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EVALUATION OF EDUCATIONAL INTERVENTIONS FOR OSTEOARTHRITICS

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Abstract

This experimental field study evaluated educational interventions for osteoarthritics which focused on pain and disease management. One hundred-sixty subjects were obtained from four different settings. Using a factorial design, patients were randomly assigned to one of five treatment groups: (a) an information brochure only; (b) joint preservation teaching plus the brochure; (c) relaxation procedure plus the brochure; (d) relaxation procedure, joint preservation teaching and the brochure; and (e) no treatment. Effectiveness of each inter-

vention was determined by measures of pain and stiffness, amount of medication, mobility problems, changes in perceived level of stress, and knowledge gained about the illness. Both pre- and posttest measures were obtained. Residualized gain scores tested via a two-way ANOVA model demonstrated an overall significant decrease for pain (F [4, 140] = 2.45, $P < .05$). Post hoc analysis identified the source of the decrease to be the relaxation procedure. Another interesting finding was that pain-related stress increased for rural residents and decreased for urban residents. Significant increases in knowledge were found for subjects from a community center, a rural community and a university clinic. Subjects from a community center and a university hospital reported significantly less joint stiffness than subjects from a private hospital clinic.

Evaluation of Educational Interventions for Osteoarthritics

Due to the growth of the elderly population in the United States, a sharp increase in the incidence of osteoarthritis is occurring (U.S. Department of Health and Human Services, 1980). This increase has intensified interest among health care professionals to find newer treatment approaches for this ancient disease. Because of the increasing number of persons with functional impairment and disability as a result of osteoarthritis, it is now considered to be a significant arthropathy (Huskisson, 1979).

Osteoarthritis is a local disease characterized by narrowing of joints with proliferative degenerative changes at joint margins (Ehrlich, 1979). Originating in joint cartilage, degenerative softening

occurs, followed by surface alterations, with eventual cartilage collapse resulting in joint deformity (Sokoloff, 1979).

The symptoms of osteoarthritis, joint pain and stiffness, usually appear after rest but disappear with joint use. However, joint activity may also precipitate pain and discomfort which increases as the day wears on. In addition, pain may be experienced at night because protective splinting of muscles around joints disappears during sleep. Moreover, the degree of pain is not necessarily representative of the amount of disease; making the relationship nonmonotonic (Clark, 1976).

While there is growing refinement regarding the definition, diagnosis, and treatment of osteoarthritis, a factor often overlooked in its management is the provision of educational programs as an adjunct to patient care. Educating the osteoarthritic about the medical aspects of the disease, pain management, joint protection and preservation has implications for preventing premature joint crippling and diminishing the impact of the disease by fostering knowledgeable involvement in a therapeutic program.

The need for educational programs for the osteoarthritic was demonstrated by Dinsmore (1979) who reported that an informational program originally planned for 50 elderly persons with osteoarthritis, drew 150 requests for participation. Furthermore, Stross and Mikkelson (1977) reported that after an educational session related to osteoarthritis, 65 persons over 55 years demonstrated an increase in knowledge. Concomitant with more knowledge, improvement in well-being has been another objective for educating the person with osteoarthritis. Gould (1978) developed an educational series covering aspects of osteoarthritis that included principles of relaxation as a means of decreasing muscle tension and stress. Overall participants reported

having more positive feelings about themselves at the end of the series.

Generally, pain, muscle tension and stress are interrelated. Selye (1976) has established that there is a physiological connection between the phenomenon of pain and the stress response. Physical pain increases plasma cortical levels and interferes with normal cortisol circadian rhythms, both indices of physiological responses to stress. Conditioning factors that enhance or inhibit the stress response may be endogenous (genetic predisposition, age, sex) or exogenous (treatment with certain hormones, drugs, or dietary factors). In turn, behavioral responses can be either catatoxic (aggressive actions) or syntoxic (passive actions), the former being more physically harmful than the latter. These actions are under cognitive control, therefore, it is possible to consciously regulate responses encountered in everyday stress (Selye, 1976).

Adjusting to a life of chronic pain certainly may be a source of stress for the arthritic. Moreover, frequent and prolonged elicitation of physiologic changes associated with stress reactions have been implicated in the development of stress-related disease. Benson, Greenwood, and Klemchuk (1977) have demonstrated that prevention and treatment of stress-related disease is possible by evoking the relaxation response. The response can be achieved by various techniques, such as transcendental medication or yoga. The physiologic changes occurring during these procedures consist of decreases in oxygen consumption, respiratory rate, heart rate, and muscle tension--changes directly counteractive to the physiologic stress response (Benson, Beary & Carol, 1974).

Along with physiologic stress reduction, the relaxation response can also affect experienced pain. With relaxation, the anxiety accompanying pain lessens when muscle tension decreases; therefore, pain reduction may also be induced. Furthermore, since thoughts are distracted away from pain as the person concentrates on eliciting relaxation, alterations in pain perception could activate the spinal-gating mechanism to affect pain control (Melzack & Wall, 1965). Grzesiak (1977) demonstrated the usefulness of relaxation techniques for the treatment of chronic pain in spinal cord injured patients. He reported that when four subjects were taught to relax their muscles and refocus their attention onto pleasant images, less pain was experienced. Because of the small sample size, generalization of these findings are quite limited. Nevertheless, Grzesiak has demonstrated that positive outcomes can result when patients are active participants in the care process.

According to Orem (1971) "Ways of determining and meeting one's self-care needs are not inborn" (p. 14). Moreover, her definition of nursing focuses on the design, provision, and management of therapeutic activities aimed at self-care behaviors. The model suggests that self-care can be promoted in specific nursing care situations by way of sharing of knowledge necessary for incorporating therapeutic actions into patterns of daily activities. Therefore, the purpose of this study was to develop and evaluate educational interventions utilizable in a variety of settings, which focused on pain and disease management for osteoarthritics through participation in the care process.

This report will: (a) describe four variations of a teaching approach focused on pain and disease management in osteoarthritis; (b)

report the results of validity checks designed to measure the extent to which each intervention was operationalized; and (c) report the effectiveness of the four approaches on outcome measures indicating the extent to which patient education and/or pain control goals were achieved in clinical and community settings.

Method

An educational program for persons with osteoarthritis was tested for potential implementation in clinical and both urban and rural community settings. This required a factorial design in which each intervention was operationalized and manipulated as an independent component. The first intervention focused upon an explanation of osteoarthritis provided via an information brochure; the second utilized a nurse-taught approach focusing on joint management in addition to the information brochure; the third was a nurse-taught relaxation procedure plus information brochure; and the fourth intervention combined the nurse-taught joint management approach with the relaxation procedure and the information brochure. Effectiveness of the interventions were determined by measures of: (a) pain; (b) stiffness; (c) amount of medication; (d) mobility; (e) change in perceived level of pain-related stress; and (f) knowledge gained about osteoarthritis. Validity checks of the interventions included readability analysis of the brochure and analysis of typed transcripts of nurse-taught interactions.

The assignment procedure incorporated random assignment of volunteer subjects to experimental or control groups. In turn, the experimentals were randomly assigned to type of intervention. Except for the rural group, each experimental group for each site was composed of ten subjects; each control, of five subjects. In the rural sample

there were five subjects in each experimental group; five subjects in the control. Table 1 summarizes patient assignment to procedures according to research site.

Table 1

Design for Manipulating Approaches: Assignment of 160 Subjects

Intervention		Site			
		Community Center (n = 45)	University Hospital (n = 45)	Private Hospital (n = 45)	Rural Community (n = 25)
Brochure	(I)	10	10	10	5
Teaching + I	(II)	10	10	10	5
Relaxation + I	(III)	10	10	10	5
Combination of I + II + III	(IV)	10	10	10	5
Control	(V)	5	5	5	5

Sample:

The 160 subjects who participated in the educational program were from four different settings: an urban senior center (n = 45); outpatient clinics of an urban university hospital (n = 45); outpatient clinics of a private inner city hospital (n = 45); and a rural group from two small towns with populations less than 3,500 (n = 25).

All persons identified by chart review or who affirmed by self report that they had osteoarthritis were eligible for this study.

Table 2

Selected Sample Characteristics of 160 Persons with Osteoarthritis by Site

Sample Characteristics	Percentage by Site				
	Community Center (n = 45)	University Hospital (n = 45)	Private Hospital (n = 45)	Rural Community (n = 25)	Total Sample (n = 160)
Age (yrs)					
40-59	2	38	11	-	14
60-79	85	60	69	56	69
80-90+	13	2	20	44	17
Sex					
Male	29	22	13	16	21
Female	71	78	87	84	79
Race					
Black	-	49	24	-	21
White	100	51	76	100	79
Marital Status					
Single	4	6	4	16	7
Married	36	31	27	16	29
Sep./Div.	4	16	18	4	11
Widowed	56	47	51	64	53
Living Con.					
Alone	36	38	60	56	46
With others	64	62	40	44	54
Education (yrs)					
13 or more	31	6	11	20	17
9 to 12	38	51	33	40	41
8 or less	31	43	56	40	42
Work Status[a]					
Prof.-Manag.	18	2	2	16	9
Skill.-Tech.	13	6	13	12	11
Clerk-Sec.	29	16	11	8	17
Unskilled	27	56	51	48	45
Never Emp.	13	20	23	16	18
Emp. Status					
Employed	4	4	2	4	4
Homemaker	9	20	24	16	17
Unemployed	-	33	9	-	12
Retired	87	43	65	80	67

[a]Reported "work status" based upon subjects who were in and/or retired from the labor force, and were classified into groups using Hollingshead's (1975) Four Factor Index of Social Status as criteria.

Subjects were told that participation was totally voluntary, decision to participate would in no way effect their care, and confidentiality was assured. Written consent was obtained.

The resulting sample (Table 2) was heterogenous as expected; thus, potentially enhancing the generalizability of the findings. It should be noted, however, that a high proportion of persons were retired (67%). There may have also been over-representation of ethnic groups, caucasian (79%), and sex as evident by the relative high proportion of females (79%).

Measurement

Sixteen items made up the interview schedules. Each item was chosen according to criteria demonstrating documented usefulness from the literature. When possible, triangulation, that is, different measures of the same variable was used to enhance construct validity. Using this approach, items representing constructs such as pain, stiffness, medication-taking behavior, mobility, and pain-related stress were formulated and measured in the following manner:

Pain: Subjects were asked to indicate which word best described their usual arthritic pain (0 = none; 1 = mild, 2 = discomforting; 3 = distressing; 4 = horrible; 5 = excruciating) on the McGill pain intensity scale (Melzack, 1975). Next, information on pain frequency and pain duration was elicited then categorized according to response. Pain frequency was coded utilizing a seven point scale (0 = never; to 6 = all the time); pain duration was coded using a ten-point scale (0 = never; to 9 = all the time).

Stiffness: Quantifiable data were obtained as follows: Degree of stiffness was assessed using a four-point scale (0 = none; 1 =

mild; 2 = moderate; 3 = severe); information related to duration of stiffness was coded using a ten-point scale (0 = never; to 9 = all the time).

Medication-taking behavior: Prescribed medications for treatment of osteoarthritis were coded on a five-point scale (0 = none; 1 = analgesics; 2 = arthritis medication; 3 = codeine derivatives; 4 = combination of analgesics and arthritis medication). In addition, self reports of the amount and frequency of medication use were also obtained.

Mobility: Self-reports of ambulation difficulties, degree of assistive device use and related problems associated with osteoarthritis were also coded using similarly described rating scales. This method provided quantifiable data for mobility problems encountered inside and outside the home.

Pain-related stress: To provide a reference point from which pain-related stress could be evaluated, information on life stress was obtained first using a ten-step ladder scale. After scale end points had been defined in terms of least to most stress (one representing least; ten representing most), subjects were asked to indicate which ladder step represented the amount of perceived stress in their lives at the present time. Repeating this procedure, subjects were then asked to indicate the amount of stress their usual arthritic joint pain caused them.

Knowledge: Four questions were asked. The first two questions were developed for this study and the last two questions were from the McGill Pain Questionnaire (Melzack, 1975). The questions were as follows: (a) "In your own words, tell me what you know about arthritis?" (b) Tell me what you think is the most important thing you can do for

your arthritis?" (c) "What kind of things relieve your pain?" and (d) "What kind of things increase your pain? Responses to each question were coded using a five-point scale (0 = no knowledge; 1 = one correct statement; 2 = two correct statements; 3 = three correct statements; 4 = knowledgeable).

Reliability and validity for the McGill Pain Questionnaire has been established (Melzack, 1975; Brena, Chapman, Stegall, & Chyatte, 1979). Therefore, validity for the pain intensity scale and questions related to behavioral responses to pain taken from the McGill Questionnaire for use in this study is assumed.

To establish reliability for the interview items, a pilot sample of eight female nursing home residents (mean age 82.4 years, SD = 6.97) were administered interview schedules. This resulted in a Cronbach's alpha of .80 after a split-half approach for estimating reliability was used.

Procedure

Interviews were conducted before and two weeks after interventions were given. Protocols for interviews and interventions were as follows:

Preintervention interview: Open ended questions from the interview elicited the following: (a) sociodemographic data; (b) information pertaining to perception and knowledge of illness; and (c) information on pain intensity and behavioral responses to pain by the use of selected items from the McGill Pain Questionnaire (Melzack, 1975). In addition, subjects were asked to indicate on a ten-step ladder where they would place their perceived life stress and pain-related stress after end points had been defined in terms of best and worst possible conditions.

After the above data had been collected, the nurse investigator carried out the assigned intervention. At the end of the interaction, a follow-up telephone interview was scheduled with the subject.

Interventions: Patients assigned to Intervention I were given a brochure prepared by the Arthritis Foundation (1979) entitled, "So you have . . . Osteoarthritis". The brochure covered general information related to osteoarthritis, including definition of the illness, symptoms and how pain occurs, medications, physical therapies, and surgical procedures. Because the Arthritis Foundation is a professional organization with experts available to it, credibility and content validity for the information was assumed.

Reliability for implementation was achieved by the following: (a) explaining relevant passages from the brochure to ensure patient understanding; (b) pointing to appropriate pages to elicit comments from patients on the informational content; and (c) analyzing the written material using the formula developed by Flesch (1948) for readability.

Application of the Flesch formula for testing level of abstraction entailed the following: counting numbers of words contained in three randomly selected 100-word sections from the brochure, then counting word syllables, numbers of personal words, and sentence length which after averaging were placed into the appropriate formula: reading ease = 206.833 - .846 x averaged word length - 1.015 x averaged sentence length. This procedure resulted in a readability score of 55.25 which fell in the middle of the 50 to 60 fairly difficult reading range. Since the average number of years of education was at least eight (83.1% of the 160 subjects reported grade school graduation), it was concluded that persons in this study would not have dif-

ficulty understanding the brochure.

Patients assigned to Intervention II received the brochure plus a nurse-teaching approach on joint preservation which focused on promoting self care (Orem, 1971).

Joint preservation was taught by demonstration of range of motion methods; joint protection was taught through information on body mechanics. To provide a certain amount of uniformity, diagrams of range of motion exercises and written information on joint protection were given to each person in this group. Although some variability in the approach was inevitable, the content of the information given to each person remained the same.

Validity for content of this teaching approach was obtained from: (a) assessment of the individual's pain, knowledge, and methods of controlling pain; (b) information given to the person in the teaching program; and (c) authorities in the field of arthritis. For the latter, two major sources were used: Toohey and Larson (1977) and Watkins and Robinson (1974). Both works were compiled by experts for use by health care professionals and patients, thus content validity is supported.

Since site of pathological involvement varied between persons given the nurse-teaching approach on joint preservation, validity for implementation of this intervention was obtained by having two independent coders assess 20 typed transcripts randomly selected from a pool of 55. These transcripts were obtained from recordings of this intervention. On a five-point scale (very low to very high), coders were asked to judge to what extent the nurse: (a) assessed patient knowledge; (b) identified the person's needs; (c) did not use a didactic (lecturing type) approach; (d) individualized the intervention;

(e) adjusted material to the person's level of understanding; and (f) explored acceptability of the proposed solution with the person.

The results showed that 82.5% of the ratings fell within the extreme upper end of the scale (very high) and 17.5% within the next level (high), indicating that the teaching approach was adequately operationalized. Using Yates correction factor, a one-sample chi-square test for differences between observed and expected frequencies indicated that the possibility for obtaining a value of high as the $X^2_{.[1]} = 55.3$ value found for the coders' ratings was less than .001, thereby supporting that the teaching approach was utilized. Furthermore, a significant correlation ($r = .74$, $p < .005$) obtained between coder ratings of the scale's coded categories indicated that a certain measure of consistency in nurse-teaching approach for this intervention had also been achieved.

Patients assigned to Intervention III received the brochure and a demonstration of the Benson, et. al., (1977) relaxation technique modified for this study. Each subject in this group was instructed to relax in the following manner: (1) sit comfortably and close your eyes; (2) relax all your muscles; (3) breathe in and out slowly holding your breath to a count of one repeating this procedure five times; and (4) open your eyes and try to imagine something pleasant for yourself.

In order to determine whether the person understood, each technique was demonstrated by the investigator and a return demonstration was given by the subject. In addition, the subject was given written material outlining the technique along with an explanation of the usefulness of a quiet environment in facilitating relaxation. In these ways, validity and reliability for the intervention were enhanced.

Benson, et. al., (1977) do not give specific information regarding the validity of the approach except to note that the relaxation response has its roots in history and is reported as being used in various forms by both ancient and modern cultures. To validate the occurrence of the relaxation response, physiologic criteria related to changes incurred during relaxation have been reported (Benson, Alexander, & Feldman, 1975; Patel, 1973; Stone & DeLeo, 1976).

Persons assigned to Intervention IV received the brochure plus the nurse-taught approach on joint preservation and the relaxation procedure as previously described.

Patients assigned to Intervention V received no direct intervention as they were assigned as controls. However, after posttest data was obtained, the information brochure and materials related to joint management and relaxation, with an accompanying letter explaining the information, were mailed to each control subject.

Posttest Interview: Approximately two weeks after the initial interview, the subject was contacted by telephone. Initial questions asked at pretest were repeated (excluding sociodemographic information). These questions dealt with information on pain intensity, pain-related behaviors, stiffness, mobility, perceived level of pain-related stress and knowledge about osteoarthritic disease.

A total of seven subjects (four male and three females) were unavailable for follow-up interviews for the following reasons: patient hospitalized, spouse objected, phone disconnected, subject uncooperative, and subject unavailable. Analysis of subject attrition showed that the drop out rate conformed to no specific pattern across subgroups or sites. Since no violations in randomness of subject assignment had occurred, missing values were replaced by subgroup means.

Table 3

Summary Table of Adjusted Means for Dependent Measures by Intervention

Variable	Pretest Mean	(I) Brochure (n = 35)	(II) Teaching + I (n = 35)	(III) Relaxation + I (n = 35)	(IV) Combination of I + II + III (n = 35)	(V) Control (n = 20)
Medication-taking behavior	4.63	4.16	5.06	5.18	4.31	4.34
Mobility	4.54	5.16	4.93	4.59	3.99	3.65
Stiffness	4.76	4.82	4.97	4.88	4.73	4.17
Pain	10.63	11.73	11.13	9.65	10.14	10.40
Knowledge	11.84	11.77	10.64	12.64	12.31	11.85
Pain-related stress	0.93	0.57	1.04	0.75	0.95	1.62

Table 4

Summary Table of Adjusted Means for Dependent Measures by Site

Variable	Pretest Mean	Community Center (n = 45)	University Hospital (n = 45)	Private Hospital (n = 45)	Rural Community (n = 45)
Medication-taking behavior	4.63	3.85	4.81	5.38	4.37
Mobility	4.54	4.09	4.45	5.31	4.14
Stiffness	4.76	4.11	4.38	5.82	4.69
Pain	10.63	10.68	10.65	10.74	10.29
Knowledge	11.84	12.34	12.68	10.00	12.73
Pain-related stress	0.93	0.55	0.41	1.08	2.30

Results

Using an International Business Machine (IBM) computer program, pre- and posttest measures were reduced and grouped under the following variables: pain, stiffness, medication-taking behavior, mobility, pain-related stress and knowledge. From these six resultant variables, residualized gain scores were generated and tested using two-way analysis of variance (ANOVA) models that compared interventions with research sites. Adjusted means for type of intervention and research sites as predictors on the six criterion variables are presented in Tables 3 and 4.

Results from the two-way ANOVA models with post hoc analyses are summarized as follows:

Pain: A significant main effect for type of intervention (F [4, 140] = 2.45, $P < .05$) was observed. No main effects for sites or interaction between interventions and sites were found. To isolate type of intervention, t tests for differences among several means were performed (Bruning & Kintz, 1968). The value for critical differences (C. diff.) at the alpha .05 level for group contrasts was C. diff. = 1.51. The results showed that subjects who received the relaxation procedure (Intervention III) reported significantly less pain (C. diff. = 2.08) than subjects who received the brochure (Intervention I). Subjects who received the combined approach (Intervention IV) also reported significantly less pain (C. diff. = 1.59) than subjects assigned the brochure. No significant differences between other intervention group or intervention groups and controls were found.

Stiffness: A significant main effect for sites was found (F [3, 140] = 2.77, $P < .05$) although no main effects for interventions or interaction between site and intervention were evidenced. To isolate

these effects, t tests for differences among site means were performed. The critical difference at alpha .05 level was C. diff. = 1.33. Subjects at the community center (C. diff. = 1.71) and at the university hospital (C. diff. = 1.44) reported significantly less stiffness than subjects at the private hospital site. No other significant differences were observed.

Medication-taking behavior: No significant main effects or interactions between interventions and sites were found.

Mobility: No statistically significant findings for the two-way ANOVA model comparing interventions with sites were observed.

Pain-related stress: Only a significant main effect for research sites was observed (F [3, 140] = 3.65, $P < .05$). When sites were compared using the t test (critical difference = 1.10, at alpha .05 level) subjects at the rural community reported significantly more stress when compared with subjects at the community center (C. diff. = 1.75), university hospital (C. diff. = 1.89), and private hospital (C. diff. = 1.22). Other significant site differences related to pain-related stress were not found.

Knowledge: Although no main effects for interventions or interaction between interventions and sites were evidenced, a main effect for research sites occurred (F [3, 140] = 3.10, $P < .05$). Sites exceeding the critical difference of 2.18 (alpha .05 level) for t test multiple group comparisons were community center (C. diff. = 2.34), university hospital (C. diff. = 2.68) and rural community (C. diff. = 2.73) when individually compared with the private hospital site. No further significant site differences were found.

Discussion

Although no single educational intervention for osteoarthritis

management demonstrated sufficient patient benefit to rationalize adoption into routine nursing practice, evidence was found to support further development of certain approaches to enhance their impact on outcome measures. For instance, a statistically significant effect of the relaxation intervention was found on the outcome measure for pain when compared with the teaching, brochure only, and control group. Because conscious relaxation results in thought distraction from pain while incurring muscle relaxation, stimulation of the gate control or other biological mechanisms to effect pain was a possible outcome for persons who practiced this technique. According to Stewart (1976), "the combination of conscious relaxation and regular rhythmic breathing is a formidable barrier to pain. The total elimination of pain is not expected; the ability to deal with it is the desired outcome" (p. 958). Therefore, it could be speculated that persons taught the relaxation procedure may have learned an effective method for controlling joint pain. Further support for the utility of the relaxation method can be noted in the fact that, person assigned to the combined approach (which included relaxation), also reported decreased pain.

Even though no specific intervention could be identified, significant decreases in stiffness were also reported by subjects at the university hospital and the community center when sites were compared. Certain patient characteristics might help account for this finding. The subjects at the university hospital site were younger than subjects at the other three locations; persons at the community center though of comparable age to subjects at the other two sites were a more active group, as was evidenced by participation in recreational activities. It is surprising, though, that improved ambulation was not reported (with decreased stiffness).

A somewhat surprising finding was the significant increase in pain-related stress reported by persons at the rural community. One explanation for this could be that the nurse-patient contact which focused upon pain (a rare event in the rural area) may have effected increased stress levels in these persons. Another explanation may be that the increased stress levels indicated a need for further nurse-patient contact. This contention is supported by the fact that during the initial contact, subjects stood in line waiting to be interviewed.

Nonetheless, persons living in urban areas such as the community center, university hospital and private hospital reported less stress when compared with the rural residents. Even though stress reduction could not be attributed to a specific intervention, it is speculated that persons taught range of motion exercises and relaxation procedures may have experienced less stress since both procedures are effective methods of pain control. As pointed out by Smith and Selye (1979) one way a nurse can help a patient reduce stress is to educate the individual on how to control stressors (such as pain). Further support that exercise and relaxation may have effected stress reduction is gained by the fact that no significant changes in medication-taking practices occurred.

Furthermore, significant increases in knowledge were reported by persons at each research site except the private hospital. Since each person assigned to an educational intervention received the information brochure, the lack of identification of a specific intervention related to knowledge gained about the illness is not unexpected. However, it was unexpected that private hospital subjects reported no change in knowledge related to their illness. Since these persons were at the lower end of the educational continuum (56% reported an educational level of eight years or less) the acquisition of knowledge

related to their illness may have been difficult. Another explanation could be that due to reliance on private physicians, they lacked the motivation to learn about their illness and its management. Nevertheless, the majority of subjects in this study were motivated to learn, as reflected by the increased knowledge reported by persons at the community center, university hospital and rural community sites.

In general, approximately, half of the persons given exercise information, slightly less than half of those who received relaxation procedures, and about one-third who received the information brochure reported the information as useful. Since no marked differences were reported in the utility of the various educational approaches, support for any one over the other cannot be promoted. Nevertheless, the fact that a group of elderly persons cooperated with the instructional interventions and were receptive to learning about osteoarthritis demonstrated a need for patient education in this area. According to Hollingsworth (1980), "sometimes a modest gain may represent a major gain in the ability of the older patient to function and to remain independent. No patient is more grateful than the arthritic who lives with constant pain" (p. 228). Therefore, the expressed usefulness of the educational materials along with the minimal dropout suggests that persons participating in this study were generally satisfied with the interventions.

Another indication of patient satisfaction was the significant gain in knowledge about the illness shown by subjects at three of the four settings. With regard to learning in the older person, Schaie (1975) pointed out that the elderly are not less intelligent than younger persons, but may appear so because their educational backgrounds differ; consequently, an older person's ability to learn may

be underestimated. The increased knowledge reported in this study reflected the capability of elderly persons to learn about disease management. Therefore, it may be speculated that educational programs related to osteoarthritis and its management need to be developed and implemented since education in this area may also be perceived as helpful by other elderly persons.

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