Understanding the Effects of Traumatic Brain Injury

Cognitive Difficulties after TBI

The cognitive difficulties experienced by people after traumatic brain injury (TBI), often have more impact on their recovery and outcome than their physical limitations. Most people with traumatic brain injury, even those that are severe in degree, are ambulating after their trauma. Within a year, 90% of them are getting around independently and able to care for themselves. It is however, the cognitive difficulties and behavioral problems that have the most significant impact in terms of one’s independence.

TBI has a generalized effect, that is the entire brain is affected to some extent. This is different from what occurs with a stroke, where a specific hemisphere or section of the brain is affected. An individual may have aphasia because they have a left hemisphere stroke or significant neglect because they have a right hemisphere stroke. With head injury there are not, for the most part, patterns of significant deficits in some areas with intact abilities in other areas. Every ability, in a lot of cases, is affected.

It helps to think of cognitive abilities as a hierarchy, beginning with very basic skills and then moving on to more complex ones.

- **Arousal or alertness** is first in the hierarchy. This is the foundation for everything else. An individual first must be aroused in order to do anything cognitively or behaviorally.

- **Sensory and motor skills** are next. One must be able to sense the world in order to operate in it and manage one’s life. Sensing means having the use of one’s senses, including vision, hearing, and touch. While few head injuries cause blindness, they can cause double vision or perceptual problems, making it difficult to interpret visual material. With regard to hearing, an individual very rarely becomes deaf as a result of a head injury. However, there may be problems in discerning discreet sounds or in processing auditory material fast enough to be able to keep up. Motor ability involves manipulating one’s environment with one’s hands, particularly performing basic skills.

- **Attention and concentration** are at the next level. These skills involve selecting what is important in the environment, as well as shifting one’s attention to what is important. It may be easy to pick out what is important, but one must also be able to maintain attention and focus. Then as changes occur, one must be able to shift attention. All of these components of attention can be disrupted by a brain injury.

- **Language skills or the ability to communicate** with the world follow in the hierarchy. It’s very rare that someone with a TBI loses all language abilities such that they cannot comprehend or express themselves. Language skill problems after TBI are more subtle. An individual may be able to express himself in a basic way, but be unable to explain complex things in a logical fashion. One of the more subtle problems that may exist involves word-finding skills. The individual cannot quickly access words from memory. When talking, they tend to talk around the topic. It is difficult for them to “hit the nail on the head”. It can be very frustrating finding that correct word.
Spatial and constructional abilities are at the next level and involve spatial activities, such as drawing or building things and judging distances. This requires visual perception as well as being able to take a mental image and apply it in the environment through motor output. A complex series of events has to take place for this to occur.

Memory abilities come next. Individuals with traumatic brain injury, even severe injury, often have relatively good recall of events that occurred prior to their trauma. There may be gaps for a week or a month before the injury, but this usually fills in over time. All of that information is already in the memory banks. The head injury does not take that away. It may interfere somewhat with the ability to retrieve some information but it does not erase the existing memory.

The problem faced by people with TBI is with encoding and retrieving new information. Memory for new information is usually the most severe deficit experienced by people with traumatic brain injury. There are several reasons why memory for new information is difficult for people with TBI.

A major factor is the neurochemical cascade that takes place as a result of the TBI that effects the hippocampal areas of the brain, which are essential to memory encoding. In addition, disrupted executive skills may have a significant impact on memory functioning. As a result the individual may not be able to attend to information, organize information for encoding, or appropriately scan memory to retrieve information.

Think of the brain as a very organized filing cabinet. Each drawer is labeled and all the files are arranged and labeled. To locate information you open the correct drawer and locate the right file. With a head injury, it is like the filing cabinet has been turned upside down and all of the files are in the wrong place and so it is hard to organize things again.

Reasoning skills or the ability to solve problems are at the next level in the hierarchy. First one has to know that there is a problem. Individuals with head injury often do not recognize the need for a solution or they tend to be inflexible. They may come up with one strategy but if that does not work, they cannot think of an alternative. They will stick with that same strategy even though it’s not working.

The basic “if - then” reasoning that most people use, does not occur for these individuals.

Intellectual abilities follow. Here we see a combination of many different skills that combine reasoning, memory, spatial skills, etc.

Academic abilities are at the final level, combining many different skills. For someone who has been through a reasonable educational program, it’s rare to lose academic abilities following a TBI. Injured people can usually still read, write, and do math because those are ingrained skills; they’re already in the memory banks to the point that the skills are almost automatic. The problem academically is that the individual is not able to add to these skills after the injury because of the memory and reasoning difficulties.

Behavioral/Emotional Difficulties

Behavioral and emotional difficulties cannot be separated from the cognitive difficulties that accompany TBI. Ninety-nine times out of 100 when there is a behavioral problem it is tied to a cognitive problem.

Restlessness and agitation are common problems, particularly early in recovery. At that point of recovery, people with TBI have significant problems with attention. Restlessness is a normal reaction for a person who cannot pay attention or is easily distracted. The same thing applies with reasoning. When an individual cannot reason effectively enough to accomplish a goal, they tend to be restless and thus more agitated.

Emotional lability and irritability exhibited by the individual with the head injury are frequently described by family. To understand what is happening, think about it in terms of executive (reasoning) skills as a gating mechanism. These gates keep behavior in control. A lot of what the frontal lobes of the brain do is inhibit actions that are not consistent with our goals. They keep you from doing things that you should not do. For example 3 year old children, whose frontal lobes are not fully activated, do whatever comes to mind, sometimes to their detriment.

When you have a significant brain injury that involves the frontal areas, the gating mechanism can be knocked askew such that the person cannot inhibit behavior as well as prior to the injury. The
individual is not reasoning effectively and cannot figure out what to do in a situation to solve a problem. To get the attention needed or to generate a response they may get angry or exhibit other inappropriate behavior. The gates that kept behavior in control are knocked askew and things come out that used to be kept in.

- **Confabulation** is another behavior problem. A patient may tell staff they were at the Talladega races last weekend when actually they have been in the hospital for the past 2 months. The person is not lying; instead their memory is playing tricks on them. They are not able to organize their memory and therefore cannot retrieve information accurately. This person may have been to Talladega, but in the distant past. Their organizational process, called “time-tagging”, of their memories is often disrupted and hence their inaccurate recall.

- **Diminished insight** on the part of people with TBI is a frequent complaint among caregivers. Self-awareness is a very unique skill of adults. As adults we are able to step outside of ourselves and look at our performance and abilities. This involves being able to process information at a very high level, requiring attention, memory and reasoning abilities. Often a person with severe head injury does not have a very good understanding of their deficits or the impact of those deficits on daily life. They will deny cognitive difficulties that are obvious to others or feel they can engage in activities, such as driving, even while acknowledging significant problems.

- **Impulsivity/socially inappropriate behavior** results from both diminished reasoning and lack of inhibition. Both have a lot to do with frontal area functioning and the gating mechanism that has already been described. Many families describe the person with the head injury as saying hurtful things and that they are insensitive and blunt. They say things that come into mind without due consideration of the situation. It can be a subtle problem or it can sometimes be severe. The injured person is not able to reason that “If I say this, then something undesirable is going to happen.” The appropriate inhibition is not there.

- **Poor initiative** can be confused with depression. Frontal area injury can affect the ability to plan and to organize. This results in a person not initiating activity. They will sit quietly and contentedly. If directed to do something, they will do it. But they will not go any further than that. The if/then reasoning skills are not present. In addition, attention problems may prevent the individual with TBI from focusing on something long enough to be able to carry through with a plan.

- **Lack of emotional response** is demonstrated by a lack of initiative and a flattened affect. The individual does not smile or show any emotional response to things going on in the environment. An example is an adult with TBI who was told by his mother that he cannot drive anymore. His reaction was to put his keys on the dresser and walk out without exhibiting any reaction or emotional response. Most adults would react differently. The emotional response is just not there.

- **Paranoia or blaming of others for negative events** is a natural tendency when individuals do not reason effectively. This can be compounded for individuals having traumatic brain injury because they are not reasoning well enough to know the logical explanation for what is happening. They automatically assume that someone else is doing something to them and project blame automatically. If you are not able to reason through things, you assume that somebody is doing something to you. When the person is not able to remember something that they did, they blame someone else.

- **Depression** is a common problem for individuals after head injury. The issue is how much of it is organic, related to the brain injury itself, versus reactive to the situation. Fortunately, in either case, the condition is usually responsive to medication and counseling. The danger is that depression can compound the problems that already exist by decreasing activity levels and undermining the expression of skills possessed by the injured person.

- **Anxiety** occurs, in part, because of reasoning difficulties. The inability to comprehend a situation or anticipate what is going to happen leads to anxiety. Three situations in particular seem to generate anxiety among people with TBI: 1- Riding in a vehicle in heavy traffic, 2- Being in crowds and 3- Being around small children.
How Can Rehabilitation Make a Difference?

Facts About Acute Rehabilitation:
Who gets it, how is it done, and who benefits?

Relatively few individuals receive rehabilitation immediately following their acute medical hospitalization (acute rehabilitation). It is estimated that less than 20% of persons with traumatic brain injury receive acute rehabilitation. Referral to acute rehabilitation is more likely if a Physical Medicine and Rehabilitation physician is consulted; if abnormalities are evident on a CT scan; if the patient is older and unmarried so that there is not much support if they go home; if there are injuries besides the TBI; if medical monitoring is necessary; and if the acute care is lengthy. ¹

The Functional Independence Measure (FIM) scores from the ICRC study were recorded at the time of admission to acute rehabilitation and at discharge from UAB-Spain Rehabilitation Center. The FIM is used to measure rehabilitation outcome by measuring functional abilities, such as being able to care for oneself, ambulate, respond, communicate, and remember things.

40% of the individuals who came to UAB-Spain Rehabilitation Center had admission scores in the 18 to 30 range (lowest range). There was significant improvement as indicated by the fact that less than 10% were in this range by the time of discharge. It is obvious that individuals receiving rehabilitation at SRC are severely impaired. They need a lot of medical care and rehabilitation.

The data from the Model Systems national database ² on rehabilitation lengths of stay from 1993 to 1998, shows that acute care and rehabilitation length of stay has diminished. The patients are more impaired when they come to rehabilitation and their length of stay is shorter. The reason for this is likely related to a number of factors, including pressures to expedite care. Consequently when an individual leaves acute rehabilitation they are more dependent than at the completion of rehabilitation 10 years ago. Rehab professionals are more and more dependent on what goes on at home and the post-acute services that an individual receives.

Rehabilitation of the Brain

How can the brain be rehabilitated? Why do we want to do this?

The brain is a dynamic organ that has a natural ability to change with time. In developmental studies researchers have lesioned the brain intrauterine in the rhesus monkey and other animals. These animals were then observed after birth for changes that occurred in brain development as compared to the normal brain. This gives some idea of how the brain develops and how it changes spontaneously. It tells us how the brain responds to changes that occur with injury. In one study, following intrauterine ablation of the left frontal lobe in rhesus monkeys, it was found that the tracts that were supposed to go to the left frontal area instead went to the right frontal area. This confirms the plasticity of the central nervous system.

In studies involving deprivation of vision, the eyes of animals were covered so that they saw opaque whiteness. It was found that areas of the brain typically receiving visual input exhibited degeneration. In fact, other functions typically represented in surrounding areas of the brain encroached or took over the visual areas. There is a critical period where if the obstructions are taken off the eyes, the visual areas will still develop. If, however, the cover is left on long enough, the visual areas will never develop normally.

Another study looked at deprivation of general stimulation. Rats were placed in cages that either offered a stimulating or unstimulating environment. In a stimulating environment there was a wheel, materials to burrow in, and things to climb on. The
other cage had nothing. When the brains of the rats were compared after sacrifice, the rats that were in the stimulating environment had more dendritic sprouting than the rats in the unstimulating environment. The stimulation caused brain changes, providing further evidence that the brain is dynamic.

What happens with adults? Are adult brain cells able to react to brain changes? There are indications that adults can exhibit plasticity as well. Plasticity is a natural response to loss of neurons through aging. In addition, long-term potentiation occurs in our brains everyday. This means if the brain experiences repeated stimulation in a particular neural network, changes of a chemical and physical nature take place, increasing the chances of those cells reacting to that same stimulation in the future. It is like a cellular form of memory. This occurs everyday in many locations of the brain.

As adults we lose neurons everyday due to aging. The remaining neurons set up new connections, new pathways, and the brain adapts. There are some indications from studies of persons with stroke who recover that the surrounding tissues in the brain try to take over the functions that are lost in the area of tissue destruction. So the brain does try to adapt, even in adults. It may not be as quick as in children, but it does happen.

When an individual has a significant injury to the brain, several things can cause improvement. One source of improvement is the neurochemical changes that take place. If the chemistry in the brain is disrupted, the neurons cannot function. This results in disruptions of thinking and behavior. It can take weeks or months for the brain to resolve the chemical imbalance that occurs with TBI. One reason we see progress early in recovery is because the neurochemistry is resolving and getting back to normal state.

Over the long term, there can also be sprouting of dendrites in the brain. The remaining neurons sprout, establishing new connections. After a traumatic brain injury, the brain tries to recover by creating new pathways. However, that occurs only to the extent that a person is active and doing things. The brain does not adapt if it’s inactive.

Other evidence of brain recovery is seen from sequential lesions. This has been noted in individuals who have had a stroke, recovered, and then had another stroke. This is a sequential lesion. In animals, more objective studies have been done. A lesion is made to the animal’s brain and the animal is allowed to heal for a month. Then another lesion is made to another part of the brain or in the area of the existing lesion. Typically, the combined, sequential lesions do not have the same impact as if a single lesion had injured the same area of tissue covered by the sequential lesions. So essentially, the brain is adapting between the two lesions. Research indicates this effect will be seen if during the interval between lesions, the animal is active, such as by being placed in a stimulating environment. If there is no stimulation, the brain does not adapt. The same is true for an individual with a brain injury. Their brain will try to recover, but in order for that to happen, they have to be active. They have to be stimulated. Rehabilitation involves stimulation.

Neuroimplantation is another potential treatment following traumatic brain injury. This is not the same as transplanting a heart. No one is transplanting brains. Thus far, the techniques being employed involve taking a mixture of cells, usually fetal cells, adding neural growth factors, and injecting the mixture into the brain. This has been done to provide treatment of Parkinson’s disease by infusing dopamine-generating cells.

Could this work with TBI? Remember, traumatic brain injury happens all over the brain. It does not occur in one location, unlike Parkinson’s disease that results from degeneration in one location, the substantia nigra. With TBI the cells cannot be injected in one location to replace what is lost. This treatment is not ready for TBI yet, but it is being explored in animal models. Future treatments may include injecting or introducing stem cells for neurons. These would then generate new neurons, creating new pathways. It is a wide-open field so be on the lookout for new research.

Effectiveness of Rehabilitation

There are several articles that provide a good review of the effectiveness of rehabilitation. Chestnut (1999) was asked by the National Institute of Health (NIH) to do a summary report on the effectiveness of rehabilitation. What he as a neurosurgeon was looking for were studies that had control groups that would allow a very clear picture
of the effectiveness of rehabilitation. He did not find very many studies of that sort, so he was critical of rehabilitation, stating that it does not have the same scientific basis as some other medical interventions. He concluded that we do not have enough information yet to know whether rehabilitation works, but on the other hand we cannot stop doing rehabilitation.

Why is it so Difficult to Prove that Rehabilitation Works?

What makes it so difficult to prove that rehabilitation works? First, there is the heterogeneity of the sample. TBI effects people ranging from less than a year old to ninety years old. Individuals who had significant problems before their injury are included. These people do not have the same experiences that other people have.

Second, no two head injuries are alike. Some people have significant left hemisphere involvement, some have right hemisphere involvement, some have very diffuse involvement; it varies from person to person. All of this can affect rehabilitation and its outcome. There are also differences in the time from injury to rehabilitation. The rehabilitation center does not control when someone is referred. It can be within a week of injury or several months later. If the injured person is extremely ill or if there are respiratory problems, the person could be in the ICU for weeks. There is no way to control that.

Third, researchers in rehabilitation cannot use a traditional control sample in which treatment is not provided. We cannot ethically place individuals in a no-treatment control sample.

Fourth, it is often difficult to control the services that an individual receives during rehabilitation. Some people receive therapy everyday, 5 hours a day. Others do not because they get sick or need medical tests. After discharge it is difficult to control what services people with TBI receive in the home community. Some people are fortunate enough to live where the county health department will provide services, some do not. Some people have insurance that will pay for speech therapy and some do not.

Finally we cannot control the plethora of extraneous influences. How much family support does the injured person have? Are they abusing alcohol? Are they using drugs? All of these factors make it difficult to show that rehabilitation works. This is a very complex situation. There are many extraneous things that can affect outcome following TBI. At present, we cannot prove in a scientific sense that rehabilitation works. However, when we look at the information that we have about how the brain adapts, which would you choose: rehabilitation or no rehabilitation?

Post-Acute Rehabilitation

What happens after a person completes acute rehabilitation? There are many different types of programs that can continue providing the stimulation needed for individuals recovering from traumatic brain injury. Home-based programs rely on the primary caregiver. There are also outpatient or day treatment programs; residential post-acute programs; and transitional programs that transition the person from being in a hospital setting into a community setting. There are also neurobehavioral programs for those individuals having significant agitation or behavioral outbursts. Not all states have such programs. In many instances, this comes down to what third-party payors will support.

In a study that compared the outcomes of people in a home-based program versus a residential program, those participating in the residential program did have a better outcome in terms of cognitive abilities. It is going to take a lot more than one study to demonstrate the need for these services to insurance groups.

Measuring Outcome after TBI: Onset vs. 6 and 12 months employment

What do people do with their lives after TBI?

Employment

An important outcome for adults is getting back to work. The ICRC dataset for the Birmingham area shows that about 57% of these individuals were employed prior to their injury with about one-forth of the sample unemployed. At 6 months post-injury we see almost a direct reversal of that, with under 20% employed and about 67% unemployed. There is improvement at 12 months with about 57% unemployed and 26% employed. National statistics show that within a year after injury about 20 to 30% of people get back to work. That continues to
improve with time. At 24 months it is up to about 40%, but beyond that there is little change. Most people who get back to work after a severe TBI do so within two years of their injury.

**Employment Status**

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Data from ICRC Study, 1999

**Occupational Duties**

This data looks at not only if individuals with TBI return to work, but the type of work they return to. Is it the same thing they did prior to injury? If it is different, how different is it? The data shows that the majority (over 80%) go back to the same job they had before. This is very important for Vocational Rehabilitation Services because it shows that the best approach is to have these people return to the job they had before. The most difficult group to work with for vocational counselors is likely the 15 to 24-year old clients who were never employed prior to their TBI. In this group there is no familiar job or understanding co-workers to return to.

Return to work varies based on the severity of injury. Those with milder injuries return to work much more rapidly. However, at 24 months post-injury, about 18% of those with milder injuries are still not back at work. At the same time point about 38% of those with moderate injuries and 60% of those with severe injuries are not back at work. So even the milder injuries have difficulties sometimes.

**Injury Onset vs 6 Months Residing with**

Who do individuals live with after their injury? Many individuals (37%) were living with parents before their injury. This number increases a bit at six months after their injury. Slightly fewer are living with their spouses after injury. Some people, approximately 7%, are institutionalized, such as in nursing homes. These figures show little change from 6 months to 12 months post-injury.

**Responsibilities**

We know that people often have responsibilities at home, such as childcare and housekeeping. We wanted to capture those activities relative to what they were doing before their injury. Breaking it down into three categories (assuming less responsibility in the home, about the same, or increased responsibility) we found that people with TBI generally exhibit decreased responsibility in the home setting. At six months after injury 58% were not assuming as much responsibility in the home as prior to the injury. At 12 months post-onset this had fallen to 44%. Someone is picking up the slack at home and it is most likely the spouse and/or parents. Not only are people with severe TBI not employed, they also cannot assume the same responsibilities at home. The burden on family members is tremendous.

**Supervision Required**

How much supervision is needed for people with severe TBI on a day to day basis? Breaking it down into less supervision than they required before their injury, the same amount, or more supervision, 62% required more supervision at 6 months after injury.
This decreased to 38% at 12 months post-trauma. Who is doing the supervision? That responsibility falls on caregivers, such as parents, spouses, and so forth.

**Return to Driving**

Driving is an important component of independent living in our culture. Breaking it down into categories of no return to driving, partial return, or full return to driving, we find that at six months following injury almost 70% of people driving before the injury had not returned to driving. Who’s doing the driving? The caregivers must step in again.

Living with a TBI

There are indications that people with severe TBI are more strongly represented in populations of persons with Alzheimer’s disease than in the average population. There is speculation that severe TBI may be a risk factor for having Alzheimer’s disease in the future. This does not mean that everyone who has a TBI is going to develop Alzheimer’s disease. There is a genetic predisposition towards Alzheimer’s disease in some cases and it is possible that for individuals with that genetic predisposition a traumatic brain injury may accelerate a process that would have happened anyway.

To help understand this, we can use the definition for “reserve capacity”. All of us have reserves that we can use. If you have an injury, you can fall back on those reserves and recover. Think of the brain as a bucket of sand in which you have billions of sand particles. The sand particles represent the neurons in your brain. Everyone starts with a full bucket. Everyday, a spoonful of that sand is thrown away; representing the neurons that die naturally from age. One spoonful does not make a big difference in a big bucket with billions of particles of sand. You can adapt to that and survive. When somebody has a severe brain injury, the spoon becomes a shovel. Take out a couple of shovels of sand and that brings down the level of sand precipitously. On all of our buckets, there’s a red line near the bottom. If the sand gets below that red line, you cannot function independently. If everyone lives long enough, we are going to get to that point. In the case of head injury, it may happen more quickly. It is like aging in a sense; aging more rapidly.

Severe TBI presents families with a tremendous burden in dealing with family members having TBI. The burden can be attributed to the cognitive and behavioral problems that people with TBI exhibit, such as irritability, memory problems, and reasoning difficulties. In general, the burden on family members is not due to the physical limitations caused by the TBI. Families are also tremendously concerned about the future needs of their injured family member. If the individual with TBI needs supervision or assistance, someone is going to have to serve as a caregiver. In most cases of traumatic brain injury the parents (particularly mothers) fulfill that role. Parents, being older, are more likely to pass away before the injured person. So they have a tremendous concern about who is going to take care of their child. Unfortunately there are no good answers.

**What happens to people with head injury?**

In a moment, their lives change dramatically. With a severe brain injury an individual goes from being independent to being dependent; from being capable to being incapable. It is compounded by the fact that they cannot even remember it happening. They wake up and everything is different. What they can remember is being like they used to be: independent, driving, doing things, and going to work. All of a sudden, people are telling them, “You can’t do that! You can’t get up and walk right now because you’ll fall. No, you can’t go to the bathroom on your own. No, you can’t do this and no you can’t...
do that.” What do you think their response is? Anger and frustration is understandable. People with TBI know what they want to do, they can see it, but they can’t do it.

The end result is that people with TBI cannot do what they want to do and they are constantly confronted with frustrations, roadblocks, and hurdles. Put yourself in this position and you can understand the depression, the anxiety, the irritation, and the bitterness that can occur after head injury. In the presence of this level of frustration and general distress, it is essential that we are understanding and optimistic about potential improvement in functioning without promising what cannot be given, such as a complete recovery.

**What are the problems with traditional rehabilitation services?**

1. There are a limited number of both programs and professionals. For instance, there just are not enough speech therapists to see everybody who has speech disorder in the state of Alabama.
2. For those fortunate enough to receive therapy, the number of hours that an individual meets with a therapist is limited, reducing the impact that the therapy has on the person.
3. There is poor generalization from the clinic to the home. This means that often what is done in the clinic may not translate well to what the individual is actually doing at home.
4. Traditional rehabilitation promotes a view of recovery as time-limited. That is, as long as you are getting these professional services, such as PT, there will be progress. Once the therapy stops, the thinking goes, progress will come to a halt.
5. Those working in rehabilitation, intentionally or not, promote a view of rehabilitation as a professional concern. Professionals know about recovery and rehabilitation, the individual or family member does not. This sets up a situation in which people may feel helpless. Caregivers feel helpless because a professional has to tell them what to do.
6. Professional rehabilitation services are expensive. Many people do not have the resources to receive such services. The challenge is to reformulate rehabilitation by expanding treatment beyond the professional model of rehabilitation. It is possible to think out of the box. There are examples of steps being taken in Alabama to “re-think” rehabilitation.

The *Alabama Department of Rehabilitation Services (ADRS)* about ten years ago decided to focus on traumatic brain injury as a primary concern. They have developed unique programs that work to fill the void for Alabamians who do not receive post-acute services. The *State of Alabama Independent Living Services (SAIL)* program provides homebound services to people who are nonambulatory. This program allows for attendants’ services and adaptive equipment.

The *Interactive Community Based Model (ICBM)* program has a team of six Care Coordinators positioned throughout the state who are responsible for contacting people after their injury and their families once they are discharged from the hospital. They work on setting up a program for the injured person at home to provide stimulation and to keep the injured person active. The goal is to keep the individual with TBI focused on recovery and eventually transition them into vocational rehabilitation quickly, not several years down the road. Finally it is *Vocational Rehabilitation Service (VRS)* that provides vocational training that helps injured people return to work with appropriate support.

The *Alabama Head Injury Foundation* also has developed many programs.

- A respite program gives caregivers a break so they can go shopping or take the weekend off.
- A housing assistance program helps pay for needed renovations when there is no other way to pay for them.
- The Service Coordinator program has individuals in ten communities across the state. They connect people with TBI with services in their community. This goes beyond VRS as it serves individuals who have no vocational potential because of the severity of their injuries.
- A camp program sponsors two weekends or a full week at *Camp ASCCA*, allowing people with TBI the opportunity to do things that they thought they might never do again, such as riding horses, boating, fishing, and water skiing.
- A Day Recreation Program here in Birmingham,
called Small Places, provides individuals with TBI a place to meet other people and to do recreational things. The program is being replicated in two other places in the state because it has been successful in Birmingham.

Many of these services are being funded through the Alabama Impaired Drivers Trust Fund. The Alabama Head Injury Foundation was instrumental in passage of a law several years ago that added a hundred dollars to every drunk driving fine. Ninety-five of the hundred dollars goes to the Impaired Drivers Trust Fund. The Trust Fund parcels out that money to organizations like the Alabama Head Injury Foundation and the Alabama Department of Rehabilitation Services.

The UAB TBI Model System is working with the ADRS Care Coordinators, to develop a family-centered home-based cognitive stimulation program. In this collaborative effort we are providing Care Coordinators with more systematic approaches to deal with the injured people they work with. Each Care Coordinator has a laptop computer. A program has been developed that lists activities that people with head injury can do. It is arranged using the Rancho Scale, a measure of an individual’s level of recovery. For example, if a person is listed as Rancho Level 4, a list of activities is available, involving fine motor coordination, concentration, memory, reasoning, spatial skills, and orientation. The Care Coordinator can find out what type of activities this individual can do, select the appropriate activity and print the task from the computer. They then work with the family on how to do this task with the injured person. When they return in a few weeks they can access how it is going. With the input from the family, they can then decide whether to increase the complexity of this task or try something new. This activity, and other programs provided by the ADRS and the AHIF, characterize the unique thinking taking place in Alabama.

References


8- Alabama Department of Rehabilitation Services, 2129 E South Blvd; P O Box 11586, Montgomery, AL 36116-2455. (334) 281-8780. [Available on http://www.rehab.state.al.us].


This information was presented by Tom Novack, PhD, at the Recovery after TBI Conference, Sept, 1999.