or her social behavior pattern. The individual may no longer recognize the appropriateness of a certain action in a given time and place. He or she may make rude and/or inappropriate comments to others. The individual may be easily led or swayed in a certain direction and not recognize the immediate consequences or long-term ramifications of actions. Judgment in evaluating the safety or danger in a situation may be impaired. The individual may unknowingly place himself or herself or others at risk.</p>	<p>When inappropriate behavior occurs, the teacher should speak with the student alone to discuss the situation in a calm manner. The teacher should review the occurrence and present the student with "what if..." situations and choices. The student should be given opportunities to verbally express judgment and decision making regarding appropriate behavior as well as opportunities to role play. The teacher may wish to access assistance from other professional staff and parents in identifying intervention strategies. The student may benefit from talking about his or her feelings and receiving assurance that the feelings are normal. Discuss alternative behaviors with the student.</p> <p>Inappropriate sexual behavior and remarks must be addressed in partnership with the student, staff and family. Staff need to handle matters of disinhibition and social judgment carefully. If staff treat the student with contempt, then the student receives faulty feedback. The student's normal feelings need to be directed to socially appropriate behaviors. Assistance from a counselor may be needed.</p>

Euphoria

Characteristics and Behaviors	Teaching Strategies
<p>Some individuals may exhibit a euphoria-like personality change. The individual may appear giddy or frivolous and giggle or laugh at inappropriate times. A response may be nonchalant in potentially dangerous or emotionally laden situations. The person may misjudge the seriousness of a social situation and react with inappropriate comments.</p>	<p>When such behavior occurs, the teacher should speak with the student to remind the student of potential consequences of actions, which are appropriate to the situation. The student should be given the opportunity to express opinions and other possible consequences of actions. It may be necessary to enlist a friend of the student to help address these inappropriate behaviors. Closer supervision may be necessary</p>

Excessive Talking

Characteristics and Behaviors	Teaching Strategies
<p>The individual may talk too much, often repeating what has already been said. The person may also talk about inappropriate topics, being unaware of the need to screen out issues depending on who is listening.</p>	<p>Redirect the student's attention to the topic at hand. If you believe that the student is distressed about something, allow him to talk for a specified period of time, but you do not have to continue to listen or respond after the first time he or she tells it. When possible, use closed ended questions to limit response time while still involving the student in the classroom activity.</p>

Flexibility

Characteristics and Behaviors	Teaching Strategies
<p>Because of the cognitive deficits, individuals with TBI are sometimes thought of as self-focused and egocentric. An extremely dogmatic, single-minded personality style may develop. These individuals have difficulty perceiving and accepting alternative or flexible viewpoints. A general lack of empathy is present. Individuals often reject feedback given by others and place blame or project responsibility onto others. This can lead to problems with communication, repetition of mistakes and poor problem-solving techniques.</p>	<p>Keep environment and schedule the same with as little change as possible. If changes are necessary, the changes should be explained before they are made, and as they occur. Verbal confrontation should be avoided when the student is upset. When the student has calmed, the teacher should then speak with him or her individually regarding the situation. Be sure to address the student as soon as he or she is calm when he or she is most likely to remember the incident.</p>

Frustration Tolerance (Decreased)/Anger

Characteristics and Behaviors	Teaching Strategies
<p>Frustration tolerance involves the ability to cope patiently and to continue to persist in situations that are taxing or demanding without becoming emotionally upset. This coping mechanism is frequently impaired following brain injury. Typically, frustration may be expressed in overt, directly aggressive actions, including verbal tirades or physical assaults. Passive-aggressive responses may be common, such as work refusals, pouting, and lack of motivation. Individuals with TBI are often frustrated when attempting to complete a task, which was easily accomplished before the brain injury.</p>	<p>Begin to elicit responses from the student during individual and seat work activities when you can be assured that the student will respond correctly. Gradually request occasional responses in front of the student's friends, then small groups and repeat these until the student feels comfortable participating in a large group.</p> <p>Do not attempt to punish the behavior using traditional behavior management approaches. Remove the student from the area in which he is physically acting out. Ignore inappropriate verbiage and redirect.</p> <p>Learn to detect behaviors leading up to the outburst and intervene prior to it happening (watch the student's body language). Allow time for the student to be away from the situation and get needed rest or emotional release. Provide an understanding person with whom the student can share feelings and frustrations. If he is able to demonstrate some control, be direct with your feelings about his behavior, but not critical. Remember that the student may not be completely responsible for the lower tolerance or anger displayed.</p>

Decreased Personal Hygiene

Characteristics and Behaviors	Teaching Strategies
<p>Because of cognitive and emotional adjustment problems, the individual with TBI may develop poor personal hygiene habits. Attempting to restructure and prompt proper hygiene may be a difficult remedial task. Yet, in assisting the individual to develop social and vocational options, it may be a critical area of instruction.</p>	<p>It is important to enlist the aid of parents or guardians to help the student maintain appropriate hygiene. It may be helpful for the student to maintain a daily hygiene checklist to enhance compliance. Also, the student's peer group can prove quite effective in pointing out the need for care in daily grooming. If necessary, access gym facilities for showering. Teach hair and dental care.</p>

Impulsivity

Characteristics and Behaviors	Teaching Strategies
<p>Impulsivity can be defined as the tendency to act or verbalize before thinking and can increase because of stress. It may be a function of the inability of the person to simply control his or her urges or to cognitively recognize the consequences of behavioral actions. Impulsive actions may be seen by others as offensive or socially inappropriate and may lead to violation of social norms, mores, and laws. Impulsivity may affect relationships, work products, safety and self-esteem.</p>	<p>The teacher can prevent or minimize the student's stress thus decreasing the occurrences of impulsive behavior, (i.e., telling the student that he has plenty of time to complete a task). Redirecting the student's attention to appropriate behavior may also be helpful. Short-term rewards for brief periods of self control or a formal behavior management system with the assistance from a counselor may be beneficial.</p>

Irritability/Restlessness

Characteristics and Behaviors	Teaching Strategies
<p>Irritability and restlessness are common complaints following brain injury. There may be no clearly identifiable cause for this behavior or it may be related to the individual's level of fatigue or discomfort. The person may complain of never being satisfied with his or her self or accomplishments. Negativism or pessimism are common with the feelings of hopelessness and helplessness. Difficulty sleeping, pacing the floor, motor over-activity, distractibility, and concentration problems may be present for prolonged periods of time.</p> <p>These problems may be the result of stress from unrealistic achievement standards of cognitive/arousal problems. The person may also complain of over protectiveness and lack of independence from the supervision of others which contributes to his or her irritable, negative behavior.</p>	<p>Since this behavior occurs more frequently when the student is tired or stressed, it is beneficial for the student to have frequent rest periods, and work in an environment which is as quiet as possible. Provide a structure for the student's day. Encourage and affirm appropriate behavior and assignments completed well. During outbursts, redirect, provide alternatives or physical activities (i.e., taking a walk).</p>

Lability

Characteristics and Behaviors	Teaching Strategies
<p>Emotional lability involves abrupt mood changes without apparent cause. It will vary between surges of positive, active moments followed by depressive, inactive periods or by negative emotions. This emotional "roller coaster" is somewhat similar to manic-depressive illness except that the quality and length of the emotional cycles are more rapid and frequent. The most difficult part is the person's inability to manage or predict the reactions.</p>	<p>When such changes occur, the teacher should speak with the student alone, if needed, to discuss the occurrence in a calm manner. Redirection of attention will often help the student "redirect" mood changes. Any verbal or physical confrontations should be avoided as this can escalate emotions.</p>

Sexual Dysfunction

Characteristics and Behaviors	Teaching Strategies
<p>Problems with sexuality can occur on both ends of the spectrum, from hypo- to hyper-sexuality. One person may become sexually promiscuous and impulsive after a brain injury, while another may be fearful, frigid or impotent in sexual encounters. The ability to express and explore sexual feelings is often impaired because of the social isolation and restriction encountered by the person with acquired brain injury.</p>	<p>The student should be informed that such behavior is inappropriate as soon as possible. Opportunities to discuss sexual feelings should be provided by the teacher or counselor. Additional strategies appear in the Disinhibition section that appears earlier in this chapter.</p>

Instructional	
Don'ts	Do's
<ol style="list-style-type: none"> 1. Ignore appropriate behaviors. 2. Teach learned helplessness. 3. Overly comfort/protect. 4. Totally isolate or restrict. 5. Criticize 	<ol style="list-style-type: none"> 1. Provide environmental and instructional supports. 2. Encourage safe exploration. 3. Listen. 4. Maintain high expectations. 5. Seek technical assistance to deal with the behaviors and needs of the student.

Chapter Six

WORKING WITH FAMILIES OF CHILDREN WITH TRAUMATIC BRAIN INJURY

Coping with an incident that results in a traumatic brain injury is extremely hard on family members. School personnel will need to understand the impact of such an event on a family. Changes in lifestyle, finances, emotions and relationships can be occurring along with a variety of legal concerns (O'Hara, 1991). Each family will react differently so it is important to listen to the needs of the individual family. The following section highlights some of the major areas of concern for families following a child's injury.

Emotional Reactions to Brain Injury

Although families are usually relieved and, perhaps ecstatic, when their child survives a serious brain injury, a number of other emotions occur after the crisis has passed. One of these is grief. Unlike death, the grief or sorrow which often accompanies a brain injury is not finite. When recovery slows (and during other times of frustration), families sometimes experience feelings that their child might have been "better off dead." Families are distressed by these feelings, yet, there is often no one to whom feelings can be openly expressed because of the belief that others, even close friends, could not possibly understand. Because the person with a traumatic brain injury is so different from the way he or she was before the injury, some families choose to view the person they knew before the injury as having died. It is not uncommon for families to describe themselves as "grieving for the son I've lost and learning to love the new son who has replaced him."

Sorrow at incomplete recovery is also commonly expressed as anger at the person or condition that caused the injury, at rehabilitation and health care professionals for not being able to "fix" the patient, at the lack of available resources in schools and elsewhere, and at insurance companies for refusing to pay for treatment. This anger may be appropriately channeled or it may be destructively expressed, blaming the child or others for behaviors or limitations over which the individual with the brain injury has little control.

Sometimes families avoid grieving by denying the seriousness of the injury or permanence of the effects. Prediction of ultimate outcomes is so difficult that it is hard to say when denial exists. Certainly within the first few months after the injury no one really knows what the eventual outcome will be. Denial comes only later when families still expect complete recovery but it is clear that recovery will be less than complete. Denial likely serves an important function in giving the family time to get over the initial shock of the injury and in preserving hope. For the most part, denial is not a problem unless it leads to behaviors that interfere with appropriate treatment and services, such as parents failing to identify a child who is in need of, and eligible for, special educational services.

Parents experience a variety of reactions to their child's injury. These reactions can appear at different times, in various orders, individually and simultaneously

Common reactions for parents

anxiety		abandonment		denial
fear		confusion		powerlessness
disappointment		rejection		depression
embarrassment		frustration		hopelessness
discouragement		detachment		self-pity
grief		isolation		irritability
annoyance		financial insecurity		marital instability
guilt *				

** (especially if one feels that he/she is responsible)*

Long-term Family Adaptation

Although families initially worry most about whether or not the injured child will walk and talk again, the symptoms that continue to be most worrisome long after the injury are the more subtle changes. These include cognitive losses such as distractibility and poor memory, and personality changes such as a bad temper, irritability, and lack of motivation. In children, changes in behavior and ability to get along with others are often most problematic when the child returns to school and resumes relationships with friends and family.

As families begin to recognize the significance of these problems, they often expect their child to receive such interventions as behavioral management and social skills training in addition to more traditional rehabilitative services including physical, occupational, and speech/language therapy. The school's ability to work with a child with a traumatic brain injury who may not appear to have a disability also becomes a central concern to families.

Following the child's injury and as time progresses, the family is faced with trying to deal with many life changes including:

- **Loss of the person, as they knew him or her**
- **Loss of a wage earner (*parent or child as a future wage earner*)**
- **Loss of some hopes for the future**
- **Loss of certain aspects of a relationship**
- **Loss of some independence or freedom**

Many times the family is unable to deal with these changes in a healthy manner. The ability of the family to cope with a traumatic brain injury can be impacted by the family's financial, educational, and emotional status along with the type of support system that is in place (i.e., friends, church, school, other family). (Waaland, 1991) Conflicts may arise which require professional psychological help. Fortunately, there are numerous community based services available to assist families during these times of adjustment. A referral to a mental health professional may be needed to determine if professional help is needed and if so, the type of service (i.e., individual, family or group counseling) that will best serve the family as a unit.

Return to the Community

The issues for a child with a brain injury returning to the community are different from those facing an adult and his family. Issues include how the child can reenter the school system, whether he or she can play with peers safely, whether friends are accepting, how much supervision and care is required, who is responsible for providing services, how the family can balance responsibility and independence against limits that are appropriate to the child's functional level, and so forth. Returning to the home, the community, and the school are somewhat separate but equally important issues for a child with a brain injury and a good deal of overlap can exist.

It is likely that the experience of the child with a brain injury returning from the hospital or rehabilitation center will be an occasion of mixed feelings on the part of all involved. Most families are happy and excited to have the child home again; however, the family also may feel anxious, afraid, inadequate, and uncertain. Even those families who have been intensively involved in the rehabilitation process may be frightened as they realize that they will now be resuming the primary responsibility for the child. The individual with a brain injury may also be frightened as he or she tries to fit in again with family, school and friends as well as adjust to the changes being experienced. The three most important things to remember in the transition period are that such feelings are normal, that adjustment takes time, and that resources are available for support and guidance.

The individual with a brain injury may have physical care needs that, if not frightening to parents, teachers and friends, are at least unsettling. Some children may have a gastrostomy tube ("g-tube" or feeding tube), a tracheostomy (breathing through a surgically created hole in the neck), limited movement, difficulty swallowing, splints or casts, and so forth while others may have made a fairly complete physical recovery and have none of these. Whatever the degree of the child's recovery, those working with the child, both at home and in school, may need to learn range of motion exercises, feeding procedures, tracheostomy care, how to transfer the child from the wheelchair to a desk chair, commode, etc., and back.

More subtle than the physical changes are the behavioral and cognitive changes that may have occurred. The child may be impulsive, confused or disoriented, unmotivated, easily irritated and fatigued, forgetful, verbally or physically aggressive, and distractible. Many of these difficulties can be improved by increasing the amount of structure in the child's environment. For instance, routines can be established for the child; a reward system can be used to increase the positive behaviors and decrease the negative ones; external cues such as lists, clocks, and calendars to prevent confusion can be added; rest periods can be built into a child's schedule to reduce the likelihood of fatigue; and having specific rules to limit the decisions that the individual with a brain injury is required to make.

Educational Services for Individuals with Brain Injuries

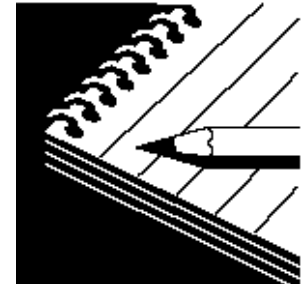
Children with a traumatic brain injury may need specially designed instruction. This specially designed instruction may be implemented within the regular educational program, individually or in small groups (two or three persons). Depending upon their age, functional levels, and needs for rehabilitation services, children with brain injuries may spend varying amounts of time in school. In the more acute care settings, typical programming for the highest functioning students includes books and assignments from their home school systems to use as a way of insuring continuity when they return home. Schools in rehabilitation centers provide an opportunity to identify the educational needs of the child and the types of specially designed instruction appropriate for the child as well as the settings in which a child with a traumatic brain injury functions best. Adaptations such as alternative communication devices, special seating, or other specific modifications for the child also can be developed. Educational staff also will work with school systems, social workers and families to develop the child's IEP and identify appropriate services needed by the child.

Chapter Seven

EVALUATION

Whereas the approaches used by the various rehabilitation agencies differ significantly, the means for assessing progress is quite similar.

Rehabilitative success is typically measured by comparing the patient's performance on a standardized battery of psychometric and behavioral tests at various points in time throughout the rehabilitation process (Edelstein & Couture, 1984). In addition to these psychometric and behavioral measures, the patient's progress is monitored in terms of Functional Capacities Evaluations (FCEs) which seek to identify the individual's maximum levels of physical ability (i.e., lifting, walking, standing, range of motion, etc.).



MEDICAL EVALUATION

For the initial assessment of severity, practitioners rely primarily on the Glasgow Coma Scale to determine if the injury is a mild, moderate or severe brain injury. The Glasgow Coma Scale measures the individual's pupillary response, motor responses to check brain stem functioning, and verbalization abilities to yield a score from 3-15.

Lower scores represent more severe injuries while higher scores represent less critical injuries.

Glasgow Coma Scale

Eye Opening (E)	Score
Spontaneous	4
In response to speech	3
In response to pain	2
No response	1
Best Motor Response (M)	
Follows commands	6
Localization of pain	5
Withdrawal from pain	4
Flexion to pain	3
Extension to pain	2
No response	1

Glasgow Coma Scale (Continued)

Verbal Response (V)	
Oriented	5
Confused conversation	4
Inappropriate words	3
Incomprehensible sounds	2
No response	1
Coma Score = E + M + V TOTAL SCORE (range) = 3-15	
(Sum of highest value in each category is coma score)	
Full mental capacity = 15	
Highest level of coma = 8	
Brain death = 3	

Another assessment method used early to determine the severity of the injury is the Ranchos Los Amigos Levels Hospital Scale. In this scale, there are eight levels of cognitive functional ability presented hierarchically.

Ranchos Los Amigos Hospital Scale

Level I:	No response: Patient does not respond to stimuli.
Level II:	Generalized response: patient reacts inconsistently and non-purposefully to stimuli. Responses are limited and often delayed.
Level III:	Localized response: Patient reacts specifically but inconsistently to stimuli. Responses are related to type of stimuli presented (i.e., focusing on an object visually or responding to sounds).
Level IV:	Confused, agitated: Patient is extremely agitated and in a high state of confusion. Shows non-purposeful and aggressive behavior. Unable to fully cooperate with treatments due to short attention span. Requires much assistance with self-care skills.

Ranchos Los Amigos Hospital Scale (Continued)

Level V:	Confused, inappropriate, non-agitated: Patient is alert and can respond to simple commands on a more consistent basis. Highly distractible and needs constant cuing to attend to an activity. Memory is impaired with confusion regarding past and present. The patient can perform self-care activities with assistance. May wander and should be watched carefully.
Level VI:	Confused, appropriate: Patient shows goal-directed behavior but still needs direction. Follows simple directions consistently and shows carry-over for relearned tasks. The patient is more fully aware of his or her deficits and has increased awareness of self, family and basic needs.
Level VII:	Automatic, appropriate: Patient appears oriented in home or hospital and goes through daily routine automatically. Shows carry-over for new learning but still requires structure and supervision to ensure safety and good judgment. Able to initiate tasks in which he or she has an interest.
Level VIII:	Purposeful and appropriate: Patient is alert and oriented, is able to recall and integrate past and recent events and is aware of and responsive to his culture. Shows carry-over for new learning and needs no supervision once activities are learned. May continue to show a decreased ability in relation to pre-morbid abilities, abstract reasoning, tolerance for stress, and judgment in emergency or unusual situations.

Note: This information is important for school staff to know. The longer the coma, the greater the likelihood of deficits that could impact learning.

The rehabilitation of head injured patients is further complicated by the ever growing yet still limited knowledge of the human brain. As physicians attempt to diagnose the degree of damage to the brain, they will utilize many highly technologically advanced instruments. The most commonly used diagnostic tests used are Computerized Tomography (CT scan), Positron Emission Tomography (PET scan), and Magnetic Resonance Imaging (MRI)

CT scan:

Computerized x-ray taken at different levels of the brain to yield a three-dimensional representation of the physical shape of the brain.

PET scan:

An instrument that records chemical activity in specific regions of the brain.

MRI:

An instrument that develops images from biochemical operations of the brain by using a magnetic field.

Neuropsychological assessment has become an important part of the assessment of individuals with traumatic brain injury. A neuropsychological assessment includes a variety of evaluations that determine one's strengths, weaknesses, abilities, and behaviors in light of brain functioning and injuries to different areas. While many tests used in a neuropsychological assessment are common tests used in typical psychological evaluations, the interpretation is based on brain function and the related injuries. **Traditional psychometric assessments may not provide as relevant information for school personnel as it does for other disabilities.**

A wide variety of assessment instruments are available for areas affected by a traumatic brain injury. The following is a partial list of the types of psychometric tests used for the assessment of traumatic brain injuries.

PSYCHO-EDUCATIONAL EVALUATION

Intellectual Measurements

Tests which have been designed to assess general intelligence are typically composed of multiple tasks which make-up verbal and performance components.

Examples:

- British Ability Scales (BAS)
- Columbia Mental Maturity Scale
- Differential Ability Scales (DAS)
- Kaufman Assessment Battery for Children (K-ABC)
- Kaufman Brief Intelligence Test (K-BIT)*
- Leiter International Performance Scale
- McCarthy Scales of Children's Abilities
- Nonverbal Test of Cognitive Ability
- Pictorial Test of Intelligence (PTI)
- Raven's Standard Progressive Matrices
- Stanford-Binet Intelligence Scale-4th edition
- Test of Non-verbal Intelligence (TONI)
- Wechsler Adult Intelligence Scale-Revised (WAIS-R)
- Wechsler Intelligence Scale for Children-3rd edition (WISC-III)
- Wechsler Preschool and Primary Scale of Intelligence-Revised (WPPSI-R)
- Woodcock-Johnson Psychoeducational Battery-Revised Tests of Cognitive Ability

* A good test for children who can't handle lengthy testing. (Mateer, 1993)

Academic Achievement Measurements

The primary goal for academic achievement testing with students with brain injuries is to provide a baseline by which progress can be measured. The goal is to identify and document the current functional level of the student academically. If there are pre-injury measures available, a comparison can be made to identify areas of progress or decline. The current test results can also be compared with scores expected based upon age to establish the student's status compared with the norm. Finally, academic achievement tests can be used to identify relative strengths and weaknesses of the student which could be crucial for developing appropriate programming.

Examples:

- Kaufman Test of Educational Achievement (K-TEA)
- Peabody Individual Achievement Test (PIAT)
- Reading/Everyday Activities in Life
- Test of Written Language (TOWL)
- Wechsler Individualized Achievement Test (WIAT)
- Wide Range Achievement Test-Revised (WRAT-R)
- Woodcock-Johnson Test of Achievement-Revised

Motor Functioning Measurements

Motor functioning tests are typically performed by physical and occupational therapists and can be helpful in establishing which side of the brain was damaged in the trauma. In addition, motor functioning tests serve to document speed and dexterity weaknesses that could hinder participation in the academic setting and offer information which can be used to establish the need for remedial instruction.

Examples:

- Finger Tapping Test
- Grip Strength
- Grooved Pegboard Test
- Harris Tests of Lateral Dominance
- Left/Right Hemisphere Scales
- Purdue Pegboard Test
- Purdue Perceptual Motor Survey
- Strength of Grip
- Sensory Perceptual Examination
- Tactile Form Recognition

Visual Perception and Perception Measurements

Visual problems are quite common following brain injury in part because there are many parts of the brain which are involved in visual perception and these areas are not centrally located. Included in this area of disability are visuo-perceptual impairments or problems of visual discrimination (i.e., determining size, shape, brightness and length), visuospatial impairments such as misreaching or over reaching and inability to judge distances, and visuoconstruction impairments which refers to problems encountered in drawing or assembling object.

COMMON VISUAL PERCEPTION IMPAIRMENTS

Visual Agnosia:	Inability to recognize common objects
Prosopagnosia:	Inability to recognize familiar faces
Hemi-inattention:	Visual neglect
Stereopsis:	Depth perception difficulties
Topographic Disorientation:	Inability to navigate familiar surroundings
Visuomotor Apraxia:	Misreaching or over reaching

Examples:

Bender Visual Motor Gestalt
Benton Visual Retention Test
Block Design Sub test (Wechsler scales)
Developmental Test of Visual-Motor Integration (VMI)
Facial Recognition
Hooper Visual Organization Test (VOT)
Map Localization Test
Minnesota Percepto-Diagnostic Test
Motor Free Visual Perception Test (MVPT)
Pantomime recognition
Rey-Osterreith Complex Figure
Tactual Performance Test (TPT)
Test of Visual Perceptual Skills
Trail Making Test
Underlining Test

Non-Visual Perception Measures:

Auditory Discrimination Test
Speech Sounds Perception Test

Communication Measurements

Communication assessments are used to isolate or identify specific problems related to receiving or expressing written or spoken language.

COMMON COMMUNICATION IMPAIRMENTS

Aphasia:	Inability to express or understand language
Anomia:	Inability to name objects or recall names
Alexia:	Inability to read or recognize words
Agraphia:	Inability to express thoughts in writing
Dysarthria:	Disruption in speech articulation

Examples:

Aphasia Screening Test

Boston Diagnostic Aphasia Examination

Clinical Evaluation of Language Fundamental-Revised (CELF-R)

Communication Abilities in Daily Living

Controlled Oral Word Association

Detroit Tests of Aptitude (DTLA-2)/Story Construction

Expressive One-Word Picture Vocabulary Test (EOWPVT)

Language Sample (Tell a story to a picture)

Multilingual Aphasia Examination

Paragraphs/Word Associations

Peabody Picture Vocabulary Test-Revised (PPVT-R)

Porch Index of Communicative Ability

Selective Reminding Test

Test of Adolescent Word Finding

Test for Auditory Comprehension of Language

Test of Language Development: Intermediate/Malapropisms

Test of Written Language-Second Edition

Token Test for Children-Revised

Vocabulary sub test (Wechsler Scales)

Woodcock-Johnson Test of Achievement-Revised (WJ-R) Reading Comprehension

Emotional Functioning and Psychosocial Development Measurements

Tests of emotional functioning and psychosocial development are typically batteries of tests designed to ascertain behavioral control problems, self-esteem problems, mood disorders, denial of disability, anxiety disorders, inappropriate social/sexual behavior and aggressive/agitated behaviors. The usefulness of this information is dependent upon a solid understanding of the students emotional and psychosocial development prior to the brain injury.

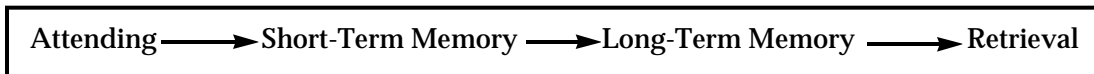
Examples:

AAMD Adaptive Behavior Scale
Adaptive Behavior Inventory for Children
Aggregate Neurobehavioral Student Health and Educational Review (ANSER)
Boyd Developmental Progress Scale
Burkes Behavioral Rating Scales
Child Behavior Checklist
Children's Incomplete Sentences
Conners Parent Rating Scale
Conners Teacher Rating Scale
Draw-A-House-Tree-Person
Kinetic Family Drawing
Minnesota Child Development Inventory
Robert Apperception Test
Vineland Adaptive Behavior Scales

Memory and Learning Measurements

The goal of memory and learning assessment is to ascertain the student's current abilities in this area (i.e., visual/auditory memory, delayed memory, distractibility, and retrieval from memory). In addition, memory and learning tests can indicate where in the memory continuum (see below) problems exist.

MEMORY CONTINUUM



Examples:

Benton Visual Retention Test
Category Test
Children's Auditory Verbal Learning Test (CAVLT)
Children's California Verbal Learning Test (CCAVLT)-(to be published)
Digit Span Sub test (Wechsler Sub test)
Information Sub test (Wechsler Sub test)
Performance Scale
Reitan-Modified Halstead Category Test
Rey-Osterreith Complex Figure
Selective Reminding Test
Sentence Memory Test
Serial Digit Learning
Visual Aural Digit Span Test
Wechsler Memory Scale
Wide Range Assessment of Memory and Learning (WRAML)
Wisconsin Card Sorting Test

Attention/Concentration Measurements

Attention testing is a complicated matter due to the multi-faceted nature of this area. Attention is composed of four major sub-types, selective attention (ability to attend to stimuli with disregard for distractions), sustained attention (ability to maintain attention over an extended period of time), divided attention (ability to attend to more than one task simultaneously), and alternating attention (ability to shift attention from one task to another without losing focus). Attention/ concentration testing can indicate the effect that attention problems have on overall performance, which individual sub-component appears to be most/least impaired, as well as indicate methods for dealing with the problem at hand.

Examples:

Attentional Capacity Test (ACT)
Attention Deficit Disorders Evaluation Scale (ADDES)
Child Behavior Checklist (CBCL)
Coding/Animal Pegs/Digit Span/Digit Symbol (Wechsler Scales)
Conners Continuous Performance Test
Conners Rating Scale for Attention
Freedom From Distractibility (Wechsler Scales)
Goldman Friscoe Woodcock Auditory Skills Test battery-Selective Attention Sub test
Gordon Diagnostic System (GORDON)

Examples (Continued):

Matching Familiar Figures Test
Paced Auditory Serial Addition Test
Symbol Digit Modalities Test (SDMT)
Stroop Color-Word Interference Test
Test of Visual Attention (TOVA)
Trail Making Test, Part B (TMT)

Executive Functioning Measurements

Executive or higher order functions refer to problem-solving abilities (i.e., reasoning, planning, and organization), flexibility in thinking, and the ability to integrate feedback from others. These abilities are primarily attributed to the frontal lobes in the brain. Tests of executive functioning attempt to assess the ability of the student to confront assignments which involve cognitive abilities mediated by the frontal lobes.

Examples:

British Ability Scales
Categories Test
Comprehension Sub test (Wechsler Scales)
Draw-a-Bicycle test
Go/No-go Paradigms
Matric Analogies Test
Rey-Osterreith Complex Figure
Ruff Figural Fluency Test
Similarities Sub test (Wechsler Scales)
Stroop Test
Tinkertoy Test
Wisconsin Card Sorting Test (WCST)

Chapter Eight

RETURN TO SCHOOL

Federal law requires the public school system to provide a free appropriate public education (FAPE) for all children regardless of disability. In most cases, a collaboration among school officials, parents, and the appropriate health care and rehabilitation professionals will be needed to identify the services and environment needed for a student with a traumatic brain injury that will be returning to school.

It will be important to have as much information as possible concerning the child. This information can be obtained from the student's physician and hospital via the school representative or case manager. When possible, the school representative should visit the student at the hospital or rehabilitation facility. Attending discharge planning conferences and staffings are an excellent method for obtaining such information as well as insight into the student's current status. Information exchange prior to discharge can assist in evaluation, placement and educational planning of goals and objectives for the student both at the hospital during rehabilitation and subsequently at school.



Another, occasionally overlooked facet of the return to school is aligning peer-group support and preparing the student for potential problems. The student with a traumatic brain injury may have some difficulty in explaining what has happened. Peers and teachers may feel uncomfortable asking about the injury and subsequent treatment. A few planned visits to the school prior to full-time reentry will allow for the opportunity to get reacquainted with one another and build anticipation for the full time return. These visits can be used to determine the need to relocate classes and determine if the student is going to experience difficulties in getting around the building. If so, maps or signs can be developed for the student. In short, these visits can be used as "trial runs."

Just because a child with a traumatic brain injury has recovered enough to return to school, it cannot be assumed that the child has recovered his or her full pre-injury capabilities. A variety of characteristic problem areas may exist for the returning student. Some typical problems encountered include a tendency to over estimate abilities, decreased social inhibition, poor impulse control, faulty logic, decreased initiative, depression, acting out behaviors, concrete thinking, flat affect, increased irritability, and poor motivation to list a few.

Some basic solutions for problems encountered may be to:

- demonstrate new tasks
- state instructions explicitly providing as many sources of input as possible (auditory, visual, etc.)
- ask the student to restate instructions in different words
- provide as much structure as the student needs
- as attention wanders, be prepared to redirect attention as needed providing "rest breaks" as needed to obtain maximum learning
- be prepared to repeat information as many times as is needed, both during any specific day as well as from day to day as new learning often is much slower
- allow extra time to complete assignments as needed as well as for moving from class to class (sometimes extra assistance may be needed through the use of a "buddy" or an aide to help the student with a traumatic brain injury)
- encourage the student to use a notebook for organizing information such as assignments to do, class schedule, calendars, telephone numbers
- if possible allow the student to record classes for later review (audio/videotapes)
- provide pre-printed class notes for the student
- encourage the student to ask questions about information presented in class
- simplify instructions and tasks into their simplest component parts as needed
- allow the student to use a calculator
- allow for "fatigue prevention" by reorganizing the class day when possible or allow the child or youth to return to school on a limited basis increasing the time in attendance in accordance with the child's level of tolerance

The child who has returned to school following a traumatic brain injury is likely to be both a challenging and a frustrating individual with whom to work. Even the most creative solutions to problems may fail. It is not uncommon for the child, educators, parents, and others to develop unrealistic expectations and experience feelings such as frustration, anger, helplessness and guilt. As all those involved with the individual with a traumatic brain injury learn more about brain injury and its effects, reactions can be better kept in proper perspective. Many students with brain injuries can change dramatically over a very short period of time. When such changes occur, they can be highly rewarding for the student, teacher, family and friends.

There are still many questions about brain injury, especially when the injured person is a child or adolescent. Some of the available answers have been presented here although this will undoubtedly raise others. As families, researchers, educators, and clinicians continue to share their experiences, more answers can be found.

School Support for Parents

School staff can provide invaluable support for parents. Staff should be encouraged to build a partnership with the parents to develop successful programs and strategies for the student. As staff meet with parents, individual staff members need to recognize that the parents may react differently each time and may have difficulty understanding and making decisions. If the parents appear critical, it may be due to the stress of their situation, and therefore, the staff should not take this criticism personally. Very possibly, the parents may be on “overload” because they have been bombarded with technical language, medical technology and at times, conflicting reports. (Waaland, 1990)

School staff can develop a partnership and support system by:

- providing jargon free information
- providing the opportunity to view the child realistically
- sharing strategies with parents
- avoiding overreacting to parental criticism
- encouraging investigation and use of community resources
- offering help for siblings in the school (Mira, 1992)

School Support for Siblings

Atraumatic brain injury can be very stressful for siblings. These brothers and sisters can unintentionally be ignored by their parents during the family crisis; thus, putting them at risk as well. There are a number of steps that school staff can take to provide support for the siblings. Staff should first watch for the following common reactions of siblings.

jealousy	feelings of abandonment
confusion	guilt
depression	aggression
eating disturbances	fear
withdrawal	hyperactivity
sleep disturbances	difficulty getting along with others
truancy	school failure
anxiety	worry
denial	loss
sadness	anger
pain	embarrassment
resentment	frustration
impatience	reluctance to take friends home
shame	delinquency

Ways for the School to Support Siblings

- Suggest to parents that they make arrangements for relatives or friends to spend time with the sibling(s)
- Assist parents with answering siblings' questions about the injury
- Watch for common reactions in school and intervene if these behaviors endure
- Provide time for the sibling(s) to talk with the school counselor or other staff person
- Encourage the child to express feelings and provide feedback that the feelings are normal and not "wrong or bad"
- Locate a local support group for the siblings
- Encourage friends and classmates to be understanding and supportive during this time

PARENT RESOURCE CENTER PROGRAMS

<p>BEREA PRC (606) 986-1929 Mary Callie 3 Pirate Pkwy-Lower Level Berea, KY 40403</p>	<p>JESSAMINE CO PRC (606) 885-6670 Cindy Busick Rosenwald-Dunbar Elem. School 1500 Wilmore Road Nicholasville, KY 40356</p>
<p>CALLOWAY CO PRC (502) 762-7300 Shirley Carpenter East Elementary School 1169 Pottertown Road Murray, KY 42071</p>	<p>KY SCH FOR THE BLIND PRC (502) 897-1583 Jane Schaffer (Ext 295) 1867 Frankfort Avenue Louisville, KY 40206</p>
<p>CHRISTIAN CO PRC (502) 887-1265 Gloria Moss 1605 Phelps Avenue Hopkinsville, KY 42240</p>	<p>MAGOFFIN CO PRC (606) 349-6117 Rebecca Fletcher P.O. Box 109, Gardner Trail Salyersville, KY 41465</p>
<p>FAYETTE CO SP ED PRC (606) 381-3940 Donna Gatewood & Melissa Sommer Southern Elementary School 340 Wilson Downing Bldg. D 10 Lexington, KY 40517</p>	<p>MCCRACKEN CO PRC (502) 575-9723 Robbie Spees 1250 Husbands Road Paducah, KY 42003</p>
<p>Franklin CO PRC (502) 875-8409 BeLinda Henson Collins Lane Elementary #1 Cougar Lane Frankfort, KY 40601</p>	<p>MURRAY USE CENTER (502) 759-4893 Kay Travis 903 Main Street Murray, KY 42071</p>
<p>HOPKINS CO PRC (502) 825-1981 Colleen Wiles 110 Sugg Street Madisonville, KY 42431</p>	<p>SIMPSON CO PRC (502) 586-2008 Pat Gilmer P.O. Box 467 Franklin, KY 42135</p>
<p>JEFFERSON CO PRC (502) 485-3562 P.O. Box 34020 (502) 485-3346 VanHoose Ed Cntr, 4th Floor Louisville, KY 40232-4020</p>	<p>WHITLEY CO PRC (606) 549-7000 Deborah Lawson (Ext 25) 116 North 4th Street Williamsburg, KY 40769-1115</p>
<p>JESSAMINE CO PRC (606) 885-1851 Diane Hall & Shawna Wachs Warner Elementary School 821 Wilmore Road Nicholasville, KY 40356</p>	

Chapter Nine

VOCATIONAL CONSIDERATIONS

The first step of any vocational counselor's work involves the evaluation of the student's current and potential functioning. Specifically the counselor is interested in determining aptitudes, interests, skills, and physical limitations. Medical reports and diagnostic test results help the counselor with the process. The ultimate goal is to identify the best vocational direction based upon what is known about the student and what is known about the local labor market (i.e., physical demands of local jobs and knowledge of companies that will typically hire workers with disabilities) and community services (i.e., vocational training programs and financial assistance services).

A vocational evaluation of the student includes an initial intake interview, general medical review, and vocational testing. In the initial intake interview the vocational counselor collects information on the student's social and vocational history. This information will allow the counselor to develop a vocational plan as well as direct additional formal evaluations needed to adequately determine a vocational goal. This information can also assist the schools with postsecondary transition.

TYPICAL INITIAL INTERVIEW QUESTIONS (Rubin, S. & Farley, R., 1980)

Physical Factors

- Are there specific physical impairments?
- How long ago was the injury?
- Is medical treatment still being received?

Educational-Vocational Factors

- What were the student's favorite/least favorite school subjects?
- Has there been any specific formal vocational training?
- What jobs have been held in the past?
- What were the student's favorite/least favorite aspects of jobs held?
- Has the student held a job since the injury?

Psychosocial Factors

- Are there any fears regarding competitive situations?
- Are there any fears regarding others knowledge of any disabilities?
- Are there any fears regarding physical limitations?
- Is there medication involved that has detrimental side-effects?
- Does the student plan to be living with his or her family?
- What is the interpersonal relationship status of the student's family?
- What is the status of the student's support system and social life?
- Who are the student's friends and what does the student like to do socially?

Economic Status

- What is the primary source of financial support?
- What are the total income, amount of debt and living expenses?
- Is there much concern about finances (i.e., is the student receiving SSI or Workers' Compensation)?

Personal Vocational Interests

- Will the student consider vocational training?
- Is there a specific vocational goal?
- Where does the student hope to be working in five years?
- What is the minimum salary a student expects to make working?
- Does the student prefer working independently or with others?
- Is the student willing and/or able to relocate?

Following the initial interview, a medical evaluation is required to determine whether or not there are physical or medical limitations which may keep a student from performing the essential functions (required duties) of certain jobs. The evaluation also helps establish the exact limitations which may be present, and can be used to determine if interventions/modifications can help the student perform specific job duties. If testing or evaluations, beyond what has already been performed, are indicated, the physician should be informed of the student's vocational objectives so that a proper evaluation of the student's abilities with respect to the vocational goal can be performed.

When a student is unable to identify a specific vocational goal, vocational testing can help the student identify his or her vocational interests. All too often, individuals are unable to select a specific vocational goal especially when there is a limited work history and limited life experiences. When confronted with a student who merely "wants to get a job." or "... just needs to make some money.," the counselor is able to rely on vocational tests to help the student explore some work options or identify jobs that include subjects or tasks which are of interest to the student. It is important not to use these tests to quickly and easily identify a student's future vocation but rather as tools to spur discussion or investigation of work fields or specific jobs. For instance, if a student's vocational profile is determined to be similar to that of a pastry chef, don't necessarily push the student in that direction. Use this information to explore related areas of work such as peer counseling. By the same token, do not discount the possibility that you may have a future pastry chef in front of you.

Vocational Aptitude Tests:

- General Aptitude Test
- Non-reading Aptitude Test Battery
- Purdue Pegboard
- Crawford Small Parts Dexterity Test

Vocational Interests Tests:

- Strong-Campbell Interest Inventory
- Geist Picture Interest Inventory
- Career Assessment Inventory
- Minnesota Importance Questionnaire

The presence of cognitive disabilities can complicate the development of a vocational goal and the placement of an individual. Disabilities related to short-term memory, planning and judgment, attention, concentration, and comprehension may make it necessary to consider sheltered workshops or formal vocational rehabilitation and training programs. There are numerous resources available in the community to help prepare students for the world of work (see Appendix A) and these services should be discussed with the student and the student's family should they appear necessary. Remember there are trained professionals available with years of experience in helping individuals with brain injuries obtain gainful employment. These professionals are skilled at addressing issues such as cognitive deficits, proper dress, being on time for work, arranging transportation, proper workplace behaviors, resume preparation, and job interview skills. When necessary, consult with these professionals for transition planning and consider completing a referral to the proper agency.

Appendix A

RESOURCES

Kentucky Resources

Assistive Technology

Kentucky Assistive Technology
Services Network (KATS)
Coordinating Center
8412 Westport Road
Louisville, KY 40242
(502) 327-0022
(800) 327-5287
Internet: www.katsnet.org

Brain Injury Programs

Cardinal Hill Hospital
2050 Versailles Road
Lexington, KY 40504
(859) 254-5701
(800) 769-2474

CARITAS Peace
Neurobehavioral Unit
2020 Newburg Road
Louisville, KY 40205
(502) 451-3330
(800) 451-3637

CenterPOINT Educational Program
425 South Second Street, Suite 311
Louisville, KY 40202
(502) 582-2266
Internet: www.braincenter.org

Frazier Rehab Center
220 Abraham Flexner Way
Louisville, KY 40202
(502) 582-7484
Internet: www.jhhs.org

HealthSouth Northern Kentucky
Rehabilitation Hospital
201 Medical Village Drive
Edgewood, KY 41017
(606) 341-2044
(800) 860-6004
Internet: www.healthsouth.com

HealthSouth Rehabilitation Hospital
134 Heartland Drive
Elizabethtown, KY 42701
(270) 769-3100

Pathways/Christopher East
4200 Browns Lane
Louisville, KY 40220
(502) 459-8900

Brain Injury Association, Inc. State Affiliate

Brain Injury Association of Kentucky
(State Offices)
4229 Bardstown Road, Suite 330
Louisville, KY 40218
(502) 493-0609
(800) 592-1117
Internet: www.braincenter.org

Brain Injury Association of Kentucky
North Central Offices and CenterPOINT
425 South Second Street, Suite 311
Louisville, KY 40202
(502) 582-2266
Internet: www.braincenter.org

Brain Injury Services Unit (State Government)

Brain Injury Services Unit
100 Fair Oaks Lane
Frankfort, KY 40621
(502) 564-3615
Internet: <http://dmhmrs.chr.state.ky.us//braininjury/>

Client Assistance Program

Client Assistance Program
Capitol Plaza Tower
Frankfort, KY 40601
(502) 564-8035
(800) 633-6283 (KY only)

Independent Living Programs

Center for Accessible Living
981 South Third Street, Suite 102
Louisville, KY 40203
(502) 589-6620

Community Alternatives of Kentucky
1706 E. Main Street
Frankfort, KY 40601
(502) 875-5777

State Office of Special Education

Division of Exceptional Children
Services, Kentucky Department of
Education
Capital Plaza Tower, Eighth Floor
500 Miro Street
Frankfort, KY 40601
(502) 564-4970

Support Groups (Brain Injury)

Bowling Green
Green wood Mall Medical Center
Contact: Dawnel Portmann
(270) 782-3322

Elizabethtown
HealthSouth Rehabilitation Hospital
Contact: Dr. Marge Dubicki
(270) 769-3100

Lexington
Cardinal Hill Rehabilitation Hospital
Contact: Jenny Wurzback
(502) 254-5701

Louisville
Baptist Hospital East
Contact: Debbie Nelson
(502) 896-7456

Louisville

Frazier Rehab Center
Contact: Dr. Bill Kraft
(502) 582-7484

Louisville

Frazier Rehab Center
Contact: Toni Hall
(502) 429-8640

Louisville

Pathways/Christopher East
Contact: Pam Pearson
(502) 459-8900

Louisville

Headliners Social Group
Contact: Todd Gregory
(502) 633-1013

Owensboro

Owensboro Mercy
Contact: Grace Mundell
(270) 688-4313

Thelma

Carl Perkins Rehabilitation
Contact: Sha Reynolds
(606) 789-1440

Parent Resource Center Programs

See Chapter Eight, page 48

Educational Resources

American Vocational Association
1410 King Street
Alexandria, VA 22314
(800) 826-9972

Association on Higher Education
and Disability
University Of Massachusetts (Boston)
100 Morrissey Blvd.
Boston, MA 02125-3393

Council for Exceptional Children
1920 Association Drive
Reston, VA 22091-1589
(800) CEC-SPED
Internet: www.cec.sped.org

Center of Education for Training on
Employment
Ohio State University
1900 Kenny Rd.
Columbus, OH 43210-1090
(800) 848-4815

National Clearinghouse on
Postsecondary Education for Individuals
with Disabilities
HEATH Resource Center
One Dupont Circle, Suite 800
Washington, DC 20036-1193
(800) 544-3284
Internet: www.health-resource-center.org

National Information Center for
Children and Youth with Disabilities
(NICHCY)
P.O. Box 1492
Washington, DC 20013
(800) 695-0285
Internet: www.nichcy.org

National Resource Center for Traumatic
Brain Injury
Virginia Commonwealth University's
Medical College of Virginia
Internet: www.neuro.pmr.vcu.edu

U.S. Department of Education
400 Maryland Avenue, S.W.
Washington, DC 20202
(800) USA LEARN

Recreational Activities Resources

Baseball

Little League Challenger Baseball
U.S. Central Region Headquarters
9802 E. Little League Drive
Indianapolis, IN 46235
(317) 897-6127
Internet: www.littleleague.org

Basketball

National Wheelchair Basketball
Association
Internet: www.nwba.org

Bowling

American Wheelchair Bowling Assoc.
6264 North Andrews Avenue
Ft. Lauderdale, FL 33309
(954) 491-2886

Canoeing

Cooperative Wilderness
Handicapped Outdoor Group
Idaho State University
P.O. Box 8128
Pocatello, ID 83209
(208) 282-3912
Internet: www.isu.edu/cwhog

Fishing

handiCAPABLE Guide Service
P.O. Box 222
Gilbertsville, KY 42044-0222
Internet: www.handicapable.net

General Recreation

American Alliance for Health,
Physical Education, Recreation and
Dance
1900 Association Drive
Reston, VA 22091-1599
(703) 476-3400
Internet: www.AAHPERD.org

Horseback Riding

North American Riding for the
Handicapped Association
1(800) 369-RIDE

Music Therapy

American Music Association
8455 Colesville Road, #930
Silver Spring, MD 20910
(301) 589-3300

Scouting

Boy Scouts of America
Lincoln Heritage Council
824 Phillips Lane
P.O. Box 36273
Louisville, KY 40233
Internet: lhcbasa.org

Snow Skiing

Extreme Adaptive Sports
504 Brett Place
South Plainfield, NJ 07080
(908) 313-5590
Internet: www.sitski.com

Sports (Various)

Disabled Sports USA
451 Hungerford Drive
Suite 100
Rockville, MD 20850
(301) 217-0960
Internet: www.dsusa.org

Wheelchair Sports USA
3595 East Fountain Boulevard
Suite L-1
Colorado Springs, CO 80910
(719) 574-1150
Internet: www.wsusa.org

Special Olympics Kentucky
105 Lakeview Court
Frankfort, KY 40601
(502) 695-8222
(800) 633-7403
Internet: www.soky.org

U.S. Association for Blind Athletes
33 North Institute Street
Colorado Springs, CO 80903
(719) 630-0422

Summer Camp Programs

Camp Easter Seals
Mt. Juliet, TN
(615) 444-2829
e-mail: escamp@bellsouth.net

Camp KYSOC
1902 Easterday Road
Carrollton, KY 41008
(502) 732-5333
Internet: www.cardinalhill.org/camp/

National Easter Seals Society
Internet: www.easter-seals.org

Track and Field

Wheelchair Racing Resource Page
Internet: www.execpc.com/~birzer

Vocational Resources

Clearinghouse on Disability Information
Division of OSERS
Department of Education
Switzer Building, Room 3132
Washington, DC 20202-2425
(202) 205-8241
Internet: www.ed.gov/offices/OSERS/

Center for Rehabilitation Technology
Georgia Institute of Technology
490 Tenth Street, Northwest
Atlanta, GA 30318
(800) 726-9119

disAbility online
Internet: www.wdsc.org

The Dole Foundation
1819 H Street, NW, Suite 340
Washington, DC 20006-3603
(202) 457-0318

Industry Labor Council
National Center for Disability Services
Human Resource Center
201 I.U. Willets Road
Albertson, NY 11507-1599
(516) 747-6323

Job Accommodation Network (JAN)
918 Chestnut Ridge Road, Suite 1
West Virginia University
P.O. Box 6080
Morgantown, WV 26506-6080
(800) 526-7234

Just One Break (JOB)
373 Park Avenue South
New York, NY 10016
(212) 725-2500

Mainstream
3 Bethesda Metro Center, Suite 830
Bethesda, MD 20814-6301
(301) 654-2400

National Organization on Disability
910 - 16th Street, NW, Suite 600
Washington, DC 20006
(800) 248-2253

National Rehabilitation Information Ctr.
Internet: www.naric.com

President's Committee on Employment
of People with Disabilities
1331 F Street, NW
Washington, DC 20004
(202) 376-6200

Virginia Commonwealth University
Rehabilitation Research & Training Ctr.
1314 West Main Street
VCU Box 2011
Richmond, VA 23284-2011
(804) 367-1851

Brain Injury Association, Inc.
105 North Alfred Street
Alexandria, VA 22314
(703) 236-6000
Internet: www.biausa.org

Center for Accessible Housing
North Carolina State University
P.O. Box 8613
Raleigh, NC 27695-3082
(919) 515-3082

Disability Rights Education and
Defense Fund, Inc.
1633 Q Street, NW, Suite 220
Washington, DC 20009
(202) 986-0375

Equal Employment Opportunity
Commission
1801 L Street, NW
Washington, DC 20507
(202) 663-4900

Midwest Regional Head Injury
Center for Rehabilitation and Prevention
448 East Ontario, Sixth Floor
Chicago, IL 60611
(800) 252-8247

National Association of Protection
and Advocacy Systems
900 Second Street, NE, Suite 211
Washington, DC 20002
(202) 408-9514

National Easter Seal Society
230 West Monroe Street, 18th Floor
Chicago, IL 60606
(312) 726-6200

Additional Resources

American Occupational Therapy
Association
Box 1725
1383 Piccard Drive
Rockville, MD 20850
(800) 755-8550

Appendix B

Glossary

A

Abnormal postural tone

The degree of vigor or tension in a muscle which is not normal. This results in a body posture that lacks smoothness of movements.

Abstract thinking

Refers to concepts that may be difficult to understand; concepts that are theoretical or detached, dealing with things that cannot actually be seen. Some patients with cognitive deficits can only understand concepts that are "concrete," or related to something tangible in the environment.

Active Range of Motion (AROM)

The amount of motion in a joint that a person can achieve by using their own muscle strength.

Activities of Daily Living (ADL)

Activities include feeding, dressing, personal care, home-making, etc.

Acute Rehab Program

An acute rehabilitation program begins as soon as the patient is medically stable and continues until he is ready for either an outpatient or long term rehab program.

Adaptive equipment

Devices (i.e. button hooks, reachers) which allow a person to perform tasks they previously could not do because of an impairment.

Adiadochokinesia

Inability to stop one movement and follow it immediately by the directly opposite action, known as rapid alternating movements.

Affective behaviors

Actions, gestures and expression; verbal and nonverbal associated with emotions. Brain injury can cause a person's emotional response to be irrelevant or not match the situation.

Agitation

Excessive motor activity which is usually non-productive and is often accompanied by shouting or loud complaining.

Agnosia

Inability to recognize a sensory stimulus. May occur in any sensory modality.

Agraphia

Inability to express thought in writing.

Air splints

Plastic bags that are formed to fit around the disabled limb and inflated to full capacity to exert a pressure on the tissues which facilitates the flow of circulation and energy and reduces spasticity.

Alertness

Refers to consciousness or wakefulness.

Alexia

A disorder in which cerebral lesions cause a loss of the ability to read.

Ambulatory

Walking.

Amnesia

Partial or total loss of memory for periods of time. See **Amnesia (anterograde)**, **Amnesia (post-traumatic) & Amnesia (retrograde)**.

Amnesia (anterograde)

Inability to remember events beginning after a brain injury. Severely decreased ability to learn new information.

Amnesia (post-traumatic, PTA)

The period of anterograde amnesia following a brain injury. Patient is unable to store new information.

Amnesia (retrograde)

Loss of memory for events preceding a brain injury.

Anomia

Inability to find the correct word. Problems with naming objects, persons or events; often, the person will recognize the word when it is given.

Anoxia

A condition resulting in insufficient oxygen to the brain.

Anti-convulsive medications

Medications that prevent or relieve convulsions/seizures. Such medications include: Dilantin, Tregretol, and Pheno-barbital.

Antibiotics

Medications used to treat or prohibit infections.

Anxiety

Motor tension caused by physical and psychological tension (i.e. worry, fear, upset stomach, heart pounding, lack of concentration, difficulty sleeping).

Apathy

Lack of interest or emotion. A person exhibiting apathy may refuse to participate in or seem disinterested in activities; may prefer to sit or lie around. Lack of interest may be the result of the injury and not under the voluntary control of the individual.

Aphasia

Impaired ability to articulate ideas and/or understand language. Impairment is related to damaged brain cells rather than damaged speech or hearing organs.

Aphonia

Loss of voice.

Apraxia

Inability to plan and perform a learned voluntary movement smoothly, not due to muscle weakness or failure to understand directions.

Apraxia of speech

An impairment of speech caused by damage to the area of the brain responsible for planning orderly movements of the speech muscles; the partial or total inability to initiate or sequence speech sound in the proper order despite the fact the muscles of speech themselves may have adequate strength.

Art therapy

Using art techniques such as painting, crafts, and group activities to develop motor skills, perceptual abilities and self-esteem.

Arterial line

A catheter in the patient's arteries, most often in the arm. The arterial line is used to measure blood pressure and the amount of oxygen and carbon dioxide in the blood.

Articulation

The movements of speech organs employed in producing a particular speech sound.

Articulation disorder

Incorrect production of speech sounds due to faulty placement, timing, direction, pressure, speed or integration of the movement of the lips, tongue, velum or pharynx.

Aspiration

When fluid or food enter the lungs via the windpipe because of failure of the voice box to close off the windpipe (trachea).

Assistance levels

1. Dependent: Individual makes no voluntary effort to assist.
2. Maximal Assistance: Individual participates some and another person performs most of the activity.
3. Moderate Assistance: Individual and assistant participate about equally.
4. Constant Minimal: Individual performs most of the activity and only needs some assistance.
5. Verbal Cues: Individual requires observation by another person and verbal cues to perform the activity in order to

Assistance levels (cont.)

prevent the need for physical assistance or to avoid a potential safety hazard.

6. Supervision: Individual requires observation by another person to ensure safety.

7. Independent: Individual requires no assistance or supervision to perform the activity.

Ataxia

A lack of coordination which results in jerky, unsteady movements of the arms and legs.

Attending physician

The doctor ultimately responsible for the care of the patient.

Attention (attention deficits)

The capacity for focusing attention on a specific occurrence; for choosing which stimuli to perceive.

Attention to task

The ability to focus on an activity.

Audiologist

A person who evaluates hearing.

Augmentative communication devices

A computer or other means of communication for people unable to speak.

Automatic behavior

Actions which require little or no thought, effort or planning. These actions are usually learned in childhood and used frequently such as tying shoelaces and counting.

Awareness

Ability to recognize and discern stimulation originating from within the individual or the environment.

B

Balance

The ability of the body to readily adapt to changes in the center of gravity to find equilibrium.

Bed mobility

Movement in bed which includes rolling to the right or left, sitting up, lying down, and vertical and horizontal movements.

Bed sore

A sore on the body due to prolonged contact with the bed; also known as a "decubitus ulcer."

Behavior modification program

A program for an individual with behavior problems which creates a series of rewards and the withholding of rewards.

Behavioral rehabilitation

When the patient's behavior interferes with regaining lost skills, counseling is given to help accept the disability which is now faced. This in turn will result in the patient's improved cooperation with those trying to help the patient recover.

Biofeedback

Instant information given to an individual in order to monitor a particular state of mind.

Bladder program

Medical procedure in which an indwelling (Foley) catheter is inserted to assist bladder drainage.

Body awareness and laterality

Awareness of one's body, its parts, how they work and the ability to distinguish between movement on the left and right sides of the body.

Body image

A person's mental picture of his body that expresses his feelings and thoughts about his body instead of an exact picture of the physical structure.

Body scheme

The knowledge of how one's body is put together and the relationships of body parts to each other (i.e. a person may not know that her hand is at the end of her arm).

Bowel routine

The use of activity, medication and diet to regulate bowel function.

Brain scan

Procedure that uses radioactive dye to allow a "picture" to be taken which scans for abnormalities.

Brain stem

The brain stem connects the larger portion of the brain with the spinal cord and the rest of the body. It controls consciousness, swallowing, heart beat, body temperature, breathing, eye movements, etc. All signals from and to the brain must pass through the brain stem.

C**Carryover**

Refers to the ability to retain newly learned skills or information and apply them another situation.

Catheter

Also called a "line." Catheters are thin tubes which may be placed in several parts of the body to put material in, drain fluids out or to take samples or measurements.

Central Nervous System

The central nervous system (CNS) consists of two parts, the brain and the spinal cord. The largest part of the brain is made up of the two hemispheres and their interconnections. This part of the brain controls thinking, movement, vision, speech, and understanding language. The spinal cord is the connection of the brain to the rest of the body.

Cerebellum

The portion of the brain concerned with coordinating movements that is located below the cortex.

Cerebral angiography

An injection of dye into an artery so that the vascular system of the brain can be studied by x-ray.

Cerebrospinal fluid, CSF

Fluid which surround the brain and spinal cord.

Chest tubes

Tubes inserted between the ribs and lungs to remove air and/or fluid.

Chux

Blue, absorbent and waterproof underpads used to protect bedding.

Circumlocution

An inability to recall a name of an object (i.e. "cup" is "drink from" or "ball" becomes "that round thing.")

Clonus

Quick stretch of a muscle producing a sustained series of rhythmic jerks.

Closed brain injury

An injury brought about by force that does not crack or penetrate the skull.

Cognition

The process of "thinking" which includes perception, memory, and judgment.

Cognitive strategies

Use of mental techniques to compensate for weaknesses (i.e. using a color code on a schedule board to "remember" daily appointments.)

Cognitive therapy

Learning that is concerned with acquisition of problem-solving abilities, intelligence and conscious thought.

Coma

A period of prolonged unconsciousness and unresponsiveness to the environment.

Coma treatment (intervention)

A program designed to strengthen the recovery process through medical, nutritional, and physical intervention; should include sensory stimulation.

Communication

Any means by which an individual relates information or feelings to another including speech, sign language, gestures, and writing.

Communication disorder

Disruption in spoken or written ability due to disease or injury, or any interference with an individual's ability to comprehend or express information.

Community re-entry

Offers retraining in the life skills needed to function as independently as possible; includes emphasis on self-care, activities of daily living, and physical mobility.

Community reintegration

A program designed to teach patients and their families about community resources and how to use them (i.e. transportation services, recreation programs, and support groups).

CT (CAT) Scan

Also known as computerized tomography, which is a series of x-rays of the brain at various levels to show its structure; shows the more obvious abnormalities such as hematomas, enlarged ventricles or atrophy.

Comprehension

Understanding language in a way that allows learning and appropriate action.

Concept

General idea or meaning usually understood by a word, symbol or sign; idea which combines several elements from different sources into a single notion.

Conceptual disorder

Disturbance in ability to formulate and understand concepts.

Conceptualization

Process of thinking or imagining; ability to abstract and categorize; formation of a concept or ideal.

Concrete thinking

Difficulty in forming abstract concepts, in speculating about what might be, and in grouping things into categories.

Concussion

A blow to the head which results in the brain being "shaken-up" but not obviously bruised. May or may not involve a loss of consciousness.

Confabulation

Statements about people, places and events with no basis in reality. May be detailed and stated with apparent confidence by the patient. Usually done when a patient feels the need to fill in memory gaps with some information no matter how farfetched.

Consulting physicians

Doctors in other specialties who have been asked to give their advice on certain aspects of the care of the injured person's care.

Continent

Ability to control bowel and bladder functions.

Contracture

Loss of range of motion in a joint due to insufficient movement.

Coordination

The harmonics working together of several muscles or muscle groups in the execution of complicated movement.

Cortex

The largest portion of the brain and is where most thinking and cognitive functioning takes place.

Craniotomy

Any surgical opening into the skull performed to relieve intra-cranial pressure, to control bleeding or to remove a tumor.

D**Decadron, Dexametasone**

A steroid given to lessen swelling of the brain.

Decerebrate posturing

Exaggerate posture of extension as a result of a lesion to the preponine area of the brain stem.

Decorticate posturing

Exaggerated posture of upper extremity flexion and lower extremity extension as a result of a lesion to the mesencephalon or above.

Decubitus ulcer

A "bed sore" due to prolonged contact with the bed.

Deficit

A decrease in functioning; the inability to perform a particular task at a previous level.

Denial

Patient or family will not admit or realize the severity and long-term nature of a brain injury.

Diaphoresis

Excessive sweating.

Diffuse injury

An injury to the brain which impairs functioning of large areas of the brain tissue.

Diffuse axonal injury; white matter shearing

Microscopic tears of the nerve fibers that may have a more significant impact on functional abilities than the more obvious damage to the brain.

Dilantin, Phenytoin

Anti-seizure drugs which are usually given to prevent seizures.

Diplopia

Seeing two images of a single object; "double-vision."

Discrimination (auditory)

Ability to sort and sift sounds from each other.

Discrimination (perception)

Ability to discern fine difference among stimuli, whether visual (sight), auditory (hearing), or tactile (touch).

Discrimination (visual)

Ability to detect differences in objects, forms, letters or words.

Disinhibition

Not being able to control impulses and/or emotions due to the injury.

Disorientation

Not knowing where and who you are; confusion about the date and time.

Distractibility

Not being able to determine most important information or input; all stimulation is perceived as equally important and therefore makes concentration difficult.

Dressings

Bandages.

Dura

The tough, fibrous membrane forming the outermost of the three coverings of the brain and spinal cord.

Duration

Length of a sound. Length of sounds or syllables; pauses between phrases or sentences; overall rate of speech.

Dysarthria

Difficulty with pronunciation due to weakness or poor coordination of the muscles of the lips, tongue or jaw.

Dysfluency

Any type of speech which is marked with repetitions, prolongation, and hesitations; an interruption in the flow of speech sounds.

Dyslexia

Impaired ability to read.

Dysphagia

A disturbance in the act of swallowing either solids or liquids.

Dysphasia

An impairment of speech, not as severe as aphasia, usually the result of an injury to the speech area in the cerebral cortex of the brain.

E

Echolalia

A parrot-like repetition of words spoken by others.

Edema

Swelling of the brain because of a head trauma.

EEG, Electroencephalograph

An electrical test of the functioning of the brain. The EEG is very good at detecting seizures. The EEG is very inaccurate when used to estimate the extent of brain damage.

EKG (ECG), Electrocardiogram

An electrical test of the functioning of the heart.

Emesis

Vomiting.

Emotional lability

Exhibiting rapid and drastic change in emotions.

Encephalograph

Non-invasive use of ultrasound to record echoes from brain tissue. Used to detect hematoma, tumor or ventricle problems.

ET or Endotracheal tube

A tube inserted into the patient's trachea (windpipe) to control breathing and prevent foreign material from entering the lungs.

Evoked potentials

A specific type of EEG, involves recording the electrical responses of the brain that are provoked by specific visual (sight), auditory (hearing), or tactile (touch) stimuli; suggests how well nerve circuits are functioning.

Euphoria

An exaggerated feeling of well-being or elation.

Evoked cerebral responses

A test to measure the brain's response times to a specific stimulation.

Evoked potential

A tracing of a brain wave measured on the surface of the head at various places. The wave, unlike the waves on an EEG, is a response to a specific visual, auditory or tactile stimuli. Evoked potentials are being used to diagnose a wide variety of central nervous system disorders.

Executive functions

The mental control functions of the brain including planning, prioritizing, sequencing (putting things in order), self monitoring, self correcting, inhibiting ("holding back" when appropriate), initiating, controlling or altering behavior.

Expressive aphasia

Inability to express one's self even though one knows what to say. The "thoughts" are there but the expression is inhibited.

External fixation device

A special splint that holds broken bones in place, these devices are connected to pins through the bones.

Extremity

Arm (and hands) or leg (and feet).

Eye-hand coordination (visual-motor integration)

The use of the eye and hand in unified action; making your hands do what your "eyes" perceive needs to be done; coordination.

F

Family teaching

Meetings with families to help them understand the patient's problem areas and to make suggestions.

Family conference

A meeting between the family and all the members of the rehab team to discuss progress, concerns or discharge plans.

Figure ground skills

Recognition of forms and objects when presented in a configuration with competing stimuli; being able to "pick out" objects; the ability to distinguish foreground from background.

Fixation, visual

A pause of the line of sight on something of interest in the visual surroundings.

Flaccid

Relaxed, having defective or absent muscular tone; weakness.

Flaccidity

Lack of muscle tone which results in inability to perform any movement.

Fluency

Smoothness with which sounds, syllables, words and phrases are joined together during speech.

Focus, eye

The term has many meanings and usually avoided; it does imply the convergence of the two eyes attending or tracking something.

Foley catheter

An indwelling catheter (tube entering the body) used to provide drainage of urine, when bladder function is impaired.

Form constancy

Recognition of forms and objects when presented in different contexts.

Frontal lobe

The area of the brain located in the front left and right sides. The area play an important role in controlling emotions, motivations, social skills, expressive language and more.

Frustration tolerance

The ability to deal with frustrating events in daily life. The point at which a person can no longer control his anger.

Functional

The term functional (as in functional living skills) refers to a person's ability to accomplish a task using any means available (adaptive equipment, compensations, techniques, etc.)

Functional ability

Level of independence and success at a given task; capacity of performing an act that results in a practical end result.

G**Gait (ambulation) training**

Instruction in walking, with or without equipment.

G-tube, Gastrostomy tube

An artificial opening into the stomach used for feeding an unconscious person.

Glasgow Coma Scale

A scale of severity of injury related to the level of consciousness with three factors: motor responses, eye opening and verbal responses.

Goal directed, purposeful behavior

Intended actions directed toward accomplishment of an objective.

Group home

A closely supervised living situation for disabled individuals which focuses on development of self-help skills to prepare individuals for semi-independent or independent living.

H**Halo**

A metal ring placed around the head for patients with spinal injuries to prevent their head from moving.

Hematoma (subarachnoid, subdural, epidural)

Trauma to the head which causes blood vessels to rupture; blood accumulates and puts pressure on the brain; other three terms refer to location of the blood.

Hemianopsia

Blindness of one-half of the visual field caused by brain damage. Hemianopsia is not blindness in one eye, it indicates blindness in one-half of each eye and normal vision in the other half of each eye.

Hemiparesis

Muscle weakness of one side of the body.

Hemiplegia

Paralysis of one side of the body caused by an injury to the opposite side of the brain.

Hemorrhage

The escape of blood from a ruptured vessel.

Hoyer lift

Equipment used to transfer a person safely to and from bed to wheelchair.

Hydrocephalus

Excess accumulation of cerebrospinal fluid, causing increased intracranial pressure.

Hydrotherapy

Treatment using water as a means of promoting relaxation and healing, increasing flexibility and decreasing pain. May involve use of water tanks, pools, walking tanks, and whirlpools.

Hyperactivity

Abnormal excess of physical action.

Hyperesthesia

Increased sensitivity to touch.

Hypoxia

A decrease in oxygen supply to tissue.

I**Impairment**

A function which is diminished in strength or quality because of sickness or injury.

Impulsivity

Attempting with confidence, unfamiliar tasks or responses that are beyond one's capability or knowledge; acting without thinking action through first.

Incontinent

Inability to control bowel and bladder.

Inflexibility

Inability to respond to change.

Initiation

The ability to start an activity or conversation with little or no prompting.

Insight

Understanding and "making sense" out of the factors in a situation.

Intensive Care Unit (ICU)

The place in the hospital where critically ill people are cared for. Sometimes brain injured people are cared for in a special Neurological ICU (NICU).

Intentional tremor

A tremor that occurs only with voluntary, planned movements.

Intermediate care facility

A program which provides personal care to the person with an intermediate degree of physical and/or social dependency also with minimal medical care. The emphasis is on a structured supportive care system in meeting daily living needs.

Intern

A medical doctor who has completed his medical training and is usually in his or her first year of specialty training. Interns work under the supervision of Physicians.

Internist

A medical doctor with expertise in internal medicine, treatment of infectious diseases and diseases of the heart, gastrointestinal tract and other internal organs.

Intracerebral

Refers to the "inside" of the brain.

Intracranial

Refers to the inside of the skull which contains the brain.

ICP, Intracranial pressure monitor

A monitoring device to determine the pressure within the brain. It consists of a small tube attached to the patient at the skull with a screw and then to an electronic sensor.

IV, Intravenous line

A catheter (tube) inserted into a vein through which fluids and medicines are given.

Isolation

Precautions to protect the patient and others, usually from the spread of infection.

J

Judgement

The ability to make appropriate decisions based upon available information and expected consequences; the ability to determine the potential consequences of one's actions.

K

Kinesthesia

The sensory awareness of body parts with movement.

L

Lability

Inappropriate emotional expression and control such as exaggerated laughing or crying.

Lack of self-correction

The patient does not recognize verbal or action errors; or if error is pointed out, he or she is not able to identify steps for self-correction.

Lack of initiation and "follow-through"

The inability to start, continue and carry through actions without structured supervision.

Language, confused

Unconscious rambling from idea to idea; difficulty in maintaining focus in verbal interaction.

Language, expressive

Communication with conventional written or spoken word.

Language, impairment

Limited ability or inability to use language effectively.

Language, receptive

The process involved in understanding verbal or visual messages; words that one can understand.

Latency of response

Lapse of time occurring between a stimulus and response; a slow reaction.

Level of awareness

Degree of acuity in perceiving internal and external stimuli; ability of a person to understand what is "going on" around them.

Limbic system

A set of structures (usually part of the temporal lobe) that plays an important role in memory, attention, emotion, and behavior.

M

MRI, Magnetic Resonance Imaging; NMR, Nuclear Magnetic Resonance

A relatively new procedure that uses magnetic fields to picture the brain's soft tissue; provides a more detailed picture than the CT scan. Images of the body are created without

MRI, Magnetic Resonance Imaging; NMR, Nuclear Magnetic Resonance (cont.)

the use of radiation. During MRI, a magnet is used to pull on the nuclei of the body's hydrogen atoms. This magnet causes the nuclei to line up and repeatedly absorb and raise radio waves. A computer then translates these radio waves to images of the areas examined. The images are projected on a video screen and recorded on film in interpretation by a radiologist (a physician specializing in diagnostic imaging).

Manual dexterity

Ability to coordinate one's hands to accomplish a task such as dialing a telephone.

Medical assistance

Refers to medical insurance provided by the state or federal government for persons who meet certain medical and/or financial eligibility standards.

Medically stable

Reaching a point in medical treatment where life threatening injuries and diseases have been brought under control.

Memory

There are many types of memory. It involves the ability to recall and record new information. Some of the more common aspects of memory include the process of perceiving information, organizing and storing it, and retrieving it at a later time as needed. Memory is a complex function that involves many parts of the brain working together. There are different types of memory including immediate (repeating a phone number), recent (recalling what occurred the previous day) and remote (recalling the name of a childhood friend).

Memory, immediate recall

Immediate repetition of information given by an examiner.

Memory, long term

More permanent storage of the memory trace; the ability to recall information from 24 hours previously or longer.

Memory, sequential

Storage and retrieval of information requiring a specified order of input and recall.

Memory, short-term

Working memory with a limited capacity. Its contents are in conscious awareness. Lasts 30 seconds to several minutes.

Memory, span

Number of items that can be recalled from stimulation.

Modalities

General term used to describe treatment using heat, cold, light, water, etc. These treatments are commonly used to help reduce pain, increase functional movement, reduce contracture, promote healing, and more.

Monitor

A television screen near the patient's bed showing their heart beat, blood pressure and other important information. Most monitors have alarms to alert the staff when something is wrong.

Motor control

The ability to selectively contract or relax a muscle or group of muscles at will.

Motor planning

Action formulated after input from sensory, motor and/or perceptual modes.

Motor lag

A person receives input of information, motor lag refers to the prolonged latent period between stimulus (information) and initiation of motor response.

Muscle tone

The amount of tension (continuous contraction) in a muscle at rest. The quality or quantity of muscle tone has an effect on the efficiency of voluntary muscle contraction. For example, when a person has low muscle tone, their endurance will be less and they will react less to a given stimulus.

Myelography

An injection of dye into the spinal subarachnoid space so that an x-ray of the spine can be taken.

N

NG tube, Nasogastric tube

A tube which passes through the patient's nose and throat and ends in the stomach. This tube allow for feeding to maintain nutritional status or to remove stomach acids.

Neglect, (unilateral, hemi-, hemi-attention)

Severe lack of awareness of the side of the body or environment opposite the side of the brain injury. May occur in any sensory modality.

Neurologist

A physician who specializes in diseases of the brain, nerves and muscles.

Neuropsychological evaluation

An assessment using psychological tests, interviews, history, and behavioral observations, to determine a person's cognitive, emotional, and behavioral state, with particular emphasis on deficiencies of intellect, personality and behavior as outcomes of brain injury. Assessments are used to determine brain/behavior relationships, locations of injury, brain systems involved and serve as guides for needed treatment interventions.

Neuropsychologist

A psychologist with special skills in dealing with people with brain injuries. Neuropsychologists often administer special evaluations of brain function and coordinate the rehabilitation of people with brain injuries.

Neurosurgeon

A surgeon who is an expert in diseases of the nervous system and also operates on the brain and is often the attending physician supervising the care of the person with the brain injury.

Nurse

A person with expert training in the care of a patient. Nurses in the ICU and on rehabilitation teams often have additional training.

Nutritionist

An expert in the feeding and nutritional needs of people.

O

Occipital lobe

The back part of each side of the brain, involved in perceiving and understanding visual information.

OTR, Occupational Therapist, Registered

An Occupational Therapist establishes the routines of self-care activities and family living; working to improve thinking through interaction and activities.

Oral motor function

Movement of the lips, tongue and soft palate.

Organic personality syndrome

A change in personality marked by impaired judgment and loss of control over emotions, impulses and behavior; person may exhibit sudden temper outburst, sudden crying, apathy, indifference, loss of initiative, suspiciousness, and anxiety, as well as other behavior or emotional difficulties.

Organization

The ability to arrange data in such a manner as to understand relationships between events or information.

Orientation

Reality-based information about the world; who one is, where one is, who one is talking to, what day it is, etc.

Orthopedic surgeon

A physician who specializes in diseases of the bones; often involved in the treatment of injuries to the limbs and back.

Outpatient rehabilitation

This program is for patients who appear to benefit from less intensive rehabilitation and may benefit from living in the community with retraining received at rehabilitation centers.

P

Paraphasia

Condition characterized by fluent utterance of speech sounds in which the production of unintended syllables, words, or phrases are prominent during the effort to speak,

Paraphasia (cont.)

similar errors observed in written language.

Parietal lobe

The upper middle lobe of each side of the brain, involved in perceiving and understanding sensation and relates to speech and writing.

PROM, Passive range of motion

The amount of motion at a given joint when it is moved by another person or another functioning limb.

Perception

Integration of sensory impressions into psychologically meaningful data.

Perceptual-motor skills

The ability to correctly perceive the environment and to produce appropriate motor responses (movement) to that environment.

Perseveration

Meaningless repetition of a verbal or motor response, or repetition of answers which are not related to successive questions asked.

PET Scan, Positron emitted tomography

Imaging procedure that allows the brain's metabolism to be pictured so that areas of greater and lesser brain activity can be discerned.

Phonation

Production voiced sound by means of vocal fold vibration.

Physiatrist

A physician who specializes in physical medicine and rehabilitation, who has overall responsibility for directing the rehab program.

PT, Physical Therapist

A Physical Therapist treats a patient with a program formulated from an evaluation of the individual's motor functioning to correct and improve areas of impairment.

Posey

A safety harness used to prevent falls.

Position sense

The sensory awareness of body parts in the absence of movement.

Position in space

Knowledge of one's position in space relative to other objects.

Positioning

Placing a person in a position and changing that position so that muscle and joint flexibility is preserved and skin breakdown prevented.

Posture

The resultant motor response that reflects the individual's relationship to the forces of gravity and with a large degree of automaticity.

Pressure sores

see **Decubitus Ulcer**

Problem solving

The ability to use cognitive processes in a task in a practical way, using reasoning and judgment.

Proprioception

The awareness of the position of one's joints in space.

Psychiatrist

A physician who specializes in the management of behavioral and psychiatric problems.

Psychologist

A physician who specializes in the management of behavioral and psychological problems.

Pulmonologist

A medical doctor who specializes in problems of the lungs.

Q

Quadripareisis

A weakness that involves arms and legs.

Quadriplegia

An immobility or impairment in arms and legs.

R

Rancho Los Amigos Scale

An eight-level scale of cognitive recovery ranging from no response (level 1) to purposeful, appropriate interactions with the environment (level 8).

Range of motion

Refers to the specific angles of movement of which a joint is able to move.

Receptive aphasia

Inability to understand spoken language.

Rehabilitation

The restoration of maximum independence to a disabled individual with his or her limitations by developing his residual capabilities.

Resident

A medical doctor who has finished his or her medical training and is taking additional training to specialize while under supervision.

Respirator

See Ventilator.

RT, Respiratory/Pulmonary Therapist

A person with special skills in operating machines to aid breathing and in keeping the patient's airway open.

Respite care

The family is given a break from the daily care of their loved one.

Rigidity

Difficulty in conforming or changing attitudes or actions.

S

Seizure, seizure disorder

A seizure is a disturbance in the electrical chemical activity of the brain due to nerve cell damage or electrolyte imbalance.

Self-monitoring

Awareness of one's behavior and the accuracy of appropriateness of one's performance; the ability to self-correct when appropriate.

Sensory integration

Interaction of two or more sensory processes in a manner which enhances the adaptiveness of the brain's response.

Sensory stimulation

A treatment that stimulates all the senses designed to encourage the person in a coma (or vegetative state) to respond to their environment.

Sequelae

Events following or resulting from the injury.

Sequencing skills

The ability to put items in the correct order. May be motor (movement) or linguistics (words into sentences) as well as keeping track of the correct order of stimuli.

Serial casting, inhibitive

A technique used to reduce contracture and control hypertonicity in and around a joint, usually the ankles and wrists. It is a series of plaster casts which are applied to the area every 7-10 days; when the casts are changed, the joint should be recast in an improved position.

Sheltered workshop

Work oriented rehabilitation facility with a controlled environment. Such a workshop employs disabled people and provides work experience which may assist the individual in progressing toward a productive vocational status.

Shunt

A procedure to drain off excessive fluid in the brain.

Skilled care facility

A facility in which nursing services, therapy services and other sources of physical support are provided to individuals with physical and/or cognitive limitations.

Social imperception

Lack of concern and emotions about what is going on and the priorities of life.

Social interaction, socialization

Refers to the skills needed to participate in the social situations which are part of daily living.

Social Security Disability

Monthly income granted to persons who have paid into the social security system and are confirmed disabled and unable to work for at least one year; may also provide some form of health insurance.

Social worker

Social Workers do a wide range of work from finding sources of funds to providing emotional support for families.

Space boots, wrist splints and sheepskins

Lamb's wool, padded support devices used to align the muscles and tendons of the patient and to protect the skin against pressure sores. Without this support, patients who are unconscious for long periods may develop deformities limiting future movement.

Spasms

Involuntary muscle contractions resulting from excess muscle tone. This is caused by an interruption of controlling impulses in the brain and spinal cord.

Spasticity

An uncontrolled increase in muscle tone at rest or during movement.

Speech

Oral expression on language.

Speech impairment

Any deviation of speech outside the range of acceptable variation in a given environment.

Speech pathologist

A Speech Pathologist is an expert in caring for problems with expressing and understanding language.

Spinal cord

The spinal cord is the final connection of the brain to the body. The result of a spinal cord injury can be paralysis and loss of sensation in the limbs as well as loss of bowel and bladder control.

Splint

An external device applies to an extremity (usually the hand) to provide positioning to help prevent or correct contracture.

Spontaneous movement

A reaction resulting from a natural impulse without obvious planning or premeditation.

Spontaneous recovery

Visible outcome of the natural healing process of the nervous system.

Staffing

See **Team Conference**.

Steroids

Medication which appears to improve function of the brain by decreasing the swelling during the initial days of the injury.

Stimulus, stimuli (plural)

Anything causing or intending to cause a response or reaction.

Simulus bound behavior

Behavior in which an individual has difficulty changing to adapt to their immediate surroundings.

Sub-acute rehabilitation program

This program is designed for patients following the acute level of therapy; generally for people with a longer recovery time and for which more time is needed to decide the best treatment.

Supervised living

Some people with brain injuries are unable to return to a life of complete independence. In a supervised living situation, provisions to use remaining abilities are offered with extended help as needed.

SSI, Supplemental Security Income

Refers to a federal income maintenance program for aged, blind, and disabled who have limited income and resources. Administered through the Social Security Administration, people who receive SSI generally are eligible for medical assistance as well.

Swan-Ganz catheter

A special catheter (tube) inserted into a small vein and moved along the vein into the heart; may be used to measure pressures in different parts of the heart and to measure how hard the heart is working.

Synergy, movement

Combined action of two or more muscles to form a pattern of movement.

T

Tactile defensiveness

Overly sensitive to touch; a patient may withdraw, cry, yell or strike out when touched.

Team conference, staffing

A periodic meeting of an individual's rehab team. At the conference, the person's progress, rehab goals and estimated length of stay are discussed and documented. Families are periodically contacted by the social worker, psychologist, or other team member for discussion of the details of the topics at these conferences.

Temporal lobe

The lower middle part of each side of the brain, involved in receiving information from the auditory (hearing) system and involved in memory.

Tilt table

A table which has the capacity to raise and lower a person from the horizontal to the vertical position and vice versa.

Tracheostomy

A hole made in a patient's neck which will allow them to breathe with a ventilator.

Traction

An arrangement of weights and pulleys to keep fractured bones aligned while they are healing.

Transducer

Usually connected to a monitor and used to measure blood pressure, ICP and other information.

Transfers

Basic transfers include movement to and from a bed and chair; advance transfers refer to movement to and from a toilet, car, tub/shower and floor.

Treatment

Individual or group therapy designed to improve problem areas.

Tremor, intention

Coarse, arrhythmic movements that become intensified toward the termination of movement.

Tremor, resting (non-intention)

Rhythmical movements at rest and may be diminished during voluntary movements.

Trunk control

The ability of a person to, at will, maintain proper alignment of the head, neck, and pelvis; to move and bring the trunk back into alignment after displacement.

Tube feedings

Nutritional feedings administered through a gastrostomy tube (a permanent or semi-permanent tube placed in the stomach) or a nasogastric tube (a permanent or semi-permanent tube placed in the pharynx or esophagus) when swallowing is impaired.

U

Ultrasound (echo)

A means of making pictures of internal body parts using sound waves instead of standard x-rays.

Unilateral

Pertaining to only one side.

Unilateral neglect

Neglect to one side.

V

Vegetative state

A state or level of lessened awareness, there is no meaningful response to the environment but the breathing and sleep/wake cycles continue.

Ventilation

The process of exchange of air between the lungs and room air.

Ventilator (respirator)

A mechanical device designed to qualify (humidify, warm and adjust oxygenation) the air which is then delivered to the patient by assisting or controlling pulmonary ventilation (breathing), either intermittently or continuously.

Ventricles

Four cavities in the brain which are filled with cerebrospinal fluid. These cavities may enlarge when brain tissue is damaged.

Ventriculostomy

A catheter placed through the skull into one of the cavities (ventricles) in the brain. The catheter may be used to measure pressure, withdraw fluid or, in some cases, to administer medicines. It is also known as an Intracranial Pressure Monitor or ICP.

Verbal cues

Directions given to an individual requiring supervision to complete tasks. These directions are usually given to assure the task is complete in the appropriate sequence of steps and/or accomplished safely.

Verbosity

Inability to control amount of verbalization (talking); often disorganized speech.

Vestibular

Awareness of movement involving the head. Disorders of the vestibular system can lead to a lack of awareness of movement, a lack of awareness of direction of movement or hypersensitivity to movement.

Videofluoroscopy, barium swallow

A swallowing exam performed to determine any difficulties a person may have in swallowing in order that appropriate therapeutic measures may be taken.

Visual-motor coordination

The brain's ability to organize and interpret what is being seen so that one can act on it.

Visual field deficit

Not visually perceiving information in a specific area of the visual field. This may involve left, right, half or quarter of the visual field.

Vocational counseling

Assisting the disabled person in understanding their assets and liabilities and providing vocational information to help the person choose work suitable to their interests and abilities.

Vocational evaluation

A systematic appraisal or testing of an individual's employability and vocational potential.

Voc rehab (vocational rehabilitation) counselor

Assesses a person's employment potential and helps person access job training and placement.

Voice, voice function

The sound that is produced by the vibration of the vocal cords.

Voice disorder

Any deviation in pitch, intensity, quality or other basic vocal attribute which consistently interferes with communication, draws unfavorable attention, adversely affects the speaker or the listener, is inappropriate to the age, sex or perhaps the culture or class of the individual, may be organic or functional in nature.

Voiding

Urinating.

W**Wheelchair manipulation**

The ability to maneuver a wheelchair on level surfaces; advanced manipulation would include uneven surfaces.

Whisper

Non-vocal sound that vocal folds do not approximate.

Appendix C

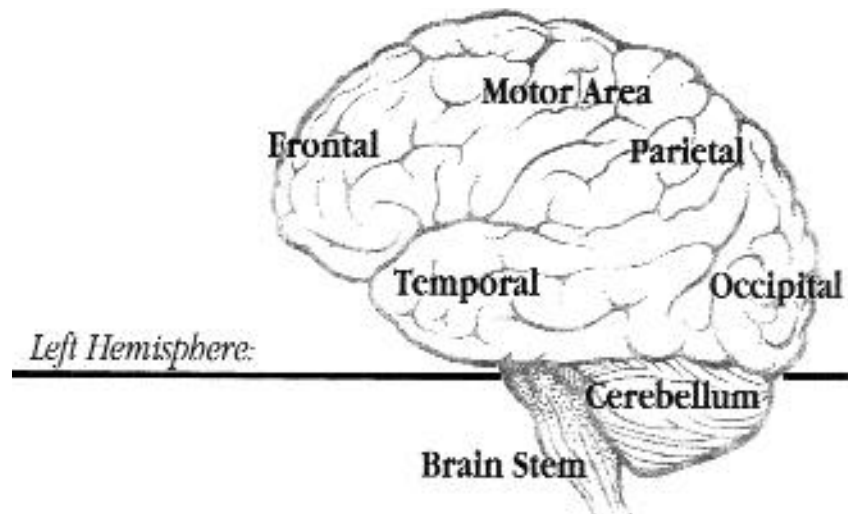
IN DEPTH REVIEW OF THE BRAIN & INJURY

The Brain

The brain which is composed of billions of interconnected nerve cells (neurons) is set on the axis of the brain stem at the top of the spinal cord. Protecting the brain is the hard shell of the skull as well as several layers of membrane called "meninges" (dura mater, arachnoid and pia mater) and fluid called "cerebrospinal fluid" (CSF). Four **ventricles** (cavities) deep in the brain are also filled with cerebrospinal fluid. An extremely complex organ, the brain can be thought of as being made up of five basic parts: the brain stem, the cerebellum, the basal ganglia, the diencephalon, and the cortex. Each of these sections has diverse underlying structures and functions.

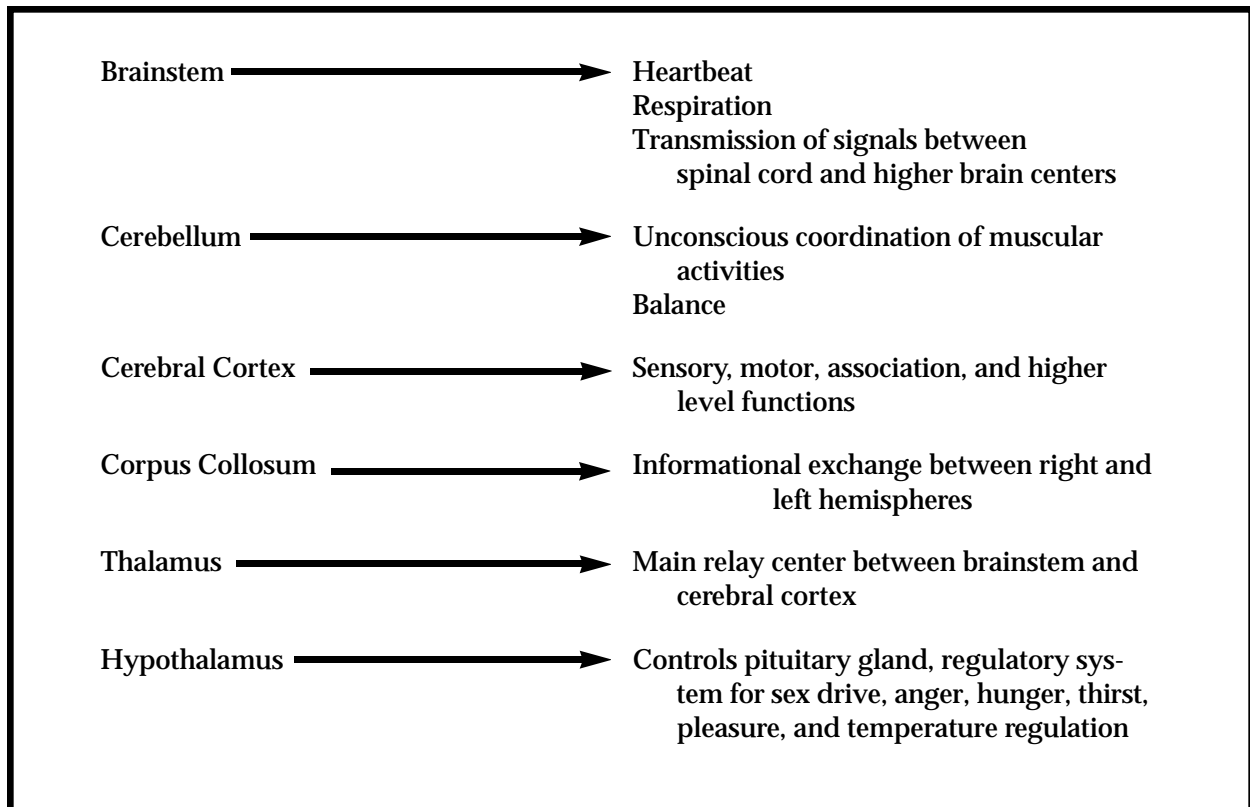
The brain stem is primarily responsible for arousal, postural reflexes, and "vegetative" functions of breathing and heart rate. The cerebellum is responsible for maintaining equilibrium and muscle tone and works in conjunction with the basal ganglia in modulating and modifying movement. The diencephalon, which includes the thalamus and hypothalamus, is the site of three main processes. It is an important relay station for information, it plays a central role in endocrine and hormonal function, and also is responsible for homeostatic (balancing) functions such as maintaining body temperature, sleep cycles, and appetite. Closely connected with the hypothalamus is the limbic system, several interrelated and interconnected structures that are of primary importance in the regulation and expression of emotions. Finally, the largest portion of the brain is the cortex, the two symmetrical cerebral hemispheres connected by the corpus callosum and involved with the more complex and integrated brain functions we know as behavior and learning.

The uppermost layer of the brain is divided into four lobes - frontal, temporal, parietal and occipital - each of which has its own primary functions. Located at the frontal (anterior) of the brain, the frontal lobes seem to be involved in planning, initiating and organizing behavior ("executive functions") as well as voluntary motor abilities and portions of expressive language. Just posterior to (behind) and below the frontal lobes are the temporal lobes, important for memory, attention, speech, and auditory processing. Above the temporal lobes and behind the frontal lobes are the parietal lobes, involved in spatial and tactile (sense of touch) functions and in the integration of information from the different senses. Finally, the occipital lobes, located at the back of the brain, are largely involved with aspects of vision (Sively and Ayres, 1996).



(Brain Injury Association of Kentucky, 1996)

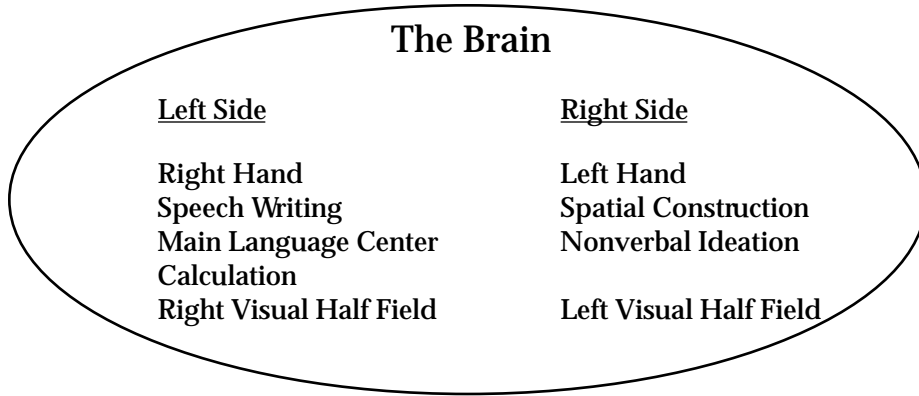
Areas in the brain and the associated functions



While simplistic in nature, this cursory presentation of the various functions of different parts of the brain is designed to help educators to know a bit more about what to expect after an injury. For example, if a student sustains damage to the temporal lobes, memory problems might be expected. If the frontal lobes are involved, there may be problems with planning, initiating activities, and organizing and completing work. If damage is seen in the cerebellum, difficulties in motor coordination may be noted.

In addition to the relationships among the different areas of the brain and their functions, there are also some general facts about the brain which can be helpful in understanding the effects a brain injury can have on a child. First, in most cases, the hemisphere (side) of the brain responsible for sensory or motor function is opposite (contralateral to) the side of the body on which it occurs. Thus, using the right hand is a left-sided brain function and conversely, using the left hand is a right-sided brain function. In addition to this crossover arrangement, there are some typical right and left hemisphere functions. For example, in most people the left side of the brain has the primary responsibility (dominant) for language, and the right side is dominant for visual-spatial functions. This dominance arrangement sometimes is incomplete or reversed in left-handed people.

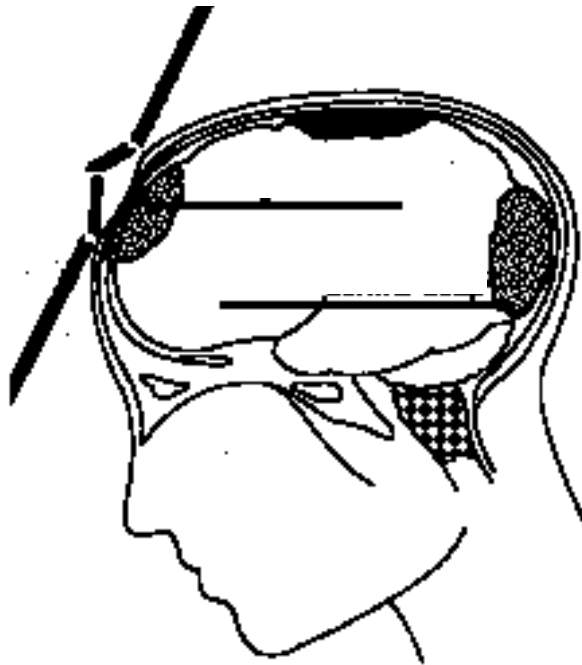
The Brain



Left Hemisphere Skills	Right Hemisphere Skills
Analytical Thinking Digital Computation Rational Thinking Sequential Ordering Temporal Thinking Verbal Skills	Artistic Ability Holistic Thinking Intuition Simultaneous Thinking Synthetic Reasoning Visual and Spatial Ability

How The Brain Gets Injured

Atraumatic brain injury (TBI) refers to an injury to the brain that is not limited to the initial impact. In addition to the initial insult to the brain, a TBI is accompanied by several secondary effects which are sometimes more important in terms of their effects than the primary impact. In an acceleration/ deceleration injury (particularly as occurs in motor vehicle accidents), the head typically strikes a hard surface, causing the initial injury. The brain which has a consistency of cream cheese at room temperature, moves forward within the skull and strikes the inner surface of the skull just after the initial impact. There also may be secondary injuries to the brain at that time, which results from the brain moving within the skull and being bruised by bony prominences (uneven surfaces) of the skull. In addition, areas deep within the brain may be damaged (diffuse white matter or axonal shearing) by the force of the rotation (the brain twisting on the spinal cord or twisting and rubbing over itself) in the course of the accident. The



((Brain Injury Association of Kentucky, 1996)

combination of these injuries often leads to an initial loss of consciousness following a brain injury.

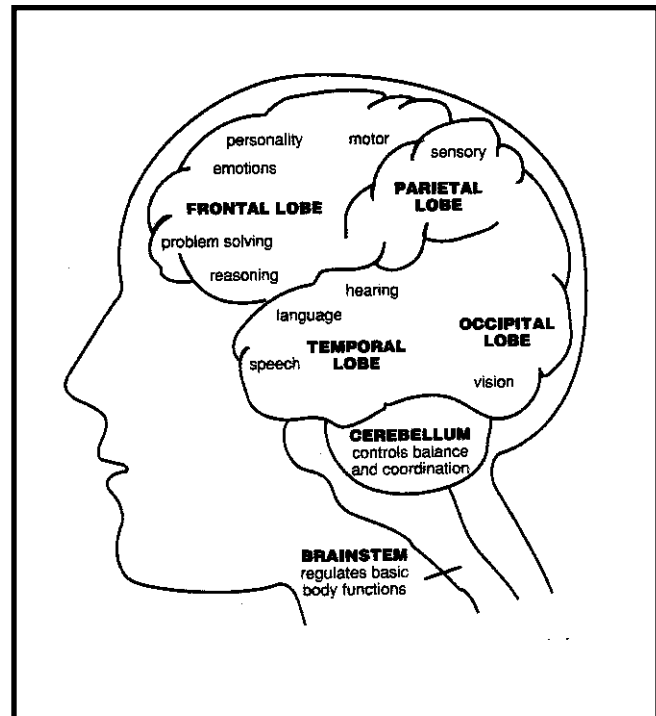
The most severe type of brain injuries are diffuse in nature. Diffuse brain injuries occur when there is a shearing of axonal structures in the brain. This results in the blocking of brain impulses delivering information across the white matter in the brain. Diffuse brain injuries are typified by decreased levels of arousal and consciousness, and dysfunctional information processing. The generalized damage to the axonal structures will result in a loss of consciousness for at least 24 hours.

Focal brain injuries are those injuries which occur in specific brain areas. The most common focal injuries are to the frontal and temporal lobes. Diagnosis of the exact site of a focal brain injury is made by the close monitoring of the individual's level of functioning. For instance a person with a brain injury who has trouble remembering recent events (i.e., where the car was parked) is demonstrating signs of an injury to the hippocampus. Similarly, an individual with a brain injury who has trouble comprehending language most probably has sustained an injury to Wernicke's area.

Unfortunately, damage to the brain is not always limited to the initial insult. Further damage may result from some of the physiological processes that follow. These processes may include bleeding within the skull (hemorrhage or hematoma), the disruption of blood flow (ischemia), the disruption of oxygen to the brain (anoxia or hypoxia), and increased pressure within the skull (intracranial pressure). Beyond the mechanical and structural damage to brain tissue, significant injury is caused by chemical changes that have been altered as a result of the insult to the brain.

Damage to the brain is due to destruction of specific areas of the brain itself and pressure resulting from swelling or the pooling of cerebrospinal fluid (CSF) and blood. The brain is protected by the cranium, the collection of bones which make up the skull, and CSF in which the brain is suspended. Problems arise when these protective structures are violated by either missiles (projectiles which strike the head) or through the agitation of the brain within the cranium in closed head injuries.

Missile injuries can be classified into three types. First is tangential injuries in which the striking object does not invade the brain itself. In these injuries, damage results when the skull is fractured (depressed skull fracture) and the inwardly dislodged bones lead to increased pressure within the skull. A second type of injury is a penetrating brain injury. In penetrating injuries, the object, skin, hair, and bone are all driven into the brain causing varying degrees of damage. Through and through injuries are the third classification. In this type of injury, the missile passes completely through the brain leaving skin, hair and bone fragments scattered throughout. In addition, the passage of the missile emits shock waves which can damage blood vessels and nerves within the brain (Brumback, 1993; LEIR, unpublished; Marshall et. al., 1981).



(Brain Injury Association of Florida, 1996)

In closed head injuries, there is damage to the brain resulting from a blow, typically from blunt objects, or agitation of the brain with no invasion of the cranial vault. Damage caused by closed head injuries can range from minor skin lacerations to more serious skull fractures with bruising of the brain, swelling tissue, and pooling blood and CSF.

Skull fractures are categorized as either depressed fractures, compound fractures, or basilar fractures. Depressed skull fractures occur when bone is forced inward towards the brain thus increasing the amount of cranial pressure. In compound fractures, lacerations to the scalp accompany breaks in the cranium. Finally, in basilar skull fractures, there is a break in the bone at the base of the skull and associated damage to the cranial nerves (Brumback, 1993).

Not all head trauma will produce significant deficits. Whereas some trauma can lead to permanent and severe deficits, others will result in negligible or no deficits. The degree to which the trauma affects functioning depends, in some measure, on the type of injury incurred by the child. There is not a perfect relationship between the severity of a blow to the head and resulting injury to the brain. While it is usually true that a severe blow to the head will cause a severe injury, a child does not have to lose consciousness or have his or her head struck to sustain a severe brain injury. For example, a whiplash injury can cause a mild traumatic brain injury with significant after effects. The initial Glasgow Coma Scale (GCS) score (often found in medical records) can be used to approximate the severity of the injury. Typically, a GCS score of 3-8 = severe, 9-12 = moderate and 13-15 = mild.

The Effects of Traumatic Brain Injury

By the time the child has been medically stabilized, a number of professional evaluations will have been conducted to assess the effects of the child's injury. This information can be invaluable when used to develop rehabilitation strategies, instructional planning, and individualized educational programs. The evaluations are likely to focus on four areas: cognitive, sensory, social-emotional, and physical-motor. A brain injury can affect any or all of these areas to varying degrees and may change over time. The effects will depend on a number of factors including the age of the child when the injury occurred, how severe the injury was, the child's pre-injury personality and development, the quality of medical and rehabilitation care, family involvement, and the post-injury environment.

Some of the common cognitive difficulties following traumatic brain injury include distractibility, confusion, decreased attention span, poor memory for recent events, difficulty understanding language or expressing oneself, fatigability, irritability, impulsivity, and decreased frustration tolerance. Sensory changes may include decreased ability to perceive stimulation (e.g., not reacting to touch or sound) or hypersensitivity to stimulation. Social-emotional changes may include sudden mood changes, apathy and a lack of motivation, self-centeredness, depression, and inappropriate remarks or behaviors due to a loss of inhibitions. Common physical or motor changes include weakness on one side (hemiplegia) or both sides, tremors, rigidity, increased muscle tone (spasticity), difficulty planning and carrying out movements, and so on.

There are many possible effects of a brain injury and each child is unique in his or her characteristics and recovery. Therefore, in assessing the individual child, the focus is not only on areas of strength (intact functioning) but also treatment needs. Pre-injury abilities, temperament, and behavior also must be considered. It is important to specify injury-related deficits when possible because rehabilitation that focuses on areas that were difficult for the child before the injury may result in excessive frustration. Conversely, identifying the child's premorbid (pre-injury) and current strengths can increase hope and motivation. Children who recover well physically can derive a good deal of satis-

faction and heightened self-esteem from physical activities, allowing them to concentrate on improving their thinking skills without feeling inadequate. Moreover, a child's strengths can be exploited and used as a means of compensation for weaknesses. For example, a highly motivated individual who can read and write can use lists and schedules to overcome memory difficulties.

A highly important, but frequently overlooked, factor in assessing the child with a traumatic brain injury is the age and developmental level. Although many of the effects of traumatic brain injury in children are similar to those that occur with adults, the specific effects (deficits) as well as rates and patterns of recovery may differ quite substantially. Moreover, expectations of children at any age are different than those for adults and these need to be kept clearly in mind when assessing a child's post-injury strengths and deficits.

Rate and Nature of Recovery

It is generally recognized that a brain injury that occurs earlier in life places an individual at higher risk for functional deficits and adjustment problems, than one suffered in adult life. There is however a wide variability at the individual level that makes the prediction of any single child's rate of recovery impossible.

There is a growing body of research to suggest that global or diffuse deficits (i.e., most or all abilities show some degree of impairment) occur more often than highly specific deficits following brain trauma in children. It is known, for example, that in some instances damage to a specific brain area can result in fairly discrete and predictable problems in adults. The same thing cannot be said about such injuries in children except to note that the older a child is at the time of injury, the more closely the outcome will resemble that seen in adults. Unfortunately, there have not yet been enough long-term studies on the recovery from pediatric brain injury to answer these questions.

The effects of a brain injury in a child do not remain constant because of changes in both the brain and expectations for behavior during the course of development. Difficulties may appear immediately after the injury but later disappear; they may appear early and remain; or they may become apparent only after a delay, sometimes of several years.

This last circumstance has been referred to as "growing into a deficit". An example might be an adolescent who was injured years earlier and seemed to make a good recovery, only to have significant social problems with the onset of puberty and the pressures of sexual maturation and expectations for more independent, mature functioning and decision making. Knowing that the brain injury may be part of the reason for these developing difficulties may allow for more appropriate treatment as well as avoid some of the secondary emotional reactions (depression, anger, frustration, etc.) which may arise due to "unexplained" difficulties. Similarly, the change from middle to high school involves changes in a variety of factors which may reveal "hidden" deficits such as the inability to deal with more complex material being addressed in



the classroom, or the problems brought about by the need to move to different classrooms for each class. Since the effects of brain injury are not constant, brain-injured children and adolescents should be reevaluated periodically if changes or difficulties emerge or continue.

Recovery From Traumatic Brain Injury

During the recovery process, the child with a traumatic brain injury may change so significantly that he or she may seem like four or five different children, all unlike the child who existed before the injury. The brain recovers in a fashion which is not completely understood at present; however, there are a number of features of recovery which are known and which need to be considered. First of all when brain tissue or neurons are damaged or made dysfunctional as a result of an injury, bleeding, lack of oxygen, and so on, that tissue is not replaced. For the most part, unlike the skin and other portions of the body, nervous system tissue does not regrow. Thus, after a brain injury, a reorganization of functions must occur inasmuch as is possible. The extent to which this reorganization is accomplished determines the ultimate degree of recovery of, or compensation for, abilities lost as a result of the injury. Such reorganization seems to be a highly complex process and as such requires far more time (or "healing" of the brain) to occur than healing in other portions of the body. This is especially true since a child's brain continues to grow, change and develop into adolescence.

The most rapid and easily noticeable recovery from brain injury tends to occur in the first 6 weeks to 6 months following the injury. After about 6 months, the recovery process slows with cognitive gains occurring at an increasingly gradual rate over the ensuing 12-18 months. While recovery does not simply stop at 24 months post-injury, it may have slowed to the extent that changes cannot be measured with common assessment devices. It is important to remember that recovery from brain injury is a dynamic process which occurs at a rate which varies across individuals and that significant recovery of abilities has been noted as much as 10 years following an injury to the brain.

Since it does take the brain much longer to reorganize than it takes for the rest of the body to complete the healing process, the individual with the traumatic brain injury is often thought to be back to normal as there are no cuts, or bruises and broken bones have healed. For the individual with a traumatic brain injury, this can lead to disastrous situations. Once the scrapes, bruises and other physical problems have healed, the child with a traumatic brain injury is placed back in his or her former classroom and expected to be able to pick up with little or no difficulty where he or she left off before the injury. In fact, it is often a year or more before a student is able to get back to the pre-injury level of academic skills and in some cases, the student will not be able to attain the pre-injury level of functioning. Thus, the child's performance must be carefully monitored with the individualized educational program of instruction being adjusted as needed - oftentimes every few weeks.

Acute vs. Post-acute Rehabilitation (Misenti M., et. al., 1992)

<u>Acute Rehabilitation</u>	<u>Post-acute Rehabilitation</u>
Physical health and personal care skills	Community living skills
Cognitive processing skills	Vocational and work skills
Language and communication skills	Academic and continuing education skills
Movement and mobility skills	Social and behavioral skills
Social and behavioral skills	Recreation and leisure skills
Environmental awareness and responsiveness	Independent living skills

Appendix D

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