

The Long-term Effects of a Self-management Program for Inner-city Primary Care Patients With Acute Low Back Pain

Teresa M. Damush, PhD; Morris Weinberger, PhD; Susan M. Perkins, PhD; Jaya K. Rao, MD; William M. Tierney, MD; Rong Qi, MS; Daniel O. Clark, PhD

Background: We evaluated the effect of a self-management program for low-income primary care patients with acute low back pain (ALBP) from inner-city neighborhood health centers.

Methods: We conducted a randomized controlled trial of a self-management program compared with usual care at university-affiliated neighborhood health centers and an emergency department of an inner-city public teaching hospital. We enrolled 211 patients who visited a physician for ALBP (<90 days' duration). The self-management program consisted of 3 group sessions and telephone follow-up that focused on understanding back pain, increasing physical activity, and dealing with fears and frustrations.

Results: At baseline, 4 months, and 12 months, blinded interviewers assessed back pain physical function (Ro-

land Disability Questionnaire), health status (Arthritis Impact Measurement Scales), self-efficacy, and time spent in physical activity. Compared with patients receiving usual care, intervention patients reported significantly better scores on the Roland Disability Questionnaire ($P=.009$), mental functioning ($P=.009$), self-efficacy to manage ALBP ($P=.03$), time spent in physical activity ($P=.047$), and reduced fears of movement/reinjury ($P=.005$) after 12 months.

Conclusion: A self-management program can improve and maintain functional status, mental functioning, and self-efficacy to manage future symptoms for 1 year among primary care patients with ALBP living in the urban, inner city.

Arch Intern Med. 2003;163:2632-2638

From the Indiana University Center for Aging Research (Drs Damush, Weinberger, Tierney, and Clark), Regenstrief Institute Inc (Drs Damush, Weinberger, Tierney, and Clark), Indiana University School of Medicine (Drs Damush, Weinberger, Perkins, Rao, Tierney, and Clark and Ms Qi), Roudebush VAMC (Drs Weinberger, Rao, and Tierney), and Department of Biostatistics, Indiana University (Dr Perkins and Ms Qi), Indianapolis, Ind. Dr Weinberger is now with the Department of Health Policy and Administration, University of North Carolina, Chapel Hill, and Dr Rao is now with the Centers for Disease Control and Prevention, Atlanta, Ga. The authors have no relevant financial interest in this article.

LOW BACK pain is highly prevalent in the United States and extremely costly in terms of health care expenditures, lost wages, and disability.¹⁻⁴ Acute low back pain (ALBP), defined as symptoms lasting less than 3 months, accounts for more than 90% of all back pain and nearly half of the costs.¹ Acute low back pain, recurrent in its nature, is remarkably burdensome among the urban, socioeconomically disadvantaged population.⁵⁻⁷ Indeed, in a recent assessment of health concerns and needs among randomly selected congregants of 5 urban African American churches, back pain was reported among 41% as a pressing health issue.⁸ Moreover, data from the National Health Interview Survey indicated that in comparison to whites, African American men and women in the United States reported losing more workdays for greater lengths of time because of low back pain.⁹

To address this major medical problem, we developed and implemented the Acute Low Back Pain Self-management Pro-

gram (ALBP-SMP) for urban, socioeconomically vulnerable primary care patients.¹⁰ Based on the successful Arthritis Self-management Program,¹¹ our program emphasized increasing patient self-efficacy (ie, confidence) in order to enhance the patient's motivation and confidence to implement strategies required to manage their ALBP. Programs that emphasize self-efficacy have consistently demonstrated effectiveness in improving and maintaining health outcomes and reducing health care utilization among patients with various rheumatic and chronic conditions,¹¹⁻¹³ including low back pain,¹⁴ over both short- (ie, 6 months)¹⁴⁻¹⁶ and long-term (ie, 12 months)^{16,17} periods.

We recently reported that inner-city patients in our ALBP-SMP had significant increased short-term (4-month) improvement in their self-efficacy to manage low back pain symptoms and improved mental functioning (ie, less anxiety and fewer depressive symptoms).¹⁸ For the present study, we sought to examine whether the improvements observed at 4 months

could be maintained at 1 year. This is critical because the intensive components of our ALBP-SMP were completed by 4 months. Our primary outcomes were functional status and patient satisfaction with health care received for low back pain. Secondary outcomes were self-efficacy, self-management practices, social support, and fear of movement. Based upon the long-term improvements of previous self-management programs, we expected continued improvements in functional status at 12 months among our primary care patients enrolled in the intervention arm.

METHODS

STUDY SITE AND PARTICIPANTS

The study was approved by the institutional review board of Indiana University–Purdue University at Indianapolis. Our study methods have been published in detail elsewhere.¹⁰ Briefly, we recruited patients from our university-affiliated neighborhood health centers and emergency department, which serve inner-city patients, during June 1998 to March 2000. Inclusion criteria were (1) age 18 years or older; (2) primary diagnosis reflecting back pain; (3) ALBP (ie, patient- and physician-reported current episode <3 months' duration and not due to severe trauma); (4) receiving primary care in our clinical venues; (5) deemed eligible for study by their primary care physician (PCP); and (6) access to a working telephone. We excluded patients who met any of the following criteria: (1) prior surgery for back pain; (2) receiving disability insurance payments or in the process of applying for back pain disability; (3) residing in an institution; (4) being incompetent for interview per physician or project coordinator; (5) severely impaired in vision, hearing, or speech; (6) unable to understand and speak English; (7) being pregnant; or (8) judged by their PCP to have a terminal illness (life expectancy <1 year) or severe comorbid condition limiting their functional ability.

RECRUITMENT AND BASELINE DATA COLLECTION

In all of our clinical venues, physicians use microcomputer workstations linked to the Regenstrief Medical Record System¹⁹ to enter all orders. When physicians entered the reason for the patient's visit in the computer as "low back pain," they immediately received a computerized alert describing the study and eligibility criteria and requesting their permission to recruit the patient. If potentially eligible, an e-mail message was sent to the project coordinator who reviewed charts and contacted patients to confirm eligibility. For patients agreeing to participate, an interviewer, blinded to study hypotheses, obtained informed consent and attempted to conduct baseline interviews at the primary care center, the patient's home, or by telephone. We attempted to schedule all baseline interviews within 7 days of confirming eligibility. Patients received \$10 for completing the interview.

STUDY GROUPS

Immediately after completing the baseline interviews, we randomized patients to the control or intervention group. Patients in the control group received usual care. Based upon the physician's judgment, usual care could include referral to occupational therapy, physical therapy, or a neurological center; nonnarcotic/narcotic analgesics; and back exercise sheets. The only interventions that were not available to the control group were those associated with our program (described hereafter).

Those randomized to the intervention group were invited to participate in the ALBP-SMP. The program, which was based on the Arthritis Self-management Program,¹³ a chronic back pain program,²⁰ and social-cognitive theory,²¹ focused on increasing self-efficacy and social support to self-manage low back pain. Its final structure was based upon a series of focus groups intended to maximize the relevance and feasibility of the ALBP-SMP to our study population. The program is described in detail elsewhere^{10,18} and included:

- 3 in-person classes (once per week) in community rooms of the neighborhood health centers focusing on evidence-based treatment recommendations, behavioral changes, increased self-efficacy, and reducing negative affect.²²
- Class handouts: written educational materials showed recommended exercises, including walking and proper body mechanics.
- Classes on audiotape and a cassette player: when patients missed a class, we provided them with an audiotape of the class, a handheld cassette player, and copies of the written handouts distributed at the missed class.¹⁰
- Physician letters of support: with the physicians' permission, we mailed letters with the scanned signature of the PCP within 2 days of each session. These letters, tailored to the content of each session, encouraged patients' further participation in the program.
- Telephone follow-up: to reinforce the class sessions, our research staff made telephone calls to participants at 4, 6, and 8 weeks to discuss ascertainment of goals, assist with problem solving, and set new goals (ie, short-term intervention calls). Thereafter, the staff made telephone calls (ie, maintenance calls) once a month to continue reinforcing the class sessions and sustain behavioral change.

FOLLOW-UP DATA COLLECTION

Patients were mailed letters to remind them of their 4- and 12-month assessment. Interviewers blinded to group assignment, collected identical outcome data at 4 and 12 months.

MEASURES

Primary Outcomes

Functional status was assessed with 2 complementary measures. First, the Arthritis Impact Measurement Scales (AIMS2) is a validated, arthritis-specific measure of functional status²³⁻²⁵ that can be reliably reduced to a 5-component model. Three of these components were included as our primary outcomes: physical function, affect, and symptoms. Higher scores indicate worse functioning. Second, the Roland Disability Questionnaire is a 23-item back pain–specific measure of functional status^{26,27} that has demonstrated reliability, validity, and sensitivity to change.²⁷ We used total score, with higher score indicating poorer functioning.

Patient satisfaction was measured with a validated scale developed specifically for patients with low back pain.²⁸ Overall scores range from 9 (least satisfied) to 27 (most satisfied).

Secondary Outcomes

Self-efficacy was assessed with the 6-item version of the Arthritis Self-efficacy Scale to manage symptoms of low back pain.²⁹ For each item, patients reported their degree of certainty or confidence to manage symptoms at the present time on a scale ranging from 1 (very uncertain) to 10 (very certain).

To estimate self-management practices, we asked patients to estimate the time they spent performing exercise per

Table 1. Participant Characteristics*

Characteristic	ALBP-SMP Group (n = 105)	Usual Care Group (n = 106)	P Value
Age, y	45.4 (19-77)	45.5 (18-82)	.96
BMI	29.9 (14-55)	30.9 (17-56)	.30
Years with ALBP	7.8 (0-40)	6.8 (0-59)	.42
Severity of LBP in last 4 wk	7.0 (0-10)	6.8 (0-10)	.51
Months since last episode of LBP	2.7 (0-104)	2.5 (0-33)	.84
Female	71.7	75.2	.56
Married	31.4	31.4	>.99
Living alone	22.6	14.3	.12
African American	55.7	63.8	.23
Completed high school	60.6	63.5	.67
Work for pay	52.4	52.5	.99
"Just making ends meet" or less	82.4	78.0	.44

Abbreviations: ALBP-SMP, acute lower back pain (LBP) self-management program; BMI, body mass index (calculated as weight in kilograms divided by the square of height in meters).

*Data are given as mean (range) or as percentage.

week (none, <30 minutes, 30-60 minutes, 1-3 hours, >3 hours), cognitive symptom management (never, almost never, sometimes, fairly often, always), and stress management (open-ended questions).³⁰

Social support was assessed using the social interaction component of the AIMS2.²³⁻²⁵ The final component of the AIMS2, role functioning, was also assessed as a secondary outcome.

Fear of movement/activity was measured with a 10-item scale that focused on interpretation of pain, fear of activity/exercise, and safety/injury and was adapted for this study.³¹ Response items included a 4-point scale ranging from strongly agree to strongly disagree.

PATIENT CHARACTERISTICS

Demographic characteristics were obtained during baseline interviews. Income was assessed with a single item used previously in this patient population. It asked whether patients felt that their household income is "comfortable," "just able," or "unable" to make ends meet.³² In terms of baseline clinical data, we used Regenstrief Medical Record System data to calculate Ambulatory Care Group,³³ a rigorous measure of outpatient comorbidity that has been validated in a number of settings, including inner-city Medicaid populations.³⁴ We used this measure to test for between-group differences in comorbidity. We also obtained height and weight at baseline from the clinical records.

INTERVENTION DOSAGE

To determine if the intervention dose affected patient outcomes, we created a scoring system to reflect the dosages of the intervention, which were based upon class attendance and telephone calls received during the intervention (ie, short-term telephone call) and during the maintenance period.¹⁸ The intervention dose scores ranged from 0 to 15, with the highest score reflecting attendance at all 3 classes. Of those having follow-up data at 4 months, approximately 8% received no dose; 23% received a score of 6, which could equal 1 class and 1 call; and 22% received a score 15, which could equal attendance at all 3 classes. The short-term telephone call dose score ranged from 0 to 4, with approximately 25% receiving 1 or 2 calls, and 18% receiving 3 or 4 calls. Of those having follow-up data at 12 months, the maintenance tele-

phone call score ranged from 0 to 9, with 22% receiving no maintenance calls and 49% receiving 5 or more maintenance calls.

STATISTICAL ANALYSIS

To compare baseline characteristics between intervention and usual care, and between dropout and completers at 12 months, we conducted *t* tests (for normally distributed continuous variables), Wilcoxon rank sum tests (for ordinal and nonnormally distributed continuous variables), and χ^2 tests (for dichotomous variables). For the dropout analysis, we also tested for intervention status \times dropout interactions using 2-way analysis of variance for continuous variables and logistic regression for dichotomous variables.

For the analyses of each outcome, we performed a repeated-measures analysis of covariance, (ANCOVA) with the 4- and 12-month visit outcomes being the response variable, intervention status, month (4 or 12 months), and intervention \times month interaction as the predictors, and baseline outcome, age, race, sex, body mass index, years with low back pain, severity of back pain in the 4 weeks previous to the baseline interview, and months since onset of last episode of back pain as covariates. This approach is equivalent to modeling the change scores adjusted for baseline. In addition, it assumes that the missing outcomes are missing at random. In other words, after adjusting for all covariates present in the model, missing values are not related to any other observed or unobserved variable. To support the missing at random assumption, we compared 4-month mean outcomes (adjusting for baseline outcome and the aforementioned covariates) between subjects who only completed the 4-month visit and those who completed both the 4- and 12-month visits. There were no significant differences among the primary outcomes.

To control the overall type I error for multiple hypothesis testing for the primary outcomes of interest (physical function, affect, and symptoms from the AIMS2, Roland ALBP-specific functional status, and patient satisfaction), we used Hochberg's sharper Bonferroni procedure.³⁵ In Hochberg's procedure, the *m* *P* values of interest (*m* = 5 in this case) are ranked from smallest (*i* = 1) to largest (*i* = 5). Tests are conducted in order from largest *P* value to smallest, and as soon as one test is significant, testing ceases and the remaining tests are declared significant. The *i*th *P* value is compared with the nominal level of significance of $\alpha / (m - i + 1)$, where α is the family-wise error rate desired. For our sample, we wished to control for a family-wise error rate of $\alpha = .05$, so the largest *P* value is compared with $\alpha/1 = .0500$, second largest with $\alpha/2 = .0250$, third largest with $\alpha/3 = .0167$, fourth largest with $\alpha/4 = .0125$, and smallest with $\alpha/5 = .0100$.

We evaluated the dose-effect of the intervention among those in the ALBP-SMP group. We conducted analyses similar to the intervention group analysis, except that intervention group status was replaced by intervention class score, short-term telephone call score, and maintenance telephone call score (described in detail hereafter) in the ANCOVA models.

RESULTS

Of 540 patients who initially fulfilled eligibility criteria, 281 (52%) were willing to participate. After excluding 47 patients who could not be reached after multiple attempts and 23 who became ineligible before baseline (ie, no telephone access), 211 patients were randomized to the intervention (n = 105) or control (n = 106) group. The patients' baseline characteristics are reported in **Table 1**. Mean age of the subjects was 46.4 years, 73.5% were female, and 59% were African American. Although randomized to group assignments, the groups differed at base-

line on self-reports of weekly time spent in aerobic activities. We controlled for this difference in the analysis because we adjusted for baseline scores in all outcome models. No other group differences were present at baseline.

INTERVENTION ATTENDANCE

Of 106 intervention patients randomized to the intervention program, 30 (28.3%) attended at least 1 class, 66 (62.3%) received the intervention by mail and class audiotapes with telephone follow-up, and only 10 (9.4%) received no intervention.¹⁰

FOLLOW-UP DATA

Of the 211 patients randomized, 139 (66%) (63 intervention, 76 control) completed 12-month interviews. Of the 72 patients who did not complete the 12-month interviews, 1 had a lost interview, 2 persons died, 17 declined because of health problems or other reasons, 12 could not

be contacted, 12 moved from the area with no forwarding address, and 28 had disconnected telephones. Compared with those who completed the study (**Table 2**), the study dropouts were significantly more likely to be in the intervention group ($P = .05$), younger ($P = .002$), using a muscle relaxant ($P = .05$), and enrolled from the emergency department for the qualifying visit ($P = .002$). Patients who did not complete the study reported significantly greater pain severity ($P = .01$), poorer emotional functioning ($P = .007$), worse physical functioning ($P = .03$), and lower self-efficacy to manage symptoms ($P = .03$) at baseline than those who remained. There were no differences in any of our secondary measures. These results are similar to those observed at the 4-month assessment.¹⁸ No subject who missed the 4-month visit returned for the 12-month visit, and all subjects who had follow-up data at either the 4-month visit alone or both the 4- and 12-month visits were included in the analyses.

PRIMARY OUTCOMES

Table 3 gives the unadjusted means for each outcome at baseline and 12-month assessments, as well as intervention effect estimates obtained from the ANCOVA models, 95% confidence intervals, and P values. For back pain symptoms, affect, Roland Disability Questionnaire (LBP-specific functioning), and patient satisfaction with back pain care, there were no intervention status \times month interactions, indicating that the effect of the intervention did not differ between 4 and 12 months. There was a significant intervention status \times month interaction for physical functioning (AIMS2) ($P = .02$), with physical functioning improved at 1 year but not at 4 months. During the follow-up period, the intervention group had significantly improved affect (ie, emotional functioning) and LBP-specific functioning compared with the control group (**Table 3**). There were no significant changes in the other primary outcomes, although we observed a trend toward improved symptom scores at both months ($P = .052$) and physical functioning at 12 months ($P = .02$) in the in-

Table 2. Baseline Comparisons Between Participants Who Completed and Participants Who Did Not Complete the 12-Month Follow-up Assessment*

Characteristic	Completed (n = 139)	Dropped Out (n = 72)	P Value
Randomly assigned to intervention	45.3	59.7	.05
Age, y	48 (14.2)	41 (14.0)	<.01
Used muscle relaxants	22.3	34.7	.05
Emergency department was place of treatment at enrollment	38.7	66.7	<.001
Severity of back pain	7.6 (2.4)	8.4 (2.6)	.01
LBP-specific functional status (Roland Disability Questionnaire)	13.9 (6.6)	16.7 (6.1)	<.01
Affect	4.2 (1.8)	5.0 (2.0)	.01
Self-efficacy	6.4 (1.9)	5.7 (2.2)	.03

*Data are given as percentage or as mean (SD). A higher score on lower back pain (LBP)-specific functional status indicates poorer functioning.

Table 3. Baseline and 12-Month Unadjusted Means (SD) on Primary Outcomes: Functional Status and Patient Satisfaction

Measure	ALBP-SMP		Usual Care		Effect* (95% CI)	P Value†
	Baseline (n = 77)	12 mo (n = 63)	Baseline (n = 87)	12 mo (n = 76)		
Functional status‡						
Symptoms	6.2 (2.2)	3.8 (2.5)	6.0 (2.2)	4.5 (2.4)	-0.65 (-1.31 to 0.01)	.052
Physical function	2.4 (1.7)	1.5 (1.2)	2.6 (1.6)	2.0 (1.8)	4 mo: 0.07 (-0.34 to 0.48) 12 mo: -0.56 (-1.03 to -0.09)	.74 .02
Affect	4.4 (2.0)	3.4 (1.9)	4.3 (1.8)	3.8 (2.1)	-0.57 (-1.00 to -0.15)	.009
LBP specific						
Functional status‡	14.7 (6.7)	9.1 (6.8)	13.9 (6.8)	11.3 (8.1)	-2.43 (-4.26 to -0.61)	.009
Patient satisfaction§	24.4 (5.0)	25.9 (4.6)	24.3 (5.7)	25.4 (5.4)	0.05 (-1.31 to 1.40)	.94

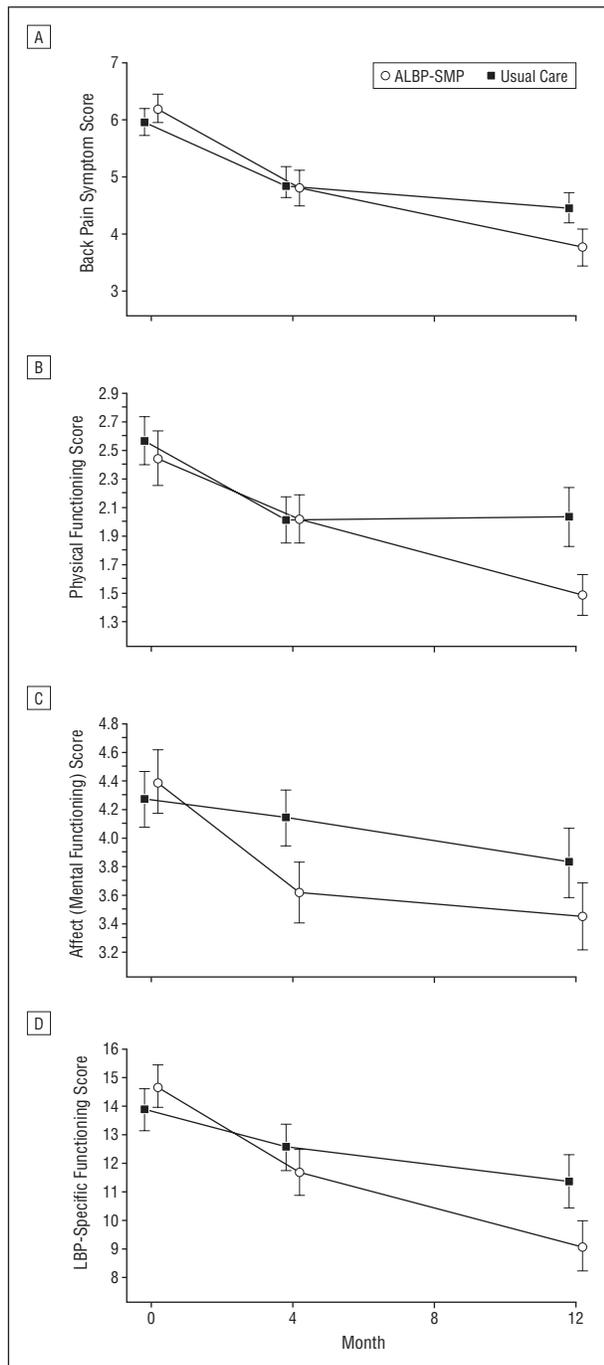
Abbreviations: ALBP-SMP, acute lower back pain (LBP) self-management program; CI, confidence interval.

*The intervention effect is estimated from a repeated-measures model adjusting for the baseline outcome and covariates. A negative value indicates that the ALBP-SMP group had a lower adjusted mean compared with the usual care group.

† P values reported are for the repeated-measures analysis of covariance F test of intervention effect or intervention effect \times visit in the case of physical function, where there was a significant treatment \times visit interaction ($P = .02$).

‡A higher score on functional status scales (Arthritis Impact Measurement Scales) and LBP-specific functional status (Roland Disability Questionnaire) indicates poorer functioning.

§A higher score on patient satisfaction indicates higher satisfaction.



Back pain symptom score (A), physical functioning (Arthritis Impact Measurement Scales) score (B), affect (eg, anxiety) score (C), and lower back pain (LBP)-specific functioning (Roland Disability Questionnaire) score (D) vs time in months. Lower score indicates fewer symptoms (A) or better functioning (B-D). Data are mean \pm 1 SE plotted at each visit. ALBP-SMP indicates acute low back pain self-management program. At baseline and 4 months: n=77 ALBP-SMP group, n=87 usual care group; at 12 months: n=63 ALBP-SMP group, n=76 usual care group.

intervention group. See the **Figure** for graphic representations of these results.

SECONDARY OUTCOMES

Results for the secondary outcomes are reported in **Table 4**. There were no significant intervention

status \times month interactions. Intervention status was significant at the .05 level for self-efficacy, fear/avoidance of activity, and total physical activity, with subjects in the intervention group reporting more self-efficacy, less fear/avoidance, and more time in total physical activity on average than the usual care group.

DOSE EFFECT OF INTERVENTION

To determine if the intervention dose affected patient outcomes, we created a scoring system to reflect the dosages of the intervention (see the "Methods" section).¹⁸ Consistent with the 4-month dose-response results, we found a significant dose-response effect for the intervention class score but not the short-term or maintenance telephone call scores for the LBP-specific functioning score and fear and avoidance. For each unit increase in intervention class score, LBP-specific functioning status decreased (ie, improved) by 0.3 units ($P=.04$), and fear and avoidance decreased by 0.3 units ($P=.03$) on average. We also observed that for a unit increase in intervention class score, positive talk increased by 0.1 units on average ($P=.01$) and decreased by 0.4 units on average ($P=.05$) for each unit increase in short-term telephone call score, with maintenance call score not being significant in this model. Finally, for each unit increase in maintenance call score, a 0.3-unit increase (worsening) in symptom score was seen on average at the 12-month visit ($P=.04$). There were no interactions between intervention dose and month observed, indicating that any dose effects observed did not change over time.

COMMENT

Previously, we found that a self-efficacy program for patients with ALBP improved short-term (4-month) outcomes. The results reported in this article extend our previous findings by demonstrating long-term effects of our program. More specifically, these patients reported improvements in mental functioning (ie, anxiety), and better physical functioning specific to low back pain. Compared with baseline values, patients in the intervention group improved 17% on the low back pain physical functioning score (ie, Roland Disability Questionnaire) after 1 year. Marginally significant improvements in back pain symptoms and general physical functioning were also reported. Our results are congruent with previous research that has reported improvements in specific low back pain physical functioning 3, 6, and 12 months after suburban primary care patients participated in a similar low back pain self-management intervention.^{14,17} Similarly, another back pain intervention that focused primarily on exercise also reported significant improvements in the specific low back pain physical functioning among intervention participants at 6 and 12 months later.³⁶

Role functioning and social support did not change across the study period. Furthermore, it appears that our intervention did not significantly affect patient satisfaction with back pain-related health care. It is unclear whether patients perceived the self-management pro-

Table 4. Baseline and 12-Month Unadjusted Means (SD) on Secondary Outcomes: Role Functioning, Social Support, Self-efficacy, Fear/Avoidance, and Self-management

Measure	ALBP-SMP		Usual Care		Effect* (95% CI)	P Value†
	Baseline (n = 77)	12 mo (n = 63)	Baseline (n = 87)	12 mo (n = 76)		
Functional status‡						
Role function§	3.5 (2.8)	2.6 (2.6)	3.4 (2.6)	2.5 (2.6)	0.04 (-0.71 to 0.78)	.92
Social support	3.5 (1.8)	3.7 (2.1)	3.8 (2.0)	3.9 (1.7)	0.15 (-0.29 to 0.59)	.499
Self-efficacy	6.1 (2.0)	7.2 (2.1)	6.4 (2.1)	6.6 (2.4)	0.62 (0.06 to 1.18)	.03
Fear/avoidance of activity	24.7 (6.9)	20.4 (6.1)	23.3 (6.6)	22.0 (7.6)	-2.35 (-3.96 to -0.74)	.005
Self-management¶						
Stretching	33.5 (54.4)	58.5 (56.6)	40.5 (58.3)	45.2 (57.3)	12.63 (-1.90 to 27.16)	.09
Strengthening	20.1 (46.0)	30.0 (52.6)	30.7 (55.7)	29.2 (54.8)	9.02 (-3.54 to 21.60)	.16
Aerobic exercise	65.4 (76.0)	83.6 (88.3)	90.4 (87.7)	76.5 (85.9)	13.60 (-12.26 to 39.45)	.30
Total physical activity	120.4 (137.9)	178.1 (149.3)	160.4 (168.9)	152.5 (159.3)	42.00 (0.63 to 83.37)	.047
Positive talk	2.1 (1.9)	2.1 (1.8)	2.4 (1.7)	2.3 (1.7)	-0.09 (-0.55 to 0.38)	.71
Relaxation	1.1 (1.5)	1.4 (1.4)	1.1 (1.5)	1.6 (1.7)	0.06 (-0.37 to 0.49)	.78

Abbreviations: ALBP-SMP, acute low back pain self-management program; CI, confidence interval.

*The intervention effect is estimated from a repeated-measures model adjusting for the baseline outcome and covariates. A negative value indicates that the ALBP-SMP group had a lower adjusted mean compared with the usual care group.

†P values reported are for the repeated-measures analysis of covariance F test of intervention effect.

‡A higher score on functional status indicates poorer functioning.

§Samples sizes for role function are approximately 25% lower than reported, as this scale is applicable only to those who are working.

||A higher score on self-efficacy and fear/avoidance indicates higher self-efficacy and fear/avoidance.

¶Stretching, strengthening, aerobic exercise, and total physical activity time scores are listed as minutes spent per week and are self-reported. Positive talk and relaxation score are frequency scores on a 0-5 scale.

gram as continuation of their back pain health care or as a separate program.

While emotional and tangible social support from family and friends to manage health did not increase, individual self-management did increase. Examination of the self-management processes indicated that patients in the intervention significantly increased their self-efficacy to manage their back pain and reduced their back fears and worries after 1 year of enrollment. Our results are similar to those from other rheumatic self-management programs. Various intervention modes of the Arthritis Self-management Programs have also found significant increases in patient self-efficacy.^{11,16} Furthermore, several studies of self-management programs among suburban primary care patients with low back pain also reported reductions in back pain fears and worries through out the 1-year follow-up period after the intervention.^{14,17} Disease self-management programs appear to diminish the psychological distress from living with a serious medical condition such as low back pain. Specifically, patients tend to reduce their fears about being physically active and further back pain, and long-term disability.

In addition to improving mental functioning (eg, anxiety and depression), the self-management program sparked behavioral changes. Intervention patients reported spending significantly more weekly time in activities promoted in the low back pain self-management program (ie, total physical activities of stretching, strengthening, and aerobic exercise) across the study period. Other self-management activities promoted, positive talk and relaxation, did not significantly increase among the intervention participants, suggesting that urban primary care patients living in the inner city are less interested in these cognitive self-management strategies.

Our data suggest that patients in the self-management arm began to implement self-management strategies and experience some improvements in functional status shortly after the intervention. However, the greatest improvement in functional status occurred 1 year later among urban primary care patients, suggesting that the greatest improvements occur after long-term implementation of self-management strategies.

Although we found that patients maintained their outcome improvements at 12 months, it is unclear which component of the multifaceted self-management intervention affected patient outcomes. Some significant dose-response effects were maintained from 4 to 12 months, and some were not. It is also unclear which mode of intervention delivery is needed for optimal benefits because of the lack of uniformity in the delivery of the intervention. Those randomized to the intervention group but who were unable to attend the group meetings received the class materials along with class audiotapes in the mail followed by telephone calls similar to an arthritis self-management mail program.³⁷ Recently, an Internet self-management program demonstrated improved health status among its discussion group participants after 12 months,³⁸ indicating alternative modes of intervention delivery may be just as beneficial as traditional group classes. Alternative intervention modalities are needed to reach a greater proportion of this inner-city population as 30% attended the traditional group classes and 60% received the materials through the mail with some telephone follow-up.

Follow-up was lower than anticipated; however, this was a mobile population as indicated by reasons for dropout. Patients lost to follow-up reported more severe back pain at baseline and were more likely to have been seen at the emergency department for their back pain at en-

rollment than those who completed the study. This may indicate that a portion of the dropouts were individuals who tended to present at the emergency department only when their pain was severe and were less likely to be interested in proactive intervention strategies. In addition, a greater proportion of the patients randomized to the intervention dropped out than those in the usual care arm. This is not surprising given the participation effort required in the intervention arm compared with usual care.

Because of the aforementioned differences between the dropouts and completers, our results may not be generalizable to the entire population of those with ALBP and it is possible our treatment effects may have differed if the treatment had been administered to the entire population of interest. Nonetheless, this is the first study that tested a self-management program for inner-city primary care patients with ALBP. Similar to other back pain self-management studies, we found improvements in patient functional status and self-efficacy to manage symptoms.

With the prevalence of low back pain, primary care settings are ideal for intervening. The results from this study support the hypothesis that low back pain self-management programs can effectively be offered adjacent to traditional medical care in urban, primary care clinics.

Accepted for publication January 23, 2003.

This work was supported in part by grant AR20582 from the National Institutes of Health, Bethesda, Md, and the HSR&D Department of Veterans Affairs, Research Career Scientist Program (Dr Weinberger) and Research Career Development Program (Dr Rao).

This study was presented in part at the annual meeting of the American College of Rheumatology; November 11, 2001; San Francisco, Calif.

Corresponding author and reprints: Teresa M. Damush, PhD, Regenstrief Institute Inc (RG6), 1050 Wishard Blvd, Indianapolis, IN 46202-2872 (e-mail: tdamush@regenstrief.org).

REFERENCES

- Bigos S, Bowyer O, Braen G, et al. *Acute Low Back Problems in Adults: Clinical Practice Guideline Number 14*. Rockville, Md: Agency for Health Care Policy and Research, Public Health Service, US Dept of Health and Human Services; 1994. AHCPH publication 95-0642.
- Deyo RA, Cherkin D, Conrad D, Volinn E. Cost, controversy, crisis: low back pain and the health of the public. *Annu Rev Public Health*. 1991;12:141-156.
- Wipf JE, Deyo RA. Low back pain. *Med Clin North Am*. 1995;79:231-246.
- Frymoyer JW, Cats-Baril WL. An overview of the incidence and costs of low back pain. *Orthop Clin North Am*. 1991;22:263-271.
- Callahan LF, Pincus T. Formal education level as a significant marker of clinical status in rheumatoid arthritis. *Arthritis Rheum*. 1988;31:1346-1357.
- Heistaro S, Vartiainen E, Heliovaara M, Puska P. Trends of back pain in eastern Finland, 1972-1992, in relation to socioeconomic status and behavioral risk factors. *Am J Epidemiol*. 1998;148:671-682.
- Hagen KB, Holte HH, Tambs K, Bjerkedal T. Socioeconomic factors and disability retirement from back pain: a 1983-1993 population-based prospective study in Norway. *Spine*. 2000;25:2480-2487.
- Baldwin KA, Humbles PL, Armer FA, Cramer M. Perceived health needs of urban African American church congregants. *Public Health Nurs*. 2001;18:295-303.
- Guo HR, Tanaka S, Halperin WE, Cameron LL. Back pain prevalence in US industry and estimates of lost workdays. *Am J Public Health*. 1999;89:1029-1035.
- Damush TM, Weinberger M, Clark DO, et al. An acute low back pain self-management intervention for urban, primary care patients: rationale, design and predictors of participation. *Arthritis Rheum*. 2002;47:372-379.
- Lorig K, Gonzalez VM, Laurent DD, Morgan L, Laris BA. Arthritis self-management program variations: three studies. *Arthritis Care Res*. 1998;11:448-454.
- Lorig K, Laurin J, Holman H. Arthritis self-management: a study of the effectiveness of patient education for the elderly. *Gerontologist*. 1984;24:455-457.
- Lorig K, Fries JF. *The Arthritis Helpbook*. 4th ed. Reading, Mass: Addison-Wesley Publishing Co; 1996.
- Von Korff M, Moore JE, Lorig K, et al. A randomized trial of a lay person-led self-management group intervention for back pain patients in primary care. *Spine*. 1998;23:2608-2615.
- Lorig KR, Sobel DS, Stewart AL, et al. Evidence suggesting that a chronic disease self-management program can improve health status while reducing hospitalization: a randomized trial. *Med Care*. 1999;37:5-14.
- Fries J, Carey C, McShane DJ. Patient education in arthritis: randomized controlled trial of a mail-delivered program. *J Rheumatol*. 1997;24:1378-1383.
- Moore JE, Von Korff M, Cherkin D, Saunders K, Lorig K. A randomized trial of a cognitive-behavioral program for enhancing back pain self care in a primary care setting. *Pain*. 2000;88:145-153.
- Damush TM, Weinberger M, Perkins SM. A randomized trial of a self-management program for primary care patients with acute low back pain: short-term effects. *Arthritis Rheum*. 2003;49:179-186.
- McDonald CJ, Overhage JM, Tierney WM, et al. The Regenstrief Medical Record System: a quarter century experience. *Int J Med Inf*. 1999;54:225-253.
- Moore JE, Lorig K, Von Korff M, Gonzalez VM, Laurent DD. *The Back Pain Helpbook*. Reading, Mass: Perseus Books; 1999.
- Bandura A. *Social Foundations of Thought and Action*. Englewood Cliffs, NJ: Prentice-Hall Inc; 1986.
- Lorig K, Lubeck D, Kraines RG, Seleznick M, Holman HR. Outcomes of self-help education for patients with arthritis. *Arthritis Rheum*. 1985;28:680-685.
- Meenan RF, Gertman PM, Mason JH. Measuring health status in arthritis: the Arthritis Impact Measurement Scales. *Arthritis Rheum*. 1980;23:146-152.
- Meenan RF, Gertman PM, Mason JH, Dunaif R. The Arthritis Impact Measurement Scales: further investigation of a health status measure. *Arthritis Rheum*. 1982;25:1048-1053.
- Meenan RF, Mason JH, Anderson JJ, Guccione AA, Kazis LE. AIMS2: the content and properties of a revised and expanded Arthritis Impact Measurement Scales health status questionnaire. *Arthritis Rheum*. 1992;35:1-10.
- Roland M, Morris R. A study of natural history of back pain: development of a reliable and sensitive measure of disability in low back pain. *Spine*. 1983;8:141-144.
- Deyo RA. Comparative validity of the Sickness Impact Profile and shorter scales for functional assessment in low-back pain. *Spine*. 1986;11:951-954.
- Deyo RA, Diehl AK. Patient satisfaction with medical care for low-back pain. *Spine*. 1986;11:28-30.
- Lorig K, Holman H. Arthritis self-efficacy scales measure self-efficacy. *Arthritis Care Res*. 1998;11:155-157.
- Lorig K, Stewart A, Ritter P, Gonzalez V, Laurent D, Lynch J. *Outcome Measures for Health Education and Other Health Care Interventions*. Thousand Oaks, Calif: Sage Publications Inc; 1996.
- Vlaeyen JWS, Kole-Snijders AMJ, Boeren RGB, van Eek H. Fear of movement/(re)injury in chronic low back pain and its relation to behavioral performance. *Pain*. 1995;62:363-372.
- Dexter PR, Wolinsky FD, Gramelspacher GP, et al. Effectiveness of computer-generated reminders for increasing discussions about advance directives and completion of advance directive forms: a randomized, controlled trial. *Ann Intern Med*. 1998;128:102-110.
- Weiner JP, Starfield BH, Steinwachs DM, Mumford LM. Development and application of a population-oriented measure of ambulatory care mix. *Med Care*. 1991;29:452-472.
- Tierney WM, Harris LE, Bates AS, Culler S, Wolinsky FD. Restricting Medicaid payment for transportation: effects on utilization and charges. *J Gen Intern Med*. 1995;10(suppl):126.
- Hochberg Y. A sharper Bonferroni procedure for multiple tests of significance. *Biometrika*. 1988;75:800-802.
- Moffett JK, Torgerson D, Bell-Syer S, et al. Randomized controlled trial of exercise for low back pain: clinical outcomes, costs, and preferences. *BMJ*. 1999;319:279-283.
- Fries JF, Carey C, McShane DJ. Patient education in arthritis: randomized controlled trial of a mail-delivered program. *J Rheumatol*. 1997;24:1378-1383.
- Lorig KR, Laurent DD, Deyo RA, Marnell ME, Minor MA, Ritter PL. Can a back pain e-mail discussion group improve health status and lower health care costs? a randomized study. *Arch Intern Med*. 2002;162:792-796.