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A Review of TBI and Return to Work

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A REVIEW OF TBI AND RETURN TO WORK

by

Anne Berg
Bachelor of Science in Physical Therapy
University of North Dakota, 1996

An Independent Study
Submitted to the Graduate Faculty of the
Department of Physical Therapy
School of Medicine
University of North Dakota
in partial fulfillment of the requirements
for the degree of
Master of Physical Therapy

Grand Forks, North Dakota
May
1997
This Independent Study, submitted by Anne Berg in partial fulfillment of the requirements for the Degree of Master of Physical Therapy from the University of North Dakota, has been read by the Faculty Preceptor, Advisor, and Chairperson of Physical Therapy under whom the work has been done and is hereby approved.

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Degree Master of Physical Therapy

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Date 3-6-97
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ABSTRACT

Approximately two million traumatic brain injuries occur every year and of those 70,000 to 90,000 individuals develop disabilities which prevent a normal independent lifestyle. The typical individual afflicted is a 20 year old male with a normal life expectancy who is likely to face a lifetime of unemployment and dependency on public assistance if post-acute rehabilitation services are not provided. There is a lack of vocational programs and very limited funding available. This literature review will begin to fill the void of information regarding return to work programs by examining the return to work rate, specific return to work programs, functional assessments being utilized, and the quality of life and cost benefits. The purpose of this paper is to show that with proper rehabilitation many individuals with TBI can return to work and function as productive citizens of society.
CHAPTER I

INTRODUCTION

Traumatic brain injuries (TBI) are the number one cause of death and disability in the United States for people under 40 years of age.1,2 One person is hospitalized for a TBI every minute of every day which totals 500,000 per year.1 The occurrence is even more common with estimates of two million per year, however the exact number is unknown since many do not seek medical attention.1,3 Of the survivors 70,000-90,000 develop intellectual, physical and/or medical disabilities preventing a normal independent lifestyle. As greater numbers of individuals with TBI survive and live longer lives, a corresponding increase in demand for long-term rehabilitation services is seen.4 The medical problems are enormous and the socioeconomic impact is staggering.5

Those most often afflicted with a TBI are men 15 to 24 years old; in fact it is 2 to 3 times more common in males than females.1,5 The major causes of TBI are motor vehicle accidents (50%), falls (21%), assaults (12%), and sports and recreation (10%).6 There is also a high incidence of alcohol and drug use at the time of injury.1,5 The incidence risk is three times higher if an individual had previously sustained one head injury and eight times greater if they had two or more previous head injuries. There is also a greater occurrence if single or of the lower socioeconomic status. Thus the typical individual with a TBI is a 20 year old male with a normal life expectancy who
is likely to face a lifetime of unemployment and dependency on public assistance if post-acute rehabilitation services are not provided.7

TBI impacts every facet of one’s life. It has a very individualistic representation depending on the nature of onset, specific type of neurological damage, and pre-injury status of health, productivity and social skills.5,8 TBI is a very complex and multifaceted affliction that may result in physical, cognitive, behavioral and personality impairments.9-11 Despite good prognosis for recovery physically and perhaps even cognitively, individuals with severe TBI have poor recovery of community integration skills.9 Many individuals may appear recovered yet hidden disabilities remain which inhibit them from gaining competitive employment. The time frame for recovery has typically been thought to be one to two years post-injury for sufferers of TBI.12 Although the most rapid recovery may occur during that time, studies have shown gradual improvements in function for at least 10 years post-injury.13,14 Thus post-acute services which may occur two or more years post-injury can still improve function.

The most desirable goal for many individuals with a TBI is a return to work.11 The recovery of skills necessary to function in the work place are some of the most difficult to regain which results in a low post-injury employment rate.9 Specialized vocational rehabilitation programs have been shown to improve the rate of individuals who successfully gain and maintain employment. Despite these facts there remains a shortage of rehabilitation programs which could decrease the number of unemployed depending on public assistance.15
The National Head Injury Foundation estimated that fewer than 10% of individuals with moderate to severe TBI receive appropriate rehabilitation services. Many factors contribute to this including shortage of beds, lack of funding sources (especially government funding for individuals uninsured or underinsured), geographic location of programs, and finally because many patients are not referred by healthcare providers. Lack of referrals to post-acute rehabilitation programs may be due to inadequate knowledge of return to work potential that exists, especially if specialized TBI programs are not available in the region. The leading cause of inadequate services however is lack of programs secondary to lack of funding.4

The potentially devastating physical, psychological and social consequences of TBI make it one of the most critical problems facing the health care system.5 Rehabilitation is taking significant cuts in reimbursement by managed care organizations and the length of treatment has been cut in order to reduce costs. TBI rehabilitation is a relatively new and specialized industry; quality standards have been largely voluntary and implicit versus regulatory and explicit, which has led to problems.16 Specialized TBI rehab programs have repeatedly documented a decrease in disability and handicap for their clients even for those considered neurologically stable.17,18 However, there is an increased demand for standardized outcome measures to prove this.

Post-acute rehabilitation programs have been difficult to compare. Findings reported in studies can be confusing, as they are based on programs of individuals from various injury etiologies, diverse evaluation procedures, inconsistent definitions
for success, and shortage of long-term follow-up studies.\textsuperscript{11} Sample sizes are typically small for any one program and thus insufficient to support meaningful reporting.\textsuperscript{19} It has also been very difficult to develop a viable control group to compare improvements of natural recovery to improvements of rehabilitation programs. Functional improvements have been shown, for graduates of post-acute rehabilitation programs, but the results are not comparable due to the varied research designs of each study.\textsuperscript{20}

No matter what area you work in as a physical therapist you may encounter patients with TBI, so it is important for every facet to be aware of possible treatment options to help these individuals regain their optimal independence. The purpose of this literature review is to show that with proper rehabilitation many individuals with TBI will be able to return to work and function as productive citizens of society. The return to employment not only has an economic impact on society and the individual, but also provides a sense of independence and improved self-esteem for the individual with a TBI. The focus of the study will be on return to work of individuals who have suffered a moderate to severe TBI.
CHAPTER II

RETURN TO WORK

Return to work is the leading indicator of recovery following brain injury.21 Unfortunately, individuals with moderate-severe traumatic brain injury have consistently shown disappointing post-injury employment rates without vocational rehabilitation.7,22,23 Most clinical researchers have discovered that unemployment rates for survivors of TBI are usually over 60% with some studies citing 70% to 80% unemployment.24 A survey completed in Canada of 454 individuals with TBI documented that only 25% of these individuals were employed and of those 30% were employed in sheltered workshops or unpaid employment.25 The rate of competitive employment documented in the literature is highly variable with one study citing a competitive employment rate as low as three percent.23 In addition, individuals who do find employment often have difficulty retaining their jobs due to erratic problems in vocational or social functioning which may not become evident until months or even years later.26 A longitudinal study of post-injury employability showed that 67% were employable at 12 months, 59% were employable at 24 months, and 50% were employable at a three year follow-up.23

The variations of employability rates may be attributed to three primary factors.11 First, the area and severity of TBI is varied resulting in unpredictable deficits. Second, the research design between studies is not consistent with varied definitions
and standards for return to work. Third, the demographics and pre-injury history of each group studied may vary widely.

Work is defined differently in various studies. Some regard work as any form of productive activity such as: competitive paid employment, sheltered employment, volunteer work, household head or student. Some studies have stipulations of full time status, return to pre-injury job or mainstream schooling to qualify as having successfully returned to work. While involvement in any of these activities is beneficial, this literature review will focus mainly on full or part time competitive paid employment in an integrated setting so that the cost benefits of return to work programs can be shown to advocate funding and reimbursement. Keep in mind that the varied definitions of work will also result in varied statistics on the number of individuals who successfully return to work.

Influential Factors

There are a variety of factors that may increase and individuals chance of successful employment: 1) Early referral to a vocational program, 2) Return to pre-injury job or familiar nature of work, 3) Employer acceptance, 4) Individual actively involved in choosing job, 5) Special work provisions, 6) Lengthy support periods, 7) Pre-morbid history.

Early referral increases an individuals chances of gaining employment for several reasons. Although recovery occurs for a lifetime the most noticeable improvements occur within the first two years which may help decrease the amount of vocational rehabilitation needed. Compensatory patterns can be trained before bad habits occur
that will interfere with new learning. If an individual is referred late the positive and optimistic attitudes that an individual may have held may be replaced with pessimism and financial disincentives (e.g. social security). There is also an increased chance of returning to the pre-injury employer if early referral occurs.

Return to the previous job or a modified job with the same employer increases the chances of successful employment. The familiar setting may elicit more automatic reactions which will enhance functional work performance. If a return to the pre-injury job is not possible return to a familiar nature of work should be sought. This permits relearning of tasks rather than new learning which may be difficult for the individual.

The return to previous employment may also have other benefits. Employers may be more tolerant if the individual worked for them prior to the injury. An empathetic and supportive employer will ease the employee back into the job improving the individual’s attainment and retention of work. Although return to work at the professional level has been shown to be low due to decreased executive functioning commonly seen with TBI, there are those who suggest that individuals with professional jobs pre-injury will have better success. This is because their employers may be more likely to be indulgent and cooperative and will have more resources available to help accommodate individuals with disabilities.

The individual should be empowered and have an active participation in the job search. The individual will perform better if job satisfaction is high. Job satisfaction is highest when the post-injury level of work is as close as possible to the
pre-injury level of work. If an individual lacks self-awareness of deficits, the job choices made by the individual may be unrealistic and counseling may be needed.

Special work conditions may be needed to enable the individual to gain employment. A study by Rogers of 47 individuals with TBI showed the average duration of special work conditions was twice as long for individuals who made a successful return to work. In fact the average duration of special conditions for those successfully employed was longer than the average total time of employment for those who lost their jobs. Some of the special work conditions may include:

1. Part-time work to prepare for full-time work
2. Easier work of previous or different job
3. Work trials in different areas of the company
4. Non-paid work with flexible hours in preparation for return to full-time employment
5. Rehabilitation specialists involved at workplace or with employer
6. Training to assist with specific problems at work
7. Workplace support of colleagues
8. Tolerance of erratic behavior
9. Physical adaptations

Pre-morbid History

Rate of employment may vary due to the prominent characteristics of the individuals in the study. A variety of factors must be considered including pre-morbid social, educational and vocational status.
Societal Status

There is inconsistency regarding which societal factors significantly affect employment. Three of the factors cited in the literature include age, marital status and alcohol use. Individuals who are married have been shown to have a lower return to work status than all other marital classes (never married, divorced or widowed). Individuals over age 40 also have decreased employment success. Approximately ⅓ of all individuals with TBI have a pre-morbid history of alcohol abuse and may continue with this type of lifestyle after the injury thus decreasing employment potential by compounding problems. In a study where ⅓ of the sample had problems with alcohol use an inverse relationship was shown regarding return to work. Alcohol abuse was present in 46% of the unemployed individuals in the study.

Educational Status

There are also various opinions regarding the impact of education level on employment. A higher level of education will never be a detrimental factor, however it may not be necessary in order to obtain the types of jobs typically available to individuals with TBI. showed the relationship between educational level and return to work was unable to reach statistical significance however, a trend was still noted. Of those individuals in the study who returned to work 21% had less than a grade 12 education, 32% were high school graduates, and 47% had post-secondary education. The educational level completed may have different connotations depending on if the individual was attending school at the time of the accident verses an individual injured in their 30’s with the same number of
years of education who dropped out of school prior to the injury. It may not be the educational level so much as the personal characteristics of an individual who pursues higher education that result in a positive employment trend.

Vocational Status

The pre-injury work history is important to obtain when assessing the return to work, types of employment achieved and successful retention of employment. Some individuals may have had a poor work history before the injury even occurred. A study of individuals in the Work Re-entry Program (WRP) showed that 47% of its participants had at least one pre-injury work history limitation. Twenty-five percent of the individuals were unemployed at the time of injury, 33% had limited work experience (< three years), 30% had an unstable work history (never at the same job for > one year), and 18% had no prior work experience.

The type of job held pre-morbidly will also be an important consideration. The ability to return to a previous job will depend on the occupational demands of the specific job and how the critical elements of the job match with the individuals current abilities. Due to the complex individualistic nature of brain injury one can not group all individuals with a TBI and determine one specific type of employment that would be best suited for this population. There may however be trends between occupation and return to work. A study which included mild to severe TBI showed that 42% of skilled workers returned to work while only 16% of laborers returned to work. The ability to return to a specific job depends on the severity and specific limitations of each individual. For example, an individual with severe physical limitations may be
able to return to an executive position but not a labor position, whereas someone with severe cognitive limitations may be able to return to a labor position but not an executive position. Another factor that may enable individuals with impairments to return to their previous functional level is the implementation of special equipment and assistive devices to overcome physical barriers.\textsuperscript{38}

One should not forget that there are many other non-vocational factors related to society which may impede an individual’s return to work. Two such factors are ineffective use of public transportation since most individuals are unable to drive and having to deal with an uninformed and impatient public.\textsuperscript{9}

Types of Jobs Pre and Post Injury

The pre-morbid jobs typically held by individuals most likely to sustain a brain injury are varied.\textsuperscript{39} Table 1 shows pre and post injury jobs held by individuals in a study by Rappaport and colleagues.\textsuperscript{27} The pre-morbid jobs held are very comparable to a study by Rao and Kilgore.\textsuperscript{29} The study examined in the table is of 63 individuals with severe TBI and their outcomes for up to 10 years post-injury.\textsuperscript{27} These individual were all admitted to a head injury unit between 1977 and 1982; little was discussed about the type and amount of rehabilitation received for these patients. At the time of follow up only five (9\%) of the 55 individual were receiving rehabilitation or supportive services; of those five individuals, three were attending sheltered workshops and two were attending adult developmental centers. Post-acute rehabilitation services are a relatively new field and were most likely not available to these individuals.\textsuperscript{32} The results of this study showed the biggest change after injury was the unemployment
status, with unemployment defined as the inability to hold a job, continue with school, or maintain a household. The rate went from 0% prior to the injury to 61% ten years after the injury with no one returning to a professional level of functioning.

Table 1.—Pre and Post Injury Jobs

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Pre-Injury %</th>
<th>At Follow Up %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployed</td>
<td>0</td>
<td>61</td>
</tr>
<tr>
<td>Employed</td>
<td>100</td>
<td>39</td>
</tr>
<tr>
<td>Professional</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>White collar</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Blue collar</td>
<td>31</td>
<td>8</td>
</tr>
<tr>
<td>Unskilled</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>Sales clerical</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Homemaker</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Student</td>
<td>27</td>
<td>2</td>
</tr>
<tr>
<td>Unknown</td>
<td>4</td>
<td>7</td>
</tr>
</tbody>
</table>

According to Crepeau and Scherzer, the most common variables associated with unemployment are executive cognitive impairments, emotional disturbances, deficits in activities of daily living and an absence of vocational services. Other investigators site that neuropsychological deficits and physical deficits markedly reduce vocational potential. However, there have been studies that show that sensory and motor impairments such as paralysis, ataxia, vision, hearing and speech problems are not statistically significant to return to work rates. Regardless of statistical significance it is obvious that depending on the pre-injury job, physical disability can be an obvious impediment to return to work.

In the Work Re-entry Program only 25 out of 130 participants were unable to secure paid employment. This was due largely to three factors: 1) psychiatric
disturbance with severe mental disturbance or disordered behavior (n=8) 2) economic disincentives due to disability or compensation incomes in excess of potential earned income (n=6) and 3) substance abuse (n=5). Other factors that occurred in one or two cases included medical instability, chronic pain, criminal behavior, and refusal to accept anything besides the pre-injury profession/position.

There are a multitude of reasons why an individual may not gain successful employment. Researchers have various opinions on which limitations pose the most significant problems. The focus of post-acute rehabilitation programs will vary depending on which limitations impede the ability of the individual to return to pre-morbid activities. The ideal setting in which this rehabilitation should occur has not been decided upon either.
CHAPTER III

PROGRAMS

Post-acute rehabilitation services have been in existence for only a little over a decade, but are already a crucial component of TBI rehabilitation. There is a shortage of these services and rural states such as North Dakota have no specialized post-acute vocational rehabilitation services available. There are a variety of different post-acute rehabilitation programs available, but not all of them contain a structured vocational rehabilitation component. Many are centered only on improving community integration and independent living. However, the role of rehabilitation is to return individuals to a state of productive living and in our society, work is the central identity of many people. More and more post-acute services are realizing the importance of return to work programs and are incorporating these programs into their services.

There is still potential for continued recovery in the post-acute period so hope and effort are not withdrawn, but a different emphasis is taken on how resources should be managed. At this stage of rehabilitation there is a shift away from aggressive restoration of lost ability towards adjustment to challenges of daily life in an unstructured and unforgiving environment. Rehabilitation focuses on increasing functional competence by teaching compensatory strategies for performance of activities and skills. There is clear evidence that using compensatory strategies can
improve functional abilities allowing an individual to return to work, however follow-up is often needed to maintain these improvements.\textsuperscript{23,44}

There is no single best model for vocational rehabilitation, the most cost-beneficial and appropriate service may differ depending on each individual's limitations. It is important to match an individual with the appropriate services because providing too much assistance can foster dependency and resentment while providing too little assistance may be setting the individual up for failure and regression.\textsuperscript{42} The route of rehabilitation used will depend on the pattern and speed of recovery, availability of treatment options, access to transportation, and financial support.\textsuperscript{32}

Non-specialized Community Services

For individuals who are unable to obtain specialized post-acute TBI rehabilitation, community resources can be of immeasurable benefit.\textsuperscript{5} Many of these services are not specific to TBI and most professionals do not feel adequately trained to work with individuals with moderate to severe TBI.\textsuperscript{10} This may be due to the following factors: 1) inadequate basic education preparation; 2) sparse coherent literature to guide treatment approaches; 3) inadequacy of assessment tools to identify patient's problems and needs; 4) lack of experience to guide their interpretation of patient behavior and response to treatment. Training and technical assistance need to be provided to community providers to ensure effective treatment.\textsuperscript{38} Some of the nonspecialized services available within the community may include: outpatient therapy, work hardening programs, home health, nonspecific day treatment programs,
special education, mental health counseling, vocational workshop training, non-specific
day care programs and various levels of living programs.\textsuperscript{5,32,45}

Specialized Post-Acute Brain Injury Rehabilitation Programs

There is a wide assortment of specialized post-acute brain injury rehabilitation
programs. Each program will differ but there are some basic designs that are often
followed.\textsuperscript{39,46} \textit{Neurobehavioral programs} are residential programs that provide
treatment for severe behavioral disturbances, such as acute agitation, physical
aggression, uncontrolled substance abuse, or organic psychotic syndromes.
Psychopharmacologic treatment and behavior techniques are used to help individuals
gain control over behavior problems which inhibit rehabilitation or entry into the
community. Patients are usually discharged to non-institutional or less costly and
restrictive care. \textit{Residential community re-integration programs} provide cognitive,
emotional, behavioral, physical, and vocational rehabilitation. The program centers
mainly on training of living skills. The major goal is to increase the individual’s level
of independence for independent or less supervised living; the more comprehensive
programs also provide vocational training. \textit{Comprehensive (holistic) day treatment
programs} for TBI offer multi-modal rehabilitation that emphasizes self-awareness.
This may also include \textit{outpatient community re-entry programs} which provide
rehabilitation that centers on vocational and social integration. \textit{Intense vocational
rehabilitation programs} such as supported employment focus on treatment at the
worksite and job retention.\textsuperscript{10} Day treatment programs are the most common post-acute
rehabilitation option;\textsuperscript{32} a more detailed discussion will be presented later in the chapter.
Two intensive vocational rehabilitation programs, the supported employment program and the work re-entry program, will also be examined in further detail.

**Success of Post-Acute Brain Injury Rehabilitation Programs**

Malec and associates\textsuperscript{39} reviewed 15 studies which included 856 patients of post-acute rehabilitation programs and compared their long-term vocational outcomes with that of 913 individuals in 12 studies who received either no post-acute brain injury rehabilitation, unspecified rehabilitation, or in-patient rehabilitation only. Results showed that following post-acute rehabilitation approximately 56% of the individuals returned to independent work, training, or homemaking compared to 43% of the individuals who received no or unspecified post-acute rehabilitation. Unemployment was 29% following post-acute rehabilitation compared to 47% for those with no specific post-acute rehabilitation. The difference between the two treatment groups has probably been underestimated since post-acute rehab programs tend to select individuals who are more disabled with more significant adjustment problems than typically seen in the general TBI population. Unemployment for individuals who generally seek post-acute rehabilitation services often exceeds 80% to 90% prior to attendance of the program. Certain programs that have more intensive vocational training have shown a higher percentage of successful employment.

Approaches where intervention occurs only before employment and not after will show lower job retention rates.\textsuperscript{24} Three studies were compared that utilized this type of intervention: Priganto and associates\textsuperscript{47} use of a cognitive training approach, Ben-Yishay and associates\textsuperscript{23} use of a holistic approach involving cognitive training and
occupational trials, and Burke and associates\cite{44} use of an intensive 24-hour residential program which used behavioral training as the prime means of vocational training. These approaches yielded employment rates of 35% to 50\%.\cite{24} Approaches like supported employment that offer intensive on-site job training and long-term support after placement to enhance retention show rates greater than 70\%.\cite{10}

**Day Treatment Program**

The most common post-acute service available for individuals with TBI is the day treatment program.\cite{32} The goal is to improve an individual's safety and independence in the community, and, in some programs, to return the individual to work or school.\cite{32,46} Treatment is a combination of cognitive and functional skills training to improve awareness of deficits and social behavior. The client is seen for treatment in the community for four to six hours each day. The average length of treatment is typically three to six months. Each day treatment program will vary, but a comprehensive one will include a team of professionals including: physician, physical therapist, occupational therapist, psychologist/neuropsychologist, driver's education specialist, recreational therapist, and vocational counselor. The family is also strongly encouraged to take an active part in the planning and treatment. The overall emphasis is on psychosocial well-being over medical. Treatment occurs in community settings and is very functionally oriented. Many of these programs include job trials, unpaid work followed by paid jobs, or supported employment.\cite{23,46} The job retention rate is 60% to 80% for graduates of this program.\cite{23}
Supported Employment

Supported employment programs have produced some of the most successful vocational outcomes thus far. Supported employment is defined as vocational rehabilitation for persons with the most severe disabilities who have been unable to gain or maintain competitive employment. The aim of supported employment is to return individuals to paid employment of at least minimum wage in an integrated setting not a sheltered workshop.

All rehabilitation services (e.g. cognitive training, work hardening, social skills training) are provided at the work site. Time-limited intensive support services are provided by a job coach at the work site and their presence is gradually reduced as the individual becomes more proficient and job stabilization is reached. Stabilization is said to occur when an individual requires staff intervention for less than 20% of the weekly hours worked for four consecutive weeks. Job stabilization occurs after an average of 18 weeks and a mean intervention time of 245.7 hours. Extended services which entail periodic contact with the employer and client allow ongoing monitoring of performance and intervention to help ensure job retention. The mean number of hours per week for extended services was 2.24 hours. The mean total hours of ongoing support and extended services for the first year totaled 321.7 hours. The total cost for one year of service was $10,189 at an hourly rate of $31.70.

An employment specialist will follow these basic steps when placing a client into employment:
• Determine client’s desired employment: an interview and Consumer Screening Form are completed to determine type of work acceptable, preference for full or part time work, the prior work history, and assets and liabilities; no vocational evaluation is performed.

• Job development: contacting potential employers.

• Job analysis: analyzing and recording duties of job at actual site

• Compatibility analysis: compares findings of job analysis with Consumer Screening Form

• Job selection: jobs selected for trial are most dependent on client preference and employment history.

• Job site training and compensatory strategies: behavioral training, skill training, social adjustment, cognitive training and physical adaptations.

Success Rate

In a SE study, 80 individuals placed into competitive employment over a five year time period showed favorable results. All of the participants suffered a severe TBI and no one was turned away; the mean referral time was 6.1 years. The majority of jobs obtained were clerical, warehouse, and service related with a significant amount of interaction occurring between co-workers and supervisors. The individuals worked an average of 31.2 hours per week. Table 2. shows a comparison of employment pre-injury, post-injury before the SE program, and post-injury after the SE program.
Table 2.—Employment Outcomes At Any Point In Time

<table>
<thead>
<tr>
<th>Outcomes of Employment</th>
<th>Pre-Injury</th>
<th>Post-Injury Before SE</th>
<th>Post-Injury After SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly employment ratio</td>
<td>40%</td>
<td>13%</td>
<td>67%</td>
</tr>
<tr>
<td>% competitively employed at any point</td>
<td>78%</td>
<td>46%</td>
<td>100%</td>
</tr>
<tr>
<td>Wage earned per hour</td>
<td>$4.19</td>
<td>$1.55</td>
<td>$4.90</td>
</tr>
</tbody>
</table>

Key Factors

Some of the key factors used to determine the effectiveness of the program are direct observation measures, amount of staff intervention time at the job site per week, supervisor evaluation, wages earned and taxes paid by clients, absenteeism rates, client and family evaluations, and counselor, psychologist and referring agent evaluations.28

A monthly employment ratio is calculated to show the actual work behavior. The number of months the client was employed is divided by the number of months employment was possible. The client’s 18th birthday marks the first month of possible employability pre-injury, and six months after end of comatose period marks the first month of employability post-injury.

Funding

Although there is no definitive time frame for completion of SE services, the current vocational rehabilitation funding system cannot meet the multifaceted needs of persons with severe TBI.4 The episodic manifestation of emotional and behavioral impairment are an example of problems that may persist indefinitely. Currently there are few funding sources for such long-lasting support at work.
Work Re-entry Program

Proponents of the Work Re-entry Program (WRP) feel that public vocational rehabilitation funding needs to be more flexible to allow for the varied needs of individuals with TBI to be treated in the most cost beneficial manner. The majority of funding is currently allocated to SE; funding for the WRP decreased and funding for the SE program increased. Many individuals with TBI do not qualify for supported employment funds because they do not need the intensity of services required despite their problems with retention and need for long-term support in varying degrees. The SE regulations have created a perverse incentive; in order to gain access to SE funds rehab programs provide services that exceed the needs of certain clients. For example, once stabilization is achieved most WRP participants do not warrant the twice-monthly on-site or twice-monthly off-site provision, consisting of two meetings with the individual and one employer contact each month that occurs in SE programs. The WRP provides follow up services that are based on each client’s need rather than by predetermined amounts.

The mission of the WRP is to provide an organized, outcome oriented process which will assist the reentry of individuals with TBI into the work force. The program is very individualized, with a primary focus on providing the least restrictive work environment that matches the individual’s interests, skills, and abilities. The type and intensity of services will vary depending on each individual’s needs and preferences. Approximately 60 hours of staff intervention are usually needed with a
mean cost per participant of $4,377. The WRP vocational counselors use the following components for job placement of individuals with TBI:

- **Intake:** gather pre and post injury work and social history to determine appropriate level for work re-entry
- **Vocational evaluation and simulated work samples:** identify work skills, abilities, potential and competency of sequencing work tasks
- **Work Hardening:** use of real and simulated work tasks to increase stamina, work competencies, work behaviors and productivity levels
- **Transitional employment programs:** individual placed in paid employment with a job coach for 2-3 months to further enhance goals of work hardening
- **Vocational counseling:** identify appropriate vocational options and assist in adjustment of disability
- **Job seeking/keeping training:** encourage awareness of skills needed to maintain employment so individuals can identify plausible jobs
- **Job development:** contact with employers for potential placements
- **Job analysis:** compare job requirements and potential modifications with client’s competencies and needs
- **Job placement:** counselors secure employment through collaboration with the employer and client
- **On-the-job training/support:** the intensity and duration vary according to need and are provided at the work site
• Short-term and long-term ongoing support: for the first 60 days limited on-the-job support is provided, then every 6 months a follow-up is conducted by a research assistant. Off the job support groups are provided to deal with adjustment issues and overall life demands.

Success Rate

A study of the outcomes of 142 individuals with moderate to severe TBI in the WRP showed positive results both after one year and after the observation period (October 1988 to June 1992).\(^7\) Clients were unable to obtain or sustain employment; no individuals interested were excluded for any reason. Ninety-two percent of the clients obtained employment in the first year and 75% of the clients retained employment over the four year observation period. Twenty-four percent of the individuals returned to their previous employer and 43% of the sample obtained managerial or skilled jobs. The jobs obtained were unskilled (42%), skilled technical (19%), unskilled technical (14%), skilled service (13%), and managerial (11%). The average hours worked per week was 31 and the average wage was $8.50 per hour. The percent of available months worked was 56%.

Key Factors

The method for assessing outcomes was adapted from the approach used by Wehman and associates for supported employment.\(^24\) Data is gathered regarding employment, number of jobs, types of jobs, reason for termination if warranted, hourly wages, hours worked per week, return to previous employer and monthly employment ratio.\(^7\) Information is also gathered regarding living situation, marital status, public
benefits consumed, sources of income, health insurance information, and daily living supports. A complete breakdown of the cost and return on investment will be discussed in the following chapter.

Post-acute brain injury rehabilitation programs teach compensatory strategies that lead to higher levels of social adaptability and a greater likelihood of return to work and satisfying interpersonal relationships. Programs that are unsuccessful in returning individuals to work may produce positive results by increasing their level of non-vocational productive activity, independence and reducing the number of hours of assistance needed. All of these benefits have a positive effect on self-esteem and also reduce the cost of care.
CHAPTER IV
COST

The direct and indirect expenses related to TBI can be high. Costs include medical and rehabilitation expenses, potential loss in earnings and expense to society, and also the loss of independence and the negative impact on quality of life for the individual and his or her loved ones. The American Physical Therapy Association estimates that four billion dollars are spent each year on direct treatment of TBI. The implementation of post-acute rehabilitation programs can decrease the long term costs. Lack of funding is the greatest barrier to the development of post-acute rehabilitation services for persons with TBI and rehabilitation continues to take significant cuts due to the current changes in health care. There is an increased emphasis on patient outcome and the cost effectiveness of post-acute rehabilitation programs. This makes it necessary to show how a complete rehabilitation program which includes vocational services actually cuts costs to society by returning individuals with TBI to work. Public policy makers must examine the return on investment, both human and economic, when deciding on difficult allocation decisions.

Quality of Life

The cost benefit of return to work is the primary factor upon which legislators and insurance organizations base their monetary allocation decisions. The cold hard
bottom line seems to hold precedence, however what truly is important is the impact that feeling independent has on quality of life.

In our society, which places a high value on people who are productive and who contribute to society, the ability to return to work is a very desirable goal. Employment in the competitive workforce provides increased self-esteem and psychological benefits by promoting community participation, social integration, increased autonomy and control over one’s own life.

Life satisfaction is strongly correlated with an individual’s social integration. Work is the route most adults have to becoming an active part of the community. A study of 39 TBI survivors at least two years post-injury showed that 79% felt dissatisfaction with their vocational pursuits. This dissatisfaction affects all aspects of life whether directly or indirectly. In fact, unemployment has been linked to some physiological and psychological disturbances.

Individuals with TBI often lead an isolated life whether they are residing in the home, supported living center, nursing home or state hospital. The inactivity and lack of dignified vocational options causes increased depression, frustration, and loneliness for the individual. This not only affects the individual, but their family as well. The increased independence that evolves with employment will not only benefit the individual, but it will also reduce family burden and improve quality of life for loved ones. Many supported living programs and day treatment centers are now realizing the importance of incorporating vocational services into their programs.
Funding Sources

Specialized post-acute rehabilitation services tend to be very expensive and are often above personal resources and the willingness and ability of most public and private providers. However $4.49 billion are spent on rehospitalization and nursing home costs for TBI every year in the United States. The type of individual most likely to suffer a TBI is also typically underinsured. The long-term care required by these individuals is the primary health related cause of financial ruin for young persons. There are very few long-term funding sources available and those available are not accessible to everyone. Funding may need to be sought from a variety of sources to provide adequate coverage of expenses. Some of the private sources available include: worker’s compensation, accident and health plans, auto liability, legal suits and private insurance. Government funded sources available may include: Veteran’s Administration, Medicaid and state victims fund. Five states have Medicaid waivers that allow individuals the choice of services within an institution or in a community based setting provided community costs do not exceed institutional costs. The social worker will work closely with the individual to help ascertain what options they are eligible to obtain. Physical therapists will work with the social worker to help determine the amount of funding that may be needed considering their potential for recovery and need for assistance.

The greatest funding source of services for TBI is received through vocational rehabilitation programs provided for under Title I of the Rehabilitation Act. In 1994, approximately two billion dollars was appropriated with 79% provided by the federal
government and 22% matched by the states. Funding is based on each state's population and per capita income. Supported employment receives the majority of the money and in 1994 had appropriations of $34.5 million dollars in state grants. The 1996 TBI Act appropriated $24 million over the next three years for the prevention, research, and treatment of TBI.50

The cost of rehabilitation programs is variable. According to the NHIF the mean length of stay in a post-acute rehabilitation program was 15 months with a mean cost of $195,000 per client.52 Various studies have reported favorable results at a much lower cost. In a study by Cope et al53 the mean length of stay and cost was 140 days at $22,449 for mild TBI, 173 days at $50,670 for moderate TBI, and 212 days at $68,333 for severe TBI. The supported employment program has a mean cost of $10,189 for the first year of services,28 and the WRP has a mean cost of $4,377.7 Additional rehabilitation may have been received before attendance of the SE program and the WRP however, if earlier referral occurred overall post-acute rehabilitation costs could be reduced. It has been determined that the mean costs incurred for post-acute services are actually lower than the cost of the individual remaining in attendant care for a lengthy period of time.53

Cost to Society

The actual dollar amount of TBI rehabilitation is only one of the financial impacts. The cost incurred by society when an individual is unable to gain employment due to lack of comprehensive extended rehabilitation services is even greater. The cost incurred may not only be government funding to support these
individuals, but also a loss of productivity of the individual to society. With unemployment and lost wages, one also encounters loss of employee taxes and loss of employer taxes.

The greatest economic impact of TBI is lost work of the individual. In the 1980's the loss was approximately $25.9 to $34.4 billion dollars/year. This total does not even include the amount of work lost by the family or primary caregiver. In a study by Hall et al, 47% of primary care givers at one year post-injury had altered their jobs or quit working in order to care for a loved one with TBI. This number did decrease to 33% at two years post-injury. These caregivers also reported a significant increase in financial strain after the traumatic brain injury.

Individuals with moderate to severe TBI who are unable to work usually do not have the personal financial resources to support themselves, so most individuals will need to rely on some form of supported income. This may include State Disability Insurance (SDI), Social Security Disability Insurance (SSDI) and Supplemental Security Income (SSI). SDI is only available for 12 months, and the maximum benefit level for SSI was $620/month in 1991. The mean per diem cost for supported living programs is $171, but may be as high as $550/day according to 1992 economy and resources.

Individuals who are able to gain employment may still require financial assistance due to a reduction of work hours tolerated or decrease in wages. A comparison of wages earned per year for brain injured individuals versus a “friend” control group was $3,000 - $4,000 and $10,000 - $15,000 respectively. One study
showed that 73% of graduates of post-acute rehabilitation programs who are involved in productive activities still received some financial aid.

It is estimated that eventually $\frac{1}{3}$ to $\frac{1}{2}$ of all individuals with moderate to severe TBI will rely on government funded programs.\(^{57}\) The 1991 Governor's Task Force on Head Injury Report cited that in Maricopa County, AZ the primary income for 47% of TBI survivors and their families was Social Security and for 35% it was the county health department. A study by Rapport and associates\(^ {27}\) reported the number of people in their sample requiring financial support from society went from 0-87% after the TBI. Table 3 shows the prime source of income for these individuals before and after injury. The results of this study enforce the anticipated changes with a gross drop in employability and educational advancement and an increased dependence on society to provide financial support for the basic fundamentals of food, clothing and shelter.

<table>
<thead>
<tr>
<th>Source of Income</th>
<th>Pre-injury %</th>
<th>Post-injury %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-time Job</td>
<td>72</td>
<td>9</td>
</tr>
<tr>
<td>Part-time Job</td>
<td>13</td>
<td>19</td>
</tr>
<tr>
<td>Welfare</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Social Security</td>
<td>0</td>
<td>45</td>
</tr>
<tr>
<td>Disability</td>
<td>0</td>
<td>36</td>
</tr>
<tr>
<td>Spouse</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Family</td>
<td>23</td>
<td>38</td>
</tr>
<tr>
<td>Investments</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>6</td>
</tr>
</tbody>
</table>
Work Re-Entry Program Analysis of Cost

A study by Abrams and associates\(^7\) explored the benefits of vocational services due to the decreased cost of government supported income and increased revenue generated by employment taxes of individuals with TBI and employers. The cost benefits of the WRP in San Diego, CA, are outlined in Table 4. The cost comparison is based on an average cost of $4,377 per client and an average monthly taxpayer benefit (taxes paid and reduced income support) of $222. The total taxpayer benefits during the four year observation period was slightly over one million dollars.

Table 4.—First-year Taxpayer Benefits Compared with Taxpayer Cost of Funding WRP

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Employee taxes generated</td>
<td>$519,553</td>
</tr>
<tr>
<td>Employer taxes generated</td>
<td>$308,286</td>
</tr>
<tr>
<td>Savings in supported income payments</td>
<td>$220,458</td>
</tr>
<tr>
<td>Total societal benefits</td>
<td>$1,048,297</td>
</tr>
<tr>
<td>Vocational rehabilitation costs</td>
<td>$254,624</td>
</tr>
<tr>
<td>Societal benefit-cost ratio</td>
<td>4:1</td>
</tr>
</tbody>
</table>

The cost of post-acute rehabilitation programs is highly variable, but most agree that even at its highest estimated cost it will be cost beneficial in the long run by decreasing the life long assistance needed by individuals with TBI.\(^5\) Standardized assessments are needed so that a comparison of studies can be made to determine the most cost-effective approach.
CHAPTER V

ASSESSMENTS

Post-acute rehabilitation programs are a relatively new entity and there is no specific “universally accepted” assessment of outcomes, unlike acute care which utilizes the FIM. Some feel that post-acute treatment of TBI requires such highly individualized goals that progress should simply be measured against these goals rather than on an arbitrary standard or societal norm. However reimbursement companies are pushing for more functional measurable outcomes that can be standardized for comparison of treatment effectiveness and cost effectiveness.

The FIM is the strongest scale for evaluating the need for assistance or supervision in personal care tasks. Other disability scales commonly used in acute care may include the Disability Rating Scale (DRS), Ranchos Los Amigos Levels of Cognitive Functioning Scale (LCFS), and the Patient Evaluation Conference Scale (PECS). The DRS, LCFS, and PECS all have a cognitive focus. Scales used acutely stress activities of daily living and functional self-care more than home and community activities. However, the FIM and DRS can be used post-acutely also because they have an employability rating built into them. Research is being done to determine if there is a scale that provides an accurate prognosis of potential recovery however, no gold standard has currently been identified that is capable of this function.
There is a need for more research to determine a reliable and valid measurement tool to be used in post-acute brain injury rehabilitation programs so that a national database can be established. Individual success cases will not persuade payors, policy makers, or major referral sources who ask for objective, numerical information to judge rehabilitation programs. A data base is necessary to obtain these figures. Only rehabilitation professionals have the expertise to set standards that are technically adequate to assess if proposed treatment is effective and worthwhile. If rehabilitation professionals do not set standards, payors will devise their own, less appropriate criteria.

Although the need for a standardized assessment exists, evaluators will still need to perform specific assessments to address the varied deficits of the individual if a complete picture is to be obtained. Evaluators must be flexible and creative. They may need to adapt formal and informal instruments and evaluation methods to better assess individuals with varied presentations of deficits. An effective evaluator will vary the time, instructions and method of administration to find the most effective approach. Assessments should be done over a period of time and in various environments due to the changing needs of individuals with TBI.

TBI affects each individual differently depending on the area of insult, extent of injury and pre-injury history and personal characteristics. TBI is a very individualistic multifaceted affliction that may present different deficits in each person. Limitations may be categorized as:
1) **Physical limitations** which can interfere with ability to do physical labor or complete a work day.\(^1\) Deficits may include, but are not limited to: vision, hearing, mobility, agility, motor slowness, fatigue, and post-traumatic epilepsy.\(^9\)\(^-\)\(^11\)

2) **Cognitive limitations** which interfere with functions necessary for effective thinking and job performance:\(^1\) Deficits may include, but are not limited to: attention/concentration, memory, orientation, communication, information processing, problem solving/executive skills, organization, and generalization.\(^9\)\(^-\)\(^11\)

3) **Behavioral and personality limitations** are probably the leading causes of unsuccessful job placements.\(^1\) Individuals with these deficits may present some of the following characteristics: disinhibition, lability, social aggression, irritability, depression, egocentricity, lack of initiative, inaccurate self-awareness, and decreased interpersonal skills or decreased social judgment.\(^9\)\(^-\)\(^11\)

The motor dysfunctions that occur are often overshadowed in the literature by the cognitive and behavioral/personality sequelae due to the relatively good prognosis for motor recovery.\(^5\) However, many individuals with severe TBI do suffer motor dysfunctions which can be very disabling and play an important role in the total scheme of recovery.

A team approach should be taken when assessing individuals with TBI because each area of deficit will affect the others.\(^4\) Each member of the team needs to be
aware of all deficits and approaches being taken to maintain consistency. Physical therapists are often asked to evaluate issues related to need for supervision, safety, and potential for community integration and return to work. Physical therapists and other professionals must not only focus on the physical, cognitive, and behavior deficits, but must also keep in mind the pre-injury history, family dynamics, financial and environmental limitations, and awareness of deficits when working with individuals with TBI.

There are a variety of assessments that may be used. Before doing the functional assessments a traditional physical therapy assessment should be performed to measure muscle strength, range of motion, balance, coordination, and sensation. All of these components will affect the individual's ability to perform tasks and may need to be specifically addressed. Measures of basic physical activities of daily living and mental health are important however, they do not adequately assess neuropsychological and cognitive deficits such as the ability to follow directions, work under supervision, move from one task to another, and work under stress. Factors such as pre-morbid abilities and interests, self-concept, mobility in the community, and adaptability to job requirements should also be considered. Finally, in lieu of all of the components the evaluator should summarize and document not only limitations but also capabilities.

The Commission on Accreditation of Rehabilitation Facilities has a list of standards that must be built into the evaluation of the client and into the evaluation of the program. Below are a list of such measures:
• Length of stay.
• Cost basis.
• Functional status, including activities of daily living, household and community skills, and cognitive skills.
• Patient/family satisfaction.
• Living arrangement.
• Level of assistance required.
• Employment status.
• Psychosocial behavior
• Admission criteria
• Listing of services offered.
• Specification of time each measure is applied.
• Client descriptors.

There are numerous different evaluations used in different studies and below is a list of some of them. Some may require specific training to administer and others may be performed by anyone in any discipline. Most of the assessments will not provide accurate information on vocational potential, but will provide useful background information.

The Disability Rating Scale measures awareness, self-care, dependence on others and employability. It is capable of tracking individuals from coma to community and is a reliable and valid assessment of general function. See Appendix A for an example.
The Independent Living Scale assesses functional ability/disability through analysis of tasks. Three areas assessed are activities of daily living, behavior, and initiation. Training is needed to score this assessment so only the variables looked at are listed in Appendix B. Interrater reliability was .93 and test-retest validity was .90.

Another assessment of independent living is the Living Status Scale which can be used before and after treatment to reflect the change in amount of living supervision needed. See Appendix C for an example.

The Neurobehavioral Rating Scale may be the scale of choice for psychosocial and behavior adjustment. It includes 27 cognitive and emotional disturbances which are rated by trained professionals. Other scales that measure psychosocial/behavioral adjustment are the 16-item Katz Adjustment Scale, Agitated Behavior Scale, and CAGE.

The Self-Assessment Questionnaire assesses performance living in the community, interpersonal and community survival skill competencies, and self-perceptions regarding disability, emotional status, and life satisfaction; devised by Berkeley Planning Associates (BPA). Measures of life satisfaction may include the Life Satisfaction Index, Quality of Life Scale, and Personal Well-Being Scale.

The Family/Caregiver Assessment evaluates activity patterns, work competencies, community mobility, medication management, and leisure. It also examines health, physical functioning, cognitive and social functioning, and household stress; devised by BPA.
The Community Integration Questionnaire which measures home integration, social integration, and productivity is currently the best single scale of community integration available.\textsuperscript{45,59} Items assessed include participation in household activities, shopping, errands, leisure activities, visiting friends, social events, and performance of productive activities. See Appendix D for an example.

The Preliminary Diagnostic Questionnaire (PDQ) assesses factors associated with employability, including cognitive functioning, disposition to work, emotional functioning, and physical functioning; devised by the West Virginia Research and Training Center.\textsuperscript{7}

The Occupational Status Scale can be used before and after treatment to document the change in the nature and level of involvement in educational and vocational activity.\textsuperscript{20} See Appendix E for an example. Two other scales that look at employability are the 10-item Employability Scale which provides good detail on productivity and distinguishes between full and part time work,\textsuperscript{59} and the Monthly Employment Ratio discussed in the SE section.\textsuperscript{10}

Functional Capacity Evaluations (FCE) are not traditionally seen in the TBI literature, but are being used clinically by some physical and occupational therapists in the community setting.\textsuperscript{63}

The FCE is a tool that may prove useful when assessing individuals with TBI. It is commonly used in work hardening programs which may be a community resource sought by individuals who can not receive specialized post-acute services due to lack of funding or programs. The FCE not only assesses the traditional components of
strength, endurance, body mechanics, coordination, and balance, but also allows observation of cognitive abilities and motor learning patterns used to perform tasks. Areas which demonstrate an individual’s cognitive functioning are the ability to self-pace, awareness of safety limitations, ability to incorporate suggestions made during testing, and their reaction to suggestions. Performance consistency within tasks and between tasks provides the evaluator with information pertinent to work behaviors. Although this evaluation is done in a structured clinical setting good baseline information can be obtained to determine possible capabilities in the work place.

Vocational evaluations should be performed after functional stability is maintained and dramatic changes decrease.11 A familiar setting such as home or a previous place of employment may produce better results by eliciting more automatic responses.32 However, the distraction of an uncontrolled work environment may also show an individual to be at a lower functional level due to underlying problems that may have been masked in a distraction-free clinical setting.11

When assessing vocational or educational potential the most accurate results occur if done in the context of a work trial.32 Ideally the work trial will be at the job site, at the exact work station with the same tools and materials that will be used. Work evaluations are commonly done through job-based work samples and job-site observations. Close attention should be paid to the individual’s problem solving, organization and planning, ability to self-limit, and safety awareness. There are a variety of questions to keep in mind during observation of the individual:
• Is there adequate physical and mental endurance to perform tasks at the same rate for the entire shift?

• If the individual is interrupted do they have ample executive skills to reinitiate tasks and follow through to completion?

• Does the individual exhibit behavioral problems that make co-worker interactions difficult?

• Does the individual have sufficient selective attention to work in an area with distractions?

• Is the individual aware of capabilities and limitations to safely adjust to their environment?

• With physical adaptations would the individual be able to perform the critical work tasks successfully?

Assessments are crucial in determining what approach to take when returning an individual back to work. There are many ways of evaluating and no one procedure is the best for all individuals with TBI due to the varied presentation. However, it is important that rehabilitation professionals decide upon a standard assessment so that comparisons can be made between programs to ensure quality and to prove cost effectiveness to payors.
TBI has been known as the silent epidemic; it can strike anyone without warning and with devastating results. TBI affects the whole family and often results in staggering medical and rehabilitation expenses over a lifetime. TBI typically affects young males who would usually become productive members of the work force. With improvements in technology more and more individuals with TBI are surviving causing the need for comprehensive lifetime rehabilitation which includes post-acute brain injury programs to rise.

There is a shortage of programs and fewer than 10% of individuals with TBI receive adequate rehabilitation. In recent years there has been progress made in the development of services for individuals with TBI, however the majority of these services continue to focus on acute medical and rehabilitation care. Specialized post-acute brain injury rehabilitation services are limited in number and demand far exceeds availability.

There are a variety of specialized and non-specialized rehabilitation programs available. Each program will have a different focus depending on the limitations and goals of the individual and the family. The main focus of most of these programs is to improve independent living and enhance community integration which includes social and vocational components. Return to work is the most desirable goal for
individuals with TBI, so it has become the leading indicator of recovery and the center of treatment. These programs have consistently shown improvements in function, however follow up is often needed to retain these improvements.

The key is to find a standardized assessment that can show these improvements, so funding of programs can be justified. Payors and legislators are demanding figures that show the outcomes and cost-effectiveness of programs. Currently there are a variety of assessments being used, but there is no agreement on the most reliable and accurate method. TBI is such an individualistic affliction and the varied presentation makes it difficult to find one assessment that can adequately judge the functional level of all individuals. Currently studies are not comparable and sample sizes are not sufficient to draw any conclusive decisions about the most effective form of rehabilitation.

The purpose of this literature review was to increase the awareness of return to work potential, programs and assessments used, and the cost effectiveness of brain injury vocational programs so that we may be referral sources and advocates for funding of post-acute brain Injury rehabilitation programs. By heightening the awareness of the availability of such programs or by the existence of such a program in the community the standard of care for individuals with TBI will rise.

The author found it challenging to make assumptions from this review of the literature due to the high variance of opinion and the non-uniformity of studies. However, when working with individuals with TBI it may be best not to make assumptions. To assume that we can precisely predict the level of recovery that will
occur may be to “short” an individual of the opportunity for a more independent and satisfying life. With the development of more specialized services the recovery of some individuals with TBI has far exceeded expectations. The author feels it is better to error on the side of too much rehabilitation when an individual’s quality of life is at stake.

The ultimate criterion of successful rehabilitation for many individuals with TBI is a return to work or school. The majority of young persons with TBI face years of social isolation and economic hardship if they are unable to return to the workplace. The humanitarian and financial benefits, quality of life issues, wage earning potential, and tax revenues need to be weighed against the cost of funding post-acute brain injury vocational programs.
Appendix A:

Disability Rating Scale
**DISABILITY RATING (DR) SCALE**

Name ____________________________ Sex ______ Birthdate ______ Brain injury date ______

Cause of injury: ______ MVA/MCA* _____ Head trauma ** ____ Infection ____ Stroke ____ Anoxia
____ Developmental (congenital) ____ Degenerative ____ Metabolic ____ Drowning
_____ Other (specify) ___________________

*MVA = Motor vehicle accident; MCA = Motorcycle accident. **Circle one.

---

### Category | Item
--- | ---
Arousability, awareness, and responsivity* | Eye Opening*
 | Communication ability*
 | Motor response*
Cognitive ability for self-care activities | Feeding*
 | Toileting*
 | Grooming*
Dependence on others** | Level of functioning*
Psychosocial adaptability | *Employability*

**Date of rating**

**COMMENTS:**

*Communication ability*  
1. Eye opening:
   - 0 Spontaneous
   - 1 To speech
   - 2 To pain
   - 3 None

2. Communication ability:
   - 0 Oriented
   - 1 Confused
   - 2 Inappropriate
   - 3 Incomprehensible
   - 4 None

3. Best motor resp.:
   - 0 Obeying
   - 1 Localizing
   - 2 Flexing
   - 3 Extending
   - 4 None

---

4. In presence of tracheostomy, place T next to score; for voice or speech dysfunction, place D next to score if there is dysarthria, dysphonia, voice paralysis, aphasia, apraxia, etc.

---

### Disability categories

<table>
<thead>
<tr>
<th>Total DR score</th>
<th>Level of disability</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>1</td>
<td>Mild</td>
</tr>
<tr>
<td>2-3</td>
<td>Partial</td>
</tr>
<tr>
<td>4-6</td>
<td>Moderate</td>
</tr>
<tr>
<td>7-11</td>
<td>Moderately severe</td>
</tr>
<tr>
<td>12-16</td>
<td>Severe</td>
</tr>
<tr>
<td>17-21</td>
<td>Extremely severe</td>
</tr>
<tr>
<td>22-24</td>
<td>Vegetative state</td>
</tr>
<tr>
<td>25-29</td>
<td>Extreme vegetative state</td>
</tr>
<tr>
<td>30</td>
<td>Death</td>
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</tbody>
</table>

---


Revised 6/87
Appendix B:

Independent Living Scale
### Independent Living Scale Variables

<table>
<thead>
<tr>
<th>ADL section</th>
<th>Behavior section</th>
<th>Initiation section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hygiene/grooming</td>
<td>Physical aggression</td>
<td>Shower/bath</td>
</tr>
<tr>
<td>Dressing</td>
<td>Property abuse</td>
<td>Dressing</td>
</tr>
<tr>
<td>Medication</td>
<td>Angry language</td>
<td>Medication</td>
</tr>
<tr>
<td>Meal preparation</td>
<td>Exiting</td>
<td>Meal preparation</td>
</tr>
<tr>
<td>Travel</td>
<td>Stealing</td>
<td>Dishes</td>
</tr>
<tr>
<td>Eating</td>
<td>Overfamiliarity</td>
<td>Checking mail</td>
</tr>
<tr>
<td>Dishes</td>
<td>Bizarre language</td>
<td>Laundry</td>
</tr>
<tr>
<td>Mail</td>
<td>Nonparticipation</td>
<td>Take key/lock door</td>
</tr>
<tr>
<td>Toileting</td>
<td>Self-abuse</td>
<td>Alarm</td>
</tr>
<tr>
<td>Time</td>
<td>Sexually aberrant behavior</td>
<td>Take trash out</td>
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Appendix C:

Living Status Scale
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Appendix D:

Community Integration Questionnaire
Community integration questionnaire

HOME INTEGRATION

1. Who usually does shopping for groceries or other necessities in your household?
2. Who usually prepares meals in your household?
3. In your home who usually does normal everyday housework?
4. Who usually cares for the children in your home?
5. Who usually plans social arrangements such as get-togethers with family and friends?

SOCIAL INTEGRATION

6. Who usually looks after your personal finances such as banking and paying bills?

Can you tell me approximately how many times a month you now usually participate in the following activities outside your home?

7. Shopping.
8. Leisure activities such as movies, sports, restaurants.

10. When you participate in leisure activities do you usually do this alone or with others?
11. Do you have a best friend with whom you confide?

INTEGRATION INTO PRODUCTIVE ACTIVITIES

12. How often do you travel outside the home?
13. Please choose the answer below that best corresponds to your current (during the past month) work situation:
   • full-time employment (more than 20 hours per week)
   • part-time employment (less than or equal to 20 hours per week)
   • not working, but actively looking for work
   • not working, not looking for work
   • not applicable, retired due to age
   • volunteer job in the community
14. Please choose the answer below that best corresponds to your current (during the past month) school or training program situation:
   • full-time
   • part-time
   • not attending school or training program
15. In the past month, how often did you engage in volunteer activities?
Appendix E:
Occupational Status Scale
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REFERENCES


