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**THE FUNCTIONAL CAPACITY ASSESSMENT FOR OCCUPATIONAL LOW BACK PAIN  
(A SURVEY)**

**PURPOSE:**

The purpose of this seminar is to introduce the participant to methods of assessment for work capacity when the worker's constraining factor preventing full return to the economy and/or social function is low back pain. In addition, an algorithm for medical service interaction is reviewed in a discussion of "The Workplace Center" concept.

**INTRODUCTION:**

In a pleasant drive through the New England countryside, one can observe the fulfillment of Thomas Jefferson's dream of agrarian democracy by observing the pristine simplicity of the self-contained New England farm. The farm was an industry which often supported an extended family through their production of foodstuffs for personal consumption and export. If a family member were to injure their back, they could rest and achieve medical stability with tender care and, as they improved, gradually return to the work environment as their ability permitted while other family members interacted to change the global job description. In this scheme, the injured party's ability to work was regained through the gradual assumption of responsibilities while maintaining his income and his place in the family and society. These and other more powerful reasons caused Jefferson to believe that "...man was a rational animal, endowed by nature with rights and with an innate sense of justice...that he could be restrained from wrong and protected in right, by moderate powers confined to persons of his own choice, and held to their duties by dependence on his own will. Those who labor in the earth are the chosen people of God..." Urging American reliance on the products of Europe, already hopelessly corrupted by factories, he turned with contempt to the urban community: "The mobs of great cities add just so much to the support of pure government, as sores do to the strength of the human body."<sup>1</sup> However, Jefferson's political philosophy was not to be accepted by the nation and, by 1840, we were full swing into the development of an industrial society.

It was founded in the woolen mills of Lowell and Lawrence, Massachusetts and its first workers were young women who were paid high sums and given dormitories and lessons in social grace as inducements to running the looms and other equipment of these early factories. Their workloads were restricted, as were their social lives, so that an atmosphere of virtue permeated both their personal and working lives. As demands for products increased, so did the length of the workday and job responsibilities and so came piecework and incentive pay. By the 1880's, in some industrial settings, we had achieved the 14 hour day and child labor. At this time, personal injury suits under tort law provision developed an increased interest on the part of industrialists and politicians so that by 1911, laws of workman's compensation were enacted.

Since then, there have been peaks and valleys in our national interest in the prevention of occupational injury and in its various forms of support, reward, and rehabilitation. In an article on compensation and recovery from injury (1984), Rodney Beals<sup>2</sup> pointed out that the English pirates were, like Jefferson, "...passionate advocates of a rude sort of democracy, with a high regard for justice and the rights of the individual, and a corresponding distaste for tyranny and the abuse of power." He points out that their operating expenses included the cost of a ship, provisions, a surgeon, a sailmaker and compensation for disability. After subtracting operating expenses, the pirates divided the profits with the captain who received the greatest amount of the spoils. Their entire venture was based on the premise that pay was not guaranteed save only by the successful acquisition of booty.

Their disability costs included both scheduled and unscheduled benefits. An example of scheduled compensation is presented as follows:

<u>For Loss Of</u>	<u>Pieces of Eight Awarded</u>
Right Arm	600
Left Arm	500
Right Leg	500
Left Leg	400
An Eye	100
Finger	100



This system also creates anomalies in access to medical care, the development of maladapted behavior, non-treatment directed diagnostic techniques, poor-patient response to treatment, and an increase in residual disability.<sup>3</sup>

If anything is true about occupational low back pain, it is that is of multifactorial etiology, that this etiology is unclear, that diagnostic terminology is nebulous, that medical and therapeutic interventions are thus imprecise, that functional assessment of residual capacity is based on many subjective parameters when the need for accurate empirical data is paramount, and the effect on all concerned with the problem, particularly the suffering party, is immense.<sup>4</sup>

Not only are there many factors which cause back pain, but they interact. Troup (1984) gives the example of an unskilled worker with a minor anomaly of the spine with narrowing of the intervertebral foramen who might be exposed to a number of years of repeated microtrauma to the spine without significant symptoms, but develops an attack of back pain at work when performing some unaccustomed activity. Exacerbations of this symptom complex over time may trigger psychosocial problems and stress, making the spine less flexible and subject to loaded and over-exertion activity.

Flor, H. and Turk, D.C. (1984)<sup>5</sup> updated statistics for the incidence of chronic back pain by indicating that "...about 80% of the population is affected by back pain at some point in their lives. Back pain is the third leading cause of physical limitation and disability with 3.9% of the population permanently disabled by it. Of the 1.25 million people in the United States who suffer back injuries over a year, 65,000 patients will be permanently disabled." They further point out that back pain affects men and women equally with onset between 20 and 30 years, with the greatest morbidity between 18 and 44 years. They further review that only 50% of patients who have had back pain for more than 6 months will return to work, and that an estimated 14 billion dollars are spent for the treatment of back pain in the United States alone.

Interesting as well, is their statement regarding the range of diagnostic terms associated with back pain which serve to include the following: lumbosacral strain, lumbar disc disease, sciatica, lumbago, spondylosis, osteoarthritis, spinal stenosis, myofascial pain syndrome, sacro-iliac joint sprain, myalgia, fibrositis, degenerative disc disease, and so on. They note that "such imprecise diagnoses as muscle strain, ligamentous strain, or simply description of symptoms (lumbago) account for 50-90% of the diagnoses."

It is important to note that back pain is a symptom and not a disease. It is well understood that acute back pain is a self-limiting condition. It usually resolves for 90% of patients within two months.<sup>6</sup> There is a high episode of recurrence and Willis, in his book, Management of Low Back Pain, points out that at this point in the natural history of back disease, that the spine is unstable which might help in explaining the high rate of recurrent symptomatology.

Disc degeneration seems to be part of the natural aging process of people in the western industrialized societies. Fahrni<sup>7</sup> reported that this degeneration of the spine is rare in non-industrial societies.

Magora<sup>8</sup> showed that certain occupations have shown some relationship to an increased incidence of back pain, especially those involving heavy manual labor, frequent bending and prolonged sitting. It is important to point out that he reported that the incidence of back pain correlated best with how physically demanding workers perceived their work to be rather than how objectively demanding it really was.

Troup<sup>4</sup>, in a review of literature from the National Board of Occupational Safety and Health in Sweden, found that, in 15,000-back-related injuries, lifting or strenuous movement was the factor in 85% of the cases studied, and it was the immediate cause in 60% of them. Unexpected heavy loads and vibration have also been identified as factors contributing to back disease.<sup>6</sup>

Bioengineering research has documented peak values for compression loading of the spine.<sup>9</sup> With this work, Dr. Chaffin and others at the Center for Ergonomics at

the University of Michigan assisted in developing the National Institute of Health and Occupational Safety's manual work guidelines. This, together with psychophysical data developed elsewhere, and Troup's experiments on measurements of intra-abdominal pressure during exertions of force, have brought supporting epidemiological evidence for the role of over-exertion syndrome in the production of back disease.

Chaffin, Herrin<sup>10</sup> and Keyserling<sup>11</sup> show that strength testing can be used to avoid the mismatch between job and worker and thus reduce back injury.

THE FUNCTIONAL CAPACITY ASSESSMENT:

Greenwood, J.G.<sup>12</sup> reported that current estimates for workman's compensation costs for low back disease are about 30 billion dollars a year and account for more lost days from work than any other lost time problem save the common cold. The New Hampshire Department of Labor, in 1983, experienced 13,211 compensated work accidents, resulting in \$45,585,000.00 in compensation payments. The same year, Maine compensated 46,629 injuries at a cost of \$81,263,000.00. Lost productivity and other indirect costs add significantly to these figures and are not often included in reports of economic loss from occupational low back disease. After one year on disability, the probability that one will return to work is about 25%, and after two years, there is almost no return to work by disabled employees. McGill (1968)<sup>13</sup> reports that in addition to job-related activities which increase the risk for back injury, there are personal behaviors such as sedentary lifestyle, cigarette smoking, emotional stress, poor posture, and obesity that have associated increases in risk with lower back pain. The goal for the occupational health care provider is to prevent the injury and, if one occurs, to provide proper rehabilitation following the injury and safe matriculation back to work. In New Hampshire, the preferred protocol for return to work is as follows:

1. Same employer, same job description.
2. Same employer, different job description.

3. Different employer, same job description.
4. Different employer, different job description.
5. Vocational rehabilitation with alternate job description.
6. Short term vocational education program.
7. Long term vocational education program along with benefits based on period of employment and three month average weekly wage.
8. Lump sum settlement with establishment of self-employment.

A study done by the Department of Labor in New Hampshire showed that those who returned to the economy along the profile set above were successful in their transition in almost that order. Those who failed to matriculate to the economy, particularly those who were established in their own businesses following lump sum settlements, tended to fall back on other support systems, such as Social Security Disability.

In order to prevent the continuation of failed attempts at returning to the labor market after back injury, an assessment of function has become a popular approach.

My first Functional Capacity Assessment was done at the request of a local orthopedic surgeon who wished me to supply him data so that he might complete the attached form. I looked at this form in bewilderment, as it seemed to have no functional relevance to me and I had little idea as to what I might do to satisfy the physician's request for the generation of data upon which he might judge the patient's functional capacity over an 8 hour workday period. This assessment, of course, had to be conducted in the space of a single evaluation period. It was my good fortune to know some professionals in the field of vocational rehabilitation who are certified rehabilitation counselors and have carried on assessment services for a number of years. Their firm, called Rehabilitation Consultants, is a private organization that provide a range of services, from work capacity assessment, psychophysical testing, case review and management, rehabilitation counseling,



job analysis, workplace layout modification, and a program for assisting the disabled person to become part of the community.

I found, in this introduction to assessment services, that evaluation of the positive portions of one's attributes has been the longstanding role of those in vocational rehabilitation and that, over a long period of time, in concert with other professionals particularly Occupational Therapy, they had developed methods of assessment for the whole person. While those methods of assessment were and are not perfectly reliable and inferentially predictable, they were the first organized approach I had seen to the subject save the AMA guidelines.

I was also impressed by the materials developed by our State Department of Vocational Rehabilitation in the assessment and management tracking of their clients (see Appendix). The part of the profile which interested me most was that which I had been requested to fulfill initially on the examinee referred to me by the orthopedic surgeon mentioned above. It seems that this rating system was that developed by Hanman (1958).<sup>14</sup> A nice history in the development of that form was printed by the American Mutual Liability Insurance Company in 1968 and edited by McFarland.

This plan was a method of determining the physical abilities of workers and relating them to the job demands that they were required to do in a safe way. The format produced certainly was a giant step forward as it emphasized what the worker could do as opposed to what jobs he was closed out from on the basis of his diagnosis, rather than on the demonstration of his skills and abilities. Following the first World War, the French developed a system whereby the physical requirements and related abilities of any given job description were labelled in a square. Thirty-two transparent overlays were developed matching the original representation of available jobs, but with boxes closed out that would be prohibited by a given diagnostic category. So, by placing the diagnostic category over the jobs available, one could see what positions remained that were not denied by the patient's diagnostic category.

## THE FUNCTIONAL CAPACITY ASSESSMENT

Although this was a nice idea and required the evaluation of job description, it did not allow for testing of an individual or for the adaptation of specific jobs, and so a specific method for matching the man to the job yet remained. Hamman then created a job analysis and matching form that remains with us today and requires the assessment of 80 separate functions. Comparing one's performance on the 80 factor physical function analysis assessment, he can then be matched to the specific job title, location and number of available positions within his plant.

However, as compensation law and litigation intervened, and with a propensity for industry, particularly of the modest size, to permit the return to work of an injured employee only if they could demonstrate 100% capability, the need to make a functional capacity assessment without the index of a probable job made the functional capacity assessment the bane of the physician and the nemesis of the low back pain patient.

It seemed that everyone had a different method of obtaining the functional assessment numbers necessary to decide whether the worker should return to his previous job, go through a program of vocational rehabilitation, or settle with the insurance company for a lump sum of money, split 1/3 of it with his attorney, and find another job on the basis of self-selection.

Happily, the work of a number of people in various fields is coming together so that a standard terminology, basis for assessment, and a flexible methodology is coming about.

Leaders in this area include Leonard N. Matheson, Ph.D.<sup>15</sup>, T.G. Hiebert, Ph.D., M.D.<sup>16</sup> and Keith Blankenship, L.P.T.<sup>17</sup> Work at developing reliable, safe, and reproducible assessment techniques is going on at a number of research centers including the University of Vermont under the direction of Drs. Frymore, Pope and Hazard, in the Department of Medicine at the University of California under the direction of Philip Harber, M.D., and at the University of Michigan's Center

## YOU MAY BE ENTITLED TO WORKERS' COMPENSATION BENEFITS

New Hampshire Workers' Compensation Law is complicated. You may not be aware of all of the benefits to which you are entitled. What follows is intended only as a simplified summary of those benefits. For more complete information, contact the New Hampshire Department of Labor at 271-3176 or your attorney.

### WHAT IS WORKERS' COMPENSATION?

Workers' Compensation provides medical, disability and rehabilitation benefits for work related injuries, diseases and death. The illness or injury does not have to occur at work to be covered, but it must be work related. You are eligible even if the injury is your own fault because workers' compensation is a "no fault" system.

### WHAT WORKERS' COMPENSATION ARE AVAILABLE?

You may be entitled to one or more of the following:

#### Medical Benefits

The cost of medical, surgical and hospital treatment, physical therapy, prescription charges and other medical necessities, including mileage, are covered. You have the right to choose your own doctor. Your employer's insurance carrier may have you examined by the doctors of its choice. Your right to medical benefits lasts as long as you need medical services. There is no time limit on these benefits.

#### Weekly Disability Payments

If your injury or illness prevents you from working, you are entitled to weekly disability payments. The amount of these payments depends on your average weekly wage at the time of your injury and on the extent of your injury. If you are unable to return to work following your injury, you are entitled to tax free payments equal to 2/3rds of your average weekly wage. Your weekly payments may be less if you are only partially disabled. The payments stop when you are able to work. For most injured workers, the maximum number of weekly payments is limited to 341. Death benefits are available for families of workers who die as a result of work related injuries or disease.

#### Vocational Rehabilitation Benefits

If your work related injury prevents you from returning to the type of work for which you have training and experience, you may qualify for rehabilitation benefits. Depending on your work history, training and

other factors, vocational rehabilitation benefits may include job counseling, retraining and job placement. Rehabilitation plans must be approved by the New Hampshire Labor Board. Expenses for approved services, including tuition, travel and materials, are paid by the insurance carrier. During the period of rehabilitation, your weekly disability payments continue. Rehabilitation benefits end when you have been successfully placed at a job. There is a one year maximum time limit for most rehabilitation services.

#### Permanent Impairment Award

If your work related illness or injury results in a loss of use or function of certain body parts, you are entitled to a cash award. This award is in addition to any other benefits you receive. Covered body parts include: hands, arms, fingers, toes, feet, legs, eyes and ears. The amount of the cash award depends on the extent of loss of use and your average weekly wage. You are eligible for this award even if you have returned to work and are no longer receiving weekly disability payments.

#### HOW DO I FILE A CLAIM?

You must give your employer a completed notice of injury form to receive any workers' compensation benefits. All employers are required to have forms for you to complete. The Department of Labor has forms if you cannot obtain one from your employer. It is best to complete the form and give it to your employer as soon as you know of your illness or injury. However, you have up to two (2) years to file a claim.

#### CAN I SUE TO RECOVER MORE THAN WORKERS' COMPENSATION ALLOWS?

The law generally prohibits you from suing your employer for a work related injury. You may, however, be able to sue the manufacturer of a dangerous or defective machine that injures you. Or you may be able to sue someone other than your employer who caused your injury. To find out whether you can bring a personal injury claim for your injury, contact your attorney.

If you have any questions about workers' compensation benefits, contact the New Hampshire Labor Department or your attorney.

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for Ergonomics and at the Department of Occupational Health.

Due to the separate demands of the compensatory and legal systems for the generation of different kinds of information regarding one's functional capacity and the time frame in which one is allowed to generate same, a number of approaches have evolved and fall into the proceeding categories:

1. The two-hour physician evaluation:

This usually includes a physician's taking of history and physical and review of previous medical records with recommendation for traditional job category.

2. The two-hour evaluation by physician with the addition of other specialties with or without an extensive ergonomic assessment.

3. A three-day exam:

This evaluation would include psychophysical testing, ergonomic evaluation done on repetitive days, and some job simulation activity.

4. A two-week protocol of work hardening as presented by Matheson.<sup>18</sup>

5. A 4-6 week vocational assessment program, conducted on-site with careful measurement of all the varying parameters of the work situation (see Appendix for Work Opportunities Unlimited Program).

GENERAL CONSIDERATIONS:

Before we discuss the current systems of functional capacity evaluation, I think it is important to consider how the person on the other side of the desk feels about the approaching assessment. It is my contention that the most frightening experience for any organism is a loss of control of the environment and the events that shape their experience. An animal in this situation exhibits threatening behavior and is as likely to attack as to run. Bernie Recht, M.S., C.R.C., a rehabilitation counselor friend of mine, related that on a meeting with a new client to set up a functional capacity evaluation, he was greeted on the front porch with a shotgun.

In a study on personal injury litigation and pain reporting for chronic low back pain patients, Mendelson<sup>19</sup> found that both the litigant and non-litigant groups had "...significant elevations of mean depression, neuroticism, state anxiety, and trait anxiety scores when compared to the normal population."

Therefore, it is important to remember that the nature of the workman's compensation or personal injury situation, particularly under conditions of litigation, is an adversarial situation. In addition, it is a state causing the examinee to be disarmed and placed in a dependent state. In addition, his family and related support systems may also fail him at this time, causing a general breakdown in normal behavioral characteristics of the family creating a maladapted situation in which family life and routines are centered about the "illness/disability". The functional capacity assessment, particularly if it brings words of capacity for return to some sort of work, is viewed as an agent for removing the glue around which the family has organized.

It is easy to see why, in this situation, the evaluation team is often seen to be a tool of the darker side, threatening further decompensation of the patient's personality, termination of role, and redefinition of the individual's status. It is for these and other reasons that I believe that, in the long run, when the evaluation for functional capacity is part and parcel of the treatment program, it will become more effective in defining the true match between the worker with a new set of abilities and his new job. This will be true so long as objectivity can be maintained.

In a system where a local hospital or HMO has developed a network of industries and other occupational settings to which it provides total medical service, the functional capacity assessment simply becomes an extension of other services offered by the hospital program. These services include ergonomic definition of job description, preplacement assessment, employee job transfer evaluations for fitness, wellness and executive fitness programming, injury surveillance consultation programs, ergonomic reviews and updates, worker education, safety review consultation

for coordination of safety activities from the top of the organization through the bottom, treatment services for injured workers in a total and well-coordinated way. The functional capacity assessment then becomes part of the total program for achieving appropriate vocational change or work site redesign at the company with whom he is still employed. Medical review, therapeutic intervention and work conditioning (work hardening programs), using the patient's own job as evaluation and treatment site, seems much more likely to allow the functional capacity assessment to be seen as part of a goal-oriented process, and adapted to as an empowering and helpful tool to bring the injured worker back to the mainstream of life. This seems much preferable to the response of "You can or will go back to work and you must live with the pain...or, That's tough, you must take the custodial job or you'll lose your benefits".

At present, we may be quite a way from the integrated approach for evaluation, treatment, assessment and return to work, but I believe change is coming. I believe that the short term evaluation still has its place and should be reviewed from that perspective. This is true, notwithstanding the observation made by Beals<sup>2</sup> that state-supported evaluation centers are ineffective.

#### EXAMINATION TYPES (A REVIEW)

##### I. The Physician Evaluation:

Hiebert. T.G.<sup>20</sup> has established a protocol for the physician evaluation in which he divides the assessment into three categories. They are as follows:

###### Level 1: The Basic Physician Evaluation

"Currently, most physicians evaluate a disability claim with a one time office visit. Basic information about the claimant is collected by questionnaire or direct interview. A physical examination follows with emphasis on one or more of the claimant's specific loss of function. The findings then are reported to the requesting source. These reports, written as letters, are generally two pages long, but frequently are as short as a single page. The length and comprehensiveness of these reports is increasing as physicians seek to improve their skills and make the disability claims more a part of their medical practice.

###### Level 2: The Multi-Specialty Evaluation

In many instances, companies need more than medical reports to fully understand the worker's disability status. Other evaluators, such as psychologists,

social workers, vocational and rehabilitation specialists are asked for their input. These additional evaluations often alter the company's reliance on medical conclusions made by the examining physician. A relative examination is conducted in a facility where all of the various evaluating sources are available, along with those of the examining physician. All of the collected information is then compiled by the physician who alone is responsible for the final comprehensive report. Evaluation may involve several visits by the claimant, with ongoing follow-up by the examiner. Level 2 examinations may be needed less than Level 1 and require a multi-specialty facility with all of the usual medical and ancillary services. "

### Level 3: Work Capacity Measures

"Given the current emphasis on quantification of physical and mental capabilities with reference to work, facilities must often be available to support empirical measurement of work such as in worker compensation cases. The requirements of such facilities include:

1. Adequacy of testing equipment and protocols.
2. Certification of testing personnel.
3. Standardization of data processing and reporting.
4. Availability of specially trained physicians.

A Level 3 evaluation basically consists of a Level 2 work-up with the ergonomics (measure of work capacity) included. Quantification should be made available for both physical and mental requirements."

Dr. Hiebert goes on to describe the disability evaluation as it is conducted at the Work Fitness Clinics<sup>TM</sup>, as a "...job is analyzed and a test is designed to simulate the job requirements. The analysis identifies which of the three basic physiologic components - strength, flexibility, and/or endurance - is the limiting factor of the particular task. The testing process is then set up to analyze the capability of the worker given the primary physiologic function of the task. At the Work Fitness Clinics<sup>TM</sup>, the expertise in ergonomics also can provide analysis and consultation for safety programs, job modification, training sessions, incidence tabulation and risk management."

The most useful portions of this approach to functional capacity assessment are those that place control of the assessment under the doctor of medicine and allow for the inclusion of other data with involvement of information collected by other allied health and medical professionals, as well as promoting direct measurement of physiologic parameters that have direct application to the work situation as nearly as it can be determined under the examining situation.

### BROADER CONSIDERATIONS:

It should be kept in mind that the functional capacity assessment is only one parameter in a description of a whole cluster of components which comprise the individual defined here as the worker. In the area of vocational rehabilitation, the use of a Worker Trait Group Guide is often used and is based upon the requirements of the Dictionary of Occupational Titles, published by the United States Employment Service and Training Administration, United States Department of Labor.



The materials of the Worker Trait Group Guide adapt the structure and content of the DOT to assist occupational exploration. The assessment includes a manipulation of the following:

- A. Work activities
- B. Work situations
- C. Worker functions: data, people, things
- D. Physical demands
- E. Working conditions
- F. Attitudes
- G. General educational development
- H. Preparation and training

State vocational rehabilitation in New Hampshire utilizes an assessment profile which accounts for all of the parameters describing one's functional capacity from intellectual to daily living and physical capacity (see Appendix).

II. What I believe to be the coming standard for functional capacity assessment is the system developed and taught around the country by the Employment and Rehabilitation Institute of California. This company and formula for conducting a work capacity evaluation is the product of Leonard N. Matheson, Ph.D. He has developed an integrated approach which utilizes work activity which is closely monitored and goal-directed, and regularly reviewed and upgraded as the therapeutic approach for a physically hardened return to work.

Moreover, he has standardized the terminology of the functional capacity assessment. I would recommend the taking of his workshop course, if possible, and certainly the reading of the Work Capacity Evaluation manual, if you are interested in carrying on work in this field.

He begins by saying that the work capacity evaluation is "...a process of measuring an individual's capacity to dependably sustain performance in response to broadly defined work demands...and...to include the integral aspect of the process that has been heretofore unstated, work hardening."

He makes the argument that "...measurement and development are inextricably intertwined in work capacity evaluation. As the evaluatee enters the Work Capacity Evaluation program, he is evaluated in structured work simulation tasks which consider both his current work tolerance and his potential for work capacity. The evaluatee's work capacity is inferred from demonstrated work tolerance factors, given the assumption that the evaluatee will receive sufficient work hardening to allow his work capacity to be achieved. Structured work situation tasks are used for both the measurement and development of the evaluatee. These tasks involve the use of work capacity evaluation devices, a class of equipment that allows simulation of the work demands that are placed upon the evaluatee from a light level to a very demanding level. The "broad definition" of work demands begins with the environment within which the evaluation is conducted. Wherever possible, work capacity evaluation is conducted in a setting that simulates the real work setting. Demands placed on the evaluatee in terms of attendance, timeliness, production,

safety and interpersonal behavior simulate the demands found in the real work settings."

Dr. Matheson feels that the work capacity evaluation is a bridge between health care and business, between the hospital and the workplace, and between the person as a patient and the person as a worker.

A brief review of the systems for evaluation are presented in the Appendix to this course notebook.

Keith Blankenship, L.P.T., American Therapeutics, presents a work capacity evaluation program entitled Work Capacity Evaluation and Industrial Consultation.

In this context, he integrates much of Matheson's material and provides an interesting review of the application of Dr. Matheson's concept of symptom magnification. He describes symptom magnification as being an alternative to the term "malingerer". I am most happy to see this adjustment in semantics put forward as it permits "...new opportunities to understand the patient who is dominated by this syndrome and to establish effective rehabilitation goals."

Malingering is said to occur when the patient is pretending to be ill or incapacitated in order to escape duty or work. Mr. Blankenship points out that, because our definition of malingering combines a description of behavior with an imputed motivation, it is assumed that whenever we see this behavior, the motivation is what we have originally defined it to be.

On the other hand, symptom magnification syndrome provides a conceptual basis for working effectively with patients whose symptomatology cannot be readily explained on an organic basis. Symptom magnification syndrome definition allows us to separate the behavior from the motivation, differentiate classes of motivation, and select our intervention so that we can become much more effective.

Mr. Blankenship goes on to point out that an important consequence of the patient's display or report of symptoms is an effort to control his or her external environment. This control is a natural and usually adaptive consequence of the display or report of symptoms. In the psychological literature, this is referred to as the development of operant pain behaviors and could be researched under that category.

In either case, the symptom magnifier will eventually perceive the benefits from his symptom magnifying are being greater than its cost.

The symptom magnification syndrome is outlined by Mr. Blankenship on the basis of Dr. Matheson's work as follows:

Stage 1 (Experimenting)

- A. Experimenting with the use of symptoms to control other persons and events in his environment.
- B. The cost-benefit ratio must be easily modified.
  - 1. Avoidance of reinforcement
  - 2. Behavior modification
  - 3. Early identification of vocational needs

NOTE: In our assessments carried out at the Workplace Center at Portsmouth Hospital, the role of the vocational evaluator in assessment and establishment of vocational goals is one of the paramount considerations of the program.

Stage 2 (Settling In)

- A. Symptoms/benefits outweigh the costs
  - 1. Refuge
    - a. Escape unresolved conflict
    - b. Lost job
  - 2. Game player
    - a. Malinguerer trying to achieve an unattainable goal

It is difficult to distinguish between the various types or stages of malinguering but Type 2, according to Matheson, is more rare.

Stage 3 (locked into the Syndrome)

- A. The patient has taken on personal and social role of the patient.
- B. Most of what he accomplishes he views as the result of his symptoms.

The phenomenon of symptom magnification can be dealt with, as Matheson points out, by a work hardening program, by vocational planning and identified by the functional capacity assessment.

I have dealt with it in the past with the assistance of the physician and clinical psychologist, and with an active program of exercise activity that was goal-directed from a vocational point of view.

PARAMETERS OF THE FUNCTIONAL CAPACITY ASSESSMENT:

In the functional capacity assessment, we need to consider what physical measures we are undertaking. Many of these have been described for long periods of time under the category of work physiology. A good text to review these parameters of one's underlying physiology is that written by Per-Olaf Astrand<sup>21</sup>. While a faculty member at the University of New Hampshire in the Department of Physical Education in 1975, I received a request from the Chief of Police of the City of Dover, New Hampshire. He had just lost a lawsuit on the grounds of discrimination when he failed to hire a female applicant following her inadequate performance on their pre-employment basic physical capabilities screen. It was clear that what he needed was a program of age and sex adjusted norms for each of the parameters of one's functional capacity that were highly predictive of the work situation, but were collected in an objective and reproducible manner. Using standard data collected over many years in the field of Physical Education/Work Physiology, a profile was developed which provided an assessment as follows:

1.  $\dot{V}O_2$  (oxygen consumption)
2. Resting and exercise heart rates and blood pressures
3. Grip strength as indexed to whole body strength
4. Trunk flexibility
5. Body composition
6. Muscle endurance

STANDARD NORMS

Percentile Rankings	Heart Rate	Blood Press. Systol.	Diastol.	Oxygen Uptake	Trunk Flexion	Percent Fat	60-sec. sit-ups	Grip Strength
99	40	94	60	60.0	23	7.2	48	70
95	46	102	64	51.5	22	9.6		
90	50	110	70	47.5		11.6		
85	52	110	70	46.5	21	12.9	47	62
80	54	112	72	45.0		13.9	46	
75	56	116	75	43.8	20	15.3	45	
70	58	118	78	43.8		16.2	43	58
65	59	120	78	42.5	18	17.1	42	54
60	60	120	80	41.8	17	18.0	41	
55	62	120	80	41.0	16	19.1	40	50
50	63	121	80	39.1	15	20.1	39	
40	66	128	80	37.0	14	21.2	38	48
35	68	130	82	36.3		23.4	37	
30	70	130	84	35.6		25.4	36	
25	71	132	85	35.5	13	27.4	35	42
20	72	136	88	33.5		28.6	34	
15	76	140	90	32.5	12	30.5	33	38
10	80	140	90	31.5		32.8	30	34
5	88	150	100	29.0	11	38.0	20	
1	99	158	110	22.8		49.0	10	
					10		0	30

Men  
Age  
20-29

So successful was the implementation of this testing that it became incorporated as part of a merit pay system, as well as an integral part of the preplacement evaluation.

Today, a Dover Police Officer must take a yearly examination for merit pay which includes the six-parameter fitness assessment and, if he fails to meet the established norms of the department, then his merit increase is denied. If he fails to achieve fitness levels as prescribed on the second year, he is terminated from the force. This evaluation is conducted under the supervision of the department's consulting physician and decisions for merit increases, decreases or medical problems are done in concert and consultation with him by the Chief of Police. The measure of the program's success is clearly reflected by the substantial decrease in injury rates of all sorts, both cardiovascular and musculo-skeletal for that department. When I began doing functional capacity assessments some years ago, I carried over these parameters of fitness as part of that physical analysis determination profile.

#### FITNESS FOR WORK: A METHOD OF ANALYSIS

Boudri<sup>22</sup> described a condition which showed that 25% of top Dutch athletes had visual defects of which they were unaware. He gave the examples of some female hockey players from the team that won the Gold medal in the Los Angeles 1984 games where they played with visual defects of -1 to -2½. This essentially means that some of them could not even see the ball approaching, let alone play it effectively. He further pointed out that two of the best racing car drivers had poor vision and one first class football player seemed to "react predominantly to sound perception". What of McEnroe's biting sarcasm directed at linesmen? He asks, "Was their eyesight ever tested?" He further poses the question of the development of ergonomic tennis rackets being of little use if a player cannot see to hit the ball.

The neglect of the most important factor in the man-machine system, the optimal condition of man, is often left out of the equation for determination of work capacity in our assessments. Bouldri points out that "ergonomics is more than the optimization of work places and environment, of tools and machines, and of safety of workers; it means putting an optimally healthy person into an optimal working situation." It is this match that we seek to certify by measuring a person's functional capacity. Once the individual's optimal functional levels are defined, it allows us to make whatever rehabilitative engineering or ergonomic changes are necessary in the workplace so that an effective and permanent integration into the economy can obtain for the displaced employee.

#### THE ASSESSMENT

As pointed out earlier, an assessment team is necessary so that the many parameters of the individual are evaluated and pertinent information brought together for the physician to corollate following their conduct of the history and physical.

Players on our team include:

1. A vocational evaluator for performance of an initial and, if the patient stays in the program, in depth vocational evaluation.
2. The clinical psychologist for the evaluation of psychological factors and the degree of emotional component of pain.

Note: I have included a copy of a Low Back Pain Profile which I have found to be extremely effective and the literature supporting it is in the Appendix of this text.

It is known that stress has a negative effect on our auto-immune system and that sickness may impact an examinee's functional profile. Follick, Smith and Ahern<sup>23</sup> reported the impact of sickness as a global major disability in low back pain. Corson<sup>24</sup> developed four additional objective measurements including pain complaints, psomatic interventions, and impaired functioning and remaining positive aspects of function in an assessment of self-esteem to serve as an adjunct to the McGill Pain Questionnaire.

3. Occupational health nurse - as will be reviewed later, the occupational health nurse is the key external communicator and internal organizer of the Workplace Center in Portsmouth. She also carries on preplacement screening

for vision and hearing. This includes gross audiometric screen, screen for visual acuity, colorblindness, and depth perception.

4. Occupational Therapist carries on evaluations of dexterity, motor coordination, and conducts a review of work mechanics using work simulation tools and measurements of strength and endurance performing those activities as documented by the use of the BTE, Valpar, Perdue pegboard and other devices.
5. Physical Therapist participates in a program through strength measurement using the Cybex II with UBXT. They also make assessments of the neuromotor system in case of neuromotor dysfunction, but for cases of psychological or psychiatric problems and head injury, the psychologist and O.T. cooperate closely in that evaluation.
6. Kinesiotherapist - strength testing and functional capacity assessment and evaluation of the lumbar spine. It is in this setting that the ISTU is found to be a useful screen implement.

All of the equipment used in the functional capacity assessment is also used throughout the treatment protocol and is supplemented by traditional and non-traditional exercise activities.

It is my feeling that the treatment of the patient not only requires a coherent and agreed to philosophy directed by the supervising doctor of medicine but that data collected during the functional capacity assessment also be collected with a consistent philosophy and reasonably consistent protocol. Tomberlin<sup>25</sup> et al agrees with that point of view and puts forward a compilation of data collection forms used in the Student Health Center at the University of Wisconsin. I have included for your review an evaluation protocol utilized by Addison<sup>26</sup>.

Even though the physician has carried on the history and physical, I feel that the collection of the following data in the conduct of the functional capacity assessment is useful and I usually go through the evaluation collecting the data as I will outline it, and then summarize it in a one page cover letter.

Whenever possible, a job site evaluation is done. If the job site evaluation is not possible, then utilization of norms, particularly for strength, range of motion and frequency of motion are gained by past experience at various job descriptions which allow for a more concrete determination of functional capacity; that is, they serve as an index against which to compare the patient's functional capacity as collected.

I normally begin with the collection of data base, even though some of the same information is collected in other departments. The redundant collection of information is not always superfluous, but occasionally turns up pieces of history that do not get transmitted to the physician in another way.

Meeting with the referral source prior to the assessment is always extremely useful as more of the patient's background can be learned and the rationale for the assessment can also be better understood.

I think the following are useful data points to collect:

1. History of the current episode.
2. Related medical history including:
  - a. Issues of internal medical concern, neurologic concern or other related problems.
  - b. Cardiovascular problems, diabetes and so on.
  - c. Past history of surgeries.
  - d. "Old football injuries"
3. Discussion of chief complaint
4. Pain drawing and assessment
5. Review of discussion of chief complaint
6. Work history
7. Military history
8. Recreational sport activity
9. Social history
10. Posture
  - a. Height, weight, body composition
  - b. As relates to back evaluation - lower quarter, pelvis, SI, spine, trunk, cervical spine, glenohumeral joint, upper extremity.

Note: Not all reported but tested and reviewed.

11. Tissue inspection, e.g., marks, scars, rashes, coloring, and so on.
12. Pathology of posture of the spine.
13. Reaction to palpation.
14. Flexibility - standard assessment protocol
15. Passive mobility testing:

I do not engage in this except occasionally; it is normally done by the Physical Therapy Department when undertaken.

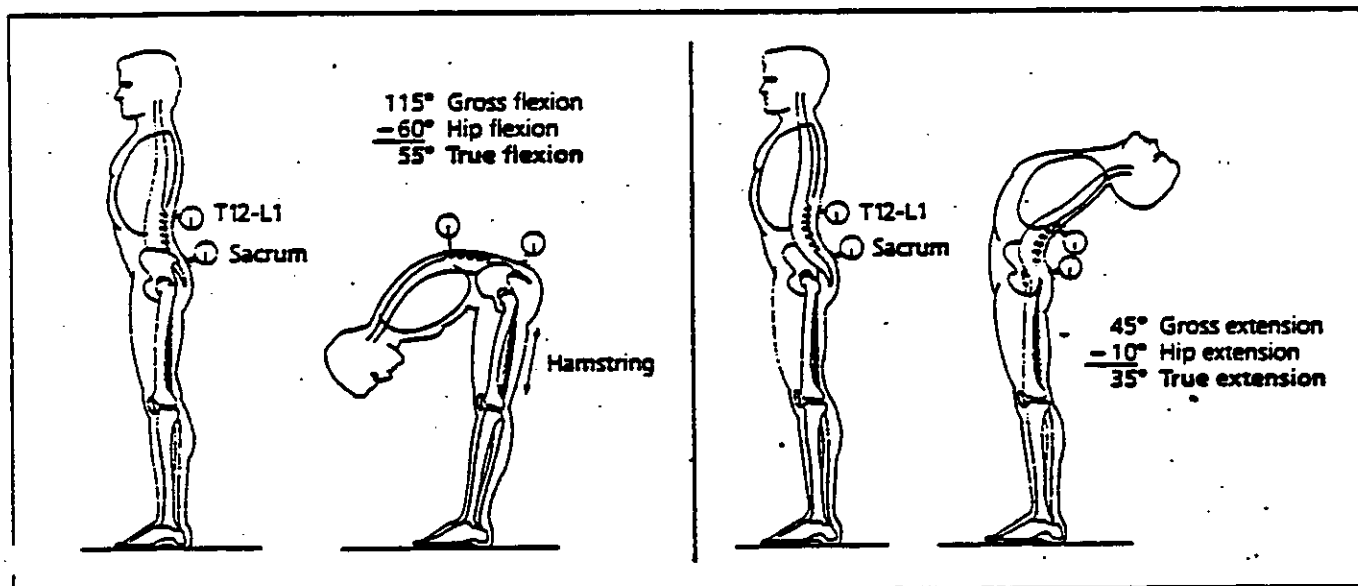


16. Gait analysis - walking, running.
17. Stantion and balance.
18. Gross neurologic assessment - muscle strength, DTR's, sensation (sensibility), girth.
19. Nerve tension signs (calf squeeze, bowstring, active SLR, Kernig test).
20. Assessment of underlying physiologic parameters
  1. O<sub>2</sub> uptake
  2. Abdominal and extensor muscle strength
  3. Chest expansion and Shober test for flexibility of spine
  4. Power grip
  5. Gross strength assessment, ISTU
21. Assessment of physical elemental activities
  1. Walking
  2. Stair climbing
  3. Balance
  4. Whole body range of motion
  5. Work simulation tasks, as indicated, using Valpar, BTE work simulator, or related activity which involves sitting, standing, crawling, using lower extremities, using upper extremities, lifting, carrying, pushing and pulling.

All of these data are collected, summarized and submitted to the physician.

He then chooses what he elects to place in the patient's report which is then forwarded to the referral source.

Mayer<sup>27</sup> uses essentially the same evaluation except that he includes the use of "inclinometers" to measure sagittal and coronal movement of the spine. The method for same is described therein



Illustrations by Frank Kardas

Figure 1—To assess spinal range of motion, determine how much of the patient's total range of motion is due to movement at the hips. The solution is to use two inclinometers, one over the sacrum, and the other at T12-L1 bridging the spinous processes. When the hip flexion determined by readings on the lower inclinometer is subtracted

from the "gross flexion" (shown by the upper inclinometer), you can determine the inclination through which T12-S1 moved (the true lumbar flexion). To determine true lumbar extension, ask the patient to repeat the procedure in the hyperextended position. The examples indicate degree of flexion and extension can be had by using

No matter how good the assessment, I do not believe that it is as clear-cut as that provided for the cardiac patient.

In the cardiopulmonary system, a measurement can be taken and a clear determination of dysfunction made. In the case of musculo-skeletal injury, particularly those involving the soft tissues, prediction for one's capacity to do 8 hours is still speculation and that is why I believe that, in the long run, the Matheson approach or the in-house work hardening programs will prevail as the most efficacious way of carrying on a functional capacity assessment.

The lion's share of this section of the presentation was prepared for me by Lindi Moreau, B.S., R.N.

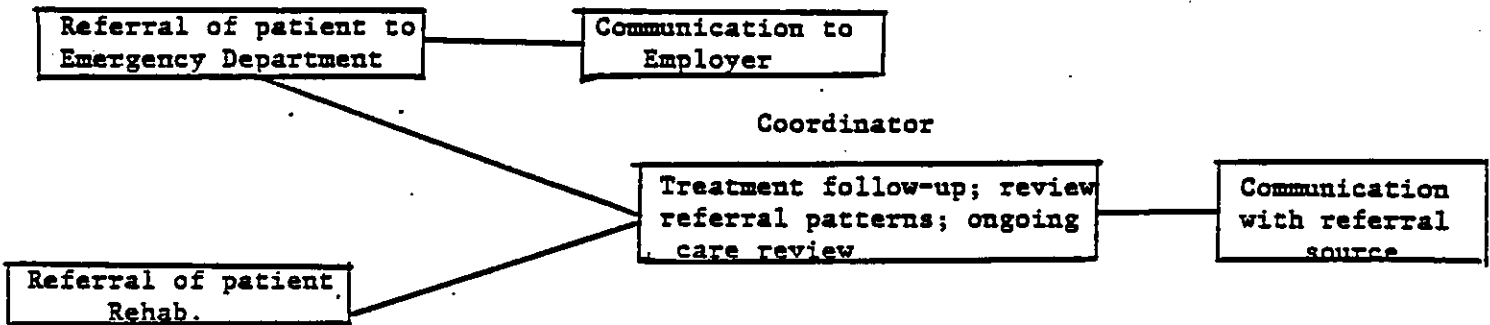
I have taken the opportunity to go forward with a description of integrated care as I believe that this sort of system will eventually replace the "quick and dirty" IME as a method of determining functional capacity for the injured worker.

As you review this section, keep in mind that it is designed to cover all Occupational Care Services.

SCOPE OF THE PROGRAM:

The initial program was developed by John Shearman, M.D. and the Workplace Center was meant to be the cornerstone around which the remainder of all outpatient medical services were to be developed. This included programs like Sports Medicine and specific activities for the "orphan" groups (MS, MD, neurodevelopmental dysfunctioned children, and so on).

ALGORITHM OF TREATMENT:



I think it is interesting that her initial comment shows communication to the referral source as the first step following admission of the patient to the Emergency Department. It is this communication that is key throughout the entire treatment process.

Patient follow-up, continuous communication with the referral source and pre-placement/periodic testing are the fundamental components of The Workplace Center. Physicians' and clinicians' familiarity with The Workplace Center is also essential for success.

**1. Patient follow-up:**

When a patient is initially seen with a work-related condition, either through the Emergency Department or through the Rehabilitation Services Division, they enter an interdisciplinary algorithm of care. Throughout treatment at the facility, the patient must be closely followed to insure prompt diagnosis, evaluation, treatment and disposition. This may be done by physician review, case manager, or occupational coordinator (the role of the occupational health nurse).

**2. Continuous communication with referral source:**

A liason must be established between the referral sources and The Workplace Center to carry on continuous communication pertaining to the patient's treatment, progress, exam, evaluation and prognosis. This link could be an invaluable aid in assisting the patient to return to work as soon as possible, as well as to promote a firm working rapport with the referral source (employer, insurance company, lawyer, Department of Labor, local M.D. and so on).

**3. Preplacement/periodic testing:**

A fundamental component to the success and safety of any health and safety program. The Workplace Center must provide all necessary elements for comprehensive testing, screening of new employees. A preplacement exam is important to the success of any employer in his effort to maintain a healthy and safe workplace for his employees. Preventive testing/screening, leading to early diagnosis and treatment assists in reducing workman's comp costs and improving health but, more importantly, it helps to determine those individuals who may not be physically or otherwise capable of performing their assigned job tasks. Incorporating objective data into the preplacement assessment is essential and can guide the personnel department of the industry in making appropriate hiring decisions that match job requirements to physical capability.

Maintaining the health and safety of the employee is equally important and beneficial. Periodic screening can assist in insuring the employer that the work force is maintaining or improving its physical/mental well being. The Workplace

Center must be able to provide the services and education necessary to implement and maintain an ongoing program designed for the specific needs of a company.

4. Physicians' and clinicians' familiarity with work site:

To promote a better understanding of the workplace, job site tours should be performed including representatives from all departments potentially treating work-related injuries and illnesses.

This information must be communicated to other members of the therapeutic department in order to be an effective aid in patient treatment and return to work.

Pertinent information gathered about the workplace must be communicated to treating physicians and clinicians, even if the job site review is not performed. Personnel treating workplace injured/ill patients must be aware of the following:

- a. Potential exposures at the work site, i.e., chemicals, dust, heavy lifting, and so on.
- b. Working conditions at the work site (poor illumination, cold environment, type of businesses and types of machines used).
- c. Common injuries and illnesses through loss review analysis.
- d. If modified work can be provided by the employer, what kind of work circumstances.
- e. Hours, workday schedules, incentive work, work rules, shift work, weekend work and so on.
- f. Types of health and safety programs available.

Note: Are Worker's Compensation costs made part of the department's everyday cost center?

Interdisciplinary means more than having a multitude of services and programs within a single organization or under one umbrella. Without continuous communication between departments, fragmented services are surely to be the result.

Each department must be kept abreast of services available throughout and across all areas of the hospital organization but, even more important, once a patient referral is made, there must be a network devised providing follow-up information to the referral source. Continuity of care, as well as appropriateness and quality of service, can be monitored through this network.

Interdisciplinary programming assumes that a group of united therapists are working toward the same goal under the same umbrella of philosophy with continuous communication among themselves and other parts of the institution.

In developing a network of this nature, it is vital to the success of the program to immediately establish a chart of the goals and objectives of the program.

Educating physicians and hospital staff will minimize misunderstandings amongst those whose support will be an important link in the treatment and referral network.

One must make an assessment of the program's services and practices that the occupational medicine center may have an impact on, whether that impact be of a positive or negative sense, and the coordinator must be sensitive to the concerns of other groups, particularly physicians who feel that work-related injured patients are referred into the clinic and never seen again can be shown that utilization of their services will increase with the utilization of The Workplace Center.

**ROLE OF THE OCCUPATIONAL HEALTH NURSE ON A DAY TO DAY BASIS**

Whether the referral to the Occupational Medicine Clinic comes from the Emergency Room, operating room, local physician, employer, attorney, Department of Labor or wherever, it enters a network designed to meet the goals and objectives of the occupational care clinic. This network of services should:

1. Monitor that patient throughout the treatment and provide communication to the referral source.
2. Review the referral pattern on a regular basis.
3. Review appropriateness of care and treatment, ultimately to insure continuity and quality of care.

4. The occupational health nurse should act as a liason between the hospital and the referral source, not only to return the patient to productive capacity as soon as possible but to monitor consumer satisfaction.

The patient (work-related injury/illness) is entered into the system upon admission through either the Emergency Room or Rehabilitation Center. Our occupational health nurse feels it is necessary to mention the importance of the central medical record system within The Workplace Center. It is imperative that all information regarding the patient is maintained in one file to facilitate patient care, review and follow-up.

#### USE OF THE NETWORK:

As in any other service or business, marketing and sales is a key element of the success of the program. In order to serve the needs of the consumer, the occupational health nurse must first establish who the consumer is by collecting demographic information as well as to review the demands and needs of the consumer solicited. Much of this information can be obtained through survey, but one does not get a true picture as many industries will not return their survey information. Using state agencies can provide reliable statistics, i.e., types of employers, demographic information of employees, percentages of unemployment, numbers and types of work-related injuries/illnesses. These sources include the State Safety Council, Department of Employment Security, Department of Labor and so on. Once the demands and needs have been identified and evaluated, and a program is in place, you must sell the program. Many networks are available to assist in marketing the services offered through The Workplace Center. Some of these include the State Safety Council, Occupational Nurses Association, labor organizations, Bar Association, State Department of Labor, community physicians' groups. If the program is to be successful, one needs to "spread the word". Design your brochures so that they are easily understood by anyone reading them. It is important that you do not sit back and rely on "a good product selling itself through word of mouth." Competition in the health care field has become fierce,

and the competition is always around the corner selling their "better product." Marketing and sales is an ongoing program and is the role of the occupational health nurse in her day to day work. A cardinal rule with respect to marketing services is to be absolutely certain that you can provide and maintain whatever you are selling.

Attending community meetings, rotary, Kiwanis, men's and women's professional groups, businesses after hours, safety council meetings, etc. also means marketing. Always bring business cards when attending a meeting of any type. The Department of Labor in your particular state must be aware of the program and services you offer, but more importantly, must understand what they are and how they benefit the injured employee and the employer. The Department of Labor is used as a resource by a majority of companies over any given state and provides them with all sorts of information and services available to them in their area. The Department of Labor also makes recommendations for injured workers for any number of reasons including independent medical evaluations, disability evaluations, vocational rehabilitation referrals, activity therapies including Physical, Occupational, and Corrective Therapies, and referral to chronic pain management programs if necessary.

They review a high percentage of workers' compensation cases and consider the outcomes achieved through various protocols of treatment. Attorneys, physicians, all insurance companies handling workers' compensation for the state, employees, vocational rehabilitation counselors, occupational nurses, safety specialists, personnel managers and so on at one time or another have contact with the State Department of Labor. Having them be aware of the programs and services offered through The Workplace Center is important in many aspects of health care and marketing. Another useful tool for marketing and sales is mass mailing to specific target groups. Define specific potential users of your programs and services and categorize them in groups. Lawyers, community physicians, employees having used services in the past, new companies in the area and so on.



Then you need to prioritize who may be the most important contacts for you to make. A letter specifically outlining those programs and services you may offer, which would be of particular interest to specific groups, must be designed and must accompany any literature sent to them. A packet specific to each group will be necessary.

Don't overlook the importance of educating your community physicians, as they represent a large portion of your referral base.

Serving as a liason between the Workplace Center and referral sources provides a perfect opportunity for marketing and sales. While providing information for them regarding a patient's status and follow-up, you can also begin to talk over some of their potential needs and how available services and programs can assist them in reducing their costs. This is a way of introducing new programs into the work site.

The occupational health nurse can be an invaluable aid in designing a work site oriented clinic if he or she has been out in the field and is aware of the needs of other health and safety professionals.

#### ERGONOMIC REVIEW:

As prevention serves a better purpose than treatment after injury, the efficient design of the workplace is of paramount importance. At The Workplace Center in Portsmouth, we have structured a relationship with the Department of Biomedical Engineering at the University of New Hampshire. We have access to the sophisticated facilities of all scientific laboratories at the University for the purpose of developing projects in rehabilitation engineering, pure research and creative property, and providing ergonomic assessment opportunities for local businesses through contracts with the Workplace Center. There are a number of books on ergonomics that are useful. One primer I found particularly helpful was "Industrial Ergonomics - A Practitioner's Guide", by Donald C. Alexander and Babur Mustafa Pulat, published the the Industrial Engineering and Management Press, 1985.

There is also a brochure designed by Dr. Donald B. Chaffin and Dr. Thomas J. Armstrong at the Center for Ergonomics, University of Michigan, Ann Arbor, Michigan and is available through the Travelers Insurance Company. The text provides a survey of occupational ergonomics as it relates to the most commonly seen work-related problems.

I hope that the material presented in this session has been useful to you so that your conduct of a functional capacity assessment may provide for a universal improvement in the quality of care provided the injured worker in our society.

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