Effectiveness of Patient Education and Psychosocial Counseling in Promoting Compliance and Control Among Hypertensive Patients

Pamela A. Webb, PhD
San Francisco, California

Compliance with physician recommendations among long-term hypertensive patients can be a chronic and difficult treatment problem. This study evaluated the relative effectiveness of additional patient education and psychosocial counseling in improving patient compliance. At a family practice clinic, 123 low income, rural, black hypertensive patients were pretested on several psychological characteristics and randomly assigned to one of three groups: vigorous, group patient education and family physician appointments; supportive, individualized psychosocial counseling and family physician appointments; or family physician appointments only, which was the baseline medical care. Intervention and follow-up each lasted three months, and the intervention was in addition to the patients' baseline medical care. Compliance was measured by: keeping follow-up appointments; bringing antihypertension medications to each appointment; consuming these medications; and diastolic blood pressure. Analysis of variance of group mean and change scores, t tests, and chi-square analysis indicated that neither additional patient education nor additional psychosocial counseling improved compliance or blood pressure control significantly better than regular family physician visits alone.

Poor patient compliance with physician recommendations is a major problem in treating chronically ill patients. Poor compliance represents a particularly difficult challenge in treating hypertension since only about 50 percent of hypertensive patients comply with their physicians' rec-

ommendations for keeping appointments, consuming medications, or attempting new dietary regimens.[1-4] Uncontrolled hypertension poses a serious health threat, and thus hypertension represents a model system for studying methods to improve patient compliance.

A major task in treating chronically ill patients is the identification of strategies to improve compliance with physician recommendations. Patient education is intuitively attractive; however, prior research has shown education helped to improve compliance in some studies and to have had lim-

ited or no beneficial effect in others. For example, Walworth and Charman, Svarstad, and Inui et al found education and high blood pressure counseling improved compliance among hypertensive patients.[5-7] On the other hand, Sackett and his colleagues, McKenney et al, Aronow et al, and Tagliacozzo et al found education did not improve compliance or help to lower blood pressure.[8-12] These conflicting results may have been related to the extent to which patients were involved in the educational programs, since patient involvement appears to be an important factor in improving compliance.[13,14]

Psychosocial counseling may be an alternative approach for improving compliance, but there has been little research on its effectiveness. There is some evidence that stress may precipitate the onset of illness or the exacerbation of existing conditions.[15,16] Accordingly, the relationship between biofeedback, muscle relaxation training, and stress reduction, and their application in hypertension control, have been studied.[17] Similarly, psychosocial counseling provides patients with skills for coping with stress and anxiety and thereby may help hypertensive patients with high anxiety levels to achieve better compliance and disease control.

Perhaps the most important issue is identifying interventions effective for different types of patients. An intervention strategy that suits the particular needs of the individual patient is more likely to motivate that patient to comply with physician recommendations.[6,11] Several patient characteristics are thought to be related to compliance, including knowledge of disease, anxiety level, and locus of control orientation, measuring the extent to which an individual believes his actions alter events in his life.[1,18-20] Intervention strategies developed to improve compliance should take these patient characteristics into account. Accordingly, this study assessed the effectiveness of two intervention strategies in relation to the three patient characteristics, knowledge, anxiety, and locus of control. Supportive, vigorous group education was expected to be more effective among patients with a poor knowledge of hypertension and an internal locus of control which implies that the individual perceives himself to be in control of events in his life. By contrast, individual psychosocial counseling was hypothesized to be more effective among patients with a

high anxiety level and an external locus of control which suggests that the individual perceives forces other than himself to be in control of events in his life.

Methods

Group Assignment

Two hundred seventeen hypertensive patient charts at a rural health clinic were screened to determine patients who had: at least a one-year history of hypertension; uncontrolled blood pressure, defined as a diastolic blood pressure of 90 mmHg or higher[5,8,21] at least once during their previous two clinic visits; a current prescription for at least one antihypertension medication; who were between 20 and 80 years of age; and who were not currently under psychiatric care or taking antipsychotic medication.

By these criteria, 150 low-income black patients were eligible and 123 patients (26 men and 97 women) agreed to participate in the study. The sample size was adequate for data analysis at the .05 significance level with power set at .80.[22] The participants were the patients of 14 family practice residents (mean age 30 years) who were in their second and third postgraduate years of training at the family health clinic which was affiliated with the University of Miami Family Practice Training Program.

After obtaining informed consent, each patient was pretested using the Spielberger Trait Anxiety Inventory, the Nowicki-Strickland Locus of Control Scale, and a Knowledge of Hypertension Test developed specifically for this study.[23-25] The patients were then randomly assigned to one of three intervention groups: group patient education and regular physician visits (N=37); individual psychosocial counseling and regular physician visits (N=31); or regular physician visits only which was the control condition (N=55). The unequal number of patients in the three groups occurred because some patients were unwilling or unable to participate after group assignment was made but prior to intervention. The unequal group sizes did not introduce a bias, as t tests between group means indicated that there were no significant differences (P>.10) between the groups on age, sex, initial diastolic blood pressure, and scores on the patient characteristic scales (Table 1). The preintervention or initial diastolic blood pressure for each patient was obtained by averaging the diastolic

Table 1. Demographic Characteristics, Preintervention Diastolic Blood Pressure, and Patient Characteristics Scores by Group

Group	Mean Age (years)	Number of Men/Women		Initial Blood Pressure*	Knowledge† Score (max=18)	Anxiety† Score (max=71)	Locus of† Control (max=28)
Education	55.5	7	30	95.7	12.2	48.2	19.3
Counseling	55.7	7	24	93.2	13.8	46.6	17.2
Control	55.5	12	43	91.6	13.1	46.2	18.7
Total		26	97				

*Average of averages
†Group mean scores

readings for the two visits prior to intervention; the group means in Table 1 are an average of these preintervention averages.

The baseline medical care at the clinic for uncontrolled hypertension, which was the control condition, included regular, monthly appointments with the same resident family physician; blood pressure checks by a nurse and the physician; medication and dietary evaluations; and any patient education deemed necessary by the physician. Since the baseline care conformed to generally accepted treatment protocols, there was no attempt to change it, and the two interventions occurred in addition to the baseline care. When a patient's regular physician was unavailable, the patient was seen by the physician's resident partner. Faculty consultation with internists and family physicians was always available to the residents.

Educational Intervention

For the educational intervention, a trained nurse-health educator who was regularly employed by the clinic conducted three vigorous group education sessions spaced one month apart and each lasting one hour. Each session was designed to actively involve the patient-learner through group discussion and a technique called group decision making. This technique requires that the group openly vote to form a consensus as to what new behaviors they would endorse and adopt, and the technique has been effective in changing attitudes and behavior.[26,27]

The discussion in Session I focused on the causes, nature, implications, and treatment of hypertension; a film on hypertension developed by the American Heart Association was shown; and a group discussion on the importance of compliance followed. Session II focused on the importance of low fat and low sodium diets for hypertension control, and on the need for regular exercise. Session III was devoted to the variety of antihypertension medications and treatment rationales and possible medication side effects, taking care not to alarm patients about infrequent or short-term effects. All sessions were audiotaped to ensure reproducibility. Each session offered patients an opportunity to discuss their problems and/or questions, and group decision making was used by the patients during each session to mutually agree to more compliant behavior. Family members of several patients also participated in the sessions. Each session was followed by a regular appointment with the patient's family physician.

Counseling Intervention

For the counseling intervention, five trained social workers who were regularly employed by the clinic conducted three individual counseling sessions with each of their counseling patients. Each session lasted one hour, and there were three weeks between each session. Each social worker had at least six counseling patients.

A humanistic approach was used, with individual counseling sessions focusing on the problems of the individual patient as identified by the patient. The sessions included marital, family, employment, sexual, and financial counseling, with other family members included when appropriate to the problem, and social service agency referrals

Table 2. Postintervention Diastolic Blood Pressure and Compliance Scores by Group

Group	Mean Diastolic Blood Pressure (mmHg)			Kept Appointments (max=12)	Bringing and Consuming Medications (max=18)
	Preintervention*	Postintervention*	Difference		
Education	95.7	88.9	6.8	10.1	4.6
Counseling	93.2	87.4	5.8	11.2	5.0
Control	91.6	88.1	3.5	10.2	4.8
*Average of averages					

made as necessary. To provide the most support to each patient in order to alleviate life stresses, individualized counseling was used rather than standardized counseling protocols. Patients were urged to contact the social worker between sessions or at the conclusion of counseling if problems arose. To ensure experimental reproducibility, meticulous case notes were maintained for each patient encounter. Ten minutes of every session was devoted to systematic muscle relaxation training directed by the social worker, and patients were urged to practice muscle relaxation training at home. Each counseling session was followed by a regular appointment with the patient's family physician.

Control Condition

During the intervention phase, the control group patients had three regular family physician appointments at monthly intervals focusing on hypertension. Thus, the control group represented the baseline medical care at the clinic.

During follow-up, the patients in all three groups had three monthly physician appointments during which the physician collected blood pressure and compliance data. There were three behavioral measures of compliance: keeping follow-up appointments, bringing antihypertension medications to each appointment, and consuming medications as determined by a pill count. These compliance measures were scored on a ordinal scale, and scores for bringing and consuming medications were tabulated separately and then combined. The most credit was given if the patient kept an originally scheduled appointment and

correspondingly less if he kept a rescheduled appointment after missing the original, made an unscheduled walk-in visit, or completely missed appointments. Similarly, most credit was given if the patient brought and consumed all his medications, and less if he brought or consumed only some medications, and still less if he neither brought nor consumed any medications. The biomedical measure of compliance was diastolic blood pressure which the family physician recorded at each appointment using a sphygmomanometer arm cuff with the patient in a seated position. The patient's diastolic blood pressure was averaged for the three follow-up appointments, and the group means were an average of these postintervention averages. Diastolic blood pressure was recorded again at 9-, 15-, and 18-month follow-up visits.

Three-way analysis of variance and step-wise multiple regression were used to compare the groups on their average compliance and blood pressure scores as well as to compare changes in these group scores, and to determine the relative importance of the patient characteristics. Since the results were the same for both types of analysis, only the analysis of variance will be discussed. For purposes of statistical analysis, patients in the intervention groups were further subdivided according to their levels of preintervention diastolic blood pressure. These subgroups were delimited by decades of preintervention diastolic blood pressure, and the subgroups were compared using the chi-square test to determine if there were differences in the direction of diastolic blood pressure change between the intervention groups for patients at different preintervention blood pressure levels.

Table 3. Percentage of Patients within Group with Controlled Diastolic Pressure: Preintervention and Postintervention (Six-Month Period)			
Diastolic Blood Pressure	Group (Percentage of Patients)		
	Education	Counseling	Control
90 mmHg or lower at preintervention= controlled	43.2	45.2	61.8
90 mmHg or lower at postintervention= controlled	63.9	53.3	66.0
Stayed below 90 mmHg from pre- to post-intervention	33.3	40.0	50.9
Dropped below 90 mmHg from pre- to post-intervention	30.6	13.3	15.1
Increase in control from pre- to postintervention	20.7	8.1	4.2

Results

The compliance and pre- and postintervention blood pressure scores for each intervention group are shown in Table 2. The return for follow-up appointment rates did not differ significantly between the groups.

Blood pressure levels improved in all three groups, and the rate of improvement was greatest within the education group (Table 3). For example, at postintervention compared to preintervention, almost 21 percent more patients within the education group had a diastolic blood pressure of 90 mmHg or lower vs 8.1 percent more for the counseling group and 4.2 percent more for the control group. However, by a chi-square analysis there were no significant differences in these rates of improvement between the groups or within the groups between the patients of different family physicians or different social workers (P>.10).

The analyses of variance based on mean postintervention scores indicated that neither education nor psychosocial counseling produced a significantly greater increase in compliance or diastolic blood pressure control than the control condition. It was hypothesized that high-anxiety patients and those with an external locus of control would benefit more from counseling, and that low knowledge and internally oriented patients would benefit more from education. However, these expectations were not supported since the interactions between the interventions and the patient characteristics were not significant for either the compliance measures or diastolic blood pressure (P>.10).

Analysis of variance was also used to examine group differences in the changes from pre- to postintervention diastolic blood pressure levels. Analysis of these group change scores prior to and following intervention did not reveal significant differences in diastolic blood pressure change between the groups (P>.10).

For purposes of statistical analysis, the patients within the intervention groups were further divided into subgroups according to the level of their average diastolic blood pressure prior to intervention. Decades of preintervention blood pressure were used to delimit the subgroups. Individual patients were then categorized as to whether their postintervention average blood pressure was higher or lower than their preintervention average blood pressure (Table 4). Chi-square analysis was employed to compare the number of patients in each intervention group whose diastolic blood pressure went up from preintervention to postintervention with the number of patients whose diastolic blood pressure went down for pa-

Table 4. Amount and Direction of Change in Diastolic Pressure from Pre- to Postintervention by Subgroups of Preintervention Diastolic Blood Pressure (percent patients* and average amount**)

Groups	Decades of Preintervention Diastolic Blood Pressure				
	70-80	81-90	91-100	101-110	111-120
Total Number of Patients at Each Decade					
Education	6	10	11	5	4
Counseling	8	6	10	5	1
Control	18	16	10	7	3
BP Rose					
Education					
Patients	83%	30%	27%	0	0
Average Amount	12.6	1.3	6.0	0	0
Counseling					
Patients	50%	33%	10%	0	0
Average Amount	8.0	6.0	6.0	0	0
Control					
Patients	67%	31%	10%	29%	0
Average Amount	7.9	9.8	3.0	16.0	0
BP Fell					
Education					
Patients	0	60%	73%	100%	100%
Average Amount	0	16.0	7.1	15.2	32.8
Counseling					
Patients	38%	67%	90%	100%	100%
Average Amount	4.3	13.0	8.0	12.6	28.0
Control					
Patients	22%	63%	90%	71%	100%
Average Amount	4.0	9.9	14.2	14.8	13.3
BP Same					
Education					
Patients	17%	10%	0	0	0
Counseling					
Patients	13%	0	0	0	0
Control					
Patients	11%	6%	0	0	0

*Percent=percent of patients at that decade of preintervention blood pressure
**Average Amount=amount of rise or fall in blood pressure in mmHg divided by number of patients at that decade of preintervention blood pressure

tients who were at the same decade of preintervention blood pressure. The objective was to determine if there were differences between the intervention groups in the direction of diastolic change in order to ascertain whether the three intervention strategies were differentially effective for patients at different preintervention diastolic blood pressure levels. The results indicated that when patients were categorized according to decades of preintervention diastolic blood pressure level, there were no significant differences by chi-square analysis between the intervention groups in the number of patients whose preintervention blood pressure rose following intervention vs those whose preintervention blood pressure fell following intervention ($P>.10$). In summary, there

**Table 5. Average Diastolic Blood Pressure
and Percentage of Controlled Patients
by Intervention Group at 9-, 15-, and 18-month Follow-Ups**

Group	Number of Patients	Blood Pressure* (mmHg)			Percentage Controlled**		
		9 months	15 months	18 months	9 months	15 months	18 months
Education	31	92.4	90.7	90.1	48%	61%	65%
Counseling	25	87.5	80.5	88.6	68%	72%	56%
Control	45	90.1	89.6	86.1	62%	58%	71%
Total	101						

*Blood pressure=average diastolic blood pressure calculated by totaling the diastolic blood pressure for all patients in that intervention group and dividing by the number of patients in that group
**Percentage controlled=number of patients with a diastolic blood pressure of 90 mmHg or lower divided by the total number of patients in that intervention group

were no significant differences in directional changes in diastolic blood pressure levels between the intervention groups for patients at different preintervention blood pressure levels.

The study patients' diastolic blood pressures were checked for purposes of the study at 9, 15, and 18 months following intervention. While the sample size was smaller due to attrition, further follow-up was deemed interesting and appropriate. The average diastolic blood pressure for each intervention group at 9, 15, and 18 months was calculated from each patient's actual blood pressure reading at the time (Table 5). The largest difference between the groups was at the 15-month follow-up, and the significance of the difference was analyzed by a t test between the group means. Fifteen months following intervention, the average blood pressure for the counseling group was significantly lower than that for the education (t_{51}=3.4, $P<.01$) and control group (t_{64}=3.2, $P<.01$). However, because these significant differences had occurred neither during the first three months of follow-up nor at the 9- and 18-month follow-ups, they were regarded as interesting but chance occurrences.

Discussion

Neither vigorous patient education nor psychosocial counseling, both in addition to high quality baseline medical care, was found to improve compliance or diastolic blood pressure control better than the baseline medical care alone among a sample of low-income, black, rural hypertensive patients. These results were obtained by three separate methods of data analysis, including: (1) analysis of variance of group average compliance and diastolic blood pressure scores; (2) analysis of variance of the differences in group average scores from preintervention to postintervention; and (3) chi-square analysis of the number of patients whose blood pressure levels either rose or fell from preintervention to postintervention. Furthermore, the intervention strategies were not differentially effective among patients at different levels of knowledge of hypertension and trait anxiety or with different locus of control orientations. These data support other studies that have found patient education to be ineffective for improving compliance or control in a variety of medical settings and for a variety of patients.[8-12] The present results suggest that psychosocial counseling by itself may be an ineffective strategy for improving compliance or diastolic blood pressure control.

Several methodological considerations are pertinent in interpreting the results. The first problem stems from the different number of subjects in each intervention group, and consequently, the

unequal number of patients at higher diastolic blood pressure levels within the three groups. While these inequalities did not appear to introduce a bias into the groups as determined by t tests for differences in demographic characteristics, preintervention diastolic blood pressure, and the three patient characteristics, the inequalities may have affected the analysis of the outcome measures.

Secondly, the process of measuring compliance itself introduces some experimental bias, known as the Hawthorne Effect. This effect results from the additional attention that all subjects receive as a result of being observed, regardless of their treatment group. All three groups improved in blood pressure control, with the Hawthorne Effect probably largely responsible for enhancing the patient-physician relationships within all three groups and thereby for improvements in the control group as well as the other two groups. With all groups improving in diastolic blood pressure control, the significance of any differences between the two treatments and the control group was reduced, thereby making the interventions seem less effective.

Thirdly, regression toward the mean may have reduced the significance of differences between the groups at follow-up. Regression toward the mean refers to the fact that the range of any set of group scores that are measured for the second time tends to become more narrow, and the scores cluster more closely around the original mean score for the group. Since diastolic blood pressure was measured both prior to and following intervention and averaged by patient and group, regression toward the mean may help to explain nonsignificant differences between the groups in postintervention mean scores. The group differences might have been more significant if these three methodological considerations had not intervened.

Despite these three methodological considerations, the evidence remains that additional education and counseling do not in themselves significantly improve patient compliance or blood pressure control when they occur in addition to regular, high quality baseline medical care by family physicians. This does not mean, however, that family physicians should not educate their newly diagnosed patients about their disease or should not refer patients for psychosocial counseling when their problems seem to merit it. One cannot conclude that the baseline medical care alone was sufficient for improved blood pressure control since more of the education and counseling patients improved in control at follow-up than the control group patients. While the educational program used was designed to be highly supportive and motivating, group patient education may not be sufficiently individualized to elicit significantly better compliance than the baseline medical care. On the other hand, the psychosocial counseling was designed to be an individualized intervention, and it did not lead to significant improvements in compliance or blood pressure control. It may be that anxiety management via psychosocial counseling is simply unrelated to health behaviors. However, the key to improved compliance may be the type of follow-up medical care after the intervention has ended.

The issue for improved compliance may not be whether the intervention has a group or individualized design, but whether the follow-up medical care is sufficiently individualized to assess individual problems and help patients resolve their difficulties with their particular regimens. Perhaps the educational and counseling programs should have incorporated regular follow-up contact between the physician, nurse or nurse practitioner, or physician's assistant and individual patients to determine problems the patient was encountering; provide hints for facilitating, and forms for recording, pill consumption; offer nutritional counseling; and generally support and reward the patient in his efforts toward compliance. Research by Sackett and his colleagues suggests that a patient education program in conjunction with this type of follow-up care, including rewards for controlled diastolic blood pressure, was more effective for improved blood pressure control than the education program was by itself.[28]

This type of individualized follow-up when undertaken by the physician may help to enhance the patient-physician relationship over time, and the quality of this relationship has been related to compliance. In fact, Becker and his colleagues demonstrated that when pediatricians had seen patients for a length of time sufficient to allow them to build a strong relationship with the young patients and their mothers, the mothers were more likely to follow the physicians' recommendations.[29] A further rationale for involving clinical

staff in more individualized follow-up care, whether undertaken by the physician, nurse, or physician's assistant, comes from Glogow's study which demonstrated that patients are more compliant when clinical staff request certain behaviors, for example, keeping follow-up appointments, than when a clinic secretary or desk clerk makes the request.[30]

Conclusions

In conclusion, neither group patient education nor individualized psychosocial counseling significantly improved patient compliance or blood pressure control when they occurred in addition to high quality baseline medical care by family physicians. Furthermore, the interventions were not differentially effective among patients at different levels of knowledge of hypertension and trait anxiety or with different locus of control orientations.

Perhaps education and counseling might enhance patient compliance among chronically uncontrolled hypertensive patients who are already receiving high quality medical care when these patients also receive more individualized follow-up care. Either the physician or another member of his clinical staff can undertake this care for three to six months after intervention with the aim of helping patients resolve their individual problems with taking their medications, following diets, and keeping appointments. Individualized follow-up care may further strengthen the relationship between the family physician and the patient and may thereby significantly improve patient compliance and disease control.

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