The Management of Work-Related Back Pain

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Key Words: back injury • services, occupational therapy • work hardening

This paper describes the Spinal Treatment Program at Columbia Hospital in Milwaukee. The primary goal of the program is to efficiently return the employee with a work-related back injury to the work setting. The two-phase program has been developed to provide treatment of acute injury, patient education, work hardening, and an assessment of the patient’s ability to perform job tasks. Preliminary evaluative data are presented for patients treated from 1982 to 1984. The patient’s discharge status (returned or did not return to work) was examined as a function of sex, age, educational level, employment category, duration of pain, or worker’s compensation status. Results indicated that discharge status was significantly related to sex, employment category, duration of pain, and worker’s compensation status.

A review of statistics from the State of Wisconsin, Department of Industry, Labor, and Human Relations (1983) reveals a high incidence and the high costs of work-related back injuries. In 1982 back injuries represented 27.3% of all industrial injuries, and 40% of these occurred in manufacturing. The average total medical benefit cost for each of the 10,697 cases reported in 1980 was $2,128—a total of $22,763,216 in compensation. The amount of compensation paid to injured workers in Wisconsin has increased over a 40-year period. In 1940 only 3.8% of Wisconsin workers with work-related back injuries received permanent partial disability whereas in 1981 the figure rose to 15.3%. Nationally, low-back injuries are the most frequently occurring work-related injuries, far exceeding others in number and cost (Grabias & Mankin, 1979–80).

The Spinal Treatment Program (STP) at Columbia Hospital in Milwaukee was developed in 1978 as a response to an increase in employees’ work-related back injuries and the subsequent worker’s compensation costs. The primary goal of the two-phase program operated by the Physical Medicine and Rehabilitation Department is to return the patient to the work setting in an efficient manner. The program is based on the concept that early intervention, an appropriate diagnosis, the education of the patient, and a determination of impairment are critical factors in returning the employee to work (American Medical Association, 1984; Meenan, Liang, & Hadler, 1983). What was started as a hospital employee program is now a program serving industry in southeastern Wisconsin, accepting referrals from any Wisconsin-licensed physician. This paper describes the STP.

Admission Process

Referrals to the STP come from a variety of sources, including physicians, insurance companies, employees, rehabilitation insurance nurses, and the patients themselves. The referring physician assumes responsibility for writing therapy orders and monitoring the patient’s progress. Physicians affiliated with the program can conduct a thorough spinal evaluation, determine the need for therapy, and provide follow-up if employers, insurance representatives, physicians, or patients prefer this approach. In addition to the primary referring physicians, medical specialists are available to provide consultations in physiatry, orthopedic surgery, neurology, neurosurgery, rheumatology, and psychiatry.

Careful assessment and diagnosis precede program admission, the minimum criteria being a thorough musculoskeletal evaluation and radiographic studies. The physician’s prescription for admission includes a diagnosis, the patient’s physical limitations, and a treatment plan. A patient is considered...
an appropriate candidate for the program if his or her diagnosis includes a recognized back pathology and/or disabling spinal pain.

Overview of the Two-Phase STP

The two-phase program involves the disciplines of medicine, occupational therapy, and physical therapy. Patients may enter at either phase, participate in a single phase, or progress sequentially from phase to phase.

The primary emphasis of Phase 1 is patient education with a secondary emphasis on acute treatment. Phase 1 lasts for 5 days or less, and the length of each treatment session depends on the treatment components prescribed. At the end of 5 days, the patient is reevaluated by the referring physician. If the physician, patient, and therapists agree, Phase 1 is extended up to 5 more days at which time the patient is again evaluated. This process assures ongoing accountability by the treatment team. The elements of the treatment program in Phase 1 are determined by the referring physician with input from the therapists.

Phase 1 patients may be either inpatients or outpatients; most are the latter. Their work status is varied. Those who are unable to work because of injury or disability receive acute treatment, an individualized exercise program, and instruction in back protection emphasizing job demands. Some patients are too acutely injured to tolerate Phase 2 treatment, therefore they use Phase 1 to prepare for Phase 2. Other patients continue to work while participating in Phase 1. This group consists of those who are at risk for more serious injury if they continue to practice improper body mechanics on the job. The goal of Phase 1 is to prevent further injury and reduce health care costs through education.

Phase 2 lasts for 2 weeks and is conducted for 40 hours per week, with treatment time divided between occupational therapy and physical therapy. The major goals of Phase 2 are to determine a patient's impairment in relation to his or her job and social roles and to return the patient to the work setting. When a patient cannot return to work, residual functional capacity is determined to provide a basis for further vocational assessment.

Evaluation

All patients entering the STP in either phase undergo occupational therapy and physical therapy evaluations. The initial occupational therapy interview focuses on a history of injury, the nature of previous medical intervention, and perceived benefits of previous treatments. A preliminary job evaluation is conducted to determine the demands of a typical workday. Information gathered might include time spent sitting and standing, type of lifting required—heavy or light, repetitive or occasional; level of job satisfaction; and history of absences or illness (A Guide to Job Analysis, 1982; Lytel & Botterbusch, 1981). This job description is then compared with the job description found in the Dictionary of Occupational Titles (U.S. Department of Labor, 1977, Robinson, 1979). Later, the patient's employer is contacted to gain additional insight into the requirements of the job.

The patient's activities-of-daily-living status is reviewed. Of interest are those behaviors that have developed as a result of the back injury, for example, an inability to sleep through the night or excessive sleeping, awakening with pain, reliance on medication or alcohol, or decreased participation in leisure activities (Fordyce, 1976). This information is helpful in identifying potential concerns such as depression, addiction, or other displacement reactions.

In addition, patients are questioned regarding their educational level, eligibility for worker's compensation, involvement in litigation, and family history of industrial injuries. They also subjectively rate their pain using a scale of 1 to 10 (Caruso & Chan, 1986). The components of the initial interview are similar for Phase 1 and Phase 2; however, the information gathered for Phase 2 is more extensive, particularly in the area of job performance. The patient's ability to perform job tasks is assessed and quantified through the use of work capacity evaluation devices (Matheson, 1984; Valpar Component Work Sample Manual, 1974; Work Evaluation Systems Technology, 1983).

The physical therapy evaluation also contains a general history, and both therapists are alerted to the possibility of discrepancies. The patient's patterns of movement and gait are observed, and pain behaviors such as bracing are noted. Other components include a musculoskeletal evaluation, palpation of muscles, assessment of mobility, measurement of strength, and determination of possible leg length discrepancy (Saunders, 1985). Additional quantitative assessments can be performed on an isokinetic testing device.

Phase 1 Treatment

In addition to the components prescribed by the physician, Phase 1 may include treatments recommended by the occupational therapist and physical therapist after their initial evaluations. The occupational therapist emphasizes instruction in the principles of back protection and their application to work and home environments. Job task simulation is provided to patients preparing to return to work so that they can practice in a supervised setting using proper body mechanics. The physical therapist also provides patient education emphasizing a review of anatomy of the spine and reinforcing principles of back protection. In addition, the physical therapist develops
Phase 2 Treatment

Phase 2 treatment components are determined by the therapists after their initial evaluations. The physician may provide guidelines concerning these components, such as mobility limitations, traction precautions, or length of treatment day.

A requirement of Phase 2 is a job evaluation conducted by the occupational therapist (Holmes, 1985). This information is used to individualize instruction in back protection and simulate work demands. Although most information can be obtained from the patient, the patient’s employer can provide further information about the requirements of the job or about the potential for alternate work sites. An on-site evaluation provides the needed information for work simulation when the therapist is unfamiliar with the job and when a modification of the work environment or an alternate job site is being considered. When frequent injuries occur in a specific work area, an on-site job evaluation may be conducted at the request of the employer or insurance representative for recommendations regarding modifications of the work site or employee training programs.

Once the patient’s job has been analyzed and the job tasks determined, a work hardening program is designed (Matheson, 1983; Matheson, Ogden, Vi- olette, & Schultz, 1985). The patient’s 8-hour treatment day is highly structured so that throughout it job tasks such as lifting, carrying, climbing, reaching, and sitting are simulated. Phase 2 treatment begins at a level compatible with the patient’s current functional status and progresses over the 2-week period. Work capacity evaluation devices are used to simulate work demands and enhance physical conditioning (Matheson, Matheson et al.). Throughout Phase 2 careful attention is given to the application of proper body mechanics. By the completion of the 2-week period the work hardening program simulates the patient’s workday.

Back protection principles are taught to every Phase 2 patient. Teaching methods are varied depending on the patient’s background, educational level, or previous exposure to patient education (Robinson, 1980). Audiovisual materials supplement individual and small-group instruction (American Hospital Association, 1979). The principles taught are always applied to the patient’s physical job demands.

An exercise program is designed by both the occupational therapist and physical therapist to meet a patient’s specific needs. For example, to enable a patient to lift properly, the upper and lower extremities are strengthened through power building exercises (Basmajian, 1978).

Relaxation training for stress and pain management is an integral part of Phase 2 because many patients have chronic or recurring pain. Patients are taught to use imagery to distract themselves from their perception of pain and thereby enhance their ability to participate in daily activities (Davis, McKay, & Eshelman, 1981; McKay, Davis, & Fanning, 1981). To help patients move without bracing or other pain behaviors, gentle movement or limbering exercises are incorporated into the relaxation program. All patients participate in a variety of relaxation exercises. Daily sessions of 30 to 45 minutes combined with audiotaped home programs allow ample opportunity for the reinforcement of relaxation techniques. To provide the patient with immediate feedback on the ability to decrease muscle tension, electromyogram (EMG) monitoring is used.

Of the many physical therapy modalities the most commonly used in Phase 2 is the therapeutic pool (Duffield, 1976). A patient with increased pain may receive other thermic modalities such as ultrasound treatment or hot packs.

Termination of Program

The decision to terminate the STP is made jointly by the patient, the physician, and the therapists. At completion of the STP, it may be determined that the patient is able to return to work. For those patients who continue to work while participating in the STP, termination is appropriate when the educational goals have been met and symptoms have diminished. In other cases, termination occurs when maximum benefit has been obtained and the patient’s residual functional capacity has been determined. For example, a patient with a rheumatic disease and spinal involvement may be given a permanent restriction on lifting, which may prevent him or her from returning to the previous job. In such a case alternate job sites are considered or a referral is made to vocational rehabilitation.

Documentation

Information obtained by the occupational therapist and physical therapist is reported in initial and discharge summaries. Because this information is shared not only with the referring physician, but also, on occasion, with other nonmedical personnel such as insurance claim adjusters, employers, and safety directors, medical jargon is avoided (Overs, 1964; Vocational Evaluation, 1977). Functional and work-oriented documentation is more likely to enable all concerned parties to make appropriate decisions about the patient’s ability to return to work.
Initial evaluations include the patient's current activity level, physical status, work requirements, and subjective assessment of pain. Treatment goals aimed at decreasing symptoms, improving work capacity, and increasing the patient's knowledge about body mechanics are documented.

The discharge summary documents the progress of the patient in accomplishing the treatment goals. A final report indicates the patient's residual function in accomplishing the treatment goals. It concludes with a recommendation regarding the patient's ability to return to work.

**Preliminary Data on the STP**

Evaluative data on the STP have been collected from 1982 to 1984, a 3-year period during which a total of 489 patients were referred. However, the data on 294 of these referrals were not examined further because the return-to-work criterion was not appropriate, that is, patients were unemployed, homemakers, or program dropouts. Information was collected on the patient's sex, age, educational level, diagnosis, previous spinal surgery, employment category, duration of pain, eligibility for worker's compensation, and involvement in litigation.

The remaining 195 referrals consisted of 100 male and 95 female patients, all previously employed, with a mean age of 39.63 years. According to their discharge status, 135 (71.05%) patients returned to work whereas 60 (29.95%) did not. This result was significant ($\chi^2 = 28.84, df = 1, p < .001$). This rate of return is consistent with the natural recovery process of low back pain (Grabias & Mankin, 1979–80). The mean age for the group that returned to work was 40.16 years, and it was 38.43 years for the group that did not return to work.

The conditions diagnosed in the majority of the 195 patients were lumbar sprain/strain or lumbar sacral radiculitis. This was the diagnosis in 100 of the 195 patients (51%) who returned to work and 95 (49%) who did not. This result was significant ($\chi^2 = 28.84, df = 1, p < .001$). The rate of return is consistent with the natural recovery process of low back pain (Grabias & Mankin, 1979–80). The mean age for the group that returned to work was 40.16 years, and it was 38.43 years for the group that did not return to work.

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Only six patients (3.07%) in this 3-year period were involved in back injury-related litigation. Although data are incomplete on the 1981 referrals to the STP, similar consistent trends appear. For example, of the 87 patients referred, 42 had injuries related to work whereas 35 (29.95%) did not. This result was significant ($\chi^2 = 14.93, df = 2, p < .001$). The age range was 19–65 years, and it was 51 years for the group that did not return to work.

Table 1 presents frequency data on patients in various categories as a function of discharge status. Chi-squares were performed to determine any significant relationships existing between discharge status and sex, age, educational level, employment category, duration of pain, or worker's compensation status.

<table>
<thead>
<tr>
<th>Discharge Status</th>
<th>Returned to Work ($n = 135$)</th>
<th>Did Not Return to Work ($n = 60$)</th>
<th>Total ($n = 195$)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>62</td>
<td>38</td>
<td>100</td>
</tr>
<tr>
<td>Female</td>
<td>73</td>
<td>22</td>
<td>95</td>
</tr>
<tr>
<td>($\chi^2 = 5.07, df = 1, p &lt; .05$)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19–29</td>
<td>34</td>
<td>15</td>
<td>49</td>
</tr>
<tr>
<td>30–39</td>
<td>36</td>
<td>21</td>
<td>57</td>
</tr>
<tr>
<td>40–49</td>
<td>27</td>
<td>10</td>
<td>37</td>
</tr>
<tr>
<td>50–59</td>
<td>26</td>
<td>12</td>
<td>38</td>
</tr>
<tr>
<td>60–69</td>
<td>12</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>($\chi^2 = 3.00, df = 4, p &lt; .70$)</td>
<td></td>
<td></td>
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<tr>
<td><strong>Educational level</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;High School</td>
<td>9</td>
<td>12</td>
<td>21</td>
</tr>
<tr>
<td>High School</td>
<td>48</td>
<td>19</td>
<td>67</td>
</tr>
<tr>
<td>College</td>
<td>54</td>
<td>22</td>
<td>76</td>
</tr>
<tr>
<td>Graduate School</td>
<td>12</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>Unknown</td>
<td>12</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>($\chi^2 = 8.23, df = 4, p &lt; .10$)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Duration of pain (weeks)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;26</td>
<td>72</td>
<td>11</td>
<td>83</td>
</tr>
<tr>
<td>26–52</td>
<td>37</td>
<td>19</td>
<td>56</td>
</tr>
<tr>
<td>&gt;52</td>
<td>22</td>
<td>17</td>
<td>39</td>
</tr>
<tr>
<td>($\chi^2 = 31.87, df = 3, p &lt; .001$)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Worker's compensation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>67</td>
<td>43</td>
<td>110</td>
</tr>
<tr>
<td>No</td>
<td>68</td>
<td>17</td>
<td>85</td>
</tr>
<tr>
<td>($\chi^2 = 7.63, df = 1, p &lt; .01$)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Physical demands of employment category</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sedentary to Light</td>
<td>54</td>
<td>10</td>
<td>44</td>
</tr>
<tr>
<td>Medium</td>
<td>53</td>
<td>11</td>
<td>64</td>
</tr>
<tr>
<td>Heavy</td>
<td>48</td>
<td>39</td>
<td>87</td>
</tr>
<tr>
<td>($\chi^2 = 14.93, df = 2, p &lt; .001$)</td>
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</tr>
</tbody>
</table>

There was a significant relationship between discharge status (returning/not returning to work) and sex; 76% of the female patients compared with 62% of the male patients returned to work. In addition, 27 of the 36 male patients (75%) who did not return to work had jobs with heavy physical demands. Neither age nor educational level related significantly to discharge status.

The relationship between employment categories and discharge status was also examined. Employment categories were classified according to three levels of physical demands (U.S. Department of Labor, 1977; Matheson, 1984). Professional and clerical jobs, as well as being a student, were classified
as employment with *sedentary/light* physical demands; the jobs of waitress, salesperson, nurse, nurse's aide, X-ray technician, hospital worker, and housekeeper were classified as employment with *medium* physical demands; and the jobs of factory worker, police officer, firefigher, and truck or bus driver were classified as employment with *heavy* physical demands. Patients in all three categories returned to work. A significant number of those who did not return to work (39 or 65%) were in occupations with heavy physical demands (i.e., the occupations of factory worker, police officer, firefigher, and truck or bus driver). A chi-square performed on these data indicated a significant relationship between the physical demands of the employment and the discharge status (see Table 1).

Other results in Table 1 indicate that a significant number of patients not returning to work (43 or 71.6%) were also collecting worker's compensation. Thirty-three of these patients (76.7%) were in employment categories with heavy physical demands. A further analysis of these 33 patients (27 male and 5 female patients) indicated no significant differences in the duration of their pain.

Chi-square results also suggested that the shorter duration of pain experienced by previously employed patients (i.e., less than 4 weeks and 4 to 26 weeks) tended to be significantly related to their return to work. The data also indicated that the duration of pain did not significantly relate to sex, age group, or employment category.

Overall, the data collected during this 3-year period suggests that the STP was effective with both male and female patients of various ages, educational levels, worker's compensation status, and employment categories. Although the program was effective with both sexes, the higher return-to-work rate for women may have been due to their less physically demanding jobs. Difficulty in returning to heavy work may be due to both the physical demands and the inflexibility of the job. Persons in professional or clerical jobs may have less difficulty in modifying such job tasks as lifting, carrying, sitting, or walking than people in heavy, physically demanding, or assembly line jobs. The patient receiving worker's compensation is less likely to return to work. This may be the result of secondary gains received from the compensation. The final variable that was significant in return to work was the duration of pain. It appears that the sooner the individual receives appropriate medical care the faster the recovery and the less likely the development of chronic pain and interest in secondary gains. Persons having the greatest difficulty returning to work were male patients whose previous employment required heavy physical demands and who were receiving worker's compensation.

Postdischarge follow-up data on these patients would be helpful in determining how long the patient continued to work. Data could be collected on the relationship between marital and family situation and return-to-work status. In addition, the patients' own assessment of their progress in the STP in relation to productivity and symptom control would be of interest.

**Program Expansion**

By the end of 1983 the STP had expanded to its maximum capacity of 200 patients per year. Further program expansion was explored through a marketing study conducted with the assistance of a consulting firm. The study sought to determine the following: (a) the frequency of industrial back injuries; (b) the costs associated with these injuries; (c) the companies currently dealing with back injuries; and (d) the reactions of a variety of persons, such as personnel directors and industrial nurses, to the STP. Data research and target audience interviews strongly supported program expansion.

After the marketing study had been done, a business plan was completed to provide a structured analysis of all variables. The plan included a program statement, an environmental analysis, a market analysis, a delineation of required resources, an administrative report, a financial analysis, and an implementation plan. A careful review of the marketing study and the proposed business plan led the executive staff of Columbia Hospital to support the expansion of the STP. The expansion included the construction of a state-of-the-art facility, additional physician support, and advanced training for therapists.

**Summary**

This paper described a two-phase spinal treatment program aimed at providing work-related interventions for the purpose of assessing the patient's residual functional capacity and returning the patient to work. Data on a 3-year period of the program revealed that 71.05% of previously employed patients returned to work at discharge and that discharge status was significantly related to the patient's sex, employment category, duration of pain, and worker's compensation status. Since the information presented represents a population of southeastern Wisconsin only, it may differ from populations in other areas because of differences in the types of industry and in worker's compensation laws.

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