

Chapter 15: Work Hardening

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Work hardening is an occupational rehabilitation service that is provided as a secondary treatment intervention to people who are chronically disabled. Its primary purpose is to remediate occupational disability and return the chronically disabled person to work. In order to understand its value, a brief description of the societal and personal contexts of the problem of chronic disability due to occupational spinal injury is necessary.

Societal Context of the Problem

In relation to the incidence of occupational spinal injuries, the prevalence of chronic disability among people who suffer an occupational spinal injury is low. Most people with occupational spinal injuries return to work within several days of the onset of the injury. The *Quebec Task Force on Spinal Disorders* (56) reported that 88% of all workers with industrial injuries due to activity-related spinal disorders returned to work within three months and an additional 5% returned to work within the next three months. Dixon (14) found that almost 50% of the painful industrial injuries improve in a week and approximately 90% resolve within one month, regardless of treatment. Andersson, Svensson, and Oden (1) report that more than 70% of those who report back injury with back pain but without leg pain recover within three weeks and 90% recover within six weeks. However, the small proportion of individuals who become chronically disabled due to spinal impairment are responsible for a disproportionate amount of the cost. In 1988, low back injuries accounted for 23% of the workers' compensation injuries in California and 34% of the cost of workers compensation (6). Across the United States, back injuries account for an average of 21% of compensable work injuries and 33% of the workers' compensation expense (48). At Boeing Aircraft Corporation, (55) back injuries have been reported to account for 41% of the workers compensation expense. Numerous studies have reported that approximately 10 to 15 percent of the people with low back injuries are accountable for 75% to 90% of the costs (28, 26, 42, 54, 60). These are the injured workers who are not able to successfully return after the primary treatment and require additional services, including surgery and rehabilitation. In turn, these cases cause occupational spinal injury to be the most costly major category of occupational injury.

The cost of medical care for occupational spinal injury is increasing at a rate that outstrips overall inflation. In 1986, the mean cost for low back pain claims against Liberty Mutual Insurance (60) was \$6,807. This increased to \$8,321 in 1989. This 22.2% increase exceeds the consumer price index increase over that period of 13.1% and the national weekly wage increase of 9.6% (12).

Personal Context of the Problem

The occupational spinal injury impairment is invisible to others. The pathology that results from an occupational spinal injury cannot be objectively quantified by current imaging techniques (39, 40, 35). The impairment itself fluctuates in response to involvement with activity, changes in the weather, and short-term effects of medication. Stress may also exacerbate the impairment. Its invisibility, combined with the

intransigence of its symptoms in some people causes it to be less than fully credible to many treaters, family members, and medical care underwriters.

For occupational spinal injury, the relationship between the impairment and the extent of functional limitations often is poor. Two people with similar levels of impairment may have vastly different functional limitations. The differences are probably due to differences in pain tolerance and interpretation, fear of re-injury, and motivation, all of which are difficult to quantify given current technology. The inexact nature of the relationship between impairment and functional limitations in occupational spinal injury leads to frustration on the part of the caregiver and causes many to provide less than adequate guidance to the patient. Recommendations such as, “Don’t do more than your back will let you” or, “Avoid heavy lifting” are frequently provided to occupational spinal injury patients by primary caregivers. These appear to be innocuous and even helpful recommendations. However, the inadvisability of such recommendations is well-known to secondary caregivers. When paired with the onerous experience of activity-related pain, such recommendations are adhered to assiduously by occupational spinal injury patients, resulting in conservative activity restrictions which, in and of themselves, are disabling. These restrictions quickly result in real changes in functional capacity which have been termed the “deconditioning syndrome” (Mayer). This problem is not a direct result of the pathology but an indirect result of the caregiver’s attempt to resolve the inexact nature of the relationship between impairment and functional limitations in a manner that protects the patient from further harm. The iatrogenic nature of occupational spinal injury disability has yet to be adequately addressed in occupational spinal injury treatment. In fields such as cardiac rehabilitation such recommendations are avoided in favor of specific activity recommendations and guidelines (31).

The fiscal costs of chronic spinal occupational disabilities are normally considered in terms of the medical treatment and indemnification for monetary damages (22). These costs are borne by the employer, insurance carrier, or governmental agency. Additional costs are also identified, related to welfare support which is provided by other governmental agencies (23). In addition, however, substantial costs are borne by the many disabled persons and their families. In most jurisdictions in the United States, workers’ compensation maintenance benefits are paid at a rate that is equal to two-thirds of the gross earnings of the injured worker up to a maximum that is roughly equivalent to the earnings of unskilled and semi-skilled workers but usually is substantially less than the earnings of skilled workers. Unless these benefits are part of a wage-replacement program paid while the person is attempting to return to work on a light-duty basis, they are not taxed by the federal government and most other income tax agencies. The two-thirds tax-free ceiling creates a burden for some and a short-lived boon for others. It is unusual to find an individual who has been off of work for six months or longer who is not experiencing some important financial consequence. Rarely is the consequence neutral. Whether the income consequence produces an economic boon or an economic burden for the disabled person, it adds to the complexity of the rehabilitation problem, and changes its character. The long-term costs are almost universally negative. In one study of occupational outcome after work hardening, only 14% of the returning workers experienced an increase in earnings, usually the result of improved skills (33). Of this sample, 52% experienced a loss of earnings rate that was measurable. Table 1 depicts the combined effects of degree of disability, gender, educational level, occupation, and race

on lifetime earning capacity for those people who returned to work at new occupations after becoming disabled due to occupational spinal injury.

Table 1. Estimated lifetime loss of earning capacity as a consequence of partial disability due to occupational spinal impairment. All subjects returned to work in new occupations after rehabilitation.

Factor	Case A	Case B	Case C	Case D
Age	26	34	38	29
Gender	Male	Female	Male	Female
Race	White	Black	Hispanic	White
Educational Level	10 years	12 years	12 years	14 years
Disability Rating	30%	50%	60%	30%
Occupation	Carpenter	School Clerk	Electrician	Equip Technician
Pre-Injury Hourly Earnings	\$20.00	\$14.00	\$23.00	\$16.50
Post-Injury Hourly Earnings	\$8.50	\$10.00	\$12.00	\$10.50
Pre-Injury Annual Earnings	\$31,000	\$29,120	\$42,550	\$34,320
Post-Injury Annual Earnings	\$17,680	\$20,800	\$24,960	\$21,840
Pre-Injury Work Life Expectancy	31.34	18.97	23.33	25.11
Post-Injury Work Life Expectancy	24.58	12.99	14.86	21.30
Projected Loss of Lifetime Earnings	\$537,054	\$282,318	\$621,761	\$396,564

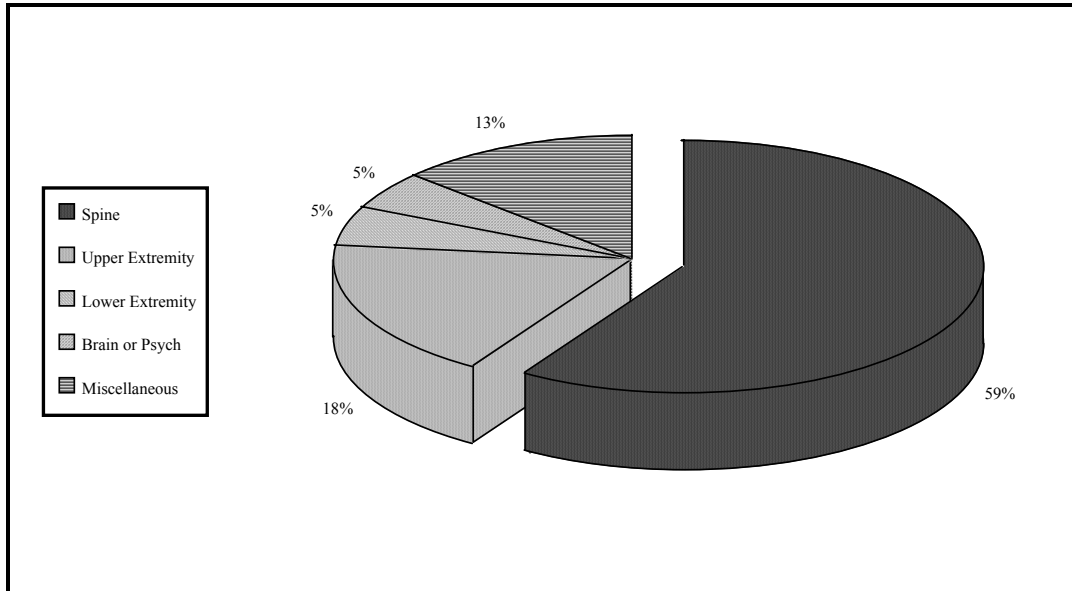
These cases from the author's recent practice depict a situation in which disability due to occupational spinal injury does not preclude return to work but restricts the level of work to which the person can return. In addition to a decrement in earning capacity, represented by an hourly wage, the disabled person experiences a truncation of expected worklife. These direct economic consequences are separate from and in addition to the ongoing medical care expense. Although figures such as these are very significant, they are rarely reported.

The societal and personal contexts of the problem of chronic disability due to occupational spinal injury are important to consider as intervention is attempted. However, the dynamics of the problem are of the greatest import to caregivers. In order to better understand the problem, let us turn now to its description.

Description of the Problem

People who are treated in work hardening programs have been unsuccessful in primary treatment and have become chronically disabled. A preponderance of people in work hardening disabled due to problems with the spine. Figure 1 depicts the make-up of the caseload of the author's work hardening program. This represents more than 1,000 consecutive admissions during the late 1980's.

Figure 1. Predominance of occupational spinal impairment in a work hardening caseload at one California rehabilitation center.



Work hardening is only appropriate for people who are chronically disabled. It is a secondary treatment program that should be used only when a primary treatment program has failed and the client presents certain characteristics which make it unlikely that return to work will be achieved by less comprehensive and expensive means. There are seven intertwining problems that typically are encountered with people who are appropriate candidates for work hardening:

1. **Functional deconditioning.** If the work hardening client's physical capacity is adequate to the usual and customary job's demands, but the client has become substantially deconditioned as a consequence of avoiding pain-producing activity, a serious transient occupational disability will result (36). If this individual has been referred to work hardening, triage to a less intensive and expensive program is necessary. It is appropriate to attempt to remediate occupational disability for these individuals through the use of an exercise-oriented physical therapy, occupational therapy, or work conditioning program. Involvement in a work hardening program is not only unnecessarily costly, it will expose the client whose only problem is physical deconditioning to other clients who have more serious impediments to rehabilitation. Although the effect of such exposure has not been studied, it is certainly a concern at the clinical level and, if it is not benign, it is certainly not helpful.
2. **Erosion of self-efficacy.** The overriding goal of work hardening programs is the development of self-efficacy. Chronically disabled people suffer from problems with self-confidence, enthusiasm and motivation. These problems develop gradually as a consequence of the gradual erosion of the individual's self-efficacy. Self-efficacy is an important cornerstone of healthy adulthood. Albert Bandura (4) points out that self-efficacy is based on the person's *perception* of

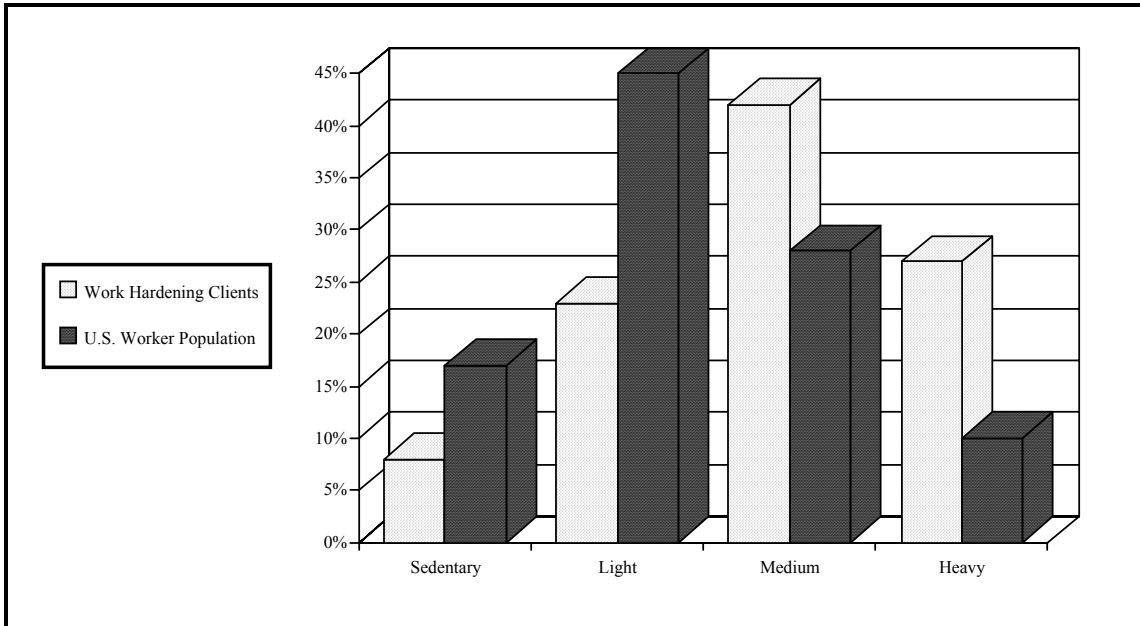
- competence and that these self-perceptions affect psychosocial function. Individuals' perceptions of their abilities affect how they behave, their level of motivation, thought processes, and emotional reactions to challenging circumstances. Christiansen (5) reports that "there is considerable agreement that the single characteristic of the individual which has the greatest influence on performance is one's sense of competence." Whether problems with SE pre-dated the occupational spinal injury which resulted in the disability the client presents to the work hardening program or has arisen since that date, the program must be able to address this issue.
3. Abandonment of the occupational role. The work hardening patient's inadequacy for the demands of work extends beyond a mere mismatch of the individual's physical capacity and the job's physical demands to include the individual's inadequacies in terms of basic work habits and work behaviors. For example, individuals who are admitted to work hardening programs frequently demonstrate problems with attendance and timeliness in the early stages of the program (30). These problems pertain to jobs beyond the individual's pre-injury job or any new alternative job. These problems pertain to any job in any work place for any employer and are fundamental to the individual's ability to return to the competitive labor market. The person who has been in the patient role for several months is often found to have given up the worker role and its attendant worker traits and behaviors. That is, the behaviors that this person displays are consistent with the patient role and inconsistent with the worker role. This is much more easily seen in a work hardening program when the client is provided with a work simulation task. Decrements in both the quantity and quality of productivity are often found. Problems with timeliness and adherence to a work schedule are also encountered frequently. Less frequent, but more troublesome problems are found with regard to willingness of the work hardening client to accept supervision as he or she would have in the usual and customary job. Objections to supervision are heard such as, "I shouldn't have to do this, I'm not getting paid for it." This is an example of a response to supervision that indicates the work hardening client is well ensconced in the patient role. If this client is unable to identify the "pay-off" in performing an assigned therapeutic task, it may be that the patient role has become so well developed that return to the worker role is unlikely. For these people, work hardening is focused on returning the occupationally disabled individual to work by resolving problems with vocational feasibility and utilizing the individual's residual functional capacity.
 4. Addiction to palliative measures - People who are disabled due to chronic spinal pain have been unsuccessful with a treatment program that usually has a substantial palliative component (40, 35, 36, 30). Several strategies have been developed for primary treatment of spinal soft tissue injuries. Historically, treatment involved the use of bedrest, analgesics, muscle relaxants, and palliative physical therapy (65). However, more than two days of bedrest has been demonstrated to be counterproductive (13). Upon referral to the work hardening program, these people often report that "My pain won't let me go back to work". Upon inquiry, such beliefs are frequently stated by these patients. In the primary treatment program, pain is a convenient and dependable indicator of treatment

- effect. It provides direction to the treatment and encourages the patient's compliance with the regimen. If the patient's goal in the primary program is pain relief, exacerbation of pain through physically challenging activities may connote treatment failure. In this sense, the primary treatment program's paradigm may become a problem for a secondary treatment program such as work hardening.
5. Development of psychological disability. Among individuals who suffer from chronic pain, the incidence of major depression ranges from approximately one-third to more than one-half (17, 25, 27). Polatin, Kinney, Gatchel, Lillo, and Mayer (47) found that 97% of men and women who suffer from chronic low back pain also received a diagnosis of somatoform pain disorder. In addition, 64% fulfilled criteria for major depression, 36% for psychoactive substance use disorders, and 19% for anxiety disorders. All of the somatoform pain disorders were diagnosed after the injury; none were present prior to the injury. Twenty-nine percent of the patients developed depression after the injury with a modest preponderance of these being females. Feuerstein, Papciak, and Hoon (16) report that "many patients with chronic lumbar pain display a set of clinical features including affective pain experience, increased subjective distress, preoccupation with somatic concerns, low self-esteem, and disease conviction." Individuals who are appropriately admitted to work hardening programs after failure in primary treatment or less intensive secondary treatment programs often are psychologically disabled. In most cases, the psychological disability is depression, which has either occurred or is significantly exacerbated by the disabled role that the work hardening client has assumed. In fact, if the work hardening client does not have some problem with depression, a question should be raised concerning his or her adjustment to disability. Although it is certainly reasonable to adjust to a disability and to live life as a disabled person without depression, the individual who is actively involved in a work hardening program should be expected to be somewhat emotionally uncomfortable with his or her circumstance. This discomfort may become part of the motivation to participate, or it may lead to depression which will limit the motivation to participate. That the emotional discomfort also gives rise to depression makes the rehabilitation process more difficult and requires that it be addressed clinically. In the admission screening process, the person with chronic spinal impairment who is so comfortable with his or her circumstance that he or she is unwilling to put up with the discomfort and disruption of participation in the work hardening program, should be given a provisional admission. A one-week trial in work hardening for these people often allows the staff to identify the person who has made an adjustment to the disability role that is either permanent or will be so resistant to modification that the program's resources will not be adequate.
 6. Development of behavioral disability. Problems with inappropriate behavior among disabled populations have been recognized for many years. Parsons (43) first defined the "sick role" as one which is conferred on the person who is ill and is actively involved in treatment. While the patient is in the sick role, he or she is allowed to temporarily escape from other role responsibilities. Mechanic (37) introduced the concept of "illness behavior" as an idiosyncratic response to symptoms given an individual's unique make-up and personality. This is a

category of behaviors which are found by people in the sick role. Mechanic (38) reports that the purpose of illness behavior is “to make an unstable and challenging situation more manageable.” Pilowsky (45-46) defines abnormal illness behavior as that which continues to dominate other social roles in spite of information provided to the patient concerning his or her disability which indicates that active treatment has concluded and a return to modified or alternative social roles is now appropriate. The behaviors which comprise the patient role appear to be learned within the context of a social support system (20). The familial context for such a role has been supported by research by Moss (41) and Rickarby, et al. (51). That such behavior is effective has been reported by Waddell, and his colleagues (58, 59). Matheson (34) defines “symptom magnification syndrome” as a self-destructive pattern of behavior which is learned and maintained through social reinforcement. This pattern of behavior is composed of reports and/or displays of symptoms, the effect of which is to control the life circumstances of the sufferer. Behavior which is adaptive for the patient role often is inconsistent with the worker role. The work hardening program provides a transition between these roles to allow the person to abandon one role and resume the other.

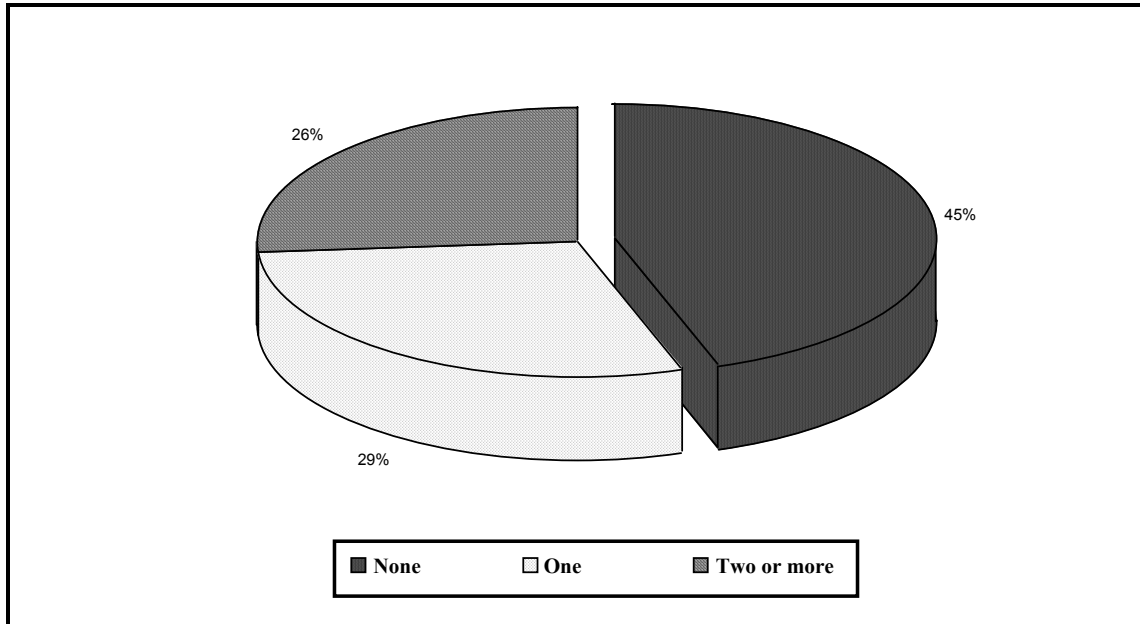
7. Mismatch between residual capacity and job demands. Work hardening patients appear to be disproportionately represented in the heavier physical demand categories. Matheson (33) compared the proportion of jobs in the United States work force at each of the physical demand characteristics levels with the usual and customary occupations of a sample of work hardening clients. Work hardening clients had jobs that typically were more physically demanding. Figure 1 depicts this relationship.

Figure 2. Comparison of physical demand characteristics levels of jobs in the United States economy and the jobs of clients in one work hardening program.



This provides one important impediment to rehabilitation. The work hardening program must offer alternative vocational goals for these people in order to be successful. If the client is unable to participate in a conditioning program to the point that functional improvement occurs, success in the work hardening program is not likely unless an alternative vocational option is available. For some clients, the mismatch between the client’s functional resources at entry to the work hardening program and the job’s demands is so substantial that, even if the client has the capacity to eventually improve to a level that would allow return to the job, a more parsimonious approach is often to identify a less physically demanding vocational alternative. This is most often the case with clients whose impairments have recurred, especially if those impairments appear to have job demands as a contributing factor. Figure 3 describes the prevalence of prior injuries among those work hardening clients who have been off of work for more than one year subsequent to the most recent injury.

Figure 3. Prevalence of prior injury among those clients referred to a work hardening program at one California rehabilitation center more than one year post injury.



The person who is occupationally disabled due to chronic spinal impairment presents unique challenges to the rehabilitation community. To the extent that this person is representative of an expensive and difficult-to-treat problem, it offers unique opportunities as well.

Historical Context

The origins of work hardening are found in the United States in the early 1900's. Industrial rehabilitation began in response to the large number of World War I disabled veterans. Initially, rehabilitation services were provided within the context of Veterans Administration hospitals and large private medical rehabilitation centers. In 1920, the passage of the United States Vocational Rehabilitation Act provided funds to assist disabled workers to return to work by retraining the disabled worker "around the disability". Among the earliest efforts were programs in "Industrial Therapy" which was defined as "the prescribed use of activities inherent to the hospital operation, planned for the mutual benefit of patient and institution" (53). Patients were assigned to work in keeping with aptitudes, interests, experience and therapeutic goals (11, 66). Treatment in these "curative workshops" was geared to restoration of the impairment. Graded activities, often planned along the lines of the physical demands of the patient's original job, were used to improve function. Therapeutic activities were adapted so that "the muscles he has always used and must use again in his job are brought into play and restored to the patient's functional and economic needs" (21).

In the 1940's the first "work evaluation" program was established at the Rochester Rehabilitation Center in New York (57). This program was an evaluation center that supplied information for the identification of appropriate vocational goals. Individuals who had gained maximum physical restoration were admitted to the work evaluation

program. In this program, clients were presented with a variety of industrial jobs in work conditions that simulated the industrial environment. Over the course of several weeks, clients would learn to work at maximum efficiency to meet industrial standards. Perhaps the best example of an early occupational rehabilitation program can be found in Wegg's (62) description of the "work therapy" program at the Morrison Center for Rehabilitation in San Francisco:

"This program consists of those activities which are simulations of actual on-the-job conditions which can be used both as an estimate of ability and as an exercise medium to develop work habits, confidence, increase physical and emotional tolerance, improve strength, range of motion, coordination, and dexterity. The familiar working situations promote good physiological effects. The clear treatment objectives provide motivation. The availability of the tools used in his trade allows the injured worker to begin developing the speed and skill he had attained during his employment. The occupational therapist is provided with an opportunity to grade activities as to length of time, resistances used, distances that weights are lifted and carried, positions of work, and so on."

In the late 1950's, there was movement toward using standardized vocational testing procedures which led to the development of the profession of vocational evaluation. Vocational evaluation was seen as a comprehensive assessment process that used standardized work samples and psychometric tests to evaluate aptitudes, interests, temperaments, and skills. Prevocational programs, such as the Institute for the Crippled and Disabled in New York (52), helped develop a client's work habits, work tolerances, coordination, and productivity to levels acceptable for entry into vocational evaluation. The decision to undergo prevocational evaluation and training, begin vocational evaluation, or go directly into a job training program was made by the rehabilitation team. This team often used information gained from structured "work tests" (61) or from "physical capacity evaluations" (49) developed and administered by occupational therapists.

In 1976, "Work Hardening" was introduced as a new occupational rehabilitation program model (30). Developed at Rancho Los Amigos in California, this model utilized functional capacity evaluation to identify the appropriate level of physical challenge to be presented to the injured worker in graded work simulations and structured physical conditioning tasks. The purpose of work hardening was to assist the injured worker to develop the work tolerances, habits, and attitudes that were necessary to return to and remain in the competitive workplace. In the late 1970's and the early 1980's, the Rancho model was adopted by other centers in California. The need became apparent for the development of standards of care. To this end, the California chapters of the American Occupational Therapy Association and the Vocational Evaluation and Work Adjustment Association convened an interdisciplinary committee to develop standards which were subsequently published by each organization. Soon thereafter, these joint standards were circulated throughout the United States and Canada.

As the interest in work hardening increased during the 1980's, professional "turf battles" began to develop. The American Physical Therapy Association (3) and the American Occupational Therapy Association (10) each developed separate standards for work

hardening programs. In addition, several large insurance carriers and state governmental underwriters of work hardening reported difficulties with lack of standardization. In response to this, the Commission on Accreditation of Rehabilitation Facilities (CARF) undertook development of standards. An interdisciplinary committee met in 1987 to draft standards which were subsequently circulated throughout the United States and Canada. Comments were received from more than 1,000 individuals and organizations. Recommendations that had a broad consensus were integrated into the proposed standards. The first CARF Standards were implemented on July 1, 1988. These standards (8) included a definition with specific program standards that would need to be met by any program desiring CARF accreditation. Soon after the standards were published, organizations began to request accreditation. The growth in accreditation was more rapid than any experienced by CARF to that point, indicating a significant pent-up demand, as the chart in Figure 4 indicates. Figure 5 depicts variation in accreditation from region to region in the United States, independent of working-age population.

Figure 4. CARF-accredited work hardening programs. Accreditation growth in terms of total number of programs, 1989 to 1994. Note: Accreditation must be renewed no less often than every three years.

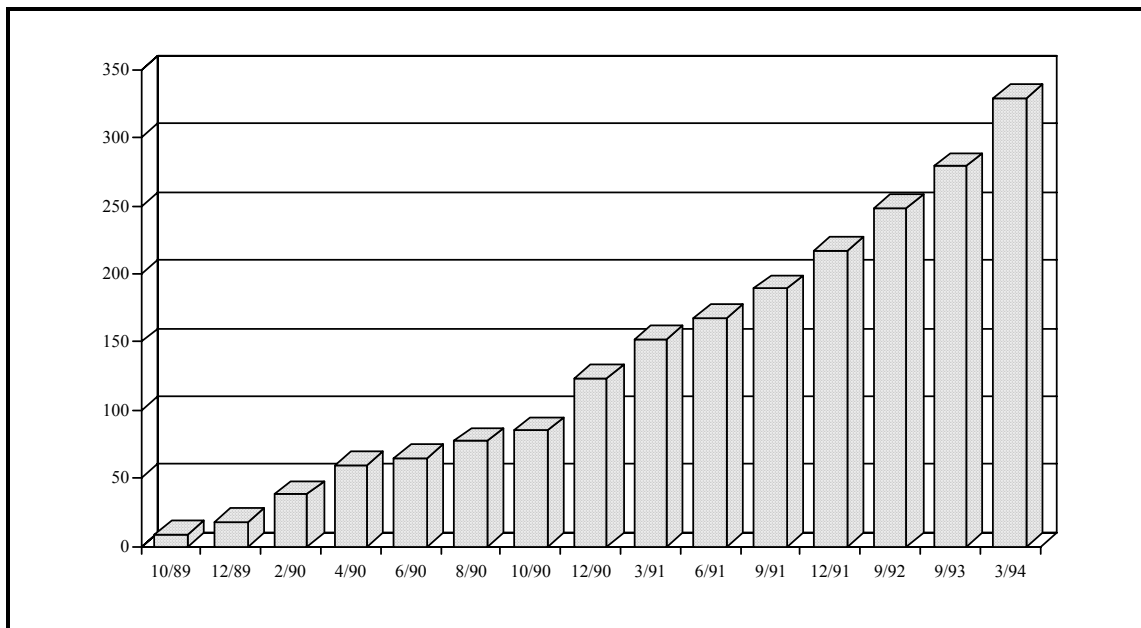
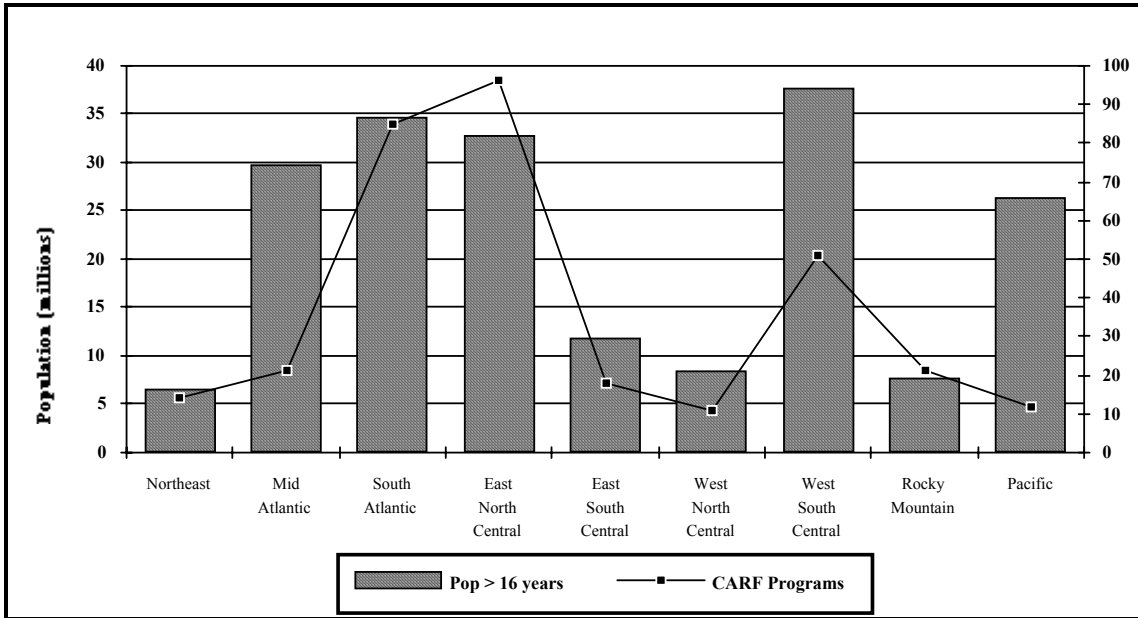


Figure 5. Comparison of prevalence of CARF-accredited work hardening programs in terms of United States population over 16 years of age.



In 1991 and 1994, CARF undertook regular triennial revisions of the standards. In the most recent version, the term “work hardening” is replaced by “Work Specific Industrial Rehabilitation”. Nevertheless, the definition provided by CARF (9) is very similar to the two earlier CARF definitions:

Work Specific Industrial Rehabilitation Programs are work-related, outcome-oriented, interdisciplinary, and individualized treatment programs that incorporate real or simulated work. These programs usually occur after an acute rehabilitation program, but may occur without previous involvement in acute rehabilitation programs. The goals of the program include, but are not limited to, restoring physical, behavioral, functional, and vocational skills. These programs may be provided in hospital-based programs, freestanding programs, private or group practices, or in industry (jobsite).

In 1993, the American Physical Therapy Association established guidelines for programs in industrial rehabilitation. Work hardening is defined as addressing the needs of patients with “vocational and behavioral dysfunction” and is contrasted with “work conditioning”. Isernhagen (24) defines work conditioning as:

“... a work-relevant, intensive, goal-oriented treatment program specifically designed to restore an individual’s systemic, neuromusculoskeletal function (strength, endurance, movement, flexibility and motor control.) The objective of the work conditioning program is to restore the client’s *physical* health and function so the client can return to work or for the client to become physically reconditioned so vocational rehabilitation services can commence.”

Work conditioning can be provided by a single discipline, while work hardening requires an interdisciplinary team. Work conditioning involves a combination of conditioning tasks and functional activities that are related to work, while work hardening uses real or simulated work activities to bring about therapeutic effect. Both programs are typically provided in multiple hour sessions beginning two hours per day five days per week. Work conditioning sessions increase up to four hours per day, while work hardening sessions increase up to eight hours per day.

The changes with time in the CARF standards as well as the development of other standards by the AOTA and the APTA have resulted in confusion. However, there are certain core attributes that are found in each work hardening program. These attributes are common to all of the standards and have survived from the first standards developed in California in the early 1980's. These include:

1. Work hardening is based on structured therapeutic activities which are available five days per week, several hours each day.
2. Work hardening uses work simulation on a graded basis to provide a therapeutic challenge.
3. Space and equipment for work simulation approximates a relevant work environment.
4. Work hardening services are provided by a coordinated interdisciplinary team. Depending on the needs of the client, the team is composed of an occupational therapist, physical therapist, psychologist, and vocational specialist. The interdisciplinary team is central to work hardening. Without the team, work hardening cannot be practiced.

Work Hardening Strategies

Work hardening can be a very effective intervention for people who are chronically disabled due to occupational spinal injury. Work hardening programs use four strategies to assist the occupational spinal injury disabled person to return to work.

Occupational Role Development - Resumption of the lost occupational role is the primary goal of the work hardening program. The first step in this process is to develop an occupational goal. This strategy is implemented by two therapeutic activities; goal development and work simulation. Each of these is described below:

Goal Development - Goals help to define the individual's personal horizon. The healthy, growing individual sets goals that describe reasonable challenges and reflect his or her self-perceptions, values, and expectations for the future. A goal is a distinct, complete, and clear communication about one issue that makes life more satisfying. Occupational goals are integral to the healthy development of clients in work hardening programs. Unfortunately, work hardening clients either report no goals or describe goals that reflect an emphasis on palliative pain control. Resumption of the lost occupational role is not often a goal that is described by the Work hardening client. If it is reported to

be a goal, inquiry will reveal that often it is more of a “pipe dream”, described wistfully as something that cannot be attained but is wished for.

The goal development process is undertaken in a formal manner in some programs (32) and is less formal in other programs. All work hardening programs have a strong focus on occupational goals. Usually, the goal development process has these steps:

1. Listing of all occupationally-relevant goals. This is accomplished in a structured interview. The professional who is conducting the interview asks the client to respond to the questions, “What are your goals? What do you want most out of a job?” and records the client’s responses. The listing process uses the client’s words and separates each goal so that it is distinct, clearly stated, and positive.
2. Ranking of goals in terms of priority of importance. The client is assisted to rank each goal in terms of its importance within the context of the other goals. This is often performed from least important to most important.
3. Review of goals with significant others. The work hardening client is encouraged to review the ranked goals with at least one person who is trusted and who will provide honest feedback. Goals can be modified, deleted, or ranked differently during this step.
4. Formalization of the goal document. The ranked list of goals is typed and copied.
5. Distribution of the goal document. Copies of the list are circulated to those people who are important to the client, including the Work hardening team members, physician, spouse, family members and friends.

The goal development process takes place early in the therapeutic relationship. Through this process, the client reveals much of what is important about himself to the caregiver. The caregiver takes the client’s goals seriously and respects the client’s goals, thus modeling the behavior that the caregiver seeks from the client. The goal development process helps the client to establish a future orientation, develop a rational basis for planning, and receive positive feedback from the community. Perhaps the most significant value of this process to the client is that it assists the client to communicate clearly with the program staff those aspects of life which are important. Given this information, the client and program staff can work with greater coherence to move towards the client’s goals.

Work Simulation - Occupational role development requires that the client be placed in a role that simulates the occupational role (30). While it is true that the client is no longer a patient, it is also true that he or she is not yet again a worker. The work hardening program provides the following to simulate work:

1. A relevant work environment. The physical space of the work hardening program is similar to a work environment. Most work hardening programs require large areas in order to provide environments that are relevant to the work environments

- of most of its clients. An industrial work environment will have concrete floors and will not be air-conditioned, while a clerical work environment will have carpeted floors and will be air-conditioned. The basic equipment relevant to the work environment will be found, including a time clock.
2. Work rules and hours. The hours of work and the rules regarding timeliness, safety, and interpersonal relations are identical to those found in a normal work environment and are integral to the work hardening program. Work hardening usually involves the patient five days per week, following a normal work schedule. The following work rules must be adhered to:
 - a. Safety - Follow rules and instructions, do not exceed work restrictions, use proper body mechanics.
 - b. Interpersonal Behavior - Accept supervisors' directions, get along with fellow workers.
 - c. Workplace Tolerance - Start each morning on time. Take only scheduled breaks and return on time. Remain in the workplace for a full work day.
 - d. Productivity - Work at the maximum pace that will allow:
 - i. Next day attendance;
 - ii. Completion of the scheduled workday;
 - iii. Sustained activity without an unscheduled break from work.

These demands are consistent with the expectations of employers in the competitive labor market.
 3. Work procedures. In addition to simulating the physical and temporal structure of a work environment, the procedural structure of the program must simulate the work environment. The injured worker's day begins by selecting his time card from the time card rack, "punching in" on the time clock, and reviewing his clipboard on which his tasks for the "work day" are listed.
 4. Work titles. Work hardening program staff are designated by occupational titles and industrial area designations such as the evaluation technician who is the "clerical supervisor" or the occupational therapy assistant who is the "woodshop superintendent". The client is called a "client". This seems to be a title with which most people are somewhat uncomfortable, preferring either the safety of the "patient" designation or the status and independence of the actual work title, such as "barber" or "secretary" or "warehouseman".
 5. Work tasks. The tasks that are performed by work hardening clients are similar to those performed in a competitive work environment. Task performance is quantified and graded in various manners relevant to the task itself. For example, a manual materials handling task is quantified in terms of the foot-pounds of work that was performed by the worker, while a typing task is quantified by the number of lines typed and the number of errors or corrections.

6. Equipment - Work hardening equipment includes work simulation tasks and apparatus that are used for physical conditioning. The basic criteria are that all such equipment be safe, reliable, valid, practical, and useful. In terms of safety, occupational rehabilitation equipment must have a demand that is able to be measured and controlled by the professional in terms of duration, frequency, and load. The task must be able to be increased along these gradients as the patient demonstrates the ability to tolerate increased load. In terms of reliability, the equipment used in occupational rehabilitation must have a demand which can be replicated, performance which can be measured, and a reasonable expectation that the patient's performance can be replicated. In terms of validity, the equipment must sample critical content of the target job's demands or the demands of a job cluster. The better the sampling of such critical job demands, the higher the validity. In terms of practicality, this equipment must have a daily cost (capital plus staff) that is reasonable.

Wyrick, et al (67) described 192 work hardening and work adjustment programs throughout the United States. Work simulation tasks and other tasks with graded physical demands typically were utilized for therapy. Services were provided by occupational therapists or physical therapists, frequently in combination. To the degree that a work hardening program can simulate a relevant work environment, it will be better able to shape role-relevant behavior and encourage the client to resume behaviors that are appropriate to the worker role.

Self-Efficacy Development - A key aspect of being human is the need to feel competent. White (63) defines competence as “efficacy in meeting environmental demands.” Competence is the ability to interact effectively with the environment while maintaining individuality and growth (64). White believed that there is an intrinsic drive in humans to influence the environment that provides motivation for exploring, manipulating and acting on the environment. He used the term “urge towards competence” to emphasize the basic nature of this drive. Christiansen (5) notes that the development of competence is based on “the experience of occupation or doing...by learning skills and strategies necessary for coping with problems and adapting to limitations.” The disabled person’s perception of functional self-efficacy arises from experience. Christiansen reports that “the extent to which individuals are able to develop a positive sense of self and belief in their autonomy is largely based on their successes in dealing with environmental challenges...”. This strategy is implemented by two therapeutic activities; serial functional testing and progressive functional challenge. Each of these is described below:

Serial Functional Testing - Functional evaluation is an important part of the self-efficacy development process. Frequent functional evaluation helps the caregiver to properly pace the level of progressive challenge. In addition, evaluation provides feedback which allows the person's urge towards competence to generate correction. Correction can be suggested or shaped by the therapist who acts as a communicator and interpreter of feedback and as a guide in the exploration of new alternative forms of responses. Most work hardening programs provide a structured functional capacity

evaluation of the client as the program gets underway. The initial functional capacity evaluation requires two hours to six hours to administer over one day to two days. It begins with a musculoskeletal and/or cardiovascular screening. Subsequently, the client's perceived functional limits are assessed by interview or through the use of a standardized psychometric test. Subsequently, formal testing is undertaken of such factors as standing range of motion, lifting and carrying capacity, and sitting and standing tolerance. The client's symptomatic response to these activities is recorded along with his level of performance. During the course of the work hardening program, certain aspects of the FCE are repeated in order to measure progress.

Once the functional capacity evaluation has provided information concerning the baseline level of the client's function, particular emphasis is placed on those areas in which there is significantly greater functional limitation than should be expected given the diagnosis and impairment. Specific functional exercises are used to remediate difficulties in this specific area and to increase strength, endurance, and other area-specific factors.

Progressive Functional Challenge - Development of self-efficacy requires that the client be willing to face and overcome a meaningful challenge within a controlled clinical environment and have a means to measure his or her performance in response to this challenge. Subsequently, the performance must be interpreted accurately by the evaluatee.

A common method of work hardening involves a work simulation task that presents progressive demands to the client on a graded basis. The starting point and gradient of increase is controlled by the caregiver in order to develop a clear pattern of the relationship between activity and symptom. An excellent example of such a task is a progressive lifting test. The evaluatee may begin at 10 pounds of load to perform a lift over a restricted vertical range and gradually increase the load and/or the vertical range and/or the frequency under the caregiver's direction. The purpose of this gradual increase is to not only identify the client's lifting capacity, but to develop a better understanding of the relationship between lifting tasks and the client's symptom response. Experience shows that the symptom response will not be idiosyncratic, but will have a specific and dependable pattern. There are many other types of progressive demand tasks that can be used. The selection of the task depends on several factors. Early in the program, the task should relate to a symptom response that is relatively easily identified and controlled. This may not be the most important of the symptoms in a particular situation. However, success in developing negotiation strategies with a simple symptom-activity combination will generalize positively to more complex and difficult symptoms and activities.

Symptom Negotiation Development - Many work hardening clients do not effectively negotiate with their symptoms. Symptoms are perceived to be out of control or minimally controlled by the client. The disabled person's perception of function can be thought of in terms of "work function themes," the rules that guide participation in work activities. These rules are learned throughout life and are constantly modified, based on experience. Information that is gained in unique circumstances is generalized to other circumstances. As a new situation is approached, work function themes guide the client's participation.

The problem encountered by the person who has chronic activity-related pain can be interpreted in terms of the work function themes that have been developed by this person. Take the example of the warehouse person who has many years of experience in lifting and carrying heavy loads. If this person experiences a traumatic and painful low back strain, the experience itself will tend to modify the person's work function themes in a conservative direction. To the degree that the experience was painful, frightening, or generally aversive, the limitation of the work function theme will be irrational given the actual functional demands of the task. The ecological purpose of this limitation is to prevent the person from experiencing a re-injury. Unfortunately, because the chronically pain-disabled person has only the aversive experience of the event as a guide, the self-limitation is often more pronounced than is appropriate. In order to develop rational work function themes, the chronically pain-disabled person must perform progressively demanding tasks successfully, experiencing pain that can be maintained within limits that he or she understands do not connote re-injury.

Symptom negotiating training is based on a simple idea: If symptoms can be predicted, they can be managed. In order to achieve this, the caregiver must set up situations in which the symptoms occur on a predictable basis and for which prediction and control of the symptoms can be accomplished by the client. One approach to this problem that has been especially effective in work hardening is to place the client into situations that exacerbate symptoms so that the specific causative factors can be identified. Once identified, strategies can be developed to be used by the client to provide behavioral control of the symptoms. Control will not be absolute, but will be incremental. This is termed "symptom negotiation" and describes an ongoing process that many clients find useful and necessary beyond the work hardening environment. The responsibility for activity-related pain must be accepted by the patient and the pain must be interpreted as an indicator of a circumstance that may, but does not necessarily, limit activity. Behaviors that can be effective in negotiating with symptoms include both proper work pacing and the use of microbreaks and tool or job modification. These are described below:

Work Pacing and Microbreaks - A large majority of clients who are disabled by activity-related pain approach activity as an "on or off" experience. That is, the person works at one pace until he or she is no longer able to work and then stops. The caregiver can work with the client to slow the pace of work or, perhaps more effectively, interrupt the normal pace of work with "micro breaks". Micro breaks last 30 seconds to 90 seconds and can be scheduled every five minutes to 15 minutes. They are intended to interrupt the flow of the activity in order to allow the person to stretch, change posture, lower the heart rate or cardiovascular work load, or in other ways decrease the immediate demand that the task is placing on the client. A kitchen timer with an alarm can be used to signal the micro break. A token reinforcement behavior modification system may be useful to encourage the client to utilize the signal and take a micro break.

Tool or Job Modification - Many clients who are disabled by activity-related pain have not learned the value of working smart rather than working hard. The client continues to perform the task in the same manner that he or she used prior to the injury or illness.

While, in some cases, this may have been the most efficient means of performing the task, other means are available that may be nearly as effective or, in some cases, may be more effective. The focus of these means is to allow the client to return to a reasonable level of productivity through the completion of the task in a modified manner. Modification of hand tools, power work tools and stationary equipment, the work station, or the job tasks themselves, can be undertaken by the client with consultation from the caregiver. Modification of the job tasks so that they are within the injured worker's functional limitations is accomplished by both modification of the job tasks and modification of the injured worker's approach to the job tasks. Both job modification and worker training must be undertaken with reference to the injured worker's specific job. This usually begins in a simulated work environment and proceeds to the actual workplace. This often is quite inexpensive and easily accomplished. A survey in California (7) found that 81% of the job modifications which were utilized were either free or cost less than \$500.

Additional Work Hardening Tasks

In addition to those tasks and activities which are designed to bring about the development of the disabled client in the areas described above, work hardening programs involve clients in other specific tasks and activities, the most important of which are described below:

1. Prior to admission to the program, a structured interview is conducted with the client which includes a review of his or her medical status, goals, and reported functional tolerances.
2. Early in the work hardening program, a functional capacity evaluation is performed that assesses the person's ability to participate safely in the program. The initial functional capacity evaluation establishes a benchmark in terms of the person's level of function in response to the expected demands of competitive employment. Subsequent functional capacity evaluation tasks which focus on one or two key functional tolerances are performed to measure progress.
3. As the work hardening program proceeds, it provides the client with education to teach safe job performance and to prevent re-injury. Work hardening clients also receive training in the issues of pathology and impairment concerning their diagnoses. In addition, spinal impaired patients often receive instruction in body mechanics, lifting techniques, and work pacing.
4. In order to prepare the client to return to a previous job, an assessment is made of the specific job requirements through worksite evaluation and/or job analysis. This information is used to structure the work simulation tasks to increase their validity and utility.

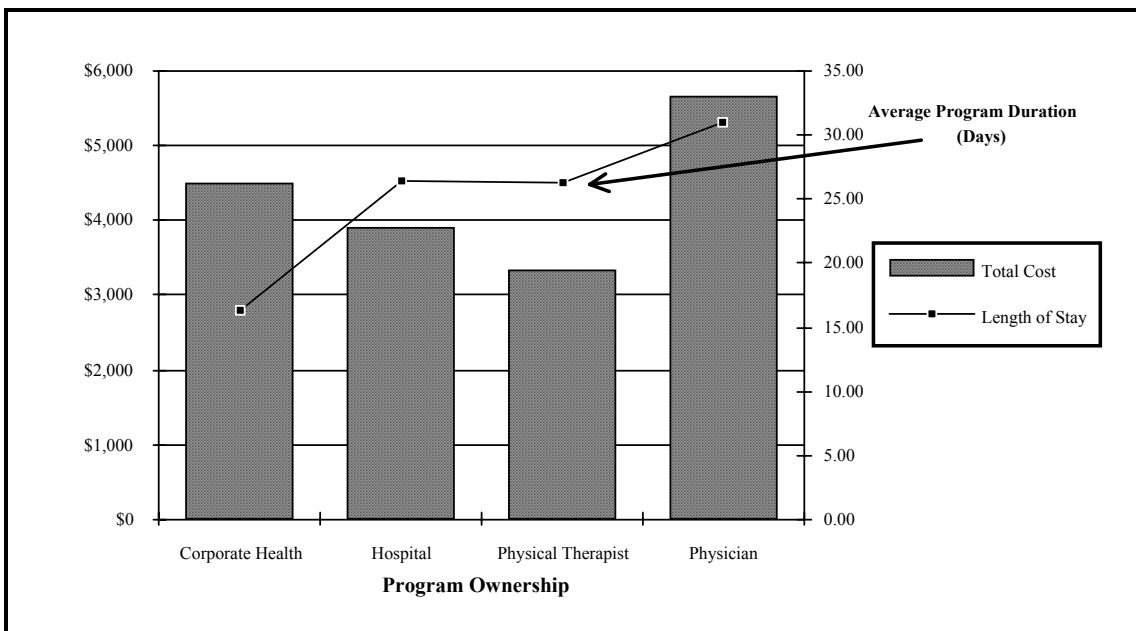
Work Hardening Program Survey

In April, 1994, a total of 346 work hardening programs were asked to participate in a confidential mail survey, including all of the programs (n = 329) accredited by the Commission on Accreditation of Rehabilitation Facilities at that time. The purpose of the survey was to describe the current state of practice of work hardening in the United

States. One of the important issues current in work hardening is the effect of the changes in program ownership on service delivery and program cost. In recent years, a few large multi-state corporate health companies have purchased established work hardening programs from private practitioners.

Of the 83 programs that responded to the survey, 40 provided complete and detailed analyses of their operations. Eight of the programs were owned by physicians, twelve by physical therapists, eight by private for-profit health care corporations, and the balance by community hospitals. Thirty-six of the programs were CARF-accredited. In terms of the physical location of each program, eight were located in hospitals, six in medical office buildings, eighteen as stand-alone programs in industrial buildings, and the balance in professional office buildings. Most of the programs provide services 35 or more hours per week on a five-days-per-week basis. A client’s typical day begins at 8:00 a.m. to 8:30 a.m. and continues until 3:30 p.m. to 4:30 p.m. with a 30-minute to 60-minute break for lunch at mid-day. Fees range from \$128 to \$276 per day while the average program fee is \$189 per day. The average cost for services ranges from \$2,375 to \$10,000 per case, with an average of \$4,254 per case. Corporate health-owned programs were 40% more expensive than average, while physical therapy-owned programs were approximately 35% less expensive than average. The comparison of total cost to the length of stay is depicted in Figure 6.

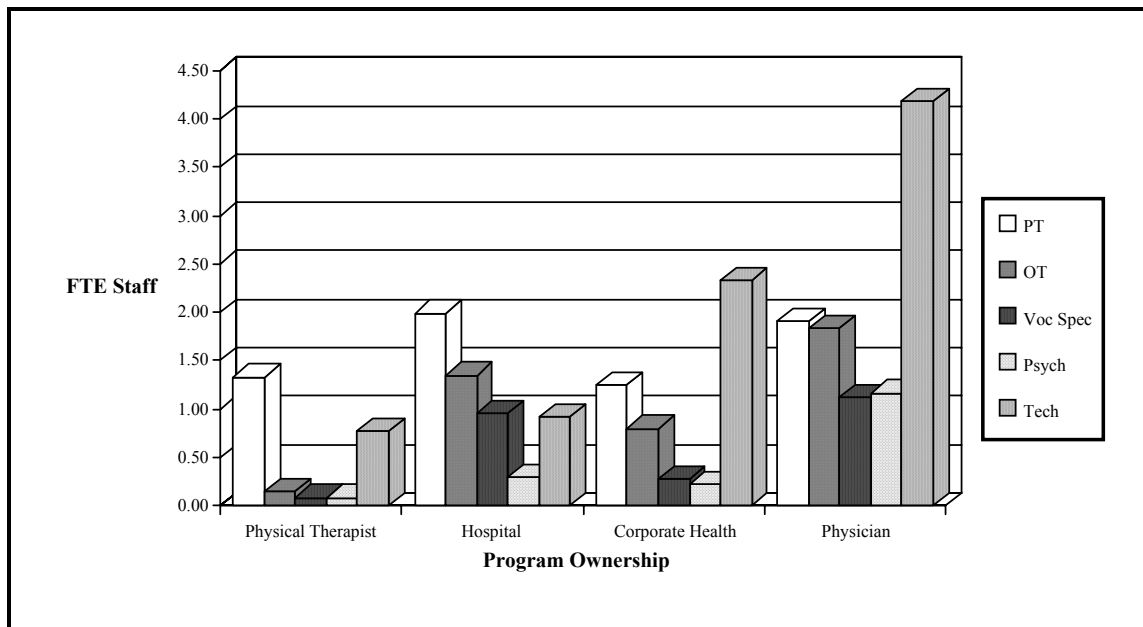
Figure 6. Relationship between program duration and total program cost, compared across ownership groups.



The corporate health programs have short lengths of stay, while the physician programs are the longest. Physical therapist total costs are the lowest, while physicians’ total costs are the highest.

The mix of professionals in each of the work hardening programs seems to vary by the type of owner. All of the programs use physical therapists, with the physical therapist being the predominant professional in hospital, corporate health, and physical therapist-owned programs. Occupational therapists are involved to a similar degree in the physician-owned programs, somewhat less in both the hospital and corporate health programs, and rarely in the physical therapist-owned programs. Psychologists' involvement is highest in the physician-owned programs while corporate health and hospital-owned programs have similar levels of involvement from psychologists. Vocational specialists' involvement varies significantly, with the hospital and physician-owned programs having significant involvement from this professional and the physical therapist and corporate health programs having very little. The mix of team members in terms of full-time equivalent workers (FTE) is depicted in Figure 7.

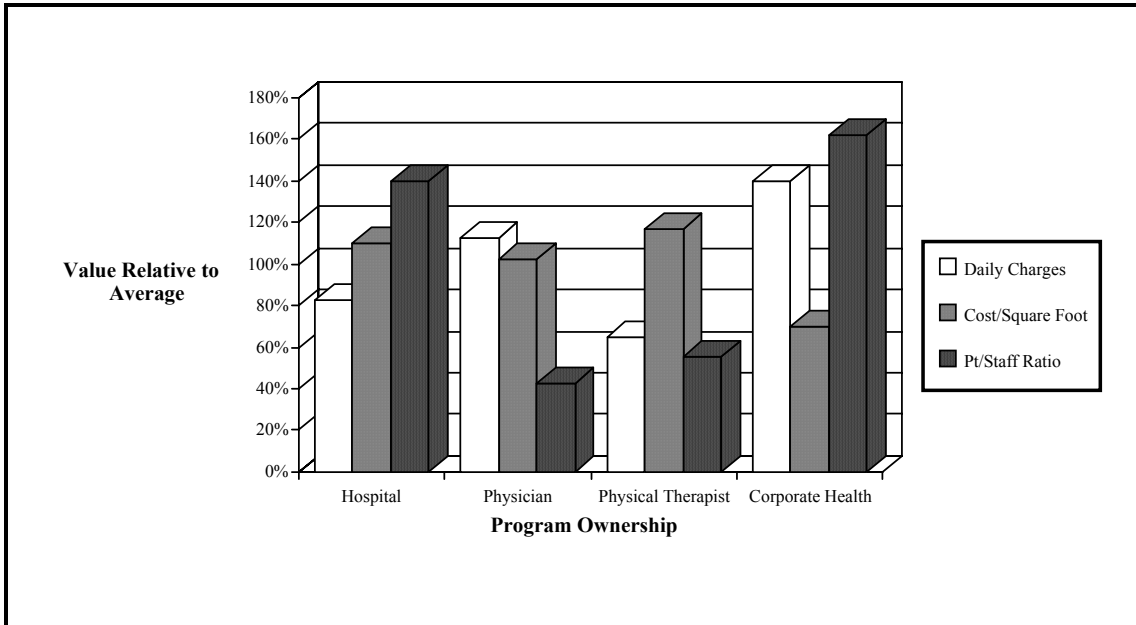
Figure 7. Mix of professionals on the rehabilitation team in terms of full time equivalent (FTE) staff, compared across ownership groups.



One of the most striking contrasts across categories of program ownership has to do with the employment of technicians. Physicians use four times as many technicians as either the hospital or physical therapist-owned programs and twice as many as the corporate health programs. These workers do not supplant professionals, however, in that the physician-owned programs have high levels of involvement across all of the professional groups. In general, the physician-owned programs were the most balanced, while physical therapist-owned programs were the least well-balanced.

The two most important costs involved with a work hardening program are the cost of space and the employees' salaries and benefits. The cost of space is fixed, while the cost of employees is variable above a minimum level, depending on the patient load. An analysis of the reported rent and the patient-to-staff ratio, each relative to the average for all programs is presented in Figure 8.

Figure 8. Comparison of daily charges as a consequence of the two major expense areas, cost of space and the ratio of patients to staff. Each amount is presented in terms of the value relative to the average for that variable. That is, an 80% amount for daily charges is interpreted as 80% of the average daily charge for all programs sampled.



This describes substantial imbalance across program ownership. The daily charges in the corporate health-owned programs and the physical therapist-owned programs are closely related to the patient-to-staff ratio. Although programs owned by corporate health are the most expensive, they also have the highest patient-to-staff ratios. This is, of course, the opposite of what would be expected if quality of care were driving the daily charges. Both the physical therapist and physician-owned programs offer the best patient-to-staff ratios, with the physical therapists appearing to provide the best value in terms of a comparison of staff availability to daily charges. Costs of space to house the various programs are similar for all but the corporate health program, which is approximately 20% less than each of the other programs.

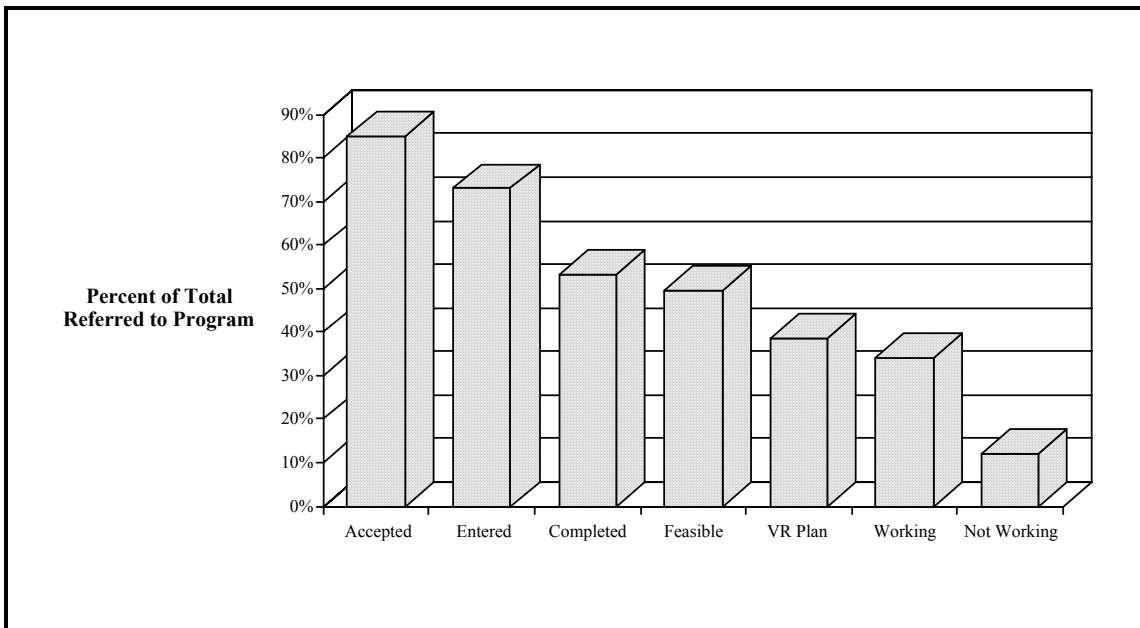
Work Hardening Program Outcome

Although several established work hardening programs have assessed outcome, a uniform system for categorizing clients, services or outcomes has never been followed. In addition, there are no studies on the efficacy of work hardening which utilize any random sampling or matching procedures. CARF-accredited programs are required to perform frequent program evaluation and should be able to provide the consumer with statistical descriptive information concerning program outcome, although this is, of course, not peer-reviewed. Lechner (29) reviewed 12 published studies of work hardening and work conditioning and found that there were few randomized control studies or matched case studies in which duration of treatment was also controlled and evaluations were conducted by blinded observers. She reports that there is tremendous variability in the research methods of the published studies. That greatly restricts

Matheson, L. (1995). Work Hardening. In J. Frymoyer & T. Ducker & N. Hadler & J. Kostuik & J. Weinstein & T. Whitecloud (Eds.), *The Adult Spine: Principles and Practice* (2nd ed.). New York, NY: Raven Press.

comparison among models. She believes that, although each program reports successful outcome, work hardening program effectiveness has not yet been scientifically documented. This is in part because the difficulty of performing research in a clinical environment is significant. Figure 9 depicts one of the dilemmas that must be addressed if reasonable comparative data are to become available.

Figure 9. Attrition of caseload as a function of stages in the course of work hardening program involvement.



In Figure 9, the natural attrition of clients in the author’s work hardening program is described. Depending on the point of reference one chooses, very different results will be reported. It is especially important to note that slightly more than one-half of the clients who were referred to work hardening actually completed the program. Samples of published outcome reports from well-recognized programs are presented below:

1. The Work Assessment and Rehabilitation Program in Tuscaloosa, Alabama, (61) reports that its work hardening program has an “85% rate of success for ... either returning to the same job or to return to the same industry with restricted physical demands.”

2. The Industrial Rehabilitation Program at Massachusetts General Hospital in Boston (18) presents the following outcome data:

Return to work same job, same employer.....	48%
Return to work different job, same employer	8%
Entry into a vocational training program.....	4%
Medical management	20%
Awaiting settlement	8%
No Information.....	12%

3. The Work Hardening Program at the Irene Walter Johnson Institute at Washington University (50) reports that 70% of patients who have completed the work hardening program have returned to work.
4. The Work Employment Rehabilitation Center at Loma Linda University (2) reports that of those who have entered the work hardening program, 55% have returned to usual and customary work, modified work, or a new job immediately after discharge. An additional 15% have entered the vocational rehabilitation program to receive training. Twenty-six percent of the patients from the work hardening program returned for medical treatment.
5. The STEPS Rehabilitation Center program at Schwab Memorial Hospital in Chicago (15) reports an 88% return-to-work rate measured 30 days after discharge.

Although these data are not based on randomized control studies and provide no basis for matched comparisons, it is important to note that, in general, work hardening services are provided to people who had been found to be “rehabilitation failures”.

Summary

Injured workers who are chronically disabled due to occupational spinal injury require a disproportionate amount of health care resources. Although these people are not working, they are often not so disabled that they cannot work if provided a work-oriented treatment program, such as work hardening.

This chapter has describes an approach to treatment of chronically disabled people that can be effective in returning a significant number of them to work. Strategies of rehabilitation are presented which have been demonstrated to be clinically efficacious. However, the efficacy of work hardening programs is much less evident. While attempts have been made to demonstrate efficacy using comparison group research methods (67, 29), neither matched-control group studies nor randomly-selected group studies have been undertaken. Work hardening programs are at risk in this set of circumstances. The risk involves being caught up in wholesale cuts in health care expenditures because the efficacy and cost-benefit of these programs has not been scientifically demonstrated.

If the anecdotal and descriptive statistical reports have any validity, it appears that work hardening can be useful in assisting one-third to one-half of the people who would otherwise continue to be disabled to return to work. This has important consequences for the successful individual, his or her family and employer, the service underwriter and welfare support agency. It is probably these consequences that have caused work hardening to have become a regular component of the strategy for treatment of occupational spinal injury for those people who are chronically disabled.

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