Title of Course: Brain Injury Treatment: A Neuropsychological Approach
CE Credit: 3 Hours
Learning Level: Introductory
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Abstract:
The majority (seventy to ninety percent) of all head injuries are classified as “mild.” Although much research exists on moderate-to-severe injuries, there is a need to understand the complexities of brain damage in individuals who have been diagnosed with a “mild” injury. This course is designed to help non-neuropsychologist professionals learn more about the field of neuropsychological evaluation and treatment and increase their knowledge regarding mild traumatic brain injury (MTBI). Topics will include types of dysfunction associated with mild brain injury, components of a neuropsychological assessment, family and work issues, and strategies for working with individuals who have mild brain injury.

Learning Objectives:
1. Identify the three dimensions of behavior studied within the specialty of neuropsychology
2. List types of dysfunction associated with injury in each of the four major lobes of the brain
3. Distinguish between the process approach and the battery approach to neuropsychological assessment
4. Identify common symptom patterns in individuals with mild traumatic brain injury (MTBI)
5. List family and work issues frequently encountered by neurologically impaired persons
6. Identify the subtle neurological deficiencies that can affect children with brain injury
7. List strategies for working with individuals who have mild brain injury
Brain Injury Treatment: A Neuropsychological Approach

“No head injury is too severe to despair of, nor too trivial to ignore” - Hippocrates, 4th century BC

Topic 1: What is Neuropsychology?

**Topic Introduction:** Many professionals today are faced with working with individuals who have sustained a brain injury. In this section, we will define the practice of neuropsychology and explore the various aspects of mild traumatic brain injury (MTBI).

Brain injuries vary in degree of seriousness and sequelae of symptoms. According to Segalowitz & Lawson (1995), seventy to ninety percent of head injuries are classified as mild. Although much research exists on moderate-to-severe injuries, there is a need to understand the complexities of brain damage in light of individuals who have been diagnosed with a “mild” injury. The purpose of this course is to help non-neuropsychologist professionals to do the following:

1. Learn more about the field of neuropsychological evaluation and treatment
2. Increase their knowledge regarding mild traumatic brain injury (MTBI)

With an increased awareness of the cognitive, emotional, and social changes brought on by a not so “mild” brain injury, it is the hope of this author that professionals of all disciplines be better equipped to serve these clients. Those with MTBI often access services provided by medical professionals, mental health professionals, attorneys, educators, and vocational services. At the conclusion of this topic you will be able to explain what the science of neuropsychology is and what neuropsychologists do.

**Neuropsychology Defined**

What exactly is “neuropsychology”? Neuropsychology is a specialty within the field of clinical psychology that studies how the brain expresses itself functionally, and how certain behaviors are caused by and controlled by certain areas of the brain. According to Lezak (2004), the dimensions of behavior studied can be classified into three major areas: 1. Cognition, 2. Emotionality, and 3. Executive functioning.

**Cognition** is the information-handling aspect of behavior. It has been the most studied behavioral area, since it is easier to conceptualize and test. Also, cognition affects a person’s immediate ability to communicate orally and in writing.

**Emotionality** can be equally devastating to an individual experiencing a brain injury, especially if a marked change has occurred since the injury. An individual’s feelings and level of motivation are often affected. A subset of the area of feelings is the area of “social disability”, which is often caused by injuries to the brain. For example, the patient may:

- Become socially withdrawn
- Suffer from a lack of acceptance by his or her family regarding residual deficits
- Exhibit inappropriate social behaviors
- Have problems profiting from experience
- Have a loss in leisure skills and interests
- Have a marked reduction in sexual activity
- Experience problems with the law
- Have problems coping with financial difficulties caused by the injury and the fact that they are now unemployed post-injury.
Executive functioning represents how an individual will navigate their daily life in the areas of planning, problem solving, benefiting from external feedback, and in the manner in which a person will respond to their environment, either impulsively or uninhibited.

Rarely is only one of these functions altered as a result of a brain injury. According to Lezak (2004), “the disruptive effects of most brain lesions, regardless of their size or location, usually involve all three systems.” (The reader should note that the word “lesion” in this context refers to any alteration of brain matter, by any cause.)

In summary, the neuropsychological evaluation provides information that complements the customary neurological exam and data supplied by an EEG, CAT scan, or MRI, by providing information on the nature and extent of functional impairment caused by the neurological injury or disease being investigated. The term “functional” refers to “what” the brain can actually do with what it knows. For example, can the brain direct you on how to tie your shoe and can you actually perform this task? Neuropsychological evaluations provide documentation necessary to rehabilitate moderate and severe brain injuries, and are also useful in detecting the presence of mild brain injury that may go undetected in routine medical and psychological examinations.

Mild brain injury can be caused by a moderate blow to the head, a fall, a drug overdose, or exposure to toxic substances, just to name a few. Mild brain injury can affect an individual’s earning potential, so it is vital to provide adequate neuropsychological documentation to identify the presence of mild head injury. This is especially important to those individuals who are suspected of malingering.

Neuropsychologists: Who are they?

A clinical neuropsychologist is an individual with a degree in clinical psychology who has had advanced training in the field of neuropsychology. According to the American Psychological Association’s Division 40 (1989), a clinical neuropsychologist “is a professional psychologist who applies principles of assessment and intervention based upon the scientific study of human behavior as it relates to normal and abnormal functioning of the central nervous system.”

A neuropsychologist specializes in evaluating brain/behavior relationships, plans training programs to help the survivor of a brain injury return to the best level of functioning possible, and recommends alternative cognitive and behavioral strategies to minimize the effects of brain injury. The neuropsychologist often works closely with schools and employers as well as with family members of the injured person.

Minimum Qualifications

Referring professionals need to know that there is a great variability in the training of individuals providing neuropsychological evaluations, consultations, and treatment. A neuropsychologist should have, at minimum, a doctoral degree (PhD, or PsyD) in clinical psychology from an accredited institution, preferably one that has been approved by the American Psychological Association. (A PhD represents a Doctor of Philosophy; a PsyD represents a Doctor of Psychology.)

According to Division 40 (Clinical Neuropsychology) of the American Psychological Association (1989), a neuropsychologist should have:

a) Successful completion of systematic didactic and experiential training in neuropsychology and neuroscience at a regionally accredited university;

b) Two or more years of appropriate supervised training applying neuropsychological services in a clinical setting,

c) Licensing and certification to provide psychological services to the public by laws of the state or province in which he or she practices, and

d) Review by one’s peers as a test of these competencies.
Typical courses that a neuropsychologist must take include at least three courses in neuropsychological assessment of children, adolescents, adults, and seniors, as well as at least three courses in the intervention of the above population groups. Courses in neuroanatomy, rehabilitation, case consultation, and report writing round out this vigorous curriculum.

When referring to a neuropsychologist, you may want to investigate if he or she has had field experience in a variety of settings where brain injured individuals have been treated. Neuropsychologists can be further certified by either the American Board of Clinical Neuropsychology (ABCN) or the American Board of Rehabilitation Psychology (ABRP).

Listings of neuropsychologists can be found in directories such as those compiled by the National Academy of Neuropsychology (NAN), or the International Neuropsychological Society (INS), the two major associations of neuropsychologists.

**Use of Technicians in Testing**

In some cases, neuropsychological tests are administered by a technician, often called a psychometrist, for later interpretation by the neuropsychologist. A well-trained technician can free up time for the neuropsychologist, but many are not well enough trained and may be less likely to identify spurious data, or to modify procedures to optimize information regarding the patient’s abilities. However, if well trained, a technician can be a valuable source of information, as they can provide another “eye” for observing test performance. A technician usually holds at least a Bachelor’s Degree in Psychology.

As a referring professional, it is important to know to what extent technicians are used, and how they are supervised. It is recommended that the neuropsychologist perform his or her own mental status examination, and participate in the administration of at least several of the measures, to acquire a “real world” picture of the patient’s performance levels.

**Learning Review 1:**

You are on a team interviewing candidates to fill the role of neuropsychologist at your facility. Two of the candidates have the following credentials:

- Candidate A has worked as a physical therapist for 12 years and has a MS in Psychology and extensive experience working with the families of critically injured patients.

- Candidate B is a newly minted PhD in psychology who has limited clinical experience.

Which candidate would make the best choice? Write down which one you would choose and why. Then look below for the answer.

**Answer to Learning Review 1:**

A neuropsychologist must have, **at minimum**, a doctoral degree (PhD or PsyD) in clinical psychology from an accredited institution, preferably one that has been approved by the American Psychological Association.

**Neuropsychologists: Where to Find Them**

Neuropsychologists can be found in a variety of settings – the most common being outpatient hospital and acute care settings. They are most often called in when an individual is first diagnosed with a brain injury or other neurological disorder, such as multiple sclerosis. In the **acute care setting**, a neuropsychologist is consulted to assess the extent of brain injury, and what aspects of behavior and cognition may be affected.
In the hospital setting, a neuropsychologist may do preliminary screening of
cognition, and then present findings to the rest of the treatment team. The
treatment team usually consists of a physiatrist (a physician specializing in
rehabilitation), a physical therapist, an occupational therapist, speech/language
pathologist, social worker or case manager, and often a recreation therapist. The
neuropsychologist recommends to the treatment team whether or not the patient
can understand and comprehend instructions, and whether or not the patient can
cooperate with interventions at this time.

In an outpatient setting, a patient is usually functioning better neurologically and
cognitively, so at this point a neuropsychologist is usually consulted to assess the
patient’s improved level of cognitive processes. Outpatient settings may either be
an outpatient office, where an individual comes once per week for treatment and
ongoing assessment, or it may be in a day-treatment setting.

In a day-treatment setting, a neuropsychologist may see the patient individually, or in groups. These groups may vary,
but usually there are “thinking skills” groups, “social skills” groups, and “coping skills” groups. In a day-treatment setting,
the neuropsychologist continues to be involved in treatment team decisions, based on findings from testing and
treatment. As the patient progresses, he or she may be referred to a vocational skills group, and be further assessed for
the skills needed to return to work.

Some neuropsychologists work in a residential setting, treating individuals with more severe brain injuries, who cannot
benefit from outpatient treatment, and need a more comprehensive range of services. These individuals cannot return
home, due to their level and type of deficits.

Learning Review 2

Your staff neuropsychologist has been called away to an acute care facility. When a staff member asks what sort of case
the neuropsychologist was called away to deal with, a nurse says it was “a patient with multiple sclerosis.” The staff
member replies, “No, that can’t be right. Neuropsychologists don’t get involved with MS patients.”

Who is correct—the nurse or the staff member? Write down your response and then look below for the correct answer.

Answer to Learning Review 2:

Multiple Sclerosis is a neurological disorder. As such, a neuropsychologist could be involved in treatment an MS patient.

Topic Summary: Neuropsychology is a specialty within the field of clinical psychology that studies how certain behaviors
are caused by and controlled by certain areas of the brain. There are three major areas of behavior: cognition,
emotionality, and executive functioning. Neuropsychological evaluations complement other neurological exams and
data. A clinical neuropsychologist has a degree in clinical psychology and advanced training in the field of
neuropsychology. At minimum, a neuropsychologist should have a doctoral degree (PhD or PsyD) in clinical psychology
from an accredited institution. Neuropsychologists can be found in all of the following settings: acute care setting,
hospital settings, outpatient settings, day-treatment settings and residential settings.

Topic 2: Neuroanatomy

Topic Introduction: To understand neuropsychology requires an understanding of how the various parts of the brain
function and interact with one another. At the conclusion of this topic you will be able to describe parts of the
neuroanatomy, as well as categories of brain injury.
Basic Neuroanatomy

Simply stated, there are 4 major lobes in the brain:

1. The Frontal Lobe
2. The Temporal Lobe
3. The Parietal Lobe, and
4. The Occipital Lobe

The Frontal Lobe modulates the more primitive responses by exerting intellectual control, reasoning, and self-monitoring. Injuries to the frontal lobe can result in:

- Decreased drive
- Lethargy
- Poor judgment
- Childish behaviors
- Poor self-monitoring
- Inappropriate sexual behavior
- Apathy
- Disinhibition
- A lack of goal directedness

The Temporal Lobe has connections to the limbic system, which controls basic drives and instincts such as survival, feeding, procreation, and emotional responses – particularly rage and fear. It is also responsible for time orientation. Injuries to the temporal lobe can result in:

- Emotional lability
- Sexual dysfunction (over arousal)
- Memory disturbances
- Hyperphagia or anorexia
- Motivational disturbances
- Language deficits
- Aggressive outbursts

The Parietal Lobe receives and identifies sensory information from tactile receptors. It processes visual and auditory sensations, and plans and executes coordinated movement (praxes). Dysfunction to the dominant parietal lobe can result in:

- Alexia (loss of ability to read)
- Agraphia (loss of ability to write)
- Anomia (inability to name objects)
- Idiokinetically and kinesthetically apraxias, (loss of ability to perform coordinated movements)
- Dyscalculia (loss of ability to solve math problems)
- Right-left disorientation
- Astereognosis (inability to determine the form of an object by touch)

Dysfunction to the non-dominant lobe can result in:

- Impaired spatial abilities
- Denial of illness (anosognosia)
- Inability to recognize body parts (autopagnosia)
- Dressing, constructional, and kinesthetic apraxias
- Astereognosis
- Left spatial neglect

The Occipital Lobe interprets visual images and is responsible for visual memory. Dysfunction results in:

- Disturbed spatial orientation (metamorphopsia)
- Visual illusions
- Visual hallucinations
- Blindness
- Symptoms that simulate hysteria
Lateralization

Not only can we discuss lobes of the brain, but injuries can be classified as left-sided injuries or right-sided injuries.

Deficits that can be observed after a primarily **left-sided** injury are:

- Aphasia
- Verbal memory
- Verbal fluency
- Concrete thinking
- Specific impairments in reading and writing
- Impaired arithmetic (loss of basic concepts)
- Defective constructions due to oversimplification and difficulty drawing angles
- Difficulty performing complex manual or oral motor sequences

Deficits that can be observed after a primarily **right-sided** injury are:

- Fluent, but illogical and loose generalizations
- Bad judgment
- Difficulty ordering, organizing, making sense of complex stimuli or situations
- Arithmetic deficits; most apparent in written calculations
- Difficulty copying designs, making constructions, and matching items
- Difficulty discriminating faces and patterns
- Difficulty seeing stereoscopically
- Difficulty processing components of music
- Problems with spatial organization
- Problems with visuospatial memory
- Problems getting lost in familiar surroundings
- Poor constructional abilities due to poor perceptual or conceptual organization
- Difficulty appreciating emotional content of facial expression or descriptive phrases
- Poorly modulated, often monotonic speech

Diffuse versus Focal Injuries

**Diffuse injuries**, as the name implies, affect the brain overall. For example, a closed head injury causes tears, shearing of neurons, and disrupts the normal transmission of nerve impulses along their way from one place to another. What is not always realized is that if someone’s forehead hits a windshield, for example, the brain shifts, and injury to the back of the head can happen as well. This is called a **contre-coup injury**.

**Focal injuries** are caused by more localized trauma, such as penetrating wounds, strokes, contusions, and hematomas. Penetrating wounds could be caused by gunshot wounds or a pair of deer antlers. Strokes are a disruption in the blood supply to the brain, and tend to affect one general area at a time. Contusions occur when a small blood vessel breaks, and surrounding tissues are deprived of normal blood flow. A hematoma occurs when a large blood vessel tears, and blood flows freely. It forms a big pocket of blood that takes up space, causing the brain to be pushed aside.
Learning Review 3:

Your staff has hired a new neuropsychologist. The neuropsychologist begins to review the first cases of brain trauma patients that the staff will be dealing with this month. The neuropsychologist notes that some of the new patients received injuries to the left side of their brains. Based on what you have read, what sort of deficits can you expect from these patients? Write down your response and then look below for the correct answer.

Answer to Learning Review 3:

Asphasia, verbal memory deficits, concrete thinking, impairments in reading and writing, are some of the deficits commonly associated with left-sided brain injuries.

Topic Summary: There are 4 major lobes in the brain: the Frontal Lobe, Temporal Lobe, Parietal Lobe, and Occipital Lobe. Injuries to any of these lobes will cause differing deficits. Brain injuries can be classified as either left-sided injuries or right-sided injuries. Again, deficits vary based on which side of the brain is damaged. Diffuse injuries affect the brain overall, and focal injuries are caused by localized trauma, such as penetrating wounds, strokes, contusions, and hematomas.

Topic 3: Process of Neuropsychological Assessment

Topic Introduction: Each member of a treatment team approaches patients from the point of view of his/her respective discipline. Oftentimes, different disciplines have diverse assessments that can lead team members to different conclusions, resulting in conflict. Therefore, it is helpful for non-neuropsychologists to understand the assessment tools that neuropsychologists use to direct their treatments. This knowledge can assist you when you have discussions with the neuropsychologist about plans of care. At the conclusion of this topic you will be able to explain what is involved in a neuropsychological assessment.

Neuropsychological Assessment

What is involved in a neuropsychological assessment? In the past, the purpose of a neuropsychological assessment was to establish the presence of brain injury. In today’s settings, neuropsychological assessment is used to establish levels of functioning.

According to a 1996 report by the Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology, “neurologic examination and neuroimaging are intended to provide localizing information and are usually superior to neuropsychological testing for localizing focal brain lesions; the purpose of neuropsychological assessment is to provide information on cognitive deficits and capacities. It should be emphasized here that neuropsychological tests do not provide information regarding causality of deficits, rather the extent of deficit.

Battery Approach versus Process Approach

Some neuropsychologists prefer to use a “battery” approach to testing, giving each patient the same group of tests. This contrasts with professionals who use a “process” approach, based on the original works of Arthur Benton, a neuropsychologist in Iowa.

The process approach is gaining fast recognition as the preferred testing procedure. With the process approach, a clinician “probes” basic cognitive skill areas, and then chooses tests based on results of the preliminary screen. As deficits are uncovered, further testing in those areas are performed. With the process approach, the clinician highlights the qualitative aspects of a patient’s performance, as well as the quantitative aspects of a patient’s performance. The
A clinician writes a report based more on *how* the patient arrived at their answers, rather than reporting only actual test scores.

There continues to be a debate, however, over whether to use complete test batteries, or test to the deficits. Jarvis and Barth (1994) state, “because of a lack of research evidence supporting the use of a flexible battery or pure process approach, the use of a fixed battery and a more empirical approach is indicated.”

Results of a neuropsychological evaluation must provide insight into brain functions for a particular individual at a particular time. Results must be reviewed within the context of the patient’s:

- Medical records
- Age
- Education
- Family dynamics
- Socioeconomic status
- Cultural background
- Previous work history

The evaluation attempts to record the functional strengths and weaknesses in the patient’s cognition and emotions, so that the clinician can develop a realistic rehabilitation plan and set both short-term and long-term treatment goals. Simply stated, an evaluation should conclude with recommendations on how therapists will assist the patient to “get where the patient wants to be” functionally.

**Functional Areas of the Brain Evaluated**

Let’s start out with a well-known, basic model of learning, as shown on the right. It was originated by A.R. Luria and later adapted by Halstead-Reitan and others.

The model shows us that information initially is available to the brain as **INPUT**. Depending on the level of attention and concentration, it is then registered as verbal information or visual information. That information must then be analyzed and concepts must be formed. In other words, something has to be done with the new information such as be compared to information with which the brain already has familiarity.

The last level is **OUTPUT**. The brain can choose to speak, act behaviorally, or squelch the recent **INPUT** information.

The functional areas of the brain investigated in a neuropsychological evaluation include, but are not limited to an assessment of:

- Attention
- Concentration
- Memory
- Visual-motor coordination
- Visual-spatial processing
- Comprehension of speech and the production of speech
- A person’s ability to plan, organize, generalize, use abstract thought, and benefit from external feedback
The speed in which an individual processes information is recorded, as well as the level of verbal and visual processing. The report should conclude with a clinical diagnosis, as well as treatment recommendations. Treatment recommendations should include all aspects of functioning, and mention how the patient’s level of functioning is going to impact their return to home and previous occupation. Recommendations for job re-training may be indicated in some cases.

Referrals to other professionals should also be included. A patient, for example, may need to be referred to an audiologist, ophthalmologist, or vocational rehabilitation counselor. An outline of a typical neuropsychological evaluation is provided in the table below.

**Format for Neuropsychological Evaluation**

<table>
<thead>
<tr>
<th>1. Client Data</th>
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</table>
| 2. Evaluation Procedures | • List of tests  
• Clinical interviews  
• Collateral interviews  
• Review of relevant medical, academic and vocational records |
| 3. Reason for Referral |  |
| 4. Presenting problems |  |
| 5. Behavioral Observations (during testing and interview) |  |
| 6. Test Results | • Level of Alertness, Orientation, Attention, and Concentration  
• Psychomotor Status  
• Memory and Learning  
• Speech and Language  
• Visuospatial/Perceptual processing  
• Intellectual Functioning/Achievement  
• Executive Functioning  
• Emotional and Personality Characteristics |
| 7. Interpretation | • Strengths  
• Weaknesses |
| 8. Treatment Recommendations | • Cognitive therapy  
• Speech therapy  
• OT (occupational therapist), TR (recreation therapist), PT (physical therapist)  
• Individual therapy  
• Group therapy  
• Family therapy  
• Referrals to other professionals  
• Educational and/or Vocational Implications and recommendations |
| 10. Signature block (including credentials) |  |
Tests Commonly Used

What tests are commonly used during a neuropsychological evaluation? The development and use of standardized neuropsychological test batteries began around the 1940’s. The two most popular test batteries have been:

1. The Halstead-Reitan Test Battery, and
2. The Luria-Nebraska Test Battery

The use of modified test versions of the Halstead-Reitan are not uncommon, as some professionals use a process-approach method and test only those areas they believe are deficient. The Luria-Nebraska Test Battery is always given in its entirety, based on the ability of the patient. Both test batteries have the ability to assess children, as well as adults. The Halstead-Reitan Test Battery tests children from age 9 and up. The Luria-Nebraska-Children Battery tests children beginning at age 8.

When a patient’s attention span and concentration levels are being evaluated, a clinician may choose to administer some form of a “digit span” test. In a “digit span” test, the clinician asks the patient to repeat a string of numbers, which increasingly becomes longer. Once the patient misses two number-strings of the same length (such as 7 digits in a row), the technique changes in that the clinician will ask the patient to recite the number-strings that he or she hears, in the reverse sequence. This is referred to as “digits backward” and is designed to assess a person’s “working memory” in addition to attention span. “Working memory” is the area in the brain that can take in information, manipulate it in some fashion, and then release it in another format. It is a much more complicated task than recalling digits in a forward sequence.

Another test for attention and concentration would be the “letter cancellation” exercise. On this test, a patient is presented with a page of numbers, letters, or both, and asked to mark out, for example, the letter “F” every time he or she sees it. Another test called “Trail Making Test A” asks a patient to simply “connect the dots” in numerical order on a page that has numbers out of sequence and arranged at random on the page. The patient is told it is a timed test, and he or she is timed to completion. Age appropriate norms are used to indicate level of attention.

The most widely used tests to measure memory are Wechsler Memory Scale III, Rey Auditory Verbal Learning Test, and the California Verbal Learning Test. Both verbal memory and visual memory are assessed, as well as short-term and long-term memory.

Various tests of expressive and receptive language include the Boston Naming Test, the Multilingual Aphasia Examination, and the Halstead-Reitan Aphasia Screening Test.

To assess visuospatial skills, the Rey-Osterrieth Complex Figure, the Block Design subtest of the Wechsler Adult Intelligence Scale-III (WAIS-III), and the Benton Visual Retention Test are used. A neuropsychologist must analyze how visual data is perceived, and how it is processed.

Executive functioning can be measured by such tests as the Wisconsin Card Sorting Test, the Halstead-Reitan Category Test, the Stroop Test, and Part B of the Trail Making Test. These tests attempt to measure very difficult constructs, such as how the brain organizes, plans, and inhibits behaviors.

Oftentimes, executive functioning is “tested” by observing people in “the real world” performing tasks such as looking up telephone numbers, using maps, and other strategic planning exercises one encounters in real life. This method actually simulates real-life tasks, allowing the clinician to know how the individual is likely to perform when they return to home, or to work, and what type of extra help they might need to perform their daily routines.

Motor dexterity, strength, and speed are measured with tests such as the Finger Tapping Test, the hand dynamometer, and the Grooved Pegboard Test. Adult intelligence is measured by the Wechsler Adult Intelligence Scale-III. The Wechsler Intelligence Scale for Children-IV (WISC-IV) is used for children under age 16.
The Wide Range Achievement Test-III (WRAT-III), the Wechsler Individual Achievement Test-II (WIAT-II), and the Woodcock-Johnson Tests of Achievement, are the three most widely used tests to measure educational achievement.

**Use of Collateral Interviews**

Collateral interviewing is relied upon heavily in neuropsychological evaluations, as compared to a typical psychological evaluation. When a patient has experienced neurological damage, he or she is not always aware of the kinds of deficits, or the extent that the deficit presents itself to others. Often, not only cognitive skills, but also social skills and “graces” are impaired.

Family members are often the first individuals who notice the changes, even subtle changes, in their loved one. For example, a patient may have difficulty modulating their emotions, and may have more anger outbursts. Many patients become depressed, even though they never experienced depression pre-trauma. A patient’s frustration threshold often is lowered, as increased awareness of deficits begin to come to light and have significant impacts on returning home or to work. Family members provide another form of assessment of a patient’s functioning that can prove to be valuable. It is always best to assess more than one significant other in the family grouping, as there can always be distortion or exaggeration, based on the potential for secondary gains in a family member.

**Variables that Affect Test Performance**

**Age:** As a person ages, there are some common changes in cognitive processing. The effects of aging can reduce psychomotor speed, reduce some aspects of memory, reduce the ability to access words, reduce visuospatial skills, and reduce complex attentional processes.

**Education:** Educational levels affect test performance. Some neuropsychological tests have norms for individuals based on educational level, but all do not. When education-specific normative data are not available, the clinician must use professional judgment in the analysis. In general, the higher the educational level, the better an individual is expected to do in cognitive domains.

**Cultural background/ethnicity:** A patient’s cultural background and ethnicity must be figured into the interpretive report. Few tests provide normative data on minorities. Minority patients are at a particular disadvantage on tests of verbal skills, especially if English was a second language.

**Gender:** Gender issues do not provide such a change in test performance as do age, education, and ethnicity. In general, women do better on tests of verbal memory than men, and men do better on tests of visuospatial skills.

**Psychiatric disorders:** Depression, anxiety, apathy, and irritability directly impact a person’s cognitive processes, as well as levels of motivation and cooperation with the examiner. Individuals with MTBI often demonstrate slowed cognitive processing, resulting in delay in response time. Patients with slowed cognition do not do as well on timed tests than on tests without a time component. Reduced attention, concentration, and memory recall are common manifestations of depression and anxiety, the two most common emotional reactions to mild brain injury.

**Substance abuse:** Chronic alcoholism and substance abuse is associated with deterioration in abstraction, visuospatial skills, and problem-solving abilities. Evaluations with head trauma patients must include a thorough history-taking of substance abuse issues, as a large proportion of head injuries are associated with substance use and abuse.
**Learning Review 4**

A new brain trauma patient, a 5-year-old female named Anna, is brought to your facility for testing. In the neuropsychologist’s opinion, the best assessment would be one that is tailored to Anna’s responses as well as highlights the qualitative and quantitative aspects of her performance, enabling the neuropsychologist to write a report based more on how the patient arrived at her answers, rather than reporting only actual test scores.

What kind of assessment approach is this called? Write down your response and then look below for the correct answer.

**Answer to Learning Review 4:**

This is called the *process approach*. With the process approach, a clinician “probes” basic cognitive skill areas, and then chooses tests based on results of the preliminary screen. As deficits are uncovered, further testing in those areas are performed. With the process approach, the clinician highlights the qualitative aspects of a patient’s performance, as well as the quantitative aspects of a patient’s performance. The clinician will write a report based more on how the patient arrived at her answers, rather than reporting only actual test scores.

**Topic Summary:** Neuropsychological assessment is used to establish levels of functioning. Neuropsychological tests do not provide information regarding causality of deficits, but the extent of deficit. The two approaches to testing are: the “battery” approach, which gives each patient the same group of tests; and the “process” approach, which “probes” basic cognitive skill areas where deficits are uncovered.

The functional areas of the brain investigated in a neuropsychological evaluation include: an assessment of attention, concentration, memory, visual-motor coordination, visual-spatial processing, comprehension of speech and the production of speech, and a person’s ability to plan, organize, generalize, use abstract thought, and benefit from external feedback. Variables that can affect testing are: age, education, cultural background/ethnicity, gender, psychiatric disorders, and substance abuse.

**Topic 4: Special Guidance for Working with Persons with MTBI**

**Topic Introduction:** The problems encountered by healthcare workers who attend the needs of persons with MTBI are unique. You are dealing with patients suffering a physical injury that manifests itself in psychological and behavioral problems. This requires a clear awareness of the patient’s multifaceted needs. At the conclusion of this topic, you will be able to explain what special guidance is needed when working with persons with MTBI.

**Managing Brain Injuries**

Improvement in emergency medical services, more aggressive emergency room procedures, and greater sophistication in managing brain injuries have resulted in a greater number of individuals surviving head trauma. In the past, many of these individuals died due to injuries. In the last 20 years, most of these individuals live, although mild-to-severe disabilities often result.

Much research initially ensued regarding the cognitive and emotional effects of moderate-to-severe brain injury, but more recently the effects of “mild” brain trauma have been studied. What has been very common is that many individuals seemed fine at discharge, but when they attempt to resume their normal routines at school, work, or at home, many complained of difficulty performing simple tasks. These tasks were simple and routine before the injury.
Many MTBI persons:

- Have difficulty concentrating, remembering, and organizing their daily routines
- Are slow to get their work done
- Exhibit decreased ability to interact appropriately with loved ones, peers, and bosses

When direct causes for these problems could not be found, many of these individuals were diagnosed as having purely psychiatric problems, or they were accused of malingering. A surge in research in MTBI began to address the issues surrounding these individuals, who appeared to be mending well physically, but not necessarily cognitively, emotionally, or socially.

**The Definition of Minor Head Injury**

Mild Traumatic Brain Injury (MTBI) has been officially defined by the Mild Traumatic Brain Injury Committee of the Head Injury Interdisciplinary Special Interest Group of the American Congress of Rehabilitation Medicine (1993). The definition is as follows: “a patient with mild traumatic brain injury is a person who has had a traumatically induced physiological disruption of brain function as manifested by at least one of the following:

1. Any period of loss of consciousness
2. Any loss of memory for events immediately before or after the accident
3. Any alteration in mental state at the time of the accident (e.g. feeling dazed, disoriented, or confused); and
4. Focal neurological deficit(s) that may or may not be transient but where the severity of the injury does not exceed the following:
   a. loss of consciousness of approximately 30 minutes or less
   b. after 30 minutes, an initial Glasgow Coma Scale (GCS) of 13-15; and
   c. post-traumatic amnesia (PTA) not greater than 24 hours”

No one specific symptom is necessary to diagnose MTBI. MTBI can be caused by anything that can result in injury to the brain itself. For example, individuals can experience a brain injury by car accidents, falls, direct blows to the head, or being exposed to toxic substances. An individual may experience a CVA (cerebrovascular accident), otherwise known as a stroke, which will cause injury to the brain. Other conditions such as seizures or multiple sclerosis, can impair brain functioning.

Some individuals are diagnosed MTBI by the score they received on their Glasgow Coma Scale (GCS). The GCS is used by hospital personnel upon admittance into the emergency room. An individual receives a score between 3 and 15, with “mild” brain injury being diagnosed with scores from 13 – 15. A loss of consciousness does not have to occur to obtain a diagnosis of MTBI.

**The Nature of “Mild” Head Injury**

Permanent brain injury can occur without significant loss of consciousness. The neurological exam may be unremarkable, with all imaging studies, such as MRI and CT scans, being negative. This is because the disruptions of nerve processes can only be seen microscopically. Subtle deficits in functioning, in such areas as attention span, memory functioning, and ability to learn new tasks, may be detected, indicating impairment of cortical functioning. Oftentimes, these subtle deficits are not noticed in the first month or so of recovery, but appear as the individual tries to return to a normal home, school, or work routine.
It is easy to explain the reason for the subtle deficits that go undetected under neurological examination and through numerous scans. The brain is made up of many different layers of matter. Each layer has a different weight, or density. Many neuronal axons cross these layers. The axons are long and thin, and when the brain is subjected to an external force, a subsequent internal injury can occur. The axons become “sheared”, that is, torn and stretched, as the different layers of brain matter move at different rates, due to acceleration/deceleration forces from the external impact to the head.

A very common external impact to the head is the windshield, as patients usually come into contact with it, or the side window, upon impact in a car accident. Since the role of the axon is to transfer information from one neuron to another, damage to it causes disruption in information flow. Problems in transferring information, then, can occur within the damaged axon, thereby rendering the initial axon incapable of fully “delivering the message” to the subsequent neurons. There is also “insulation” covering the axons, called the myelin sheath. As this protective coating is damaged, the “speed” of information processing, and efficiency of information processing is thwarted.

Other impact damage can occur from the soft brain tissue being torn inside the skull, as the brain shifts in response to a blow to the head, for example. Inside the skull are “bony protuberances” which normally hold the brain in place. Upon impact, the brain shifts back and forth, and is torn on these bony structures. The original site of impact is called the “coup” area, with the subsequent shifting of the brain to the opposite side of impact being designated the “contre-coup” area. Damage can occur at both locations. Since shear damage occurs at a cellular level, and is microscopic, it cannot be picked up with conventional imaging techniques, as can damage resulting in bleeding or swelling.

**Common Symptom Patterns**

Mild injuries can result in subtle effects that are not easy to measure except by careful neuropsychological evaluation and interview. Many clients perform in “average” ranges on an array of tests, but what they report in everyday living isn’t average at all.

One common symptom pattern is that of mild head injury which is diffuse in nature, more than specific. That is, persons with minor head injury have difficulty with overall speed of processing, capacity to process information, efficiency, execution, and integration of their mental processes. Most injuries that are considered to be mild involve the prefrontal cortex, an area of the brain that serves as a “master controller” of behaviors.

A patient may find it difficult to maintain focus of attention, to shift the focus of attention from one thing to another. An individual may find difficulties in categorization of facts and ideas, and difficulty with abstract thinking and generalization of ideas from one situation to another. Often there is a difficulty in a person’s ability to plan and to organize their daily activities. The speed at which thoughts are processed is often slowed, as well as difficulty in finding the right words to put into speech.

Patients with MTBI often demonstrate “cognitive rigidity,” a term that reflects an inability to shift thinking style. A patient, for example, may experience difficulty being flexible in their thinking style, and consequently “lock on” to ideas or facts, not being able to immediately “shift gears” and generate new ideas easily.
After a brain injury, even a mild one, there are alterations in the way the brain processes information. For example, the brain may not be able to perform as many operations at one time as it did before. Thought processes are therefore labored and slow. Difficulty paying attention and staying on task can be due to increased problems with distractibility. As a patient tries to attend to one idea or situation, they can no longer “process out” distracting and competing sounds and activities. Subsequently, attentional processes break down, and patients have difficulty learning new information. This is because the brain cannot “encode” the information on a timely basis, and the patient may not have the ability to “rehearse” the information, so that the new information can be stored for later recall. Difficulties in sequential processing and simultaneous processing of information are often a result of MTBI.

Abstract thinking is often impaired or altered by brain trauma. It is harder to compare and contrast ideas, to integrate one idea into another one. Individuals become more “concrete” thinkers, and may have difficulty generalizing from one situation to another.

Language skills are often affected. A person may experience difficulty expressing their thoughts and ideas. They may have trouble searching for the right word to use. For example, a person may try to say the word “clock” but will rather “talk around” the item and explain that “it is something you tell time with.” This process of making up for the lost word is called *circumlocution*. The word is not lost forever, but for the time being, the word cannot be accessed properly.

Many of the problems described above occur more frequently when the person is under stress, is fatigued, or is anxious. Problems exacerbate under conditions of drugs or alcohol usage.

A second common symptom pattern in mild brain injury is one of focal injuries. These usually occur when the soft brain tissue is torn by the rough, bony surface inside the skull during trauma. This results in lesions in the frontal and temporal lobes, and in *coup/contre-coup* injuries. These brain regions are involved in the processes of planning, organizing, attention, concentration, memory for new learning, and emotional control. Focal injuries can co-exist with diffuse injuries, causing a wide array of possible deficits.

**Personality and Temperament Changes**

Changes in personality and basic temperament style can occur after a MTBI, and affect an individual’s performance at work and at home, causing those around him to question his or her competency on the job, and limiting social interactions. Some of the changes that occur in personality and mood are caused as a direct physical consequence of the injury itself, and other changes occur as the patient tries to cope with cognitive and personality changes.

Depression and anxiety secondary to the original injury are very common and should be treated as soon as possible with counseling provided by a rehabilitation psychologist. Psychoeducation should be implemented to teach the patient about the causes of their deficits and to assist the patient and family in adjusting to the sequelae. A rehabilitation psychologist can assist the patient in finding compensatory strategies to assist with reduced attention, concentration, and memory processes; or enroll the patient in a course of cognitive remediation. Cognitive remediation exercises are cognitive exercises that help strengthen weak connections between neurons, and help re-establish brain connections.

**Learning Review 5**

You overhear a staff member tell a nurse that, since Anna did not lose consciousness at the time of her injury, there is no possibility of permanent brain injury. The nurse turns to you for confirmation of this information. How should you respond?

Write down your response and then go to the next page for the correct answer.
**Answer to Learning Review 5**

The staff member is wrong. Permanent brain injury can occur without significant loss of consciousness. Loss of consciousness is just one way that brain damage can occur. Other ways include, but are not limited to: sharing effects, surgical intervention, contusions, blood irritation, loss of oxygen, gunshot wound, toxic poisoning.

**Special Aspects to Look for in Testing MBTI**

Neuropsychological deficits can appear immediately following a minor head injury. Conversely, it may take months to realize that cognitive and emotional changes have occurred as a result of that injury. A thorough neuropsychological evaluation a few months after an injury can “pick up” the more subtle deficits, and make rehabilitative efforts and return-to-work efforts more successful. Without proper identification of deficits, individuals may blame other circumstances in order to explain their changes in concentration, memory, personality, and/or resilience to stressors.

**Detecting Neuropsychological Deficits**

A study by Leininger, et.al. (1990) looked at individuals who had minor head injury, both with and without loss of consciousness. These individuals reported cognitive difficulties at one month post injury. Of those subjects tested, the research concluded that those tested displayed significantly poorer performance than uninjured controls on several neuropsychological tests. Deficits were most evident on tests of reasoning, information processing, and verbal learning. When patients were asked to reproduce a complex geometric design, the result was inefficient organization, poor attention to detail, and faulty error recognition, which contributed to reduced scores -- more so than gross visuospatial or motor integration deficits.

The authors concluded that “as far as minor head injuries are concerned, the occurrence or non-occurrence of a traumatic loss of consciousness does not seem to distinguish persons at greater or reduced risk for neuropsychological consequences.

**Learning Review 6:**

Your facility receives a call from a former patient who was discharged a few months ago after he was involved in a car accident. At the time of the accident, it was unknown whether or not his head hit the windshield. At the time of discharge, the patient exhibited no clear symptoms of MBTI. Recently, after starting a new job, he found he had difficulty concentrating. The patient thinks it might be related to stress from his new job, but was wondering if it could be a symptom of MBTI. What should you tell him? Write down your response and then look below for the correct answer.

**Answer to Learning Review 6:**

It may take months for cognitive and emotional changes to become apparent as a result of a brain injury. Stress is definitely a contributing factor. After an injury to the brain, even a mild one, a person might find that they are more easily distracted. They may have trouble filtering out background noise or competing sounds. Often, a person does not recognize these deficits while in the hospital or in rehabilitation. However, when they are at home, or on the job, problems become more evident. When a person takes a new job, like in this scenario, they are trying to learn new information, which taxes the brain’s abilities, and the deficits become more evident. Emotional stress of a new job, residual depression or anxiety over the accident itself, exacerbates the situation.
**Topic Summary:** The effects of “mild” brain trauma often do not become manifest until the patient resumes normal routines at school, work, or at home. No one specific symptom is necessary to diagnose MTBI. MTBI can be caused by anything that can result in injury to the brain itself. Other conditions such as seizures or multiple sclerosis, can impair brain functioning. Subtle deficits may go undetected under neurological examination because the brain is made up of many different layers of matter. Most injuries that are considered to be mild involve the prefrontal cortex, an area of the brain that serves as a “master controller” of behaviors. Changes in personality and basic temperament style can occur after a MTBI. Psychoeducation can be helpful to teach the patient about the causes of their deficits and to assist the patient and family to cope. Neuropsychological deficits can appear immediately following a minor head injury, or they may take months to appear. A thorough neuropsychological evaluation is recommended a few months after an injury. This evaluation can “pick up” the more subtle deficits and make rehabilitative efforts more successful.

**Topic 5: Family & Work Issues for Neurologically Impaired Persons**

**Topic Introduction:** Every person with a head injury represents numerous family issues. Each person presents a unique package of issues emanating from the patient’s age, family status, family relationship and peculiar family dynamics. Even the most psychologically sound families are traumatized by a patient with a head injury. Those families that are already dysfunctional present particularly difficult challenges for the diagnostician and rehabilitation professional. Additional challenges are faced by neurologically impaired persons who have jobs and careers and who may be the primary source of income for their families. At the conclusion of this topic you will be able to identify family & work issues for neurologically impaired persons.

**Family Issues**

Since many persons suffering brain damage are in the 15-25 age range, many of them are dependents still living in the parental home, not as yet vocationally settled, and unable to financially take care of themselves. These persons offer particular challenges in that the siblings, parents, and family network are required to deal with any kind of collateral diagnostic knowledge, and most certainly in any kind of rehabilitation. Adolescents offer demanding challenges in normal maturation. When coupled with brain injury, the adaptations and support systems of the family are stretched sometimes to the breaking point, often resulting in divorce and family dissolution.

In all ages, neurologically impaired persons have difficulty with life skills that can push even the most supportive family to – and sometimes beyond – its limits. Such complex issues include sexuality, economics and finances, rapid mood swings, disturbances of sleep/wake cycles, bowel/bladder dysfunction, speech problems, and many other new and different behaviors that the individual did not have pre-injury. Frequently, the family of a brain-injured patient will report that “he/she now has a completely different personality.”

Since many brain injuries result from deviant behavior, the diagnosis and treatment must also include dealing with the family dynamics, relationship abnormalities, and individual psychological dynamics that were part of the premorbid behavioral abnormalities. Families are frequently not able to adapt to the massive changes in relationships and cannot provide the support systems needed in such cases.

While the neuropsychologist may well team-up with or refer to a family therapist, he/she must have at least minimal education and training in the diagnosis and treatment of marriage and family systems. Patients attempt to utilize every mechanism of defense known to get their needs met. Triangulation, i.e., pitting persons against each other, is a particularly common practice for patients with head injury, and not infrequently, professionals are pitted against each other. Family members can also be pitted against each other, and sometimes the patient him/herself against the physician, psychologist, social worker, and other professionals attempting to provide services.
The geriatric brain-injured patient presents a unique set of challenges. Sleep disturbances, fecal and urinary incontinence, mobility difficulties, irresponsible behavior, dangerous risk taking, anxiety/depression, social life restrictions, unwillingness to learn new skills, and severe mood swings are among the difficulties a caring family must face with an aging brain-damaged person. The normal degenerative aspects of aging often severely exacerbate these problems.

The neuropsychologist must be able to differentiate between family dynamics and patient cooperation and resistance. Secondary gain must be considered along with the value to an adolescent when placing blame on parents, or vice versa. The nearly emancipated adolescent may be thrust back into parental dependence, thus producing every emotion from pleasure to rage. While most neuropsychologists pay less attention to the personality and family dynamics than other psychological specialties, it is important for the neuropsychologist to have available, and when appropriate, utilize personality and family dynamic measurement tests.

The vast majority of studies done on families with a neuropsychologically impaired individual are clinical and anecdotal in nature. A review of textbooks in medicine and neuropsychology revealed that the word “family” appeared with significantly greater frequency in neuropsychological text than in the medical ones. This probably indicates that neuropsychologists are more acquainted with family studies and family systems than are most physicians, with the possible exception of specialized psychiatrists. Neuropsychologists must first train as general clinical psychologists, therefore it would follow that they are more literate in family studies than other professions.

The well-trained neuropsychologist often serves as the liaison between physician, rehabilitation team members, and the patient and family for treatment planning and rehabilitation supervision. This is due to the broad education and training neuropsychologists receive in the normal and abnormal functioning of individuals, family, and systems. This training is acquired during their graduate studies prior to specializing in neuropsychology. Because of this broad education and training, inpatient rehabilitation programs frequently rely upon the neuropsychologist for team leadership, case conferencing, direction of case management, and life-skills planning in preparation for discharge from an inpatient facility.

**Learning Review 7**

Review your knowledge by answering the following question:

What sort of problems might a neuropsychologist encounter when working with an adolescent? Write down your response and then look below for the answer.

**Answer to Learning Review 7**

Since brain injuries are often the consequence of deviant behavior, it is often difficult to determine what behavior is the product of the injury and what behavior is the result of normal adolescent maturation with its mood swings and emerging sexuality. For these and other reasons it is essential that the neuropsychologist investigate the family dynamics and be trained in the diagnosis and treatment of marriage and family systems.

**Returning to Work**

Oftentimes, a patient’s return to work should be graduated from part-time to full-time, and should be supervised initially by a vocational rehabilitation counselor, or work supervisor. This allows the patient’s work to be supervised until all concerned are satisfied that the employee is working up to expected potential. With a return to work too soon, and without assistance, many persons with MTBI fail at their jobs, when perhaps with a little planning and with minor job modifications or workplace modifications, an employee may achieve a more successful return to work experience.
There are many potential effects of brain injury on employability. The most rapidly growing area of employment is in the jobs requiring “information highway” skills; that is, in the areas of accessing, storing, and implementing information. We are barraged daily with all kinds of information to sift through and evaluate. The high demand for “white collar” jobs exceeds the “pink-collar” and “blue-collar” trades.

Mild brain impairment affects all jobs to some degree, but particularly those positions that support and interface with the information economy. Brain impairment, which may seem relatively minor, can cause extraordinary loss of income. For example, if an engineer loses the ability to analyze spatial relationships, he or she is out of a job. If a store owner can no longer plan ahead and project outcomes, he or she will have to sell the business, or hire a manager to take his or her place.

Deficits in attention and memory, common sequelae of mild head injuries, affect workers in a variety of positions. Many jobs require the ability to understand, remember, and execute written or oral instructions. Someone on an assembly line, being trained for a new product line, is unemployable if they cannot learn new procedures in the proper order.

As one can see, many individuals with MTBI can be literally vocationally disabled from just one accident or neurological insult to the brain. As stated by Lees-Haley (1987), “a 10 percent loss of memory is rated as a mild loss by neurologists and neuropsychologists, but employees who forget 10 percent of what they hear in an 8-hour day may be in 100 percent trouble.”

It is not uncommon for a worker’s interpersonal skills to be affected by mild brain injuries. Vocationally, this can be devastating for the individual who sells for a living, or who is a public relations consultant for a company. But it can be equally devastating to a corporate culture, where “team” players must learn to get along with each other, and to be able to understand each others viewpoints. Some injuries increase a person’s irritability, render them less able to read social cues, increase their aggressive tendencies, and rate them “difficult to get along with” by others.

Many MTBI individuals find they can no longer handle the pressure of stressful occupations. When these lowered social skills and reduced ability to tolerate emotional stress are a change from the worker’s previous level of functioning, chances for promotion are greatly reduced for these individuals. Individuals with MTBI are much more likely to be in danger of losing their jobs, and often are the first to be let go during “downsizing.”

Each state has its own Vocational Rehabilitation (VR) office. An injured person would need to contact their VR in the state they live in. Usually VR analyzes what skills the injured person has left. It might be possible to help the injured person get accommodations at the place of work, if that is all that is needed. VR might offer thorough job-retraining, if that is a more viable option.

**Learning Review 8:**

The wife of a soon-to-be discharged brain trauma patient seeks advice. Her husband is insisting that he shouldn't have any problem returning to his job as a manager at a small software company, since he will be sitting down and only working a few hours at a time.

Should you tell her that her husband is correct or mistaken? Write down your response and then look below for the correct answer.

**Answer to Learning Review 8**

Mild brain impairment affects all jobs to some degree, but particularly those positions that support and interface with the information economy. Since the husband is a white collar worker in a management position, he needs to use information processing skills that may have been damaged. He might have problems upon returning to work. A referral to a neuropsychologist may be warranted. In addition, the wife and husband need ongoing counseling.
**Topic Summary:** Neurologically impaired persons have difficulty with life skills that can put pressure on even the most supportive family. Such complex issues include sexuality, economics and finances, rapid mood swings, disturbances of sleep/wake cycles, bowel/bladder dysfunction, speech problems, and many more new and different behaviors that the individual did not have pre-injury. Families are frequently unable to adapt to the massive changes.

The neuropsychologist must differentiate between family dynamics and patient cooperation and resistance. The well-trained neuropsychologist often serves as the liaison between physician, rehabilitation team members, and the patient and family for treatment planning and rehabilitation supervision.

In addition, many individuals with MTBI find it difficult to return to work soon after discharge. A planned return to work schedule is necessary for a successful return to work. Brain injury can have a devastating effect on employability. It is not uncommon for a worker’s interpersonal skills to be affected by mild brain injuries. Individuals with MTBI are much more likely to be in danger of losing their jobs, and often are the first to be let go during “downsizing.”

**Topic 6: Working with Children**

**Topic Introduction:** Neuropsychology is a field that is rapidly becoming recognized in the areas of learning disabilities, as well as acquired brain injury. Brain injury in children can occur in the womb, at birth, or as a result of accident or abuse as an infant and young child. For example, a child may experience a stroke or a seizure in the womb. During the birthing process, it is possible for a child’s umbilical cord to become wrapped around the neck, causing possible periods without proper levels of oxygen.

There are many issues that arise pre- and post- childbirth that may interfere with normal brain development and can result in the child’s experiencing learning problems later in life. At the end of this topic section, you will be able to describe neuropsychological problems that afflict children.

**The Issue of “Soft Signs”**

What is a “soft sign” anyway? “Soft signs” are subtle neurological deficiencies that will later interfere with learning in school. They are observable “markers” that often point to an underlying neurobiological abnormality. These deficiencies do not necessarily point to a serious medical condition, but are more of a biological deviation from normal brain development.

For example, we all know that children develop certain skills and behaviors between certain age ranges. They are also expected to outgrow certain behaviors by certain ages, replacing them with new skills and behaviors. When a skill or behavior continues beyond the age at which most children have outgrown the behavior, we label that a “developmental” soft sign. Another example is when a child is not exhibiting a skill or behavior by a certain age, such as when a child doesn’t walk by age 2. A good developmental chart is the place to start, to help you decide if a child is age-appropriate in a certain area.

Some examples of developmental soft signs are motor awkwardness, or clumsiness. For example, does the child have difficulty building blocks, or does he or she have an immature grasp when holding a pencil? Is the child’s gait, posture, or stance different from other children his or her age?
Another category of signs includes behavioral anomalies that are considered abnormal regardless of the child’s age. For example, is a child unable to distinguish a common coin, or paper clip, by touch alone if they have their eyes closed? This is called astereognosis. Most children can identify common objects by touch alone by age 9. Watch for the child who has trouble finding the right words. He or she may be able to describe the function of an object, but not be able to properly name it.

Another “soft sign” to be on the lookout for is dysgraphesthia. Dysgraphesthia is an inability to identify letters or numbers that are “drawn” (with a non-sharp object) on the back of one’s hands, while blindfolded or while eyes are shut. The reason you "draw" on the back of someone's hand is to test whether a certain area of the brain is registering the drawing. That is, can the person feel the DEPTH of the drawing (does it feel light or heavy to them?)? Also, is their brain able to distinguish whether or not you are drawing a specific letter (like an "A"), number (like a “6”) or object (like a star)? After a stroke, or brain injury, this technique can help localize which side of the brain was affected, and may determine whether or not patients are progressing in treatment.

Be careful using this technique with younger children, because you must first identify the extent of their knowledge of numbers and letters. Have the child draw his own numbers and letters first on a piece of paper, and then have the examiner use the same symbol the child uses.

These subtle variations affect a child’s perception, language, as well as impulse and motor control during crucial years of development and maturation. Perception, for example, is how the child “sees”, “hears”, and “touches” his world – how he or she interprets it. A child’s perception of the world determines how he or she reacts to it.

It is sad indeed when parents and teachers don’t recognize the wide variety of deviations in a child’s early-developing learning system. Some children just do not “see” letters and numbers correctly, which causes unnecessary fights and struggles between the child and his/her parents and teachers. These children get labeled as “troubled” students, and oftentimes a psychological diagnosis is given. These children are perceived as unmotivated, when in fact, they are struggling to do the work that is asked of them—they just have no knowledge of how to change the way they approach academic tasks. These “soft signs”, taken in isolation, may not pose a problem to a child’s academic performance. But when several of the above signs exist, a referral to a specialist is well-indicated.

These learning problems can be subtle and tend to globally impact learning and behavior. Remember, as adults, if we can’t learn something new, we back away from it. We often say that we are “not interested in it anyway.” Well, children are the same. When they have early learning problems that are not identified, it is a constant uphill battle for them to perform “correctly” for parents and teachers. So they naturally back away, find other interests, or become more focused on their social life instead of academic life. Some children, not fitting in, lose precious self-esteem, and are found to have more behavior problems as a consequence of poor learning abilities. Whenever there are questions about a child, the parent should consult both a pediatric neurologist and a neuropsychologist specializing in learning problems.

**Learning Review 9:**

Match up the term with its definition

1. Dysgraphesthia a. Subtle neurological deficiencies that will later interfere with learning in school
2. Soft Sign b. The inability to identify common objects by touch alone by age 9
3. Astereognosis c. The inability to identify letters or numbers that are “drawn” (with a non-sharp object) on the back of one’s hands, while blindfolded or while eyes are shut

Write down your answer, and then go to the next page for the answer.
Answer to Learning Review 9:

1. Dysgrafhesthesia = c. The inability to identify letters or numbers that are “drawn” (with a non-sharp object) on the back of one’s hands, while blindfolded or while eyes are shut

2. Soft Sign = a. Subtle neurological deficiencies that will later interfere with learning in school

3. Astereognosis = b. The inability to identify common objects by touch alone by age 9

Topic Summary: Children’s learning disorders is an area of concern to neuropsychologists. Parents and adults who work with children need to be alert for "soft signs." Soft signs are subtle neurological deficiencies that will later interfere with learning in school. For example, if a child hasn't outgrown a behavior around the same time as his or her peers, it might qualify as a soft sign. Some soft signs are behavioral anomalies at any age such as astereognosis, which is the inability to distinguish common items by touch alone when the eyes are closed.

Adults should be alert to these signs and recognize that when a child resists learning, it isn’t always because he or she is being difficult. The child may be dealing with a neurological disorder that, if recognized, can be addressed.

Topic 7: Rehabilitation

Topic Introduction: Every head injury is different. Similar head injuries can result in different sequelae for different people. There is no one program in rehabilitation that fits all victims of head injury. The individual’s traits must be taken into consideration, as well as their functional status. This topic explores many of the variables that affect the type of therapy offered to someone with neurological damage. At the end of this topic section you will be able to identify those variables that shape the therapy of people with neuropsychological injuries.

Key Factors in Rehabilitation

Factors that mediate the best results in rehabilitative efforts are:

- History of good academic achievement
- Good social relationships
- No history of substance abuse
- No criminal history
- Good character and self-control
- Good relationships with family
- Warm and supportive family
- Intact family
- Strong-willed and determined
- Good emotional/personality adjustment
- Under 21 years of age
- Similar pre-injury/post-injury vocational abilities
- No previous brain insult
- Good stress management skills

 Desired Rehabilitation Outcomes

After a brain injury, how does a treating professional decide on rehabilitation goals? Initially, one of the most important areas to consider is functional status. A patient’s functional status includes whether or not he can take adequate care of himself unassisted. For example, can the person dress himself? Live on his own? Shop and cook for himself? Take his own medicine, etc. with minimal risk of danger to himself?

Typically, rehabilitation goals are set in the first few weeks after a traumatic brain injury. That is because today’s treatment teams initiate treatment as soon as possible, to maximize rehabilitative outcomes.
Following are just a few of the questions that a rehabilitation team must consider:

- Will the person return to home alone, or return to home with family?
- What happens when the person returns home but his/her spouse has to work during the daytime? Is the patient capable of succeeding in such a scenario?
- What if the injured person is the sole breadwinner for a family? Is there a chance the person can return to work, or must they be retrained in a different job category?
- What transferable work-related skills still remain?
- Have the patient’s social skills changed, and would they interfere with return to work?
- What level of difficulty does the patient have in paying attention and maintaining focus through a typical work day?
- Can the patient learn new information? Can he rely on skills learned over the years?

**Strategies for Working with Person’s with Brain Injury**

Suffice it to say that every human being is different and learns new information and new skills differently. After a brain injury, a person usually needs help in most areas of learning, in one way or another. One question to ask an individual is what their preferred mode of learning was before the injury. You can then assess whether or not that method still remains the same. Following is a list of characteristics for four types of learners.

**The Visual Learner:**

- Rolls Eyes
- Follows people around the room with their eyes
- Is distracted by movement
- Prefers handouts, written material, or other visual presentations
- Says things like, “I SEE what you mean” or “I get the PICTURE!”

**The Auditory Learner:**

- Talks a lot; may talk to self
- Distracted by sound
- Likes to have material read aloud
- Says things like, “SOUNDS good to me!”, or “I HEAR what you’re saying”

**The Kinesthetic – Internal Learner:**

- Sits very comfortably; usually slouched on couch
- Needs to attach strong emotion to the work
- Distracted by comfort variations, i.e., temperature, light
- Retrieves information by what something “felt like” when it was learned
- Says things like, “That FEELS right”

**The Kinesthetic – External Learner:**

- Lots of movement; leans back in chair, taps pencil
- Needs hands-on experiences
- Distracted by movement – yours or others
- Retrieves information by “feeling” the MOVEMENT when it was learned
- Says things like, “I need a concrete example.”
Recommendations for Ways to Work with Patients

It is too difficult to list every type of treatment possibility because every person with a brain injury or illness has different strengths and weaknesses. The following are just a few examples of how to work with patients.

- Individual and/or small group activities to model and practice social skills
- Speech therapy to increase communication skills
- Occupational therapy to regulate sensory information
- Physical therapy to improve coordination and gross motor skills
- Keep structure and routine. This is very important with someone who has trouble paying attention and organizing their time.
- Caregivers and treating professionals should use similar methods regarding positive reinforcement, etc.
- Break down training and/or new learning into several discrete steps, making sure the individual understands each step before proceeding to the next step (break down each step, for example, on how to pull up jeans if necessary, or how to do the laundry).
- Realize that the person’s difficulty with communication causes frustration and unwanted behaviors.
- Realize that the person’s difficulty with sensory integration causes sensory overload and unwanted behaviors.
- Treating professionals must be very short and concrete in their instructions.
- Oftentimes, a person may need to be told that a situation will change before the change occurs. He or she may not deal well with change and is easily fearful of things not understood.

Learning Review 10:

William is a 32-year-old graphic artist recovering from a near fatal motorcycle accident.

He wants to return to work. The first thing you want to know is: what is his preferred learning style? Based upon what you know about William and his chosen career field, what learning style do you think he favors?

Write down your response and then look below for the answer.

Answer to Learning Review 10:

William’s background as a graphic artist suggests that he is a visual learner. William should be evaluated to see if he can still perform the duties of a graphic artist, given his injury. Then you can provide feedback to the patient, in order to help him proceed in his efforts at returning to employment.

Topic Summary: Therapists must be aware of the differences in head injuries, as well as the unique character traits of each client. There are a number of key factors that can affect rehabilitation, such as academic achievement, good social relationships, a supportive family, and a strong-willed personality.

A number of questions must be asked before rehabilitation goals are set. For example: will the person live alone or with others? Have the patient’s social skills changed, and would they interfere with return to work? Also, the individual’s preferred learning style should be taken into consideration.

Recommended ways of working with patients include individual and/or small group activities to model and practice social skills, speech therapy to increase communication skills, and breaking down training and/or new learning into several discrete steps, making sure the individual understands each step before proceeding to the next step.
Appendix 1: Case Studies to Practice Thinking in a Neuropsychological Manner

Following are two case histories for you to consider. You are given enough information to answer the questions at the end of each case. Use the information and skills you learned in this module to think through these scenarios. Begin to think like a neuropsychologist! Need some help?

Be sure to:

- Include your opinion on prognosis regarding: health, return to work, family issues
- Consider the prognosis for returning to work
- What type of treatment modalities would you recommend?
- What type of referrals, if any, would you recommend?
- What are the vocational implications of this type of injury on this particular person?
- Address possible family issues that could arise from this injury
- Address medication management issues
- Address safety issues

Ask yourself the following types of questions:

- What types of tests would I use?
- What other methods of evaluation would provide needed information?
- What is your initial hypothesis about this case? What are you looking to find, or rule out?
- Which side of the brain do you think is primarily involved?
- What are your treatment recommendations?
- What are some vocational implications for this patient?
- What type of issues may arise socially, or within his family life?

Case Example # 1: John

- 46 years old, married
- Completed high school
- Describes himself as a poor student in school. He said he had no problems learning to read in school, but math was difficult.
- Left-handed
- No history of mental illness
- Occupation: Salesman

John was in his usual state of good health until about 2:30 a.m. on July 13, 2001. He woke with clear mentation, but was weak, dizzy, and vomiting. He reported a strong headache with right-sided weakness. He was dysarthric (speech was hard to understand due to impairment of tongue or other muscles essential to speech), but auditory comprehension was intact.

A review of John’s medical records produced the following:

Changes since the incident:

- Increase in temper control problems
- Increase in aggressive behaviors
- Problems organizing and planning
- Decreased motor speed
- Problems in speech production
- Problems in memory recall
- Slowed mental processing
Other cognitive areas:

- Attention and concentration appear to be intact
- No problems understanding what other people say to him
- No difficulties reported in judgment or problem solving

At the time John comes to your attention, he is 2 weeks post-trauma. You are evaluating him in the hospital. What do you do? Where do you start? Write your conclusions below. The answers are provided on the following page.

1. What is your prognosis regarding John’s health and family issues?
2. What is John’s prognosis regarding return to work?
3. What type of treatment modalities would you recommend?
4. What type of referrals, if any, would you recommend?
5. What are the vocational implications of this type of injury on this person in particular?
6. What are possible family issues that could arise from this injury?
7. What type of medication management issues may arise?
8. Are there any safety issues?
9. What types of tests would you use?
10. What other methods of evaluation, other than tests, would give you the information you need?
11. What are your initial hypotheses about this case? What are you looking to find, or rule out?
12. Which side of the brain do you think is primarily involved?
13. What are your treatment recommendations?
14. What are some vocational implications for this patient?
15. What type of issues may arise socially, or within John’s family life?

Write down your response, and then go to the next page to see what the author wrote.
Case Example #1 Answers:

1. What do you think is the working diagnosis, based on symptoms? John appears to have suffered a stroke, which if confirmed, would require therapy geared toward focal injuries. John has suffered a stroke to the left side of his brain, primarily to Broca’s area, which is responsible for speech production.

2. Prognosis regarding return to work? The temper and aggressive behavior that he has displayed post-trauma might jeopardize his job as a salesman. It is advisable that he obtain cognitive-behavioral therapy before returning to work, to learn anger management techniques and to decrease incidences of aggressive behavior.

3. What type of treatment modalities would you recommend? Individual and family psychotherapy; speech therapy; memory training; use of memory notebook and other organizational tools; occupational therapy; physical therapy.

4. What type of referrals, if any, would you recommend? Refer to neuropsychologist (for evaluation of cognition and emotional functioning), psychologist (to do therapy), speech therapist, occupational therapist, physical therapist, vocational rehabilitation counselor (to assess return to work goals/potential, career interests, and how to realistically reach those goals).

5. Vocational implications of this type of injury on this person in particular? As a salesman, John needs to improve his level of speech production so that others, including clients, may understand him. He needs to learn how to better organize his time and schedule; and compensate for memory problems. He needs to learn to manage his temper since he deals with the public. He will need to pace himself to reduce fatigue.

6. Address possible family issues that could arise from this injury? Counseling should be recommended for the family so they know what to expect from John post-trauma and how to address it, as well as the stress it is likely to produce. In addition, one has to consider the economic impact from loss of wages: 1) during his hospitalization, 2) during inpatient rehabilitation, 3) during outpatient rehabilitation, and then 4) possibly during job retraining. There may be additional stressors to John’s spouse if she has to return to work and now be head of the household while he is healing. There are also the fears of “what if” he cannot return to his former occupation. The wife will be changing roles from primarily “wife” to “caretaker” which changes the marital dynamics considerably. Loss or impairment of previous level of sexual functioning and desire are probable.

7. Medication management issues? John’s physician may need to evaluate and treat depression (due to loss of job, income, etc) and/or anxiety (related to worries about the future).

8. Any safety issues? John’s decreased speed of mental processing would make driving harder, since driving requires quick mental decisions. It also requires moving his head quickly from right to left and scanning his environment for cues of potential accidents. Due to right sided weakness, caused by left sided stroke, he may not be able to drive, or will have to be in a wheelchair and have a specially modified van in order to drive.

9. What types of tests would you use? Suggest using the process approach, to include tests of attention and concentration, memory, planning, organizing, sequencing, receptive and expressive speech, verbal fluency.

10. What other methods of evaluation, other than tests, would give you information you need? I would conduct interviews with family members and with John’s primary doctor. Also interview other treating professionals, such as speech language pathologist, and vocational rehabilitation specialist. Behavioral observation of patient while performing occupational and physical therapy, speech therapy, job retraining, would be invaluable to see how John relates to others and performs in “real time,” not just in testing.

11. What are your initial hypotheses about this case? What are you looking to find, or rule out? I would want to find out what the cause of the stroke was and if there is a danger of it reoccurring. Also I want to discover the extent of damage, extent of remaining strengths, as well as identify weaknesses and ways to remediate or compensate for deficits.

12. Which side of the brain do you think is primarily involved? The symptoms indicate left side stroke, affecting Broca’s Area (area of speech production).

13. What type of issues may arise socially? John may get easily frustrated due to his deficits. Family and friends should be advised to be patient. Any employer or co-workers should be informed of residual social and cognitive deficits, and how to work around them or react to them.
Case Example #2: Steve

- 29 years old, married
- Completed 10 years of education
- Right-handed
- Occupation: Carpenter

Steve sustained a gunshot wound to the head. The point of entry was in the frontal region and exiting in the occipital region (back of head). He miraculously survived. He reported no other head injuries in the past.

Review of Steve’s medical records shows the following:

Changes since the incident:

- Problems with word finding and expressive speech
- Problems in memory recall
- Slowed mental processing
- Problems with comprehending what people say to him
- Walks into walls easily, and forgets to scan to the right with his eyes

Other cognitive areas:

- Mild problems in attention and concentration
- Mild difficulties reported in judgment and problem solving

At the time Steve comes to your attention, he is 4 months post-trauma. You will evaluate him in your outpatient office. Where do you start? What information do you have to obtain? Write your conclusions below.

1. What do you think is the working diagnosis, based on symptoms?
2. What is Steve’s prognosis regarding return to work?
3. What type of treatment modalities would you recommend?
4. What type of referrals, if any, would you recommend?
5. What are the vocational implications of this type of injury on this person in particular?
6. Address possible family issues that could arise from this injury
7. Are there any safety issues?
8. What types of tests would you use?
9. What other methods of evaluation, other than tests, would give you information you need?
10. What are your initial hypotheses about this case? What are you looking to find, or rule out?
11. Which side of the brain do you think is primarily involved?
12. What type of issues may arise socially?

Write down your responses, and then go to the next page to see what the author wrote.
Case Example #2 Answers:

1. **What do you think is the working diagnosis, based on symptoms?** Steve has suffered injury to the area following the trajectory of the GSW (gun shot wound), from the left frontal lobe to its exit out of the left occipital region.

2. **Prognosis regarding return to work?** Steve’s ability as a carpenter will definitely be affected. Steve would not be able to function safely on the job due to poor gross motor skills, poor visual scanning problems, problems with attention and concentration, and poor judgment.

3. **What type of treatment modalities would you recommend?** I would recommend occupational therapy, physical therapy, individual and family counseling, as well as speech/language therapy.

4. **What type of referrals, if any, would you recommend?** Recommend referral to vocational rehabilitation counselor. Would suggest Steve have a repeat neuropsychological evaluation in 8 months, when he is 12 months post-trauma, to see where significant gains have been made, or if he has stabilized in his condition.

5. **What are the vocational implications of this type of injury on this person in particular?** Steve will need to undergo a job analysis to see what types of jobs he can still do. He will require on-the-job retraining. He cannot work any job where safety is an issue. He will likely need a job coach to supervise his work when he does return to work.

6. **Address possible family issues that could arise from this injury.** Steve could experience depression from possible permanent loss of professional skills as a carpenter, which would affect family dynamics. Loss of income to his family will also affect his ability to cope, as he was likely proud of his breadwinner status.

7. **Any safety issues?** Given the potentially dangerous tools carpenters work with, I would discourage Steve from returning to work until extensive occupational therapy has been done and progress has been shown. He has trouble interpreting what people say to him and might misunderstand directions given to him by his boss or others. Memory problems may cause him to forget what step he is on, or a particular procedure.

8. **What types of tests would you use?** I would use the Halstead-Reitan Test Battery, the Wechsler Memory Scale III, Halstead-Reitan Aphasia Screening Test, and one of the visuospatial tests such as Rey-Osterrieth Complex Figure, the Block Design subtest of the Wechsler Adult Intelligence Scale-III (WAIS-III), and the Benton Visual Retention Test.

9. **What other methods of evaluation, other than tests, would give you information you need?** I would talk to his wife and look at any carpentry work he had attempted since his trauma and compare it to his pre-trauma efforts. I might also speak to the vocational rehabilitation specialist and observe Steve doing “work trials” to see what he can and cannot still do.

10. **What are your initial hypotheses about this case? What are you looking to find, or rule out?** I want to find out to what degree Steve’s abilities are permanently impaired. I want to determine whether or not he can even return to work in his usual occupation, or if he will need job-retraining, or possibly be placed on SSI disability.

11. **Which side of the brain do you think is primarily involved?** This would be considered an injury to the left side of the brain.

12. **What type of issues may arise socially?** Steve may become withdrawn. His occupation likely defined his identity as a man; being a blue collar worker, he displayed a more “macho” type of personality. He will no longer be able to socialize after work “with the guys” such as is common on “paycheck Friday”, which is a common end-of-the-week way to relax for labor-oriented employees. Depression and anxiety will also likely affect his marriage and family dynamics, as Steve’s wife becomes more of a caretaker or possibly a breadwinner.
Appendix 2: Glasgow Coma Score (GCS)

The GCS is scored between 3 and 15, 3 being the worst and 15 the best. It is composed of three parameters: Best Eye Response, Best Verbal Response, and Best Motor Response, as given below:

**Best Eye Response (4)**

1. No eye opening
2. Eye opening to pain
3. Eye opening to verbal command
4. Eyes open spontaneously

**Best Verbal Response (5)**

1. No verbal response
2. Incomprehensible sounds
3. Inappropriate words
4. Confused
5. Orientated

**Best Motor Response (6)**

1. No motor response
2. Extension to pain
3. Flexion to pain
4. Withdrawal from pain
5. Localizing pain
6. Obeys Commands

Note that the phrase 'GCS of 11' is essentially meaningless, as it does not tell you how the score became an “11.” It is important to break the figure down into its components, such as E3V3M5 (Eye = 3, Verbal = 3, Motor = 5) = GCS 11.

A Coma Score of 13 or higher correlates with a mild brain injury; 9 to 12 is a moderate injury and 8 or less a severe brain injury.

Glossary:

Alexia: Inability to read due to cerebral injury or illness
Agraphia: An acquired difficulty in writing or spelling
Anomia: The impaired ability to name objects or retrieve words.
Astereognosis: Impaired ability to discriminate objects based on the physical characteristics of size, weight, shape, density, or textural cues.
Anosognosia: Inability to recognize body parts
Apraxias: The inability to perform learned purposeful movements
Autopagnosia: Disturbed body schema involving an inability to identify the parts of one’s body
Contre-coup injuries: Cerebral contusion appearing opposite to the point of impact after a blow to the head.
Contusions: A bruise, typically of the brain surface, without cerebral hemorrhage
Hematoma: A localized area of blood from vessel leakage or bleeding
Hemorrhage: Bleeding from either vessel leakage or vessel rupture
Metamorphopsia: Visual disorder in which the apparent shapes or sizes of objects are distorted
Stereognosis: Recognition of objects by touch
Traumatic Brain Injury: Brain injury caused by an external mechanical force such as a blow to the head

Bibliography:


Recommended Resources for Conducting Neuropsychology Assessments:


PAR (Psychological Assessment Resources 1-800-331-8378)
Recommended Websites:

National Academy of Neuropsychology: http://www.nanonline.org

International Neuropsychological Society: http://www.the-ins.org

Brain Injury Association of America: http://www.biausa.org

Biography:

Karen Lee, PsyD, CLCP, MSCC, has received extensive training in the areas of neuropsychology and rehabilitation of neurologically impaired patients and has worked in this field for the past 16 years. Dr. Lee holds a PsyD degree in clinical psychology from Forest Institute of Professional Psychology. She received her MEd in Counseling from the University of Missouri at St. Louis, and her BA degree from the University of Missouri at Columbia. Her internship training and postdoctoral fellowship training were completed at Forest Institute of Professional Psychology and St. John’s Regional Health Center, Springfield, Missouri. Both internship and residency were focused on neuropsychological assessment, neuropsychological intervention, and rehabilitation with neurologically impaired patients.

Dr. Lee is a member of the American Psychological Association and belongs to both the Independent Practice division (Div. 42) and Rehabilitation Psychology division (Div. 22). She holds licensure in Missouri, Illinois, and New York to practice as an independent psychologist. Dr. Lee is a full member of the National Academy of Neuropsychology, and is recognized by the National Register of Health Service Providers in Psychology. She has also been granted the Certificate of Professional Qualifications (CPQ) in Psychology from the Association of State and Provincial Psychology Boards (ASPPB). The American Psychological Association’s HOPE Program (HIV Office for Psychology Education) recently selected Dr. Lee as a Regional Trainer in HIV/AIDS Education.

In academia, Dr. Lee served as Interim Dean, and the Director of Graduate Training, where she was responsible for the overall training of approximately 286 students. In this capacity she also administered the pre-doctoral and post-doctoral training programs and oversaw the placement of pre-doctoral and post-doctoral applicants to Forest Institute’s training programs. Dr. Lee also served as the Director of the Neuropsychological/Rehabilitation Department at Forest Institute of Professional Psychology, in Springfield, Missouri. As Director, Dr. Lee was in charge of curriculum content and development, including placement of faculty in these courses. She taught Neuropsychological Assessment I and II, Special Neuropsychological Assessment Techniques, Neuropsychological Report Writing, as well as Health Psychology.