Nurse-Led Pain Management Program: Effect on Self-Efficacy, Pain Intensity, Pain-Related Disability, and Depressive Symptoms in Chronic Pain Patients

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Abstract:

Nurses routinely use a variety of nonpharmacologic and patient education interventions designed to reduce pain and promote independence. Research on group programs that combine these nursing strategies in a systematic approach provides evidence that chronic pain patients can realize an enhanced confidence in their ability to manage pain (improved self-efficacy) in addition to reductions in pain, emotional distress, and disability. The purpose of this study was to investigate the effect of participating in a nurse-led cognitive-behavioral treatment (CBT) pain management program on self-efficacy, pain intensity, pain-related disability, and depressive symptoms among patients with chronic pain. Pre- and postprogram data from 154 participants were examined to identify changes in pain intensity, self-efficacy, disability, and depressive symptoms. Mean differences, effect sizes, and 95% confidence intervals were computed for the study variables and paired *t*-tests were done to determine if changes were significant. Z-scores were then calculated. Pearson product moment correlations were examined to test the association between changes in self-efficacy and changes in the other variables of interest. Patients in this study reported significant improvements in all scores postprogram. Self-efficacy, pain-intensity, pain-related disability, and symptoms of depression can be changed through participation in a nurse-led outpatient CBT program. In concert with results from other research on CBT pain programs this study provides further evidence that reduction in suffering and improved sense of well-being is possible even for people who have experienced pain for many years.
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Nursing history reveals a long tradition of comforting those who are in pain. A pioneer in pain management, Patrick Wall, acknowledged the contribution of nursing when he expressed his opinion that "nurses are the professionals best positioned to evaluate, understand, and appropriately deal with pain" (personal communication, August 8, 1999).

Nurses routinely use a variety of nonpharmacologic and patient education interventions designed to reduce pain and promote independence. These interventions include cognitive strategies such as education, goal-setting, and relaxation and imagery techniques, as well as behavioral strategies such as pacing activities, monitoring symptoms, seeking social support, exercise, and goal-directed coping (McCaffery & Pesaro, 1999; Wells-Federman, 2000). Acute Pain Management Guideline Panel (1992, 1994) established guidelines for the use of nonpharmacologic interventions demonstrated by research and expert opinion to be effective for the relief of acute and cancer pain.

Although these cognitive-behavioral techniques are considered adjunctive for acute and cancer pain, integrated cognitive behavioral treatment (CBT) programs have been designed as a distinct treatment modality for individuals with chronic pain (Turk, Meichenbaum, & Genest, 1983). After a thorough review of the literature, the National Institutes of Health Technology Assessment Panel (1996) concluded that CBT is an effective, but underused form of therapy for individuals with chronic pain. An integrated CBT program provides patients with the knowledge, attitudes, and practice opportunities to develop the skills needed to cope with the physical, cognitive, emotional, and behavioral consequences of living with chronic unremitting pain.

Research on CBT programs provides evidence that chronic pain patients can realize an enhanced confidence (likened to self-efficacy) in their ability to manage, cope, and function with pain (Bandura, 1997; Keefe, 2000). Improvements in self-efficacy have been associated with reductions in disability (Arnstein, 2000; Arnstein, Caudill, Mandle, Norris, & Beasley, 1999; Arnstein, Caudill, & Wells-Federman, 2000; Council, Ahern, Follick, & Kline, 1988; Dolce, 1987; Estlander, Vanharanta, Moneta, & Kaivanto, 1994; Flor& Turk, 1988; Keefe et al., 1999; Kores, Murphy, Rosenthal, Elias, & North, 1990) and emotional distress (Arnstein et al. 1999; Arnstein et al., 2000; Friedburg & Krupp, 1994; Gross, Conrad, Fogg, & Wothke, 1994; Wright et al., 1996) for patients with chronic pain.

The effectiveness of CBT has been reported for patients with a variety of chronic pain conditions, including rheumatoid arthritis (Applebaum, Blanchard, Hickline, & Alfonso, 1988; Bradley et al., 1987; O'Leary, Shoor, Lorig, & Holman, 1988; Parker et al., 1988; Radojevic, Nicassio, & Weisman, 1992; Shearn & Fireman, 1985), chronic musculoskeletal pain (Flor, Fydrich, & Turk, 1992); osteoarthritis (Keefe et al., 1990a, 1990b; Keefe & Caldwell, 1997; Keefe et al., 1999), low back pain (Basler, Jakle, & Kroner-Herwig, 1997; Moore, Von Korff, Cherkin, Saunders, & Lorig, 2000; Turner, 1982; Turner & Clancy, 1988; Turner & Jensen, 1993; Valaeyen, Haazen, Schuerman, Kole-Snijders, & van Eek, 1995), and fibromyalgia (Valaeyen, Teeken-Gruben, & Goossens, 1996).

The purpose of this study was to investigate the effect of participating in a nurse-led pain management CBT program on self-efficacy, pain intensity, pain-related disability, and depressive symptoms among patients with chronic pain.

METHODS

Subjects and Setting

A total of 376 consecutive chronic pain patients who completed questionnaires at the time of consultation with a pain specialist at a multidisciplinary pain clinic in a tertiary care referral center were studied. Physicians referred patients after they had undergone multiple evaluations and treatments that failed to relieve the patients' pain and suffering. A 10-visit outpatient cognitive-behavioral program was offered to patients with potential to benefit as part of a comprehensive multifaceted approach to managing chronic pain. Demographic, medical, psychological, and pain-related data were collected as part of the clinical evaluation. Signed consent forms were obtained to use the data for research purposes.

Seventy-six patients (20%) did not start the program, an additional 98 (26%) dropped out, leaving 202 (54%) patients who completed the program. The 46% attrition rate is consistent with rates of attrition reported in other studies of cognitive-behavioral programs (Biller, Arnstein, Caudill, Wells-Federman, & Guberman, 2000; Kerns & Rosenberg, 2000; Turk & Rudy, 1990). Of the 202 patients who completed the program, 154 (76%) patients consented to participate and provide complete data on both the baseline and postprogram questionnaires.

Instruments

Pain intensity–visual analog scale. A 10-cm horizontal line was used for the visual analog scale (VAS) anchored by "no pain" (0) and "worst pain" (10). Participants were asked before and after the program

to mark their level of pain "right now" on this line with a slash. During participation in the 10-session CBT program, patients were asked to monitor and record pain intensity three times per day. Average daily and weekly pain and distress scores were reported at each session. However, for study purposes, only pre- and postprogram VAS scores were used in the analysis.

The reliability (Seymour, 1982; Price, McGrath, Rafii, & Buckingham, 1983; Wewers & Lowe, 1990) and validity of the VAS as a measure of pain has been established in multiple, diverse populations (Bond & Pilowsky, 1966; McGrath, 1987; Serlin, Mendoza, Nakamura, Edwards, & Cleeland, 1995; McGrath, Seifert, Speechley, Boot, Stitt, & Gibson, 1996; Ogan, Krismer, Sollner, Kantner-Rumpmair, & Lampe, 1996) experiencing acute, chronic, or experimentally induced pain (Gaston-Johansson, Fridh, & Turner-Norvell, 1988; Price, McGrath, Rafii, & Buckingham, 1983; Scott & Huskisson, 1976).

Chronic Pain Self-efficacy Scale. The Chronic Pain Self-efficacy Scale is a 22-item questionnaire with three subscales for: pain management (five items); coping (eight items); and physical function (nine items). Responses to perceived ability (e.g., "How certain are you that you can. . .") to carry out the specified activity or achieve a specific outcome are recorded on a 10-point scale (by tens) from very uncertain (10) to very certain (100). A scale score is the mean response for that scale, and the total score is the sum of the scale scores.

Items for the Chronic Pain Self-efficacy Scale were derived from three sources: (1) the Arthritis Self-efficacy Scale originally developed and tested by Lorig and associates (1989); (2) prior research on self-efficacy beliefs in chronic pain; and (3) behaviors that have been empirically demonstrated to control pain and disability in chronic pain patients. Validity has been supported in a variety of populations with satisfactory internal consistency reliability estimates (α =. 90-.91) for the subscale and total scores (Anderson, Dowds, Pellez, & Edwards, 1995). In the current study sample, very good (α = .95) reliability estimates were obtained for the total score.

Pain Disability Index (PDI). The PDI is brief self-report inventory that consists of seven questions that measure the extent that pain interferes with daily living. Patients rate each item on an 11-point scale from "0" (no disability) to "10" (total disability) based on the degree that pain interferes with functioning in the following seven areas: home/family responsibilities, recreation, social activities, occupation, sexual behavior, self-care, and life-support activities (Pollard, 1984). The PDI has demonstrated good validity and reliability with a variety of chronic pain patients (Chinball & Tait, 1994; Gronblad, Jarvinen, Hurri, Hulpi, & Karaharju, 1994; Tait, Pollard, Margolis, Duckro, & Krause, 1987; Tait, Chinball, & Krause, 1990). The instrument reliability in the current sample was good (α = .85).

Center for Epidemiological Study–Depression Scale (CES-D). The CES-D scale is a 20-item self-report measure of depressive symptoms originally designed for use in the general population (Radloff, 1977). Each item (four reverse scored) asks how frequently a specific symptom was experienced in the past week, ranging from 0 (not even 1 day) to 3 (daily). The items include many of the important symptoms of depression according to the Diagnostic and Statistical Manual (4th ed.) criteria (American Psychiatric Association, 1994), with the exception of suicide. A total scale score (range, 0-60) reflects the number, frequency, and severity of currently experienced symptoms related to depression. The internal consistency reliabilities have been reportedly high (α = .85-.92) in the general population and patient samples, regardless of age, gender, geographic, and racial/ethnic subgroups (Radloff & Teri, 1986). The instrument's reliability in this sample was similar (α = .91). The reliability and validity of the CES-D has been supported in various samples (Radloff, 1977; Radloff & Teri, 1986; Weissman, Sholomskas, Pottenger, Prusoff, & Locke, 1977).

Like all available self-report instruments for depression, the CES-D lacks specificity, resulting in a 24% to 40% false-positive rate. Therefore, a high score is interpreted as evidence that the person is at risk for a major depressive disorder, and a clinical interview to establish a diagnosis is warranted. This false-positive rate is particularly high in the chronic pain population who experience neurovegetative changes or who are somatically focused because of their pain.

Turk and Okifuji (1994) tested the appropriateness of items, validity, specificity, and predictive value of the CES-D in a random sample of 100 chronic pain patients admitted to a chronic pain treatment center. Each patient had comprehensive medical, physical, and psychological evaluations in addition to the completion of the CES-D. The appropriateness of all items and the validity of using the CES-D "as is" in the chronic pain population was supported in this investigation. Recommendations for clinical interpretation of the results in a way that enhances the specificity and the predictive value of the CES-D were made using a "cut-off score" of 19 in this population (Turk & Okifuji, 1994). Similarly, Geisser and colleagues (1997) supported the predic-

tive validity of the CES-D in the chronic pain population. Further, they demonstrated that the CES-D had better sensitivity than the Beck Depression Inventory, especially when a "cut-off score" of 27 is used for the chronic pain population.

Procedure for Data Analysis

Descriptive statistics (e.g., means, medians, standard deviations, skewness) were computed for all study variables and examined for accuracy and the assumptions required for parametric testing including: normal distribution, homogeneity of variance, and a linear relationship between variables. Central tendencies were examined and reported for pre- and postprogram scores. Mean differences, effect sizes, and 95% confidence intervals (CI) were computed for the study variables as paired *t*-tests were run to determine if pre- to postprogram changes were significant for pain intensity, disability, depression, and self-efficacy. Z-scores for these changes were then calculated so that the scores of different measures could be compared directly and displayed. Pearson product moment correlations were examined to test the associations between changes in self-efficacy and changes in the other variables of interest.

Treatment Program

Despite the heterogeneity of the population, all patients were enrolled in the CBT program. An internist and two advanced practice nurses with more than 15 years of experience in chronic illness or pain management shared the responsibilities for the initial assessment and treatment plan, in addition to weekly follow-up for patients enrolled in the program. The two advanced practice nurses provided the treatment program. The intervention consisted of a cognitive-behavioral group pain management program that met once per week for 10 consecutive weeks. The program is detailed in the book, *Managing Pain Before It Manages You* (Caudill, 1995) (see Appendix A). Through exploring the role of lifestyle factors (e.g., diet, activity, physical and emotional tension) patients develop skills and make changes in their life that decrease symptoms, reduce health care visits, and increase self-efficacy (Caudill, Schnable, Zuttermeister, Benson, & Friedman, 1991; Friedman, Sobel, Myers, Caudill, & Benson, 1995; Morley, Eccleston, & Williams, 1999).

Table 1.
Demographic Profile of Sample

Age in years	46
Female gender (%)	75
Married/committed relationship (%)	61
Caucasian (%)	94
Education beyond high school (%)	76
Disability income (%)	31
Workers Compensation recipient (%)	22
Pain duration/months: (mean [median])	50 [29]
Opioid medication (%)	53
Antidepressant medication (%)	64
Working part or full-time (%)	35

RESULTS

Sample Characteristics

As displayed in Table 1 participants had a mean age of 46 years (standard deviation ± 12 years), with 94% Caucasians, 75% women, and 76% having at least some college education. Patients in this sample had long-standing pain (mean = 50 months, median = 29 months) representing a variety of chronic pain diagnoses such as low back pain, chronic headaches, fibromyalgia, and complex regional pain syndrome. Only 35% of the sample reported that they were working part- or full-time, 31% were receiving disability income, and 22% were covered by Worker's Compensation. Sixty-four percent reported taking antidepressants preprogram (74% postprogram,) whereas 53% reported taking opioids preprogram (54% postprogram).

Changes in Pain Intensity and Disability

As illustrated in Table 2, patients entering the CBT pain management program reported moderate levels of pain intensity (mean 6.3 on a 0 to 10 scale), moderate interference with activities (mean disability score 39 on a 0 to 60 scale), and relatively low self-efficacy scores (mean 138 on a 30 to 300 scale). Furthermore, the patients in this sample reported significant symptoms of depression (mean score 28 on a 0 to 60 scale). Seventy-one percent of this sample scored above the cut-offs suggesting a high risk for a major depressive disorder (Turk & Okifuji, 1994).

At the end of the 10-week treatment program, patients in this sample reported improvements in all scores (see Table 2). Pain intensity lowered (22%) to 4.9 and disability (18%) and depression (29%) scores were also reduced, whereas self-efficacy rose (36%). Table 2 details the mean differences reported with

TABLE 2.
Mean Scores for Variables of Interest Over Time

	Preprogram		Postprogram	
Sample Subgroup [range]	**Mean**	**SD**	**Mean**	**SD**
Pain intensity [.01-10]	6.3	2.6	4.9	2.5
Self efficacy (mean) [30-290]	138	58	187	63
Disability (mean) [1-70]	39	13	32	14
Depression (mean) [1-60]	28	12.7	20	12

Abbreviation: SD, standard deviation.

t-test results highly significant for pain reduction ($t = 5.6$, $p < .001$), lower disability ($t = 7.6$, $p <. 001$), fewer reported symptoms of depression ($t = 9.3$, $p < .001$), and enhanced self-efficacy beliefs ($t = -1.5$, $p <. 001$). In addition to statistical significance, the effect sizes and confidence intervals displayed in Table 3 support that meaningful changes have occurred. Using the nonparametric analog, a Wilcoxon matched-pairs test provided further support for the significance of these changes over time with the highest ranked changes noted in self-efficacy, followed by changes in depression, disability, and pain, respectively (see Figure 1).

Pearson product moment correlations supported the presence of statistically significant associations between changes in self-efficacy and changes in the pain, depression, and disability scores (Table 4). The greatest associations ($r = -.48$, $p < .01$) were noted between changes in self-efficacy and changes in the symptom of depression. Interestingly, changes in pain during program participation were not associated with changes in pain-related disability ($r = .14$, $p = .12$).

DISCUSSION

The results of this investigation provide support that advanced practice nurses can effectively facilitate an integrated cognitive-behavioral treatment program. By teaching patients specific knowledge and skills and positively reinforcing wellness behaviors, chronic pain patients improved their perceived ability to manage their pain, function, and ability to cope. They reported significantly less pain, depression, and pain-related disability at the end of the 10-session program.

In this sample, improved self-efficacy was associated with changes in pain, related disability, and depression. This is corroborated by other research indicating that higher levels of self-efficacy are associated with a lower level of disability (Arnstein et al., 1999; Arnstein et al., 2000; Arnstein, 2000; Council et al., 1988; Dolce, 1987; Estlander et al., 1994; Flor & Turk, 1988; Keefe et al., 1999; Kores et al., 1990), higher levels of functioning (Levin, Lofland, Cassisi, Poreh, & Blonsky, 1996), and improved mood (Arnstein et al., 1999; Arnstein et al., 2000; Friedburg & Krupp, 1994; Gross, Conrad, Fogg, & Wothke, 1994; Wright et al., 1996).

Despite the improvement in pain-related depressive symptoms postprogram, it should be noted that the mean score in this sample remained slightly above "19" after program completion. However, given the relatively brief treatment period of 10 weeks compared with the chronicity of symptoms (mean = 50 months, median = 29 months), one

TABLE 3.
Preprogram to postprogram Differences

Variable (range of scores)	Mean Difference	SD	*t*	Effect Size	95% Confidence Interval
Pain intensity (.01-10)	1.4	2.8	5.6***	0.5	0.9-1.9
Self efficacy (mean) (30-290)	–48.6	51.4	–1.5***	0.9	–57-–40
Disability (mean) (1-70)	7.1	11.3	7.6***	0.6	5.2-8.9
Depression (mean) (1-60)	7.5	9.6	9.3***	0.8	5.9-9

***Two-tailed $p < .001$

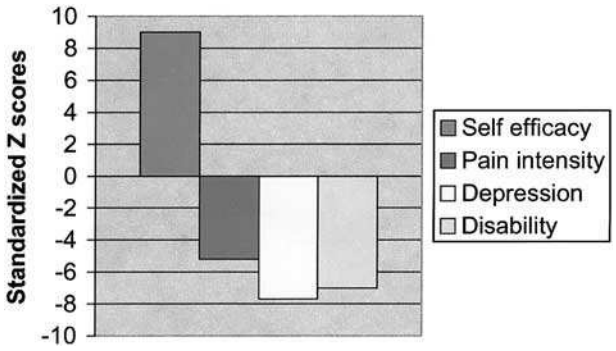


FIGURE 1. ■ Effect of cognitive-behavioral treatment program over time.

might not expect dramatic changes in depression. Given reports supporting self-efficacy as a partial mediator of subsequent depression and pain-related disability (Arnstein et al., 1999; Turner, Whitney, Dworkin, Massoth, & Wilson, 1995), and reports linking enhanced self-efficacy beliefs with clinical improvements (Arnstein, Wells-Federman, Caudill, 2002; Jensen, Romano, Turner, Good, & Wald, 1999), it is reasonable to expect a trend toward further improvement of depression.

Because the disabling and depressing impact of chronic pain can be buffered by self-efficacy, interventions designed to enhance self-efficacy should be implemented when possible. According to Bandura (1977; 1997) antecedents to self-efficacy include performance accomplishments, vicarious experiences, verbal persuasion, and optimizing emotional arousal levels. Nurses familiar with implementing treatments that provide knowledge about a patient's condition, opportunities for skills to be developed and support would ultimately enhance self-efficacy.

Limitations

There are several limitations to this study, including a limited ability to generalize to other chronic pain populations. Although this sample represented patients with pain related to a variety of etiologies, our population did not represent cultural, ethnic, or socioeconomic minority groups. Second, there was no control group against which comparisons could be made. It should be noted, however, that others have pointed to the ethical issue of a waiting list control group for patients with chronic pain as this would deny a potentially beneficial treatment to those in need (Peters, Large, & Elkind, 1992). There are reports of high dropout rates for wait list controls (Peters, Large, & Elkind, 1992) and that those patients do worse (Becker, Sjogren, Bech, Olsen, & Eriksen, 2000), pointing to the difficulties of including a control group in this type of clinical research. In addition, these changes occurred in a chronically ill population and although regression to the mean is possible, it is an unlikely explanation for the results.

A third limitation was the exclusive reliance on patient self-report. Although there is concern regarding the lack of correspondence between self-report and overt behavior (Toomey, Taylor, Skelton, & Carron, 1982), self-report is considered the gold standard for obtaining data about subjective phenomenon such as pain intensity (Acute Pain Management Guideline Panel, 1992, 1994) and related disability (Toomey et al., 1982). We recognize that some patients with chronic pain may either exaggerate or minimize their reports of pain or suffering. However, for such patients we assume that they will consistently either exaggerate or minimize reports of discomforts and the negative impact it has on their life for all study instruments.

Finally, although we used the most appropriate available information from research, theory, and

TABLE 4.
Correlations Between Changes in Self-efficacy and Changes Noted among Other Variables of Interest*

Model Variable	Change in Self-Efficacy Total score	Change in Disability	Change in Depression
Change in pain	–.27**	.14	.29**
Change in disability	–.37**	–	.32**
Change in depression	–.48**	.32**	–

*Change from pre to postprogram (Pearson *r* two-tailed†).

**Correlations significant at the $p < .01$ (two-tailed).

†Significance of all correlations confirmed using Spearman rho formula.

clinical evidence to distinguish the correct order of variables as determinants and outcomes, the cross-sectional nature of this analysis is not able to verify the direction of cause-effect relationships. Nevertheless, results from this investigation may be used to generate hypotheses for subsequent studies.

CONCLUSION

Although we have expressed several concerns with regard to the interpretation of these data, it nevertheless presents evidence to support the benefits of providing a comprehensive approach using cognitive-behavioral nursing interventions in the care of patients with chronic pain. Specifically, this research on a nurse-led CBT pain management program provides evidence that a reduction in suffering and improved sense of well-being is possible even for people who have experienced pain for many years. In addition, in concert with results from other research on the efficacy of cognitive-behavioral interventions, this study confirms that enhancing one's belief in the ability to manage pain, and to cope and function (improved self-efficacy) is an important contributor to improvements in pain intensity, function and mood.

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APPENDIX A

CHRONIC PAIN MANAGEMENT PROGRAM OUTLINE

Session 1

In this session, patients were introduced to the pathophysiology of chronic pain, the rationale for medical management and the reasons for the use of cognitive-behavioral treatment (CBT) interventions for managing pain. Homework was given, which included keeping daily pain sensation and distress diaries and recording and monitoring medication use and side effects.

Session 2

Patients were instructed in the elicitation of the relaxation response and were asked to listen to a relaxation tape daily. Breath awareness exercises were taught and patients asked to continue to chart pain diary recordings and elicit the relaxation response daily.

Session 3

Patients were taught to pace themselves by alternating activities that are more physically demanding with

those activities that are less physically demanding. They were instructed to describe physical sensations,including pain, in specific, qualitative terms instead of generic, global terms. Patients determine how they apportion their time and continued to keep diaries, elicit the relaxation response, and schedule healthy pleasurable activities.

Session 4

In this session patients are given nutritional guidance related to pain management, simple yoga exercises, and homework related to monitoring diet. They continued to monitor pain sensation and distress and elicit the relaxation response daily.

Sessions 5-10

Cognitive restructuring included the examination of automatic thoughts, cognitive distortions, and reframing. Skills are taught related to goal setting, assertive communication, and problem solving and coping strategies. Patients continued to keep daily diaries and practice relaxation techniques.