

Enhancement of Compliance Among Patients with Hypertension

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Abstract

Studies of patient compliance with medical advice consistently demonstrate a high level of noncompliance. Not following recommendations can have serious negative consequences in the management of disease. This study was an assessment of the effect on compliance of a longitudinal, individualized educational program for patients with hypertension in a managed care setting. A before-and-after self-paired design was used to assess the behavior of 107 patients with hypertension. Trained nurses using an interactive interview format reinforced prescribed treatment and provided appropriate printed material to participants. Brief telephone follow-up interviews at prescribed intervals were used to elicit problems, provide additional education, and reinforce compliance behaviors.

Most of the patients who participated showed a statistically significant ($P < 0.01$) decrease in both systolic and diastolic blood pressure. There was also an effect on various recommended behaviors, including compliance with medication taking, ideal body weight, salt restriction, stress, and exercise. A statistically significant relation existed between improved compliance with individual behavior changes and decreased blood pressure ($P < 0.01$). Elderly persons were particularly likely to show statistically significant reductions in blood pressure (75.4% versus 50.0%). A χ^2 test indicated that those differences were significant at the 0.01 level. A relatively inexpensive, office-based educational protocol can have a statistically significant effect on treatment compliance among patients with hypertension. The intervention has particular implications for geriatric patients, whose high blood pressure is disproportionately represented.

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Hypertension is a common chronic condition that contributes substantially to morbidity and mortality in the United States. It is estimated that 30 to 40 million adults in the United States meet the criteria for hypertension (antihypertensive drug therapy; systolic blood pressure, 140 mm Hg, or diastolic blood pressure, 90 mm Hg, on two or more occasions).¹ Among persons with hypertension, 84% are aware of the diagnosis, but only 55% achieve adequate control (blood pressure less than 160/95 mm Hg).² Despite advances in diagnosis and treatment, large numbers of patients continue to have poorly controlled blood pressure. Much of the shortfall can be attributed to patients' lack of compliance with recommended therapies.

Compliance has been defined as "the extent to which a person's behavior (in terms of taking medications, following diets, or executing life-style changes) coincides with medical or health advice."³ In the past 20 years, there has been a considerable amount of research on the topic. Perhaps the most striking finding to emerge from the literature is the extent of noncompliance. In an analysis of 537 original studies, Sackett and Snow concluded that across diagnoses, patient populations, and settings, compliance with long-term use of medications tends to "converge to approximately 50%."³ Studies looking at compliance with a variety of lifestyle regimens suggest even lower rates.^{4,5}

A number of factors influence compliance. The quality of communication is an important determinant of compliance behavior. At the most obvious level, communication involves the transmission of information. Studies have indicated that patients may not understand instructions and may forget as much as 40% of information conveyed to them by their physicians.⁶ The provision of written educational material can mitigate such problems, as can reinforcement through exit interviews.⁷ Ongoing patient education and reinforcement by physicians and other health professionals also can be beneficial.^{2,8,9}

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On a less tangible level, successful communication depends on the quality of the relationship between provider and patient. Patients are more likely to adhere to providers' recommendations when they perceive the provider as liking or accepting them.¹⁰ When the patient is enlisted as an active partner in the process, the success of the therapy is greatly enhanced.¹¹ The demonstration project described herein was designed to enhance patient-provider communication at the informational and relationship levels. The results of this intervention are presented.

... METHODS ...

Setting

Fallon Community Health Plan is a group-model health maintenance organization in central Massachusetts that has approximately 165,000 members. This includes more than 30,000 patients enrolled in a Medicare risk contract. The health plan contracts with the Fallon Clinic, a multispecialty group practice of more than 200 physicians that includes primary care and subspecialty physicians. Internal marketing studies indicate the patient mix is consistent with area demographics. Most patients are European in background and work in (or are retired from) blue collar jobs.

Each patient has a unified medical record. At the time of the study, all plan members had a pharmacy benefit that required a minimum copayment of \$2.00 per prescription filled in house. Previous internal research indicated that nearly all patients use this benefit. Computerized pharmacy records allow development of a medication utilization profile. Patient self-report can be validated at least in part by means of review of these records.

Sample Selection

Four internal-medicine nursing stations selected from a total of 28 participated in the study. These stations were chosen because of their central location, size, and ease of access to the investigators. Previous internal marketing studies indicated patient mix at these stations is representative of clinic-wide demographics. A time-limited study was conducted during the 6-month period from October 1990 through April 1991. The availability of study nurses during this 6-month period determined sample size.

Two nurses with extensive experience interviewing patients participated in this demonstration project. One nurse had 18 years of nursing experience

with a specialization in psychiatric nursing. The other nurse had 10 years of experience with expertise in cardiac rehabilitation and patient education. The study nurses each worked 20 hours per week on an as-available basis. They first reviewed charts of patients scheduled to be seen by any internal medicine physician who practiced at those stations during those hours. No physician-specific information was collected. Patients invited to participate had a pre-existing diagnosis of hypertension as determined at chart review and had documented potentially contributory factors such as being overweight, hyperlipidemia, or use of multiple medications.

Patients were eligible for the study if during the preceding 6 months (as documented at chart review) their systolic blood pressure was consistently 145 mm Hg or higher or their diastolic blood pressure was consistently 85 mm Hg or higher. Patients with newly diagnosed hypertension or transient elevated blood pressure were not included in the study. Of the 120 patients invited to participate, three refused, six left the health maintenance organization, one died, and three dropped out during the course of the study. Results are based on the results for patients who remained in the study for 1 year.

Intervention

In the second phase the same two nurses, designated as "treatment facilitators", conducted exit interviews with patients after physician appointments. Each interview lasted 30 to 40 minutes. During the interviews educational information based on information from the American Heart Association was provided to patients. To ensure consistency of approach, one of the authors (J.M.) observed the first five interviews of each nurse. Using the standardized questionnaire shown in Figure 1, the treatment facilitators gathered data on patient recall of recommended therapies and elicited self-reports of compliance. They also answered questions and reviewed and reinforced appropriate behaviors, including compliance with medication taking, weight loss, sodium restriction, exercise, and stress reduction. Status with respect to behavioral factors was determined on the basis of parameters detailed in the questionnaire (Figure 1). Weight was noted as an issue if according to the medical record, the respondent was 10% or more above the upper parameter of the ideal weight range used in the Metropolitan Life Insurance Tables.

With the form used at the initial interview, the treatment facilitators conducted telephone interviews 1, 3, 6, and 12 months after the initial interview to elic-

it self-reports of compliance with prescribed treatment. Questions and problems were explored, compliance behaviors were reinforced, and additional education based on American Heart Association guidelines was provided as needed. On the basis of their educational backgrounds, experience, and project-specific training, treatment facilitators were given considerable discretion in responding to patient questions. Issues of particular concern could be referred to the physician investigators. Follow-up interviews were conducted in the office suite of one of the authors (B.E.L.). Thus there was opportunity for many informal checks of content and style.

Institutional costs for the demonstration component of the program were limited to the salaries of the two part-time nurses and the nominal printing costs of the educational material. The nursing costs were less than \$25,000, including benefits.

Data Collection

Patient responses during the structured interviews were recorded by the treatment facilitators on the standardized forms at each contact. Whenever possible, information obtained through self-report was substantiated with objective data. Prescribed medication regimens, initial and final weights, and cholesterol level were corroborated by means of chart reviews.

Computer printouts of antihypertensive medications for each participant were hand tabulated. Totals were calculated for number of pills required to fulfill physician

Figure 1. Questionnaire Used in Interviews

Treatment facilitator _____
 Patient name _____
 Date of enrollment (MM/DD/YY) _____
 Date of birth (MM/DD/YY) _____
 Sex 1 = Male 2 = Female
 Date of treatment facilitator visit _____
 Date of phone call _____
 Blood pressure _____

MEDICATIONS

Number of hypertensive meds _____
 Was problem(s) noted in chart _____

SODIUM INTAKE

1 = Uses no salt; 2 = Rarely uses salt; 3 = Uses high sodium products; 4 = Adds salt to cooking/table; 5 = 3 Plus 4

WEIGHT REDUCTION

Patient height (inches) _____
 Patient weight _____

CHOLESTEROL/FAT REDUCTION

Cholesterol level _____
 Patient eats red meat 1=Rarely 2=Sometimes 3=Frequently
 Patient eats dairy products 1=Rarely 2=Sometimes 3=Frequently
 Patient eats high fat convenience foods 1=Rarely 2=Sometimes 3=Frequently

EXERCISE

1=Rarely 2=Sometimes 3=Frequently

TYPE OF EXERCISE

1=Walking	4=Weight training	7=Walk and Bike
2=Swimming	5=Jogging	8=Golf and Bowling
3=Biking	6=Other	9=Other combination

STRESS

1=Mild 2=Moderate 3=Severe

instructions. Medication compliance self-report was then corroborated by means of assessment of the difference between number of pills prescribed and number of pills dispensed.

... RESULTS ...

Participants had a median age of 69 years with a range of 25 to 92 years. Sixty-six percent of the patients

(*n* = 71) were older than 65 years. Fifty-seven percent were women. Average length of enrollment in the health maintenance organization was 6.6 years. Mean initial blood pressure was 159/85 mm Hg with a range of 112 to 212 over 50 to 110 mm Hg. Most of the participants (74.5%) had a decrease in at least one blood pressure parameter, and 37.9% had a decrease in both parameters. A *t* test indicated change in systolic pressure was significant at the .000 level and change in diastolic pressure at the .003 level (Table 1).

Compared with participants younger than 65 years, a greater proportion of elderly participants exhibited a decrease in both systolic and diastolic blood pressure (50.0% versus 75.4%) according to χ^2 analysis. The difference in proportions was statistically significant (*P* = 0.01). With respect to sex, 65.9% of men and 67.2% of women showed a statistically significant decrease in both parameters. There was not a statistically significant difference in response on the basis of gender.

In Table 2 status at baseline is compared with status at 1-year follow-up interviews for several variables. Only participants with an identified problem in the relevant variable at the initial interview are included in the analysis. Therefore, the numbers in some of

Table 1. Initial and Final Blood Pressure Values

	Initial Evaluation (0 Months)	Final Evaluation*	P Value
Number of patients with blood pressure data	107	107	
Mean systolic blood pressure (mm Hg)	159.5 SD = 16.6	147.9 SD = 17.1	.000
Mean diastolic blood pressure (mm Hg)	85.1 SD = 6.4	81.7 SD = 9.4	.003

*Charted blood pressure closest to 12-month follow-up interview

Table 2. Change in Blood Pressure According to Behavioral Changes

Behavior	Status at the Start of Intervention (0 months)	Status at the End of Intervention (12 months)	N	Mean Initial Blood Pressure (mm Hg)	Mean Final Blood Pressure (mm Hg)	P Value
Weight	10% or more over ideal weight	Lost weight	39	163/87	148/81	.001/.004
		Did not lose	25	154/82	149/81	NS
Salt Use	Use salt more than rarely	Never or rarely	39	160/87	148/82	.001/.001
		Still using salt	6	159/78	151/75	NS
Stress	Any stress	No stress	19	158/90	148/82	.047/.002
		Any stress	14	150/90	144/83	NS/.050
Medication Compliance	Under 90% compliance	More than 90%	7	163/81	143/74	.022/NS
		Less than 90%	19	163/87	150/83	.021/NS
Exercise	Never or rarely exercise	Never or rarely	26	161/86	151/85	.018/NS
		At least once a week	34	158/86	147/70	.004/.002

NS = Not significant.

the cells were too small to be statistically meaningful; they are included for informational purposes. For example, the weight analysis includes patients who were 10% or more above their ideal body weight as determined at chart review. For the purposes of the analysis, poor medication compliance was defined as filling less than 90% of prescriptions as determined by means of review of pharmacy records. Behaviors such as sodium use, level of stress, and exercise frequency were necessarily based on self-report. As the table makes clear, the intervention did have an effect on all behaviors targeted, although there was a wide range of variability. Participants who exhibited or reported a change in these behaviors also were more likely to show a reduction in blood pressure, a finding that was statistically significant.

... DISCUSSION ...

The purpose of this study was to devise a relatively inexpensive intervention with immediate practical application to a large busy group practice. To this end, the program was developed and piloted within the constraints of such a practice. The limitations of this study reflect this reality. The sample was drawn of necessity from patients who exhibited at least a certain minimal level of compliance in that they participated in follow-up care. Completely non-compliant patients were not included. Because sampling time was limited by budgetary constraints, enrollment did not occur during all clinic hours on all days. The nurses worked different hours on different days, however, and over the course of the study they enrolled patients with appointments at different times of the day. Although the issue of attention bias might be raised as a possible confounding variable, in the context of this study, it is a purposeful and powerful element of the intervention.

Overall, the results indicated that a nonintrusive educational program with relatively few resources can have a positive effect on patient behavior and blood pressure. Our results are consistent with those of studies of educational programs designed to improve compliance, which consistently show that savings due to improved compliance outweigh program costs.¹² For example, stroke is often a complication of uncontrolled hypertension. It has been reported that each year in the United States 500,000 persons have a stroke, for an estimated cost of \$25 billion.¹³ The prevention of even one stroke in the study population would more than offset the cost of the program.

In an extensive review,¹⁴ Kaplan suggested that most physicians do not emphasize educational and behavioral interventions because of perceived ineffectiveness and high cost. On the contrary, in this study, behavioral changes were associated with reductions in blood pressure. They also have the potential advantage of being low cost, causing minimal risk, and improving other conditions. Greater emphasis should be placed on such measures both as adjuncts to medical therapy and as definitive management of mild to moderate hypertension.² The results of this study indicate such interventions can be resource efficient and effective. For the program to be successful, however, consistent education and reinforcement of behavioral changes are needed.

This study has important implications for those providing care to elderly patients. High blood pressure is disproportionately represented among this population. However, physician concerns about drug interactions and poor comprehension and lack of motivation on the part of patients may lead to a reluctance to treat patients with geriatric hypertension. In a study with a geriatric population, Levine et al tested the common perception that elderly persons are at greater risk for noncompliance than are younger persons. They found, however, that among this population, appropriate education and treatment yielded 90% blood pressure control and a 50% reduction in hypertension-related mortality.⁶ In our study, elderly persons as a group were receptive to educational intervention. The elderly participants also had showed a greater reduction in blood pressure than did participants who were not elderly.

This program offers several potential benefits for both patients and staff. Most important is the potential to improve the compliance of patients with hypertension through a relatively inexpensive intervention. Another benefit is that communication is enhanced and misperceptions about treatment are more readily identified and corrected. This program also allows nurses to expand their educational role within the framework of the primary care team and thereby may enhance staff satisfaction. The program also provides a structured opportunity for nurses to function as physician extenders. Nurse visits conducted according to the study protocol might replace periodic routine hypertension checkups with physicians. This model can serve as a prototype applicable to a variety of other chronic diseases.

In this study, the intervention was used as a secondary prevention strategy. However, in the continuum of illness, the most cost-effective intervention is primary prevention. The National High Blood

Pressure Education Program Working Group in 1993 advised targeting particular groups at high risk for hypertension (those with a family history of hypertension, of African-American descent, or with high normal blood pressure) or who engage in contributing behaviors (are overweight, have a sedentary lifestyle, have a high sodium intake).¹ The protocol described herein has potential application as a primary prevention strategy. Such a program ideally can be applied to the general population, resulting in a downward shift of the entire distribution of blood pressure and a concomitant decrease in morbidity.

Improved compliance and the development of techniques that promote it have far-reaching importance. Studies of such programs consistently show that savings resulting from improved compliance outweigh program costs.¹⁴ Enormous resources are devoted to medical research in an attempt to elucidate disease processes and develop new interventions. Yet the ultimate value of any intervention depends on its application. Educational programs designed to improve compliance are a way to bridge the gap between medical knowledge and patient behavior.

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