

Back Pain: Treatment and Prevention In a Community Hospital

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ABSTRACT

Because back pain is a widespread and costly condition that tends to recur, treatment must focus on both the amelioration of acute symptoms and prevention over the long term. This paper reports a longitudinal evaluation of a program from a community hospital that emphasizes both these aspects. One hundred twenty patients routinely admitted to this program were randomly assigned to treatment and control groups. These groups were assessed for differences in demonstrated physical strength, mobility, body mechanics, and self-care knowledge, and in levels of self-reported exercise, anxiety, and pain. There were significant immediate gains on physical measures of fitness and in observed body mechanics; patients also reported significant gains in physical capabilities at home and in leisure activities. Self-care knowledge also improved. When assessed one year later, original gains in physical strength and mobility were being maintained, and self-reported physical capabilities also remained high. Although demonstrated knowledge of correct body mechanics declined over this period, it was still significantly greater than before the program. In light of these results, we believe that outpatient programs like the one reported here merit careful consideration in an era of concern about rising costs for primary health care.

KEY WORDS: *Back disorders; Outpatient programs; Prevention*

Because low back pain is a widespread and costly condition that tends to recur,^{3, 15} efforts to treat it must focus on both immediate relief of symptoms and long-term prevention. While a dual treatment approach is not uncommon, many back programs reported in the literature have concentrated on treating acute symptoms.² Moreover, these programs often have been located in large research and training hospitals. In contrast, this paper reports the evaluation of a community hospital program that emphasizes both prevention and treatment. The successful delivery of such services at this level has important implications in an era of concern over the rising cost of primary health care.

Low back pain is a prevalent, costly condition, both economically and socially. It is estimated that 50% to 80% of the working population will have an episode some time in their lives.³ Although most patients are back to work in two to three months,²⁰ those patients who do not return to work within six to 12 months are unlikely to ever do so.¹⁵

Costs to the medical system are also high, not only due to weight of numbers, but also because of treatment strategies which utilize inpatient hospital services rather than relatively less expensive outpatient or home care programs. Some of the most common forms of treatment employed in the management of low back pain – rest, traction, mobilization, physical modalities, drugs, and surgery – are done on an inpatient basis.^{19, 22} Thus, low back pain patients often occupy acute-care beds and contribute to growing hospital waiting lists.

Some of these common treatments, which may be helpful in the acute phase of back pain, are rarely, if ever, helpful in the chronic phase.²¹ Indeed, inappropriate drug use or surgery may impede recovery over the long term.¹⁰ For this reason, programs focusing specifically on prevention have followed quite different approaches. Some have emphasized biomechanical principles^{1, 2, 7} and exercise;¹⁶ others have taken a more psychologic approach, attempting to change the attitudes¹³ or behavior^{11, 12, 18} of patients.

Because programs that emphasized education have been reported to speed recovery from low back disabilities,² and because increased strength and fitness have

been reported to reduce the recurrence of these disabilities,⁶ we decided to emphasize both education and exercise in our outpatient back program. An outpatient format was chosen because of reports of cost-effectiveness from a number of areas (e.g., stroke⁵ and obstructive lung disease⁹) and because of our own experience with such outpatient programs.²⁴

The Program

Goals. Our immediate objectives in the area of education were (1) to increase patient knowledge and use of correct body mechanics during activities of daily living (i.e., the use of movement strategies that minimize mechanical strain on the back), (2) to increase patient knowledge about the causes and remediation of back disorders, and (3) to increase understanding of psychologic stress, its relation to back disability, and its management.

In the area of exercise, our objectives included an increase in physical strength, an increase in joint and limb mobility, and an increase in exercise outside the program as an integrated element of daily routine.

Program procedures. Referrals are made by general practitioners and specialists and are reviewed by the clinical director. Because the educational components of the program are designed for adult men and women in the work force, adolescents are generally not accepted. Some patients are deferred because their condition is too acute for participation in exercises.

After referrals have been screened, incoming patients are assessed by the other members of the Back Team before the beginning of the program. The physiotherapist evaluates the patient by history, pain drawing, and examination, and also obtains objective measures of physical strength and mobility (described below). The occupational therapist assesses the impact of the disability on activities of daily living, including an assessment of observed body mechanics on an activity course (details below). The social worker interviews each patient to assess levels of stress, motivation, and the presence of other psychosocial problems. This team assessment is repeated at the end of the program.

The program itself consists of six three-hour sessions over a two-, three-, or

six-week period. The team conducts lectures and demonstrations on anatomy, physiology, body mechanics, posture, stress recognition and management, physical exercise, pain relief, and first-aid techniques. The Clinical Director leads discussions on drug use and abuse. In addition, practical, specific strategies for work and exercise are presented. At the end of the program, patients may be guided into community exercise programs designed for those with back problems, or to community support agencies.

The research project reported here was designed to see if the program was meeting its immediate objectives (as outlined above) and whether any immediate gains would be maintained over the longer term.

METHODS

Subjects

All patients routinely admitted to the program between November 1981 and May 1982 participated in the study. The average age of these 120 patients was 45 (range, 17 to 74); nearly two-thirds (63%) were women.

Measures

Measures were chosen to assess change in the areas identified under program objectives for education and exercise. They included both standardized measurements and patient self reports.

Education. Use of correct body mechanics was assessed objectively by rating each patient during nine activities of daily living, such as vacuuming, lifting and carrying, washing dishes, sitting, and standing.¹⁷ Within each of these activities, patients received points for the use of correct strategies of movement. For example, during vacuuming, patients were rated for the following strategies: "bend from knees to plug cord in," "keep vacuum close to body," "face direction of movement," maintain pelvic tilt," "use lunge position," "bend knees to unplug cord" (6 points possible; 50 points total for all nine activities).

Patient knowledge about the causes and remediation of back disorders and the role of stress was assessed by a 15-item quiz constructed for this study. This quiz included such questions as "Which of the following positions puts the most stress on

the lumbar discs? (a) Standing and leaning forward; (b) Sitting and leaning forward; (c) Lying on the back; (d) Lying face down:" and "What kind of stress causes the most damage to the body? (a) Intermittent; (b) Prolonged; (c) Acute; (d) Stress does not cause damage to the body."

Levels of anxiety and pain were assessed by two self-report measures. The State Anxiety Inventory²³ is composed of 20 items (e.g., "I feel calm," "I feel nervous," "I am worried"), each with four response categories ("not at all," "somewhat," "moderately so," "very much so"). High scores indicate anxiety; low scores, calm and contentment. The Oswestry Pain Scale⁸ is composed of ten items sampling everyday activities (e.g., personal care, walking, social life). Each of these items has six response categories ranging from no impairment and no pain (0 points) to extreme impairment and pain (5 points). For example, the response categories for "sex life" are "my sex life is normal and causes no extra pain," "my sex life is normal but causes some extra pain," "my sex life is nearly normal but is very painful," "my sex life is severely restricted by pain," "my sex life is nearly absent because of pain," and "pain prevents any sex life at all." A total score is derived by summing responses.

Exercise. Physical strength was objectively assessed for seven muscle groups or exercises (e.g., "psoas and abdominals," "lower back," "squatting," and "wall-sit") by giving points for each component of the exercise. For example, the components for squatting were "chin tucked, pelvis tilted," "can squat down fully," "can rise from full squat," "full 10 times," "good balance, smoothly" (5 points possible; 35 possible for all seven exercises).

Mobility was assessed in six areas: chin to chest, lateral flexion (left and right), knee to chest (left and right), and back and hamstrings. Measurements (in cm) were summed to provide a total mobility score (higher scores indicated greater restriction).

Interested readers may obtain full details of these assessment procedures from the senior author.

Exercise outside the program was assessed by a seven-item questionnaire adapted from Health and Welfare Canada.¹⁴ Types of exercise included walking, jogging, swimming, calisthenics, and bicycling. For each type, patients indicated

whether they had done that activity in the past month ("yes" or "no"), and if they had, they reported "about how many times?" and the average duration (by checking the appropriate response category: "15 minutes or less," "15 to 30 minutes each time," "30 to 60 minutes each time," "60 minutes or more each time").

Physical capabilities were also assessed by self report. The Rand Physical Abilities Scale⁴ is composed of ten items to which patients respond with "yes" (3 points), "yes, but slowly" (1 point), or "no" (0). Items range from "Are you able to do hard activities at home, heavy work like scrubbing floors, or lifting or moving heavy furniture?" and "If you wanted to, could you participate in active sports such as swimming, tennis, basketball, volleyball, or rowing a boat?" to "Are you able to walk to a table for meals?" and "Are you able to dress yourself?." A total score is derived by summing responses.

Design and Procedures

In each of six sets of new patients, subjects were randomly assigned to treatment and control groups. Each group was assessed once, the control group at the beginning of the program, the treatment group at the end.

Approximately one year after finishing the program, a random sample of 28 patients was reassessed for physical strength, mobility, and observed use of body mechanics. In addition, the questionnaire measures were mailed to all 120 original patients, of whom 85 (70.8%) responded.

RESULTS

As table 1 indicates, a strong immediate program impact was found in both targeted areas, education and exercise. Practical self-care knowledge, as measured by observed body mechanics, increased dramatically for each of the nine activities of daily living assessed. More general knowledge of back disorders, treatment, and stress, as measured by the 15-item Back Quiz, also increased.

In the area of exercise, strong changes were also found. Observed physical mobility increased dramatically in all six areas assessed. Observed physical strength increased significantly ($p < .05$) for six of seven individual measures.

Table 1: Program Effects in Education and Exercise

Measure	Mean		<i>F</i>	<i>p</i>
	Control	Treatment		
<i>Education</i>				
Body mechanics (50 points possible)	23	46	303.6	< .0001
Quiz (15 points possible)	8	10	17.8	< .0001
<i>Exercise</i>				
Physical strength (35 points possible)	24	30	29.9	< .0001
Mobility* (cm)	181	151	26.4	< .0001
Physical abilities** (30 points possible)	25.1	26.3	5.0	< .028

Combined n = 120.

*High scores indicate restriction.

**Self reported using the Rand Physical Abilities Scale. (See text for interpretation of scores.)

Parallelling these changes in observed fitness, patient reports of capacity for physical activities outside the program (as assessed by the Rand Physical Abilities Scale) also increased significantly. The control group reported (on average) that they could not participate in active sports; the treatment group reported that they could do so.

In contrast to these findings, self-report measures of anxiety and pain showed no change over the course of the program. The mean score for the State Anxiety Inventory (40 points out of 80 possible) indicated a moderate or neutral level of anxiety in the sample as a whole; the mean score for the Oswestry Pain Scale (9.3 out of 50 possible) indicated "some extra pain" for almost all of the activities assessed.

Reported levels of exercise outside the program were high for both the control and treatment groups (28 and 31 episodes per month, respectively), and although the reported duration of these episodes increased from a mean of 45 minutes to a mean of 58 minutes, the gain was not statistically significant.

Long-term Changes

As table 2 indicates, the strong immediate gains found for physical strength and mobility were being maintained one year later. *Post hoc* comparisons indicated no change between measurements taken after the program and one year later, although assessments at both these times were significantly higher than before the program.

Table 2: Physical Strength, Mobility, and Body Mechanics: Changes One Year later

Measure	Mean			<i>F</i>	<i>p</i>
	Pre	Post	Follow-up		
Body mechanics* (50 points possible)	22.4	45.6	37.5	114.9	< .001
Physical strength (35 points possible)	24.9	29.8	28.9	27.0	< .001
Mobility** (cm)	174.	158.	160.	6.6	< .003
Physical abilities***(30 points possible)	25.1	26.3	26.9	14.4	< .001

n = 28.

*Post hoc comparisons indicated that for Body Mechanics all differences (pre-post, pre-follow-up, post-follow-up) were significant (all $ps < .001$).

**High scores on mobility indicate greater restriction.

***Rand Physical Abilities Scale. n = 75. (See text for interpretation of scores.)

Self-reported levels of exercise and physical capabilities were also maintained. In terms of the Rand Physical Abilities Scale, average scores indicated that one year after the program patients could easily participate in active sports. Reported frequency of exercise remained high (and unchanged; mean = 30 episodes per month), while reported duration increased slightly (from 55 minutes to 68 minutes; $F = 4.47$, $p < .04$).

In contrast to physical strength and mobility, gains in observed use of body mechanics were less robust. *Post hoc* comparisons indicated a decline in one-year

scores from levels assessed at the end of the program. However, these follow-up scores were still significantly higher than those at the beginning of the program. More general, verbal knowledge, as assessed by the 15-item Back Quiz, declined more sharply, returning to preprogram levels.

Finally, Oswestry Pain scores declined from a mean of 10 during the program to a mean of 6.3 a year later ($F = 24.0, p < .001$), indicating that some of the activities assessed had become completely free of pain. Despite this improvement, scores on the State Anxiety Scale remained unchanged.

DISCUSSION

Methodologic Issues

The design used in the first part of this study to assess immediate program effects is logically equivalent to the classical control-and-treatment-group design. In both, patients are randomly assigned to one of two conditions, treatment or no treatment, and then compared. However, in the classic design, assessments are done on both groups concurrently, whereas in the present design, assessments were done sequentially.

Sequential assessment raises two problems. Because control and treatment groups are not assessed concurrently, secular trends may intervene. We controlled for this possibility by repeated time sampling, that is, by collecting data for six different sets of patients, one after the other, each set with its own randomly assigned control and treatment groups. Any secular trend affecting the treatment group in set N would also affect the following control group (in set $N + 1$). In the event, we found no differences across sets (that is, over time), and so pooled data to form one treatment group and one control group.

The second difficulty is that the lack of concurrent assessment makes it impossible to confirm that random assignment has indeed resulted in equivalent groups. We controlled for this difficulty by collecting concurrent data for both groups at time of intake. Extensive analyses failed to reveal any difference between the two groups (all F s < 1), confirming that our randomization procedure was effective.

The design used for the follow-up portion of the study does not, of course,

share the strengths described above. Most importantly, results at follow-up cannot be contrasted with a control group. Thus, although some follow-up results are suggestive (given the context of immediate program effects), they need to be interpreted cautiously.

During the analyses of the follow-up data, we were concerned with the issue of whether our two obtained samples (the randomly selected sample of 28 that was reassessed on our objective measures, and the larger sample of 85 that responded to our questionnaire mailing) were representative of the original sample of 120 participants. Extensive analyses failed to reveal any significant differences on earlier measures between those who were included and those who were not included in the follow-up samples (all F s < 1). Thus, our second randomization procedure was apparently successful in generating a representative subsample, and there also appeared to be no systematic attrition introducing bias in the obtained questionnaire group.

Health Issues

From a medical and health care delivery point of view, the most important result of the present research is its demonstration that a short (six-session), relatively inexpensive outpatient program, implemented on a community hospital level, can have a large immediate impact on patients' actual physical fitness and on their knowledge of correct body mechanics. Moreover, gains in these areas were still apparent one year later.

Increased fitness and improved body mechanics, as noted earlier, have been linked to decreased use of health care services and a reduction in the recurrence of back disorders.^{2, 6} In this study, they also corresponded with increased physical abilities outside the program, as reported by the patients themselves. In light of these results, we believe that outpatient programs of the type described here merit careful consideration in a time of concern over the rising costs of primary health care.

These findings also support the view that long-term change in patient functioning can be brought about by providing patients with concrete, practical knowledge related to their disability, and by focusing on changes in specific patterns

of behavior. For example, our findings suggest that practical lessons learned on the level of action (e.g., in body mechanics) are more enduring than knowledge that is more abstract, reflective, or verbal in nature (as assessed by the Back Quiz). In part, this may occur because opportunities arise in daily living to rehearse correct body mechanics, whereas more verbal knowledge, being more seldom called for, is forgotten.

Program changes in fitness suggest the importance of focusing on specific patterns of behavior. Exercises, of course, are quite specific behavior patterns, and in our program, a short regimen of exercise (six sessions) resulted in large increases in physical strength and mobility.

However, these suggestions need to be tested in new research designed to identify factors that contribute significantly to change during the program, and factors that are important in sustaining gains afterwards. Such information will allow the design of more effective, cost-efficient health care delivery systems.

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