Factors Influencing Work Interference in Patients With Chronic Low Back Pain: A Residency Research Network of Texas (RRNeT) Study

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Introduction: Chronic low back pain (CLBP) is a disabling and expensive condition commonly seen in family physicians' offices. A complete understanding of factors contributing to patients' return to work remains elusive.

Objective: To describe patients with CLBP seen in family physicians' offices and to explore factors interfering with return to work.

Subjects: Three hundred sixty outpatients with CLBP for more than 3 months.

Setting: Ten participating family physicians' offices of the Residency Research Network of Texas.

Primary Outcome: The effect of pain on work effect as measured by a Likert scale.

Results: Patients were typically female (72%), overweight or obese (mean body mass index, 33.4), had pain for many years (mean, 13.6 years), and screened positive for recent depressive symptoms (83%). The majority of patients took at least some opioid medication for their pain (59%). Multivariate linear regression analysis found that the largest single contributor to effect on work was the subjects' score on the SF-36 physical function scale ($\beta = -0.382$). Other contributors included average daily pain ($\beta = 0.189$), the frequency of flare-ups of pain ($\beta = 0.108$), the effect of the painful flare-ups ($\beta = 0.170$), and current depressive symptoms ($\beta = 0.131$) (adjusted R^2 for model = 0.535). Age, sex, race/ethnicity, total time the patient has had CLBP, other comorbidities (including a diagnosis of depression), disability status, use of opioids, history of intimate partner violence, social support, and procedures attempted were not predictive.

Discussion: Future studies attempting to demonstrate the effectiveness of interventions in CLBP should measure depressive symptoms and the magnitude and effect of painful flare-ups, not just the overall pain score. The majority of CLBP patients seen in these practices take opioids for their pain. Screening and treating for depression may be reasonable for some patients, though evidence of its effectiveness is lacking. (J Am Board Fam Med 2011;24:503–510.)

Low back pain is one of the top 10 reasons people seek care from a family physician.[1,2] The prevalence in the population varies from 8% to 37%. Back pain is a leading cause of lost work time and disability and accounts for approximately 23% of Workers' Compensation payments.[1] The condition is expensive to the health care system, with diagnosis and treatment of all spine problems estimated to cost $86 billion in the United States annually.[2] Most back pain is temporary and improves in the first few weeks after injury. However, after 3 months of pain or disability, relapse is likely,[3] and recovery is slow, influenced by many factors including depression, sex, and racial/eth-

nic background.[1,4] Psychosocial factors have been shown to be more predictive of return-to-work status than physical or biomechanical measures.[5]

Many studies have examined predictors of return to work in patients with acute low back pain.[6–15] Fewer have examined the natural history of chronic low back pain (CLBP), especially in a primary care setting,[16,17] even though patients seek care for low back pain more commonly from family physicians than other caregivers.[18,19]

Studies of CLBP in other settings have examined the interaction between physical and psychosocial variables, generally recognizing the importance of psychosocial influences on functionality.[5,20–22] These studies only measured pain as a single variable and did not measure other salient features of CLBP. Intimate partner violence has also been associated with chronic pain, depression, and reduced employment in previous studies.[23–25]

The first purpose of this study was to describe the patients with CLBP seen in family physicians' offices. The second purpose was to determine which combination of physical and psychosocial factors had the greatest influence on the way the CLBP affected the ability to work. In particular, we wanted to know if other features of the CLBP other than a global pain score were independent predictors of work interference.

Methods
This was a prospective cohort study of CLBP in family medicine patients, though this paper only includes data from the baseline year of enrollment. This study was conducted in outpatient clinics of the Residency Research Network of Texas (RRNeT), a collaboration of 10 ACGME-accredited family medicine residency programs located in Austin, Corpus Christi, Dallas, Fort Worth, Garland, Harlingen, Houston, Lubbock, McAllen, and San Antonio (two programs). Subjects were enrolled from the resident/faculty continuity clinic associated with each residency. These clinics had an average of 29 residents and 10 faculty seeing patients (range, 18 to 72 residents and 7 to 27 faculty), an average of 29,000 patient visits per year (range, 14,000 to 63,000), and were all in an urban setting caring for a predominately vulnerable, minority, low-income patient population.

Subjects
From each clinic, we identified up to 66 consecutive eligible patients with CLBP (mean, 36; range, 9 to 66). Medical student research assistants reviewed clinic ledgers and charts each morning to identify appointed patients who met study criteria. The inclusion criteria were adults age 18 years or over, a diagnosis of CLBP (in general or a specific cause such as stenosis), symptom duration of 3 months or longer, and the subject had two or more visits to this clinic in the previous 24 months. The exclusion criteria were: patients treated for cancer pain and women who were pregnant at intake.

Procedure
As patients arrived for routine visits with their family physician, student research assistants approached them in the waiting room, the vital signs recording room, or the examination room. Research assistants briefly described the purpose of the study, and invited interested patients into a private room (usually the examination room). Students provided the patient with a consent form, described the study aims and procedures in detail, reviewed the risks and benefits of the study, and provided investigator contact information. Consent forms and survey instruments were available in English and Spanish. After the patient's visit with the family physician, the student retrieved the patient's medical record and abstracted study information from it. Patients received no compensation for their participation.

Measurement
The survey assessed demographic characteristics, pain severity (10-point scale), frequency and duration of pain episodes (four questions on a Likert scale), physical functioning and general health status (from the MOS-36),[26] social support and stress (from the Duke Social Support and Stress Scale),[27] anxiety (from the Beck Anxiety Inventory),[28] depression (from the PHQ-2),[29] alcohol and drug use, adverse childhood experiences (from the ACE, abbreviated), and family violence (from the Brief Conflict Tactic Scale).[30] The chart review was retrospective in nature and included cause and duration of pain, treatments for pain, length of doctor-patient relationship, comorbidities, body mass index (BMI), and insurance status.

Table 1. Characteristics of Enrolled Patients

Characteristic	Result, N = 360
Female, No. (%)	260 (72.2)
Age, mean (SD)	53.0 (13.5)
BMI (SD)	33.4 (9.1)
Race/ethnicity, No. (%)	
Caucasian	154 (44.6)
Hispanic	104 (30.1)
African-American	83 (24.1)
Other	4 (1.2)
Education, No. (%)	
Less than high school	71 (19.9)
High school or GED	120 (33.7)
Some college or technical	121 (34.0)
College or postgrad	44 (12.4)
Employed currently, No. (%)	81 (22.9)
On disability or applying for disability, No. (%)	177 (49.2)
Household income, No. (%)	
< $1000 per month	166 (50.9)
$1000 to $1999 per month	82 (25.2)
$2000 to $2999 per month	32 (9.8)
$3000 or greater	46 (14.1)
Comorbidities, No. (%)	
Osteoarthritis (other than back)	55 (15.3)
Asthma	57 (15.8)
COPD	47 (13.1)
Diabetes	91 (25.3)
Depression or anxiety	152 (42.2)
GI disorders	84 (23.3)
Heart disease	34 (9.4)
Hypertension	197 (54.7)
High cholesterol	115 (31.9)
Takes opioid medication, No. (%)	210 (58.5)
Takes daily scheduled opioid medications, No. (%)	94 (26.1)
Other treatments in the previous 12 months	
Acupuncture	15 (4.2)
Chiropractor or adjustments	38 (10.6)
Ice/heat	184 (51.1)
Massage	100 (27.8)
Pain clinic	66 (18.3)
Physical therapy	89 (24.7)
Injections	60 (16.7)
Surgery	17 (4.7)
Yoga	9 (2.5)
In general, would you say your health is. . ? No. (%)	
Excellent	10 (2.8)
Very good	37 (10.5)
Good	81 (22.9)

Continues

Table 1. Continued

Characteristic	Result, N = 360
Fair	137 (38.7)
Poor	89 (25.1)
PHQ-2 score (depressive symptoms in the last 30 days),* No. (SD)	
2	61 (17.3)
3 to 4	91 (25.8)
5 to 6	109 (30.9)
7 to 8	92 (26.0)
Intimate partner violence, No. (%)†	
Ever	90 (36.1)
In past 12 months	12 (4.8)
In past 30 days	10 (4.0)
Sum of supportive people checked (range, 1 to 9), (SD)	2.6 (1.8)
Patient has a written pain contract, No. (%)	67 (18.6)

*Positive screen is any score > 2.
†N = 249 because these questions were only asked in 2008.
BMI, body mass index; COPD, chronic obstructive pulmonary disease; GI, gastrointestinal; PHQ-2, Patient Health Questionnaire.

Analysis

This analysis used only the baseline data from this study. Results were first analyzed by descriptive statistics. Bivariate and then multivariate linear regression analyzed the relationship between contributing factors and the impact of the CLBP on the patient's ability to work. The dependent variable, pain effect on work, was defined as the answer to: "How much does pain interfere with your normal work (including both house work and paid work)?" All variables were tested for significance using backwards elimination by major variable subsets. Variables from the bivariate analyses were included in the multivariate model if their P value was < 0.2.

Interaction terms between each other pain variable (such as duration of pain, average pain score in last 30 days, and others) and other key remaining variables were tested in models with the dependent variable. A tolerance of less than 0.1 or a variance inflation factor (VIF) greater than 10 were used to define a significant interaction term. Additional analyses were performed, stratified by variables found to have significant interactions. Final models were checked for significant colinearity between the variables. The statistical software used was SPSS 17 (SPSS, Inc., Chicago, IL).

Results

Characteristics for the 360 recruited patients are reported in Table 1. An additional 16 subjects enrolled but did not have data on either the chart review or survey, and 53 subjects declined to participate for a variety of reasons. This was a middle-aged, predominantly female (72%) sample with a wide range of ages (18 to 89 years). Recruited patients were typically obese (average BMI, 33.4), had multiple comorbidities, did not complete education beyond high school (54%), had low incomes (51% less than $1000/month), were not employed (77%), had back pain for a mean of 13.6 years, reported their health as fair or poor (64%), and screened positive for depressive symptoms in the previous 30 days (83%), though a minority had a documented diagnosis of depression or anxiety (42%). More than half the population took some form of opioid medication, based on the chart review (59%), and a minority was on a written pain contract (an agreement between doctor and patient on medication adherence, clinic visits, and testing expectations, and consequences if expectations were not met: (19%).

Pain Variables

Patients reported significant daily pain (6.8 on a 10-point scale) (Table 2). The majority reported experiencing pain every day (66%), with the pain most commonly lasting several hours or less (54%). The vast majority of patients reported flare-ups of their pain in the previous 12 months (96%) that had a major impact on their life (36% could not work, 21% were bed-bound, and 19% were dependent on others to feed, clothe, and bathe them during a flare-up).

Bivariate analysis showed significant correlation between most pain variables and the dependent variable, pain effect on work, except duration of pain and the length of time an episode of pain lasts. Age, sex, education, and most comorbidities were not significantly correlated with pain effect on work, except chronic obstructive pulmonary disease and depression.

Multivariate linear regression results examining predictors of pain effect on work are shown in Table 3. Significant independent predictors included both the measure of average daily pain as well as two measures of the effect of pain flare-ups. Recent depressive symptoms as measured by a pos-

Table 2. Pain Variables

Pain Effect	Result, N = 360
Average pain level* (SD)	6.8 (2.2)
Worst pain level* (SD)	8.7 (5.3)
Duration of pain, years (SD)	13.6 (13.1)
How often did you have back pain in the last 30 days? No. (%)	
Never	2 (0.6)
Once or twice	18 (5.0)
Several times per week	101 (28.0)
Every day	239 (66.4)
When you had pain in your back, how long did it last? No. (%)	
No pain	2 (0.6)
Less than 60 minutes	40 (11.2)
Two to several hours	151 (42.3)
All day and night	111 (31.1)
Days	53 (14.8)
In the past 12 months, how often did you have a flare-up in your back pain, when it got extra painful? No. (%)	
Never	15 (4.2)
1 to 5 times	69 (19.3)
6 to 9 times	57 (16.0)
10 + times	129 (36.2)
Constant and severe pain	86 (24.2)
When your back pain flared up in the past 12 months (got extra painful), how did it affect your life? No. (%)	
Little effect	19 (5.4)
Limited usual work	70 (25.3)
Could not do work	125 (35.5)
Could not move from bed	72 (20.5)
Dependent on others	66 (18.8)
How much does pain interfere with your normal work (including both housework and paid work)? No. (%)	
No effect	14 (4.0)
Small effect	28 (8.0)
Moderate effect	93 (26.6)
Large effect	123 (35.1)
Extreme effect	92 (26.3)

*Pain measured on a 1 to 10 scale.

itive score on the PHQ-2 was a significant predictor, but a diagnosis of depression based on the chart review was not. The largest single contributor to the model was the SF-36 physical function scale. Poor function predicted a more severe effect on work. Analysis of interaction terms found important colinearity between current depressive symptoms and opioid use. Stratifying by presence of

Table 3. Multivariate Model: Association With Score Measuring the Effect of Pain on Work

	All Subjects N = 360	Depression Screening Negative N = 61	Depression Screening Positive N = 292	No Opioid Use N = 150	Uses Opioids N = 210
	Standardized β Coefficients and Significance				
Intercept	3.09‡	4.20‡	2.81‡	2.79‡	3.64
Average pain level	0.189‡	x	0.168†	0.148*	0.139*
Flare-up frequency, last 12 months	0.108*	x	x	0.234†	x
How often pain in last 30 days	x	x	0.090*	x	0.123*
Effect of flare-up, last 12 months	0.170‡	0.379‡	0.148†	0.269‡	x
Positive depression screen (PHQ-2 score > 2)	0.131†	x	0.170‡	x	0.172†
SF 36 Physical function score	−0.382‡	−0.579‡	−0.355‡	−0.348‡	−0.460‡
Adjusted R^2	0.535	0.685	0.452	0.609	0.398

*$P < .05$.
†$P < .01$.
‡$P < .001$.
PHQ-2, Patient Health Questionnaire.

depression yielded two regression models, with N = 292 for patients with depressive symptoms and N = 61 for patients with no depressive symptoms. The with-depression model had poorer overall correlation with the outcome variable (adjusted $R^2 = 0.452$) than the no-depression model (adjusted $R^2 = 0.685$). Additionally, fewer independent variables remained in the with-depression model. Only the pain flare-up effect and SF-36 physical function variables remained predictive of pain effect on work. Similarly, patients on opioids had poorer overall correlation (N = 210, adjusted $R^2 = 0.398$) than those not taking opioids (N = 150, adjusted $R^2 = 0.609$).

Discussion

We found that patients with CLBP cared for by family physicians have significant depressive symptoms, their pain has a significant effect on their lives, and many are prescribed opioids. Pain flare-ups interfere with work function at least as much as average daily pain.

The contribution of flare-ups of CLBP on quality of life and disability have been recognized by others.[31,32] A controlled trial of yoga versus other alternative treatments for CLBP recognized the importance of the yoga instructor helping patients manage pain flares.[33] Our study adds further weight to the impact of pain flare-ups on patient functionality.

The SF-36 physical function scale measures self-reported tasks such as running, lifting, climbing stairs, kneeling, and bathing. Our finding of its association with effect of pain on work is consistent with one intervention study that found provocative tests of stepping and strength predicted return to work.[21] Results of our regression analyses showed that particularly for patients who did not screen positive for depression, this measure of physical functioning had the largest association with work interference.

We did not administer the Fear-Avoidance Beliefs Questionnaire (FABQ).[34] Previous studies found the FABQ to be an important psychosocial predictor of return to work and disability,[34–40] and others have recommended its use.[41] Fear avoidance has been found to be higher in patients with CLBP than acute pain, though distress was found to be a greater predictor of pain and disability.[42] Results for fear avoidance are not consistent.[43,44] A study of a brief, individualized program to reduce fear and increase activity levels found a reduction in patient fears, but no differences were observed in the percent unemployed or the percent receiving Worker's Compensation or disability benefits.[45] A more recent systematic literature review of all prospective inception cohorts of patients with acute low back pain found little evidence to link such fear states with poor prognosis. These reviewers recommended that clinicians focus more on distress and depression.[46]

Our study was limited by its cross-sectional nature. This analysis could assess significant associations between pain, health, and the effects on work but was inadequate to determine cause and effect. For example, depression symptoms are significant predictors of the effect on work, but we cannot determine whether depression hinders one's ability to work, or the inability to work exacerbates depression. Further studies by this team, using longitudinal data, will shed light on those issues. It is also likely that the depressive symptoms we identified with the PHQ-2 overestimated the prevalence of major depression, because it is a more sensitive than specific diagnostic tool.[47] Our study was also limited by using only one question to measure how CLBP interfered with work.

Our study also had potential selection biases. We only recruited subjects in the summer, which may limit who walks in the door and the types of conditions we saw, such as acute pain becoming chronic by the spring after falls in the winter. Patients who were suspicious, drug-seeking, or particularly protective about their opioid medicines might be less likely to participate, though the frequent report of opioid use in our study makes these biases less likely. On the other hand, some CLBP patients might want to be especially cooperative to receive their prescriptions. Medical students may have only recruited the more "approachable" (and less antagonistic) patients; however, they were trained to invite all consecutive patients who met the screening criteria. Finally, patients with milder symptoms not seeking medications for CLBP on their visit that day may have been less likely to recognized as a potential study subject and not been approached by the medical students. This would lead to a study population with more severe CLBP than commonly seen in family physicians' practices.

Because this study was observational, we did not insist that family physicians screen and treat all their patients with CLBP for depression. We used the most sensitive cutoff score of the PHQ-2, which means there were false-positives for depression.[47–48] Recognizing CLBP as a risk factor for depression means at least some patients could be identified and started on treatment. However, a review of studies of antidepressants for nonspecific low back pain found no difference compared with placebo for improved pain or depression.[49]

We also recommend that future studies of CLBP, including drug and device studies, include more than just overall pain scores as the outcome measure for pain. Previous research and our study have found flare-ups of pain to be associated with work status and disability. If one goal of CLBP treatment is to have people return to the employed workforce, then significant pain flare-ups must decrease both in frequency and severity, and patients must be psychologically better equipped to function despite the pain.

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