

Clinical Predictors of Outcome of Acute Episodes of Low Back Pain

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In this prospective study, predictors of outcome were identified for patients (n = 116) who presented to their family physician with acute mechanical low back pain. Short-term outcome was measured by the number of days lost from work and longer term outcome was measured by disability at the six-week follow-up. Unlike other published work, this study did not find obesity or a history of previous back problems to be related to a poorer outcome from acute episodes of low back pain. Among those patients not involved in manual labor, a history of anxiety or depression was a significant predictor of both greater work loss and longer term disability. Among this same group, cigarette smoking was also found to be related to greater long-term disability from acute low back pain. Further study of this relationship is needed.

The number of hours of manual labor performed daily was a strong predictor of poor outcome (both short- and long-term) of acute episodes of low back pain. Among both manual laborers and professional-technical workers, the number of days off work (at bed rest) prescribed by the physician was significantly related to greater absenteeism from work; the physician's diagnosis of an actual or possible disc problem was also related ($P < .05$) to greater work loss among manual laborers. Neither of these factors, however, was related to longer term disability.

Low back pain is a common problem in primary medical care and a major cause of disability and loss of work. Much attention has been focused on patients chronically afflicted with low back problems. Data on the natural history of acute episodes of low back pain usually seen in the emergency room or primary care setting, however, are fragmentary. Most observers agree that acute low back pain is generally a self-limiting condition and that the prognosis is good, regardless of the specific treatments applied.¹ For some patients, however, the duration of symptoms is longer than expected, and some of them inevitably go on to develop chronic pain or disability.

The risk factors associated with a good or poor outcome for episodes of acute low back pain have not been clearly delineated. Epidemiologic studies^{2,3} have identified an association between certain occupations (especially manual

labor requiring repetitive lifting) and disability from low back pain. Obesity, a sedentary lifestyle, and cigarette smoking are also thought to be risk factors.⁴⁻⁶ Other studies have revealed that people disabled by low back pain frequently report depression, anxiety, headaches, and ulcers.⁷⁻⁹ Whether these factors represent the causes or results of the disability is not known. More recently, a study by Deyo et al¹⁰ has suggested that the examining physician who prescribes more than two days of bed rest in the treatment of low back pain may also be contributing to a poorer outcome (as measured by days lost from work).

Previous studies of the natural history of low back pain, published in 1983 in Britain and Scandinavia, focused mainly on the prognostic value of features of the medical history and physical examination of patients with either acute or chronic low back pain.^{11,12} This study was undertaken to identify prospectively from a wider range of sociodemographic and lifestyle variables, occupational variables, and physician-associated variables, those factors most highly predictive of a good or poor outcome among patients who present to their family physician with an acute episode of low back pain. Several of the variables studied (eg, unusual recent stress, presence or absence of help at home) were derived from the clinical hunches of

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physicians participating in the study; the other variables were derived from an extensive literature review.

METHODS

All study patients complained of low back pain to one of seven family practices (comprising ten board-certified family physicians, all members of the Georgetown University Family Medicine Research Consortium) in metropolitan Washington, DC, between May and October 1986. Patients were excluded from the study for the following conditions: pregnancy, pain above T12, and fever or flu-like illness. Those patients with an onset of pain more than 28 days before consulting their physician were also excluded. Patients were asked to sign a consent form and to complete a questionnaire addressing demographic, social, and medical factors. Each patient also filled out a disability questionnaire consisting of 24 items that measure self-rated disability resulting from back pain. This questionnaire was developed and validated by Roland and Morris¹³ in London and has been found to be a sensitive and reliable measure of disability from acute low back pain.*

The examining physician then completed a standardized form, developed by the panel of participating family physicians, relating to the patient's medical history and physical examination, including diagnostic and prescribed treatment data. About six weeks after the first physician visit, patients were mailed a second disability questionnaire and were interviewed by telephone by a research assistant regarding the outcome of their back pain. Those patients not fully recovered at the first follow-up were contacted a second time six weeks later (three months after the initial visit). The second follow-up again included a mailed disability questionnaire and a telephone interview by a research assistant.

Two outcome measures were considered: (1) the number of working days lost as a result of low back pain by those in the labor force (measured six weeks after the initial visit to the physician)—absence from work for more than four days was considered a poor outcome; and (2) disability at the six-week follow-up as measured by the number of items (0 through 24) checked off on the disability questionnaire—a score of 3 or greater was considered a poor outcome.

Predictor variables were derived from the patient questionnaire and the examining physician's record completed at the time of initial presentation. Each variable was categorized as reflecting patient characteristics (age, sex, medical history, recent lifestyle changes, and so forth),

employment factors (physical requirements of current job), or physician behaviors (diagnosis recorded, workup ordered, treatments prescribed). The Student's *t* test was used to analyze apparent differences in outcome with respect to continuous variables (such as years of education, daily hours of manual labor, and so on). Chi-square tests were used to detect significant differences between the good-outcome and poor-outcome groups for categorical variables, and Pearson correlations were used to examine the strength of relationships between independent variables. To determine those variables most highly predictive of good or poor outcome, when controlling for other factors, standardized models were constructed using multiple regression techniques. For all statistical tests, a probability of $<.05$ was accepted as significant. The SAS (Statistical Analysis System) package was used on an IBM mainframe for all analyses.**

RESULTS

One hundred forty-six patients consented to the study (four refused), and complete follow-up interviews were conducted with 141. Twenty-five patients, however, were excluded from the final analysis because they failed to meet the inclusion criteria (their back pain turned out not to be musculoskeletal in origin, or the onset of their pain occurred more than 28 days prior to consulting their physician.) Descriptive characteristics of the final sample of 116 are summarized in Table 1.

Days Lost From Work

One hundred four of the final sample of 116 patients were in the work force at the time they developed acute low back pain. Of these, 77 patients (74 percent) had a good outcome with regard to number of days lost from work; 27 patients (26 percent) were considered to have a poor outcome (more than four days lost from work as a result of acute low back pain). These two groups were not significantly different with regard to sex, age, race, or years of education. The mean number of days lost from work by manual laborers (6.6 days), however, was significantly higher than the mean number of days lost by professional or technical workers (3.6 days). The data were subsequently analyzed controlling for type of occupation and using multivariate regression analysis to identify individual risk factors for each group. The variables identified as having prognostic significance of more days lost from work for manual workers and those associated with a poor out-

* This instrument was used with the permission of its authors.

** Statistical Analysis System, version 6.02. Cary, NC, SAS Institute, Inc., 1985.

TABLE 1. GENERAL CHARACTERISTICS OF STUDY POPULATION WITH ACUTE LOW BACK PAIN (n = 116)

Characteristics	No. (%)
Average age (years)	38.3 (range 18-83)
Men	71 (61)
White	80 (69)
Black	36 (31)
Mean years of education	13.7 (range 7-20)
Manual or unskilled laborers	43 (37)
Professional or technical workers	61 (53)
Onset of pain work-related	27 (23)
Mean body mass (Quetelet index)	25.5 kg/m ²
Obese (body mass index > 27)	39 (34)
Mean initial disability score*	11.8 (range 3-23)
Past history of back problems	77 (66)
Currently smoke cigarettes	43 (37)
Smoke >20 cigarettes daily	23 (20)
History of anxiety or depression	12 (10)
Radiation of pain to leg	31 (27)
Straight-leg raising sign (pain at <60°)	39 (34)
Physician diagnosis of actual or possible disc problem	14 (12)

* Roland/Morris Disability Scale¹⁹

TABLE 2. IMPACT OF SIGNIFICANT VARIABLES ON DAYS LOST FROM WORK FOR ACUTE LOW BACK PAIN FOR MANUAL OR UNSKILLED WORKERS AND PROFESSIONAL OR TECHNICAL WORKERS: STANDARDIZED REGRESSION ANALYSES

Workers	Beta	P Value
Manual or unskilled* (n = 43)		
Days off work prescribed by physician	.415	.006
Daily hours of manual labor	.349	.007
Physician diagnosis of possible disc lesion	.303	.030
Professional or technical** (n = 61)		
History of anxiety or depression	.568	.0001
Days off work prescribed by physician	.230	.05

* R² = .514
** R² = .440

come for white-collar (professional and technical) workers are listed in Table 2.

No prescribed medication or treatment (other than bed rest) had any significant demonstrated impact on the number of days lost from work. Further analysis of independent variables showed that although the initial disability score was not a significant predictor by itself of more days off work in any of the regression models tested, a significant correlation existed between a high initial disability score and physician behaviors of advising more time at bed rest or off work and diagnosing an actual or possible disc lesion.

Disability at Six-Week Follow-up

Disability scores recorded at the time of the first physician visit (mean = 11.8) declined significantly by the time of the follow-up interview six weeks later (mean = 2.7). Seventy-four patients (64 percent) reported a good outcome (disability score less than 3) at the six-week follow-up. Of the 42 patients (36 percent) considered to have a poorer functional outcome at six weeks, 32 were fully recovered by the second follow-up at 12 weeks. Only ten patients (9 percent) did not recover completely during the period of the study.

For the total sample the most powerful predictors of higher disability scores at the six-week follow-up were

prolonged hours of manual labor, a history of anxiety or depression (self-reported by patients or noted on physician forms), and physical signs and symptoms of a disc lesion—positive straight-leg raising sign at 60 degrees and pain radiating to the thigh or leg. Of interest is that none of the following variables was significantly associated with greater disability at the six-week follow-up: age, sex, race, years of education, higher disability score at the initial visit, physician diagnosis of actual or possible disc problem at the initial visit, obesity (as measured by a body mass index), and history of previous back problems or other medical problems.

Since manual labor influenced so strongly the variance in outcome at six weeks, factors influencing the six-week outcome for those patients not involved in manual labor were analyzed separately. As shown in Table 3, for this group, two factors—a history of smoking ten or more cigarettes per day and a history of anxiety or depression—were significant predictors of a poorer six-week outcome as measured by the disability questionnaire. Of the ten worst-outcome patients who did not recover during the study period, seven had work requiring eight or more hours per day of manual labor, four had a history of anxiety or depression, and four smoked 20 or more cigarettes per day.

DISCUSSION

This study examined both short-term outcome (days lost from work) and longer term outcome (disability at six weeks) among patients complaining to their family physician of acute mechanical low back pain. These objective measures of outcome were chosen instead of subjective patient assessments of pain, which have been shown to

TABLE 3. IMPACT OF SIGNIFICANT VARIABLES ON DISABILITY SIX WEEKS AFTER INITIAL VISIT FOR ACUTE LOW BACK PAIN: STANDARDIZED REGRESSION ANALYSES

Patients Studied	Beta	P Value
Total study sample* (n = 116)		
Hours of manual labor	.367	.0001
History of anxiety or depression	.227	.008
Signs, symptoms of disc problem (radiation of pain to leg and straight-leg raising sign < 60°)	.207	.015
Group not involved in manual labor** (n = 73)		
Smoking > 10 cigarettes daily	.272	.016
History of anxiety or depression	.258	.022

* R² = .226
 ** R² = .151

be imprecise and unreliable.¹⁴ Consistency in physician assessment and collection of clinical data were improved through the use of standardized data forms designed by the family physicians involved in the study, although no attempt was made to check items of the physician history and physical examination for interrater reliability.

Because of difficulty supervising the multiple sites involved in the study, all eligible cases of low back pain were not enrolled. The lack of computerized databases in several of the practices prevented an accurate accounting of the overall percentage of eligible cases not enrolled. When compared with a sample of back pain patients in another prospective study in the primary care setting,¹⁵ the final sample group had a similar mean age (38.3 years). The predominance of men in this study, however, varies from published reports that men and women are equally affected, and other studies^{2,16} have reported that a lower percentage of patients go on to develop chronic low back pain (5 percent vs the 9 percent left with symptoms at the end of three months in this study). Moreover, it should be noted that the 116 subjects studied included a large percentage of well-educated professional or technical workers. It is therefore difficult to know how reliably these results can be generalized to other patient populations.

Unlike other reported research,^{4,16} this study failed to confirm the significance of obesity (as measured by a body mass index) or a self-reported history of previous attacks of low back pain as predictors of poor short- or longer term outcome from acute episodes of low back pain. A history of anxiety or depression, however, was a significant predictor of both greater work loss and longer term disability among individuals not involved in manual labor. In this study the history of anxiety or depression was reported either by the patient or the examining physician. Previous studies in family practice have indicated that patients with low back pain are more likely to have psy-

chological problems,^{2,8,17} although other studies have failed to show this relationship.^{18,19} It is important to note that, as manual laborers (mostly men) were excluded from the analysis, sex may be a confounding variable, since other studies have shown that the diagnosis of anxiety or depression is made more commonly in women than men.²⁰ Further investigation is therefore required before any causal relationship between anxiety or depression and poor outcome from acute low back pain for those not involved in manual labor can be considered.

It is also not clear that cigarette smoking is itself a cause of greater long-term disability from acute low back pain, although other investigators have found smoking to be significantly associated with medically reported episodes of low back pain.² A recent survey by Frymoyer et al⁶ of men aged 18 to 55 years confirmed the finding that severe low back pain was associated with greater tobacco consumption as measured by both the number of cigarettes smoked per day and the number of years of exposure. Smoking may simply be a marker for other psychosocial variables. The possibility, however, that smoking, as a result of associated coughing or through a direct adverse effect on intervertebral blood flow or metabolism, could influence the incidence or outcome of episodes of low back pain is conceivable and intriguing. Further study of this relationship is needed.

The number of hours of manual labor performed daily by the patients studied was a very strong predictor of both the number of days lost from work and functional disability at six weeks as a result of acute low back pain. In fact, because both the short- and long-term outcomes of acute episodes of low back pain were sufficiently different (worse) for manual laborers in this study, a strong recommendation can be made to consider this group separately in any subsequent trials of interventions or treatment regimens for acute low back pain.

The number of days off work (or at bed rest) prescribed by the physician was a significant predictor of the number of days patients lost from work for acute low back pain. This relationship was demonstrated for both manual laborers and those involved in technical or professional jobs. The influence of physician behavior on absenteeism from work by patients with low back pain has recently been underscored by a study of Deyo et al.¹⁰ They demonstrated that absenteeism from work could be significantly and safely reduced among the patients studied if physicians prescribed only two days of bed rest instead of longer periods for low back pain. The results of this study would support their recommendation for patients not involved in manual labor. A close look at the Deyo et al data, however, reveals that their subjects included only a small proportion of manual laborers. The finding in this study that prolonged hours of manual labor are a major determinant of longer term disability from acute low back pain

suggests that further investigation is needed before fewer days off work (at bed rest) can be confidently recommended for this group.

These results also indicate that a physician's diagnosis of an actual or possible disc problem is clearly related to greater work loss among manual laborers. This diagnosis, however, appeared to be more closely correlated with higher levels of initial disability than with known physical signs and symptoms of a disc lesion (although only the latter was a significant predictor of longer term disability). The percentage of patients in this study with a possible disc problem diagnosed was much higher than the 1 percent of patients with low back pain reported in other studies to have nerve-root symptoms.^{2,17} The findings of this study indicate that even when other factors are taken into consideration, physicians may be contributing to absenteeism from work when they fail to understand the serious implications of this diagnosis to manual laborers and their employers or base their diagnosis of a disc problem on initial functional status rather than on precise clinical findings.

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Commentary

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In 1985 more than one in every 20 visits to family physicians included the complaint of back pain.* In spite of its high prevalence in family practice, there has been surprisingly little research on back pain published in the American family medicine literature. Prior to the above article by Lanier and Stockton, only two studies of back pain had ever been published in *The Journal*,^{1,2} and none has appeared in the last eight years. Why has there been so little research by family physicians in this country on such a common problem? Could it be that all is well with the management of back pain and that there are no unanswered questions of any clinical importance?

In fact, there is a growing belief that conventional medical treatment for low back pain has failed to benefit many patients and has often been harmful. A leading expert on back pain, Gordon Waddell³ recently noted that "modern medicine can successfully treat many serious spinal diseases and persisting nerve compression but has completely failed to cure the vast majority of patients with simple low-back pain." He suggests that the biopsychosocial model may succeed where the biomedical model has failed: "We must consider low-back disability as an illness rather than low-back pain as a disease."

Indeed, there is serious reason for concern about the way in which back pain is currently managed. The problem starts during training, where medical students and residents are often presented with a negative image of the back pain patient (ie, the "low back loser"). These negative images are reinforced in primary care textbooks: "many of these [back pain] patients do not take an active role in their own treatment and frustrate the efforts of physicians while continuing to complain of discomfort."⁴ Not surprisingly, family physicians enter practice with negative views about patients with back pain⁵ and feel poorly prepared to manage it.⁶

Physicians may be further frustrated by the lack of diagnostic tools capable of providing the patient with a precise diagnosis,⁷ by a broad range of mostly unproven therapeutic modalities,⁸ or by often being put in the position of passing judgment on a worker's ability to return to work without having any objective measures to do so.⁹ It

is thus not surprising that a recent study of over 450 family physicians found that many felt limited in what they could do to help patients with back pain and lacked confidence that their back pain patients were very satisfied with their care.⁶

In fact, a recent study found that only 22 percent of low back pain patients were very satisfied with their care from family physicians, one third of the percentage claiming to be very satisfied with chiropractors.¹⁰ Compared with back pain patients seeing chiropractors, those seeing family physicians felt they had received much less information and concern about their problem and were much less likely to perceive their provider as confident and comfortable dealing with their back problem.¹⁰ One researcher has suggested that chiropractors may be better able than allopathic physicians to promote patient acceptance and validation, fulfill expectations, provide explanations, and engage the patient's commitment because chiropractors strongly believe their therapy will help and they are less constrained by so-called scientific models of disease.¹¹

Several other articles have recently suggested that outcomes of medical care encounters, especially those for patients with symptomatic illnesses such as mechanical low back pain, may depend more on how the provider interacts with the patient than on the actual diagnostic and therapeutic techniques the provider employs.¹²⁻¹⁷ A recent report of the Institute of Medicine Committee on Pain, Disability, and Chronic Illness Behavior¹⁸ noted: "If, as a few studies suggest, outcomes depend on the characteristics of the provider more than on the actual techniques used, *such findings may point the way to specific alterations in physician behavior or in the doctor-patient relationship that will promote rehabilitation and recovery.*"

In his argument that the biopsychosocial model has more to offer low back pain patients than the biomedical model, Waddell³ warns that "over-emphasis on pain alone, over-dependence on a nominal diagnosis of disc prolapse, and over-prescription of rest may indeed be a major cause of iatrogenic disability." The article by Lanier and Stockton provides concrete evidence that these dynamics may indeed be occurring. They found that prescribing more days off of work and giving the patient the

* Based on 1985 National Ambulatory Medical Care Survey data. Personal communication from L. Gary Hart, August 9, 1988.

diagnostic label of possible disc lesion (often in the absence of known signs or symptoms of disc disease) were highly predictive of poor outcomes. In addition, that a history of anxiety and depression was also a significant predictor of poor outcomes highlights the potential for providers to improve outcomes by placing greater emphasis on allaying patients' anxieties and less emphasis on the pain itself.

Clearly, family medicine, with its biopsychosocial perspective and access to primary care patient populations, has tremendous potential for significant contributions to knowledge that will lead to improved care for illnesses such as low back pain. In view of the shortcomings of the current clinical approach to low back pain that have been identified by both patients and physicians and the high prevalence of this problem in clinical practice, family medicine should place a high priority on research and training that will lead to improved care for low back pain.

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