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THE EFFECTS OF PATIENT OPERATED HYPERTENSION GROUPS ON COMPLIANCE IN HYPERTENSION TREATMENT.

THE UNIVERSITY OF ARIZONA, PH.D., 1978

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THE EFFECTS OF PATIENT OPERATED HYPERTENSION GROUPS ON
COMPLIANCE IN HYPERTENSION TREATMENT

by
Donald George Nessman

A Dissertation Submitted to the Faculty of the
DEPARTMENT OF PSYCHOLOGY
In Partial Fulfillment of the Requirements
For the Degree of
DOCTOR OF PHILOSOPHY
In the Graduate College
THE UNIVERSITY OF ARIZONA

1978

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SIGNED: Ronald H. Rossman
Dedicated to my wife, Sharon, and son, Sean, without whose loving help, patience, support, and hard work, this dissertation would not have become a reality.
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TABLE OF CONTENTS

Page

LIST OF TABLES ........................................ vii
LIST OF ILLUSTRATIONS ................................. ix
ABSTRACT .................................................. x
INTRODUCTION ............................................ 1

Hypertension--Medical Complications ................. 6
Hypertension Treatments ............................... 12
  Antihypertensive Drug Treatment ................. 13
  Behavioral Treatments .............................. 19
Patient Compliance ...................................... 24
  Factors Contributing to Patient Noncompliance 27
  Approaches to Increasing Patient Compliance 30
Summary of the Present Study ....................... 40

METHOD .................................................. 42

Subjects ................................................. 42
Procedures .............................................. 43
  Experimental Group .................................. 43
  Control Group ....................................... 46
  Dependent Measures ................................ 48

RESULTS .................................................. 53

Recruitment Rate ...................................... 53
Demographic Comparisons ............................ 53
Blood Pressure Results .............................. 56
  Diastolic Blood Pressures .......................... 56
  Systolic Blood Pressures ......................... 62
Pill Counts ............................................ 72
Attendance ............................................. 74
Hypertension Mastery Questionnaire ................ 74
Experimental Group Interactions .................... 80
  Frequency of Initiation ............................ 80
  Duration of Interactions ......................... 83
Patient Interviews .................................... 83
# TABLE OF CONTENTS—Continued

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISCUSSION</td>
<td>87</td>
</tr>
<tr>
<td>Sample</td>
<td>87</td>
</tr>
<tr>
<td>Blood Pressures</td>
<td>89</td>
</tr>
<tr>
<td>Pill Counts</td>
<td>95</td>
</tr>
<tr>
<td>Hypertension Mastery Questionnaire</td>
<td>97</td>
</tr>
<tr>
<td>Experimental Group Interactions</td>
<td>98</td>
</tr>
<tr>
<td>Implications of the Present Study</td>
<td>99</td>
</tr>
<tr>
<td>APPENDIX A. RECRUITING LETTER</td>
<td>107</td>
</tr>
<tr>
<td>APPENDIX B. PATIENT CONSENT FORM</td>
<td>108</td>
</tr>
<tr>
<td>APPENDIX C. DRUG TREATMENT PROTOCOL</td>
<td>111</td>
</tr>
<tr>
<td>APPENDIX D. CONTENT OF PATIENT OPERATED HYPERTENSION GROUPS</td>
<td>113</td>
</tr>
<tr>
<td>APPENDIX E. HYPERTENSION INFORMATION PROGRAM TRANSCRIPTS</td>
<td>118</td>
</tr>
<tr>
<td>APPENDIX F. HYPERTENSION MASTERY QUESTIONNAIRE</td>
<td>157</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>160</td>
</tr>
</tbody>
</table>
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Recruitment Rate</td>
<td>54</td>
</tr>
<tr>
<td>2.</td>
<td>Demographic Variables—Description of Experimental and Control Samples</td>
<td>55</td>
</tr>
<tr>
<td>3.</td>
<td>Demographic Variables—Experimental Versus Control Conditions; Chi-Square Analysis</td>
<td>57</td>
</tr>
<tr>
<td>4.</td>
<td>Diastolic Blood Pressures (in mm Hg), Experimental Versus Control ANOVA Results</td>
<td>59</td>
</tr>
<tr>
<td>5.</td>
<td>Diastolic Blood Pressures (in mm Hg)—Post Hoc Analysis Tukey (a) Test for Cell Means</td>
<td>60</td>
</tr>
<tr>
<td>6.</td>
<td>Diastolic Blood Pressures (mm Hg) Experimental Versus Control, ANOVA Results; 2 Month vs. 6 Month Follow-up (Unweighted Means Solution)</td>
<td>64</td>
</tr>
<tr>
<td>7.</td>
<td>Change Scores—Pretreatment Versus Posttreatment Diastolic Blood Pressures, Experimental Versus Control, t-Test Analysis</td>
<td>64</td>
</tr>
<tr>
<td>8.</td>
<td>Systolic Blood Pressures (in mm Hg), Experimental Versus Control, ANOVA Results</td>
<td>67</td>
</tr>
<tr>
<td>9.</td>
<td>Systolic Blood Pressures (in mm Hg), Post Hoc Analysis, Tukey (a) Test for Cell Means</td>
<td>68</td>
</tr>
<tr>
<td>10.</td>
<td>Systolic Blood Pressures (in mm Hg), Experimental Versus Control, ANOVA Results; 2 Month vs. 6 Month Follow-up (Unweighted Means Solution)</td>
<td>71</td>
</tr>
<tr>
<td>11.</td>
<td>Change Scores—Pretreatment Versus Posttreatment—Systolic Blood Pressure; Experimental Versus Control, t-Test Analysis</td>
<td>71</td>
</tr>
<tr>
<td>Table</td>
<td>Page</td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>12. Pill Counts—Experimental Versus Control, Compliant Versus Noncompliant Chi-Square Analysis</td>
<td>73</td>
<td></td>
</tr>
<tr>
<td>13. Compliance Analysis—Pill Counts</td>
<td>73</td>
<td></td>
</tr>
<tr>
<td>14. Weekly Attendance—Experimental Versus Control Subjects—Number Present and Percentages</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>15. Hypertension Mastery Questionnaire (Mean Number Correct), Experimental Versus Control Conditions—ANOVA Results</td>
<td>77</td>
<td></td>
</tr>
<tr>
<td>16. Hypertension Mastery Questionnaire—Post Hoc Analysis Tukey (a) Test for Cell Means</td>
<td>78</td>
<td></td>
</tr>
<tr>
<td>17. Experimental Group Interactions—Frequency Counts</td>
<td>82</td>
<td></td>
</tr>
<tr>
<td>18. Experimental Group Interactions—Duration of Comprehensible Interaction (in Seconds)</td>
<td>85</td>
<td></td>
</tr>
<tr>
<td>Figure</td>
<td>Description</td>
<td>Page</td>
</tr>
<tr>
<td>--------</td>
<td>-------------</td>
<td>------</td>
</tr>
<tr>
<td>1.</td>
<td>Cell Mean Diastolic Blood Pressures (mm Hg); Pretreatment, Posttreatment, and 2 Month Follow-up</td>
<td>58</td>
</tr>
<tr>
<td>2.</td>
<td>Cell Mean Diastolic Blood Pressures (mm Hg); 2 Month and 6 Month Follow-up</td>
<td>63</td>
</tr>
<tr>
<td>3.</td>
<td>Cell Mean Systolic Blood Pressures (mm Hg); Pretreatment, Posttreatment, and 2 Month Follow-up</td>
<td>66</td>
</tr>
<tr>
<td>4.</td>
<td>Cell Mean Systolic Blood Pressures (mm Hg); 2 Month and 6 Month Follow-up</td>
<td>70</td>
</tr>
<tr>
<td>5.</td>
<td>Hypertension Mastery Questionnaire—Mean Number Correct</td>
<td>76</td>
</tr>
<tr>
<td>6.</td>
<td>Experimental Group Interactions; Frequency Counts; Initiation of Exchange</td>
<td>81</td>
</tr>
<tr>
<td>7.</td>
<td>Experimental Group Interactions; Duration of Comprehensible Interactions (in Seconds)</td>
<td>84</td>
</tr>
</tbody>
</table>
ABSTRACT

Community surveys have indicated that blood pressures are significantly elevated in ten to twenty-six per cent of adult Americans. Even among persons who have been informed of the presence of hypertension or started on drug treatment, many fail to return for follow-up care or fail to continue to take their medications. This problem has been referred to as patient noncompliance. The frequency with which this problem is encountered may be due to the fact that hypertension is asymptomatic until life threatening complications develop, or due to medication side-effects or to the denial of susceptibility to the disorder and its complications. The causes of noncompliance may vary from patient to patient, but whatever the causes, inadequately treated hypertension is a major current health problem.

Patient operated self-help groups were utilized as a technique to increase compliance to treatment regimens. All subjects were patients who had previously dropped out of the traditional nurse-operated, physician-supervised hypertension clinic format. All subjects upon initial screening were found to have uncontrolled hypertension. Subjects were randomly assigned to either the patient operated groups or to a control condition. No significant demographic
differences were found between the samples in the two conditions. The patient operated hypertension groups sought to increase patient commitment, involvement, and self control in relation to their treatment and decisions relevant to it. The group patients monitored their own blood pressures weekly over eight weeks. They were actively involved in setting up and following through with their own treatment programs as well as providing each other with behavioral hints and support for increased compliance. The control condition treatment consisted of eight weekly individual patient-nurse contacts plus a tape recorded Hypertension Information Program. Past research had shown that educational programs were ineffective in increasing patient compliance; thus the control procedure was designed as an attention placebo treatment to equate for any possible Hawthorne effects that might be operative over the eight weekly meetings.

Dependent variables such as blood pressure readings, pill counts, attendance, and Hypertension Mastery Questionnaire scores were assumed to be measures which would be sensitive to and reflective of changes in patient compliance. At the start of treatment, there were no significant mean differences between the subjects in the two conditions on the dependent measures. The only exception to this was the systolic blood pressure readings of the Patient-Operated Hypertension Group members. Their systolic readings were
significantly higher than those of the control subjects. Comparison of the dependent measures from pretreatment to posttreatment showed that both conditions significantly decreased their diastolic and systolic blood pressures, increased their adherence to their prescriptions and increased their knowledge of hypertension related facts. Nevertheless, the Patient Operated Hypertension Groups were found to be significantly more effective in increasing compliance as measured by pill counts and attendance as well as decreasing blood pressures. The differences were maintained at the two month and six month followup occasions. The experimental groups remained significantly more compliant and maintained lower diastolic blood pressures. The exception again was systolic blood pressure for which, due to the greater lability and variance of such readings, the results were not as clear cut.

Both the Patient Operated Hypertension Groups and the control Hypertension Information Program were significantly effective in increasing compliance and thus, decreasing blood pressures. However, the Patient Operated Hypertension Groups were significantly more effective than the control procedures. The results revealed the impact that clinic format has on patient compliance. The results should be taken into account in the design of new programs or modification of existing hypertension clinics.
INTRODUCTION

Hypertension is a major health problem in the United States. Community surveys have indicated that blood pressures were significantly elevated in from 10 to 26 percent of adult Americans (Frohlich, Emmott, Hammarsten, Linehan, Pollack, and Horsley 1971; Wilber and Barrow 1972; Hames 1974; National Health Survey: Blood Pressure of Persons 18-74 Years 1975; Stamler, Stamler, Riedlinger, Algera, and Roberts 1976; Hypertension Detection and Follow-Up Program Cooperative Group 1977). In terms of numbers of people, that means there are from 20 to 49.5 million citizens with high blood pressure (diastolic blood pressure of greater than 90mm Hg) in this country. High blood pressure is a problem with significant impact on the lives of a great number of individuals.

The same surveys have shown that in most people with elevated blood pressure, their hypertension was either previously undetected, untreated, or inadequately treated. In the 1960's and early 1970's, the situation was such that the "rule of halves" was formulated (Stamler 1973). This formula stated that one-half of all hypertensives are not detected, one-half of the known hypertensives are untreated, and one-half of the treated hypertensives are inadequately treated. In other words, only one-eighth of the total number
of hypertensives were detected and adequately treated. As a result of such a situation, there was an expanded effort at detection and treatment of hypertension. This effort has led to some increases in public awareness but despite this, the situation remains intolerable. Stamler et al. (1976) found that the challenge of undetected, untreated, and uncontrolled hypertension remained. They found that previously undetected hypertension was present in 27.7%, detected but untreated in 10.7%, and treated but uncontrolled in 16.7%. The Hypertension Detection and Follow-Up Program Cooperative Group (1977) found that 36% of the persons screened were newly detected hypertensives while 24% were previously detected but untreated and only 25% had their hypertension under control. The rates found by Wilber and Barrow (1972) still apply to hypertension treatment. It was found that for each 100 persons screened, 25 were found to have elevated blood pressure, 16 reached a physician for diagnosis and treatment, eight continued treatment, and four achieved blood pressure control for at least one year. It is apparent that despite the increase in nationwide blood pressure screening programs and increasing numbers of hypertensives being detected, the problem still centers around the fact that even with individuals who have been informed of the presence of hypertension or started on drug treatment, many will fail to return for follow-up care or fail to continue to take their medication. Thus, the primary problem
that has hindered successful treatment of hypertension is patient noncompliance.

Noncompliance may manifest itself at any point in treatment such as when the patient drops out of treatment or accepts treatment but does not take medications as prescribed (Podell 1975). The fact that hypertension is usually asymptomatic until complications develop may be a major reason for patients not seeking or not continuing treatment (Freis 1973). The patient may perceive himself as less susceptible to or threatened by an asymptomatic disorder and hence, may not take it seriously (Gillum and Barsky 1974, Becker 1976, Matthews and Hingson 1977). The concept that hypertension can be controlled but not cured and requires lifelong drug treatment may be difficult for the patient to comprehend (Podell 1975). The patient may find that high blood pressure medications make him feel worse physically than his asymptomatic hypertension (Gillum and Barsky 1974). Yet, if a patient does not receive or comply with appropriate medical treatment for uncontrolled hypertension, his life may be in jeopardy due to sudden life-threatening medical complications. Thus, research on the topic of compliance is of urgent priority.

Past research involving patient compliance has attempted to identify and describe the demographic and attitudinal characteristics of noncompliant patients as well as the disease factors, therapeutic sources, and regimens which
were hypothesized as possible influences on compliance (Haynes and Sackett 1974). Other research efforts have employed various educational and behavioral techniques in attempts to increase patient compliance. The past research modified such factors as decreased waiting time to see a professional (Finnerty, Mattie, and Finnerty 1973), self-monitoring of blood pressures (Carnahan and Nugent 1975), patient education (McKenney, Slining, Henderson, Devins, and Barr 1973; Conte, Brandzel, and Whitehead 1974; Sackett, Haynes, Gibson, Hackett, Taylor, Roberts, and Johnson, 1975), and multiple individual regimen tailoring techniques (Haynes, Sacket, Gibson, Taylor, Hacket, Roberts, and Johnson, 1976). However, the present research sought to go beyond prior compliance studies by attempting to remedy many of the factors which have been shown to be related to increased patient noncompliance and to apply educational and behavioral techniques which have been shown to increase patient compliance. These varied techniques were combined and applied within the framework of patient operated self-help groups.

All subjects in the present study were proven non-compliers; that is, they all had previously been in treatment but had dropped out and still had uncontrolled hypertension. This population of patients was chosen in order to make the treatment effects as strong and clear as possible. It was felt that if new treatment patients were utilized, the clarity of effects would be clouded by the fact that
numerous studies have shown that 33-50% of the new patients would be readily compliant in the standard treatment format and not in need of a special treatment approach. Hence, the focus of this study was to increase compliance in proven noncompliers.

Results from the patient operated groups were compared and contrasted with the results for individuals who were seen as part of a program of individualized nurse operated treatment combined with a taped Hypertension Information Program. The changes in dependent measures upon which the comparisons were made were (1) diastolic blood pressure, (2) systolic blood pressure, (3) pill counts, (4) Hypertension Mastery Questionnaire scores, and (5) weekly attendance. It was hypothesized that the Patient Operated Groups would be more effective than the taped Hypertension Information Program in increasing patient compliance as measured indirectly but most importantly by decreases in diastolic and systolic blood pressures and directly by pill counts of medication and weekly attendance at group meetings or individual appointments. It was also hypothesized that the group members would increase their level of knowledge about hypertension as reflected by increases scores on the Hypertension Mastery Questionnaire. Rather than being a replica of past research, the present research was an attempt to apply a combination of psychological techniques in a new, more efficient approach to the problem of patient
compliance. Prior to the description and discussion of the specific method and results of the present study, a review of the literature and problems in the aforementioned areas is presented.

Hypertension—Medical Complications

Uncontrolled hypertension is one of the most important factors contributing to the premature sickness, disability, and death in adult population of the United States. High blood pressure has a prevalence of 16% for caucasians and 30% for black adults (Stamler, Schoenberger, Shekelle, and Stamler 1974). It directly causes about 60,000 deaths per year and contributes to a further million deaths each year (Blackwell 1976). High blood pressure is a significant factor in the 200,000 deaths from stroke each year, as well as playing a role in the occurrence of transient ischemic attacks and cerebral insufficiencies (Cooper 1974, Kaplan 1973). A significant amount of disability in the labor force is attributable to hypertension related disorders. In fact, 24% of the worker disability allowances were due to diseases of the circulatory system, with arteriosclerotic heart disease as the top cause (Stamler et al. 1974). Uncontrolled hypertension is not a trivial matter; it is a major killer and disabler of Americans. Yet, the major consequence of patient noncompliance is uncontrolled
hypertension which then leads to medical complications (Blackwell 1976) and hospital admissions (Hood and Murphy 1978).

Hypertension does its damage to the body every moment that the blood pressure is elevated and the higher the pressure, the greater the damage being done from heartbeat to heartbeat. The presence of hypertension affects the entire cardiovascular and circulatory system. When the blood pressure is elevated, the processes of arteriosclerosis and atherosclerosis are accelerated. Arteriosclerosis, the hardening, scarring, and loss of elasticity of artery walls, occurs with greater rapidity with the constant mechanical wear and tear that goes along with high blood pressure (Pickering 1972). Concomitant to this hypertensive arteriosclerotic scarring and hardening, the process of atherosclerosis, or the build-up of fatty plaques within the arterial lumina, is greatly accelerated (Freis 1973, Kaplan 1973, Russell 1976). Prolonged and excessive stretching of the artery walls produces fragmentation of the elastic fibers and an increase in connective tissue. This causes a thickening of the vessel walls (Freis 1973).

While the damaging processes contributed to by hypertension go on throughout the body, the disease is without a consistent set of symptoms. In fact, it is usually completely asymptomatic until a severe major medical complication occurs (Podell 1975, Miller 1977). The
complications generally occur in the target organs of the heart, brain, kidney, and eye (Freis 1966; Wintrobe, Thorn, Adams, Braunwald, Isselbacher, and Petersdorf 1974).

Chobanian (1976) found that hypertension was regarded as the most important risk factor for cardiovascular mortality as well as other cardiac complications. Because of accelerated coronary artery atherosclerosis, there is an increased risk of myocardial infarction and sudden death (Freis 1973). In fact, there is a five times greater risk of a major coronary event in patients with blood pressures above 140/90mm Hg than there is in normotensive individuals (Freis 1973). Hypertension was the major precursor in patients with pre-congestive heart failure. There is six times more congestive heart failure in hypertensives than in normotensives (Kannel, Castelli, McNamara, McKee, and Feinleib 1972). Kannel et al. (1972) also found that 60% of the males with congestive heart failure died within five years and 20% died within one year of diagnosis. Kaplan (1973) and Wintrobe et al. (1974) found that one-half of all hypertensives have hypertensive heart disease which is revealed by cardiac enlargement and left ventricular hypertrophy. This condition comes about as the heart is forced to pump the blood against greater peripheral resistance, and thus must work harder. The heart muscle becomes enlarged yet cannot pump with as much force. The result is congestive heart failure. Hypertension is also implicated in
cardiac ischemia, angina pectoris, and rupture of the aorta (Kaplan 1973, Wintrobe et al. 1974).

The arteries of the brain are thin walled and under the stress of high blood pressure, a segment of the wall may weaken and develop a microaneurysm. The weakened wall may rupture producing a cerebral hemorrhage or may become blocked and thrombose (Freis 1973). Such complications are referred to as cerebrovascular accidents or strokes. Browder and Browder (1975) have found that in individuals with mildly elevated blood pressure, the risk of either thrombotic or hemorrhagic stroke was four times greater than for normotensives.

The kidneys require great quantities of free flowing blood to perform their task of filtering out body wastes. As the walls of the vessels constrict with hypertensively accelerated atherosclerosis, there is a gradual loss of nephron functioning and a build-up of body wastes. This can lead to uremic poisoning (Freis 1973).

The appearance of the retina of the eye is a more reliable index of the severity and prognosis of hypertension than casual blood pressure readings (Gifford 1974). The severity of arteriolar constriction, either generalized or focal and the presence of retinal hemorrhages or "cotton-wool" exudates are indicative of the extent and seriousness of damage done by the high blood pressure. Vision can be impaired or lost if the hypertension remains uncontrolled.
The aforementioned dire medical complications are preventable in 80-90% of essential hypertensives; that is, if their disease is detected early, treated, and brought under control (Miller 1977). Effective treatments exist which can prevent further damage from occurring. Generally, there is not a reversal of damage but rather a halt in progression of destruction and the occurrence of complications can be forestalled (Veterans Administration Cooperative Study Group on Antihypertensive Agents 1967, 1970, 1972; Kannel et al. 1972).

Nevertheless, despite the need for control of hypertension, there is no well defined critical value or cut off point delineating normotensives from hypertensives. Rather, as Kaplan (1973) has pointed out, the higher the blood pressure and the longer the duration of elevation, the greater the damage that has been done and the higher the risk of medical complications (Veterans Administration Cooperative Study Group on Antihypertensive Agents 1967, 1970, 1972). The setting of a dividing point is essentially arbitrary, although custom is a factor in determining in what direction treatment judgments should be made. Some groups, such as the Inter-Society Commission for Heart Disease Resources (1971) have set a treatment inclusion limit of 160/95 with a rescreen or medication stipulation. The goal blood pressure is 140/90. Kaplan (1973) based his decisions regarding treatment on blood pressure in relation
to age since systolic blood pressure tends to increase with age until 55 when it levels off. Men who were less than 45 years old with blood pressures of greater than 130/90 were considered hypertensive, but men over 45 had to have readings of 140/95 to be considered hypertensive. These cut-offs would also seem to be related to the accessibility of the patient for further screening. The Inter-Society Commission for Heart Disease Resources (1971) referred all patients with readings of greater than 160/95 for diagnosis and treatment, but those with 140/90 were asked to return for frequent blood pressure monitoring checks.

However, the present research required treatment judgments to be based on a single screening opportunity rather than multiple screenings, thus a criterion for inclusion was decided upon such that, only patients with readings of greater than 140/90 were eligible to participate. Precedent for this cut-off point had been set by many studies in which decisions about treatment had to be made on single screening opportunities (Veterans Administration Cooperative Study Group on Antihypertensive Agents 1967, 1970, 1972; Gifford 1974). Another factor arguing for the setting of a lower treatment inclusion point was provided by Lew (1967). He found that even for men with blood pressures at the treatment goal level of 140/90 at age 35, and with no other overt medical impairments, the mortality rate over the next 20 years of life was 19.4% compared to 11.0% for
normotensive standard risks. Thus, even what was considered to be the treatment goal blood pressure was associated with a 76.4% higher death rate in middle age than the rate for those individuals with blood pressure lower than 140/90. In addition, Long, Winslow, Scheuhing, and Callahan (1976) found that mortality in men aged 35 to 45 with blood pressures of 160/100 mm Hg was five times higher than in those with blood pressures below 140/90. In the face of such findings, it was judged to be vitally important for the present study to include as many patients as possible for treatment while staying within the boundaries of common practice, and insuring that the patients who were at risk from hypertension received appropriate medical treatment. Such treatment generally included a work up for diagnosis of essential hypertension and prescription of antihypertensive medication.

Hypertension Treatments

The ultimate goal of antihypertensive therapy is the prolongation of useful life by the prevention of cardiovascular complications. To accomplish this goal, it is necessary to reduce blood pressure to as close to normal levels as possible. The usual treatment goal is to lower the blood pressure to below 140/90 mm Hg as an average of casual resting readings (Gifford 1974, Long et al. 1976). The most potent treatment approach to lowering blood
pressure is through the use of antihypertensive medications. They are efficient of time, quick acting, and very effective. Another approach to lowering blood pressure has been through the practice of relaxation training, biofeedback, and yoga-meditation to decrease autonomic nervous system activity. Other supportive treatment strategies have involved attempts to modify the diet, salt intake, and exercise levels of patients. Each technique contributes to the same goal of blood pressure control and all are useful aspects of a total treatment approach through which 80-90% of all patients with high blood pressure could become normotensive (American Medical Association Committee on Hypertension 1973).

Antihypertensive Drug Treatment

The principal treatment for elevated blood pressure is with antihypertensive medications. Since the introduction in the 1950's of drugs which have a therapeutic effect of decreasing blood pressure, several classic studies have been performed which illustrate the usefulness of medications in decreasing blood pressures to controlled levels and thus, decreasing the frequency of medical complications.

In the first study (Veterans Administration Cooperative Study Group on Antihypertensive Agents 1967) 143 males with diastolic blood pressures between 115 and 129 mm Hg were randomly assigned to either active drug or placebo treatment. After 24 months of treatment, the active medication group showed mean reductions of 43 mm Hg systolic and 29.7 mm Hg diastolic blood pressure, while the placebo group showed no changes. In the drug treatment group, there were two complicating events and no deaths; while in the placebo group, there were 27 complications and four deaths. Thus, for individuals with severe hypertension (diastolic blood pressures between 115-129 mm Hg) medications are significantly beneficial in reducing blood pressures and complications. In the second and third studies (Veterans Administration Cooperative Study Group on Antihypertensive Agents 1970, 1972), 380 patients with diastolic blood pressures averaging between 90 to 114 mm Hg were randomly assigned to active drug treatment or placebo treatment. The results of these studies were less clearly in favor of drug treatment, although the risk of developing a morbid event over a five year period was reduced from 55% to 18% by drug treatment. The higher the level of initial diastolic blood pressure, the greater the pressure drop and more clear cut the risk improvement with active medication. However, it is possible that the progression of the disorder is slower with lower diastolic blood pressures and significant results might not

Despite the fact that the Veterans Administration Cooperative Study Group on Antihypertensive Agents consisted of only males, the results as far as the risks of stroke and congestive heart failure are concerned have been borne out in other studies that included both men and women (Kannel et al. 1972). Reducing the elevated blood pressure also has been shown to reduce the general risk of sickness, death, and disability for both men and women (Long et al. 1976).

In spite of the fact that there is a seemingly bewildering array of antihypertensive agents, there are only three classes of drugs: (1) diuretics, (2) sympathetic inhibitors, and (3) direct vasodilators. Each of these classes of drugs works by a different mechanism to affect cardiodynamic, neurogenic, and hormonal controls of blood pressure (Hickler and Gifford 1978).

The diuretics act on the kidneys and induce decreases in plasma and extracellular fluid volume (Freis
1973, Hickler and Gifford 1978). They increase sodium and chloride excretion along with water excretion by directly inhibiting renal tubular reabsorption (Long et al. 1976). This diuresis and drop in extracellular volume is thought to be the mechanism by which diuretics lower blood pressure (Freis 1973). Drugs such as hydrochlorothiazide, chlorothalidone, furosemide, and triamterene are in the class of diuretics. The principal side effects of diuretic therapy are: hypokalemia or potassium deficiency which can result in weakness and muscle cramps, hyperuricemia or gout which is caused by increased concentrations of uric acid in the joints, and sensitivity reactions (Freis 1973, Gifford 1974, Long et al. 1976).

The second class of antihypertensive medications are the sympathetic inhibitors which decrease the activity of the sympathetic nervous system at one or more sites (Gifford 1974). Reserpine is a commonly used member of this drug class. It inhibits sympathetic activity and decreases the level of basal sympathetic tone by depleting the neural endings of norepinephrine (Gifford 1974, Hickler and Gifford 1978). The result is a decrease in heart rate and cardiac output and hence, lowered blood pressure. It can create notable side-effects, however, such as depression, drowsiness, lethargy, and lassitude (Freis 1973). Propranolol is another very frequently utilized member of this class of medications. It works to decrease blood pressure by
blocking the beta receptors in the heart and decreasing heart rate and output (Hickler and Gifford 1978). Beta receptors in the heart mediate the increase in heart rate and strength of myocardial contractions that characterize sympathetic activation (Gifford 1974). The fact that propranolol seems to have very few and infrequent side-effects has increased its popularity of usage immensely in recent years.

The direct vasodilators are the third class of antihypertensive medications. The principle upon which this class of drugs operates is the direct relaxation of smooth blood vessel walls. It decreases peripheral resistance and lowers blood pressure by dilating the arterioles (Gifford 1974, Hickler and Gifford 1978). Hydralazine and prazosin are the two most commonly used members of this class of drugs. The major side-effect of these drugs is an increase in sympathetic activity (cardiac rate and output) when the carotid sinus reflex is activated by the decrease in peripheral blood pressure (Freis 1973, Gifford 1974). Another possible side-effect is fluid retention and induced congestive heart failure (Freis 1973).

However, because of the different target mechanisms of each of the three drug classes, a step-care approach to drug treatment is most appropriate in treating hypertension (Long et al. 1976, Hickler and Gifford 1978). Since the causes and cures of essential hypertension are unknown, the
approach to treatment must be empiric and palliative (Gifford 1974). Typically, treatment is begun with a diuretic and dosages are titrated within the therapeutic dosage range of these drugs. Diuretics alone are effective in controlling the blood pressure in one-third of the hypertensives (American Medical Association Committee on Hypertension 1973). But, should the diuretic alone be insufficient to lower the blood pressure, the next step involves the addition of a sympathetic inhibitor to the treatment regimen. Thus, in addition to the diuretic, the patient would typically first add reserpine. If that regimen was still ineffective, propranolol would be added. These two medications would inhibit both central nervous system and cardiac sympathetic activation. Should the patient still remain in an uncontrolled blood pressure status, a direct vasodilator drug such as hydralazine would be added to the three other medications. This drug would relax and dilate the vessels in the peripheral areas and reduce blood pressure. Any possible side-effects of hydralazine, e.g., increased cardiac rate and output or fluid retention, are prevented by the diuretic and propranolol already in the regimen. If the patient still remains hypertensive, other very powerful, yet more dangerous medications such as clonidine or guanethidin would be used and closely monitored.
This standard step-care drug regimen is very effective in treating hypertension. It is also widely used and endorsed throughout the country (Freis 1973, American Medical Association Committee on Hypertension 1973, Gifford 1974, Long et al. 1976, Hickler and Gifford 1978). It is the standard regimen that was utilized in the treatment of hypertension in both the experimental and control conditions of the present study. It was applied in exact progression by the Hypertension Clinic nurses for the control subjects. The experimental group subjects were allowed some freedom of choice of equivalent medications and dosage levels (under strict physician supervision of the patient formulated regimens) while still maintaining the step-care approach to treatment (for the complete drug regimen protocol see Appendix C). It was the goal of the present study to emphasize the importance of patient compliance to their drug programs as a means of gaining better control of their hypertension. This was attempted through increased patient involvement in decisions about their own medications. These decisions were based on in-depth knowledge of the drugs, their actions, and rationale for use gained in the experimental group sessions.

Behavioral Treatments

As adjuncts to medication therapy, various behavioral treatments have attempted to directly influence
blood pressure. These techniques include relaxation training, biofeedback, and yoga-meditation. The rationale underlying the use of these techniques is that a person can learn to master through conscious control the functions of his autonomic nervous system. Once that mastery has been gained, the practitioner should be able to lower his level of sympathetic activity and hence, blood pressure at will (Abboud 1976; Shapiro, Schwartz, Ferguson, Redmond, and Weiss 1977).

Relaxation training methods involve the combined use of Jacobsonian progressive muscle relaxation with a mental device (repeating "one" to oneself) to prevent distracting thoughts, create a passive attitude and a quiet external environment (Benson, Beary, and Carol 1974; Beary and Benson 1974). Studies of the effectiveness of this method have shown consistent statistically significant drops in blood pressure after training in relaxation techniques. Benson, Shapiro, Tursky, and Schwartz (1971) found that subjects could decrease their systolic blood pressures from 16-34mm Hg through relaxation methods, while Benson, Rosner, Marzetta, and Klemchuk (1974a) managed a mean decrease of 10.6mm Hg systolic and a mean decrease of 4.9mm Hg diastolic after 20 weeks of training. Benson (1977) taught subjects to decrease their blood pressures from a pretreatment mean of 146.5/94.6 to a posttreatment mean of 139.5/90.8. The research of Stone and DeLeo (1976) has shown that
physiological changes in keeping with a decrease in sympathetic activity do occur in subjects who practice relaxation. However, while the declines shown in the research may be statistically significant, it is unlikely that the decreases or the techniques themselves are meaningful in the ongoing long term treatment of hypertension. In fact, Brener and Kleinman (1970) and Redmond, Gaylor, McDonald, and Shapiro (1974) have shown that decreases in blood pressure equal to those caused by relaxation training could be elicited simply by instructing subjects to think about lowering their blood pressure.

Biofeedback is a learning technique, whereby visceral responses can be brought under the definite, although usually limited, control of the learner (Miller, DiCara, Solomon, Weiss, and Dworkin 1970). As used in treatment, biofeedback utilizes electronic transducers to translate physiological processes that are not clearly or accurately perceived by the individual into audible or visible signals which are fed back to the learner. The signals reflect moment to moment changes in physiological condition (Miller 1974, Miller and Dworkin 1977). Some representative research using biofeedback has shown that blood pressures can in fact be decreased by this method. Kristt and Engel (1975) trained subjects both to lower and raise their blood pressures with systolic biofeedback. All subjects learned some degree of control with a mean decrease
of 11% and increase of 15%. This translates into decreases in blood pressure of 18/8 mm Hg. Elder and Eustis (1975) used diastolic blood pressure feedback to teach subjects to decrease their blood pressures from 3-9% in 10 sessions. In fact, Miller and Dworkin (1977) have found biofeedback training consistently produces moderate decreases in blood pressure. The decreases averaged 10 mm Hg diastolic. They hypothesized that the similarity of results suggested that the same general mechanism, perhaps a relief from environmental stress, was involved in creating the decreases (Miller and Dworkin 1977). Once again, the conclusion must be reached that the results of biofeedback training may be statistically significant but are most probably meaningless for hypertension therapy. The modest results may in fact be in large part due to instructional set (Shapiro et al. 1977) or placebo effects (Miller and Dworkin 1977).

Another area of behaviorally oriented methodology that has generated much research is that of yoga and meditation. As these techniques are used in treatment, there is usually an attempt at separating the techniques from their religious aspects. These techniques have much in common with relaxation training but are sufficiently different to merit separate consideration. In training subjects in Zen meditation, Stone and DeLeo (1976) managed mean reductions in blood pressure of 14/10 mm Hg. Using Transcendental Meditation as the method, Benson, Rosner, Marzetta, and
Klemchuk (1974b) trained subjects to decrease from a mean pretreatment blood pressure of 146.5/94.6 to a posttreatment mean level of 140.44/91.06. In a recent study, Blackwell, Bloomfield, Gantside, Robinson, Hanenson, Magenheim, Nidich, and Zigler (1976) reduced blood pressures by 7.48/6.09 mm Hg using transcendental meditation. Patel (1973) utilized yoga aided by biofeedback to allow 5 of her 20 patients to stop taking medications and 7 of 20 to decrease their drugs by 33-60%. A twelve month follow-up showed that the benefits of decreased blood pressure and medications were maintained (Patel 1975). In a later study, she again compared yoga plus biofeedback with a general relaxation placebo control condition (Patel and North 1975). She found that the experimental group decreased mean blood pressures from 168/100 to 141/84 versus mean drops from 169/101 to 160/96 for the control group. But, again, with the exception of the significant gains of the combination approach of Patel, the other research in this area showed minimally meaningful decreases in blood pressures. These effects generally appear to be shortlived unless the techniques are performed daily. In fact, Pollack, Weber, Case, and Laragh (1977) found that initial drops in blood pressure were not maintained and on six month follow-up were completely gone.

It would seem, then, that the initial hopes that the behavioral methods would allow direct non-medication dependent control of hypertension have not been borne out by
research. It must be concluded with Shapiro et al. (1977) that behavioral techniques are not alternatives to pharmacological therapy in hypertension. Rather, they should be viewed as treatment supplements to perhaps allow the reduction of medication dosages while maintaining the blood pressure at a controlled level. Another central theme in the research on behavioral methods is the attempt to increase patient involvement and allow more active participation in therapy. The notion of increased patient involvement and responsibility is central to the present research. On the other hand, the research on drug treatment effectiveness and behavioral blood pressure control techniques highlights a problem which is common to both areas and indeed, undermines the entire field of antihypertensive therapy; that is, the problem of patient compliance. Medications exist that are very effective and can control the hypertension of 80-90% of those with high blood pressure; yet, the medications must be taken as prescribed to be effective. The patient must comply to the regimen in order for there to be maximum benefit (Gillum and Barsky 1974).

**Patient Compliance**

Patient compliance is a descriptive term for the ideal treatment situation, in which an effective therapy is ordered, the patient follows the order to the letter, and gains long term and total control of the hypertension.
However, in reality, the situation is far from ideal. Generally effective treatment regimens exist, but the problem centers on getting the patients to cooperate with their treatment. The goal of therapy should be to increase patient compliance and reduce the extent of noncompliance. Blackwell (1972, 1976) has categorized noncompliant patients as those who fail to attend appointments and drop prematurely out of treatment or who fail to take medications as prescribed while still in treatment. Caldwell, Cobb, Dowling, and DeJangh (1970) and Caldwell (1976) have operationalized the definition by classifying as noncompliant those patients who: (1) had not kept an appointment for 6 months, (2) had not been referred or treated by another clinic or physician, (3) had discontinued medications for 90 days or more, (4) took less than 50% of the prescribed dosages of medication (by self-report or pill count), and (5) (most importantly) still had uncontrolled hypertension defined as casual blood pressure readings greater than 140/90 mm Hg. These were also the criteria that were applied in recruiting proven noncompliers to participate in the present research. It was felt that the most appropriate individuals on whom to utilize a possible compliance increasing strategy were patients who have proven to be noncompliant under conditions of the standard nurse operated, physician supervised clinic (Sackett and Haynes 1976, Sackett 1978).
Indeed, the problem of patient noncompliance is extremely prevalent in treatment. Even in symptomatic diseases, typically 20% of patients do not keep their appointments and 50% do not take their medications as prescribed (Blackwell 1972, 1976). In the generally asymptomatic disease of hypertension, the situation is even worse. Podell (1975), Rosenstock (1975), and Matthews and Hingson (1977) found that 50% of patients failed to keep their appointments and medication noncompliance was 60% or more. Podell (1975) has stated a rule of thumb: one-third of patients always take their medications, one-third sometimes do, and the other one-third seldom or never take their medication. Haynes and Sackett (1974) in their massive literature review found compliance rates that ranged from 15 to 93%. Caldwell et al. (1970) and Caldwell (1976) have stated that it is not at all unusual for 50% of the newly identified hypertensive cases to drop out of treatment within one year. By the end of 5 years, the drop-out rate is often 75%. Finnerty et al. (1973) had a 42% drop-out rate in their clinic, while Alderman and Ochs (1977) found 50% of the patients were lost within 6 months of the initiation of treatment. Such figures are shocking in light of the serious medical complications that are concomitants of uncontrolled hypertension. It was the goal of the present research to test a strategy aimed at increasing medication compliance and decreasing the number of patients who drop
out of treatment. The effects of this strategy will be measured by its influence on patient pill counts, attendance at meetings, and by diastolic and systolic blood pressures.

Factors Contributing to Patient Noncompliance

A great deal of research time and effort has been spent in the attempt to illuminate and describe associations between demographic variables and compliance. The majority of studies have shown nonsignificant and discordant results. Haynes and Sackett (1974) in their review of 190 articles found nonsignificant or conflicting directions of correlations on the variables of age, sex, education, occupation, socioeconomic status, race, and marital status. In fact, as Caplan, Robinson, French, Caldwell, and Shinn (1976) pointed out, of the 190 studies reviewed, 141 or 73% found no significant relationships at all between the demographic factors and compliance. Only 49 of the 190 (26%) found even one relationship significant. The lack of relationship between demographic variables and compliance was borne out by the results of the Caplan et al. (1976) study and the Hulka, Cassel, Kupper, and Burdette (1976) study as well. The importance of these discordant and nonsignificant results lies in the fact that they demonstrate that both compliance and noncompliance are common among persons of all social and demographic types and that no one patient characteristic has been shown to be a sufficient cause of
noncompliance (Podell 1975). Information on the demographic characteristic of the experimental and control subjects of the present study was elicited. But this was not yet another attempt to discern some relationship with compliance. Rather, the demographic information was used to determine whether the subjects in one condition differed significantly from the subjects in the other condition on: age, marital status, race, education, occupation, and socioeconomic status.

As with demographic factors, research has shown a generally nonsignificant or conflicting relationship between disease factors and compliance. Factors such as duration and seriousness of symptoms, side-effects, previous treatment or hospitalization, diagnosis, previous bouts, and positive family history have been shown to have little relationship to compliance (Haynes and Sackett 1974, Hulka et al. 1976).

On the other hand, the personal perceptions of the patient regarding the disease, the physician, and the treatment seemed to have an important relationship with compliance (Haynes and Sackett 1974, Rosenstock 1975, Podell 1975, Becker 1976). Awareness and perception of the disease as serious was positively related to compliance, as was the perception of personal susceptibility. Feeling well was negatively related, while belief in the effectiveness of treatment and satisfaction with treatment were positively
related to compliance. The present study attempted to emphasize and reinforce the above mentioned perceptions. This occurred as a part of the group interactions with the patients and the informational discussions with them, rather than as part of a rigid intervention program.

Other research on factors which contribute to patient noncompliance have revealed a complex of variables all interacting in positive or negative and often conflicting fashion to determine patient behavior. Caldwell et al. (1970) and Caldwell (1976) found that the reasons most frequently cited by patients for dropping out were: (1) they felt well, (2) had poor knowledge and instructions, (3) were in financial need, (4) had transportation difficulties, (5) followed the advice of a physician, (6) lacked family support, (7) were dissatisfied, (8) were discouraged, and (9) experienced side-effects. In a very important study illuminating the misconceptions shared by many patients, Griffith and Madero (1973) found that the beliefs of the patient regarding medications were of critical importance in determining compliance. The patients often expressed feelings of embarrassment at the need for "crutch" medication to help them control high blood pressure. They often feared becoming "hooked" or dependent upon the antihypertensive drugs. Patients felt that one drug was right for all and that "if one was enough, maybe two would be better or if two is enough, try to get by on one." Many saw
medication as a waste of money if it did not relieve symptoms. If the medications made them feel worse than the asymptomatic disease, they would typically discontinue the medication rather than notifying their physician. There was also widespread belief that once blood pressure was under control, it was cured and medications needed to be taken only if symptoms flared up.

Additional reasons for patient noncompliance have been posited by Freis (1973), Caplan et al. (1976), and Matthews and Hingson (1977). These reasons include: the failure of the patient to understand the instructions given to them by the physician, an overly complicated drug regimen, inadequate patient understanding of the nature of the illness and the need for continuous treatment, and the experience of side-effects with a failure to realize that alternative drug regimens exist. The present research sought to remedy these misconceptions which contribute to patient noncompliance by the education, interaction, and sharing provided within patient operated group treatment.

Approaches to Increasing Patient Compliance

The preceding sections have pointed up the nature and extent of the noncompliance problem in hypertension treatment. But, this discussion should also serve as a critique of the effectiveness of the traditional nurse operated, physician supervised hypertension clinic. These
clinics have satisfactory impact on about one-third of their clients, for that is the quantity of patients that typically gain control of their blood pressure with this treatment approach (Hames 1974, Moser 1974, Alderman and Ochs 1977, Freis 1977). Alderman and Ochs (1977) have pointed out that the orientation of the traditional medical care system is toward tertiary prevention, that is, the treatment of acute, symptomatic episodic disease. There is increasing emphasis on secondary prevention or early detection and treatment as well as on long term care, but there has been little modification of the existing system to accommodate new approaches to treatment. In fact, some studies have acknowledged that the dropout problem existed, but have dealt with it by eliminating from their program a priori all those subjects who were considered to be most likely to discontinue treatment (Veterans Administration Cooperative Study Group on Antihypertensive Agents 1970, Podell 1975, Sackett and Haynes 1976).

But other than a few such studies which attempted to sidestep the problem, there have been a number of experimental attempts made to increase patient compliance in hypertension treatment. These studies will be reviewed and their relevance to the present study detailed.

Finnerty et al. (1973) interviewed clinic drop-outs to determine their reasons for discontinuing treatment. The most commonly cited reason was the long waiting period (mean
of 2.5 hours) to see a different physician on each visit for a very short period of examination (mean of 7.5 minutes). The clinic was reorganized to decrease waiting and provide patients with a primary care professional. The drop-out rate went from 42% to 8% within one year. The present study attempted to reduce waiting time and maintain continuity of patient contact by having all experimental group patients meet at one set time to convene the group session. The groups consisted of the same patients and professionals at each weekly meeting, thus allowing for continuity of care.

Even so simple a technique as providing phone reminders as follow-up for patients who have missed appointments has been shown to increase attendance and compliance (Fletcher, Appel, and Bourgeois 1975; Podell and Gary 1976). In the present study, both control and experimental patients who missed an appointment or group received a phone call reminder in advance of their next appointment or group.

Self-monitoring of blood pressures has had mixed results in past research. Carnahan and Nugent (1975) believed that patient home blood pressure self-monitoring would provide a sort of feedback to the patient as to treatment progress, and thus would increase compliance. Their results showed minimal effects. However, the incorporation of self-monitoring with pill counts and the tailoring of treatment to individual habits in the multiple approach of Haynes et al. (1976) showed that the technique is basically
a useful one. It appears that self-monitoring is a component which can not stand on its own as a treatment approach, but rather is very good as a supplement to other compliance increasing treatments. The present study attempted to incorporate self-monitoring feedback as a component of the experimental treatment. Experimental group subjects were taught how to take blood pressure using mercury sphygmomanometers with simultaneous professional competence monitoring. Then, as a weekly part of treatment, the group patients took and recorded the blood pressures of one another.

The complexity of medication regimens in terms of numbers of medications and frequencies of dosages has been the focus of several compliance studies. Glick (1965) and the Veterans Administration Cooperative Study Group on Antihypertensive Agents (1972) found that compliance did not seem to be related to the specific drug taken. Patients complied as often to placebo regimens as to active drugs and with the same reported frequency of side-effects (7%). In a recent study Haynes, Sackett, Taylor, Roberts, and Johnson (1977) manipulated regimen complexity and found conflicting data regarding the effects of the number of medications a patient was taking. Rather, the number of times per day medications were to be taken seemed more important in determining compliance than the quantity taken each time. In light of the unclear results and to prevent a source of confounding from entering into the present study, the standard
drug treatment regimen (see Appendix C for the complete drug regimen) was followed for both groups. The exception to this was that experimental subjects had more freedom to choose their own drugs and dosages with physician supervision, while the control subjects followed the regimen strictly. No attempt was made to limit the number of drugs or frequency of dosages which were administered.

Wilber and Barrow (1972) suggested that in order to achieve better hypertension control an intensive, detailed patient education program should be undertaken. This program would stress the dangers of untreated hypertension and emphasize the possible life threatening complications that go along with uncontrolled hypertension. Much of the recent media hypertension program has attempted to follow the recommendation of Wilber and Barrow (1972). However, social psychological research has indicated that communications that deal with anxiety arousing topics are often ineffective or inconsistent in altering behavior (Janis and Feshbach 1953, Leventhal 1965, Higbee 1969, Matthews and Hingson 1977). Fear arousal has been shown to bear no relationship to compliance behavior (Radelfinger 1965; Evans, Lasater, Dembroski, and Allen 1970). On the contrary, the present research sought to decrease the level of fear and misconceptions in the patients, through the provision of social support and information in the group sessions.
However, the call of Wilber and Barrow (1972) for an educational effort has resulted in several studies in the area of patient education. The results of these studies seem generally favorable, yet for the most part the programs of education are simply reported upon descriptively. The research does not compare educational with control conditions. Thus, generalization from these results is risky. Lewis and Resnick (1967) and Lewis, Resnick, and Waxman (1969) implemented nurse operated hypertension clinics and compared them with physician operated clinics. The nurses did better at decreasing complaints and broken appointments and increasing compliance. However, these studies made no attempts to ascertain whether the effects were maintained over time. McKenney et al. (1973) did include a 6-month follow-up evaluation in their study of a pharmacist to patient educational program about compliance and possible side-effects. Their compliance rate went from 25% to 79% as a result of the educational treatment but fell back to 42% compliance at 6-month follow-up.

Conflicting results were found in the study by Sackett et al. (1975). They utilized a very short didactic tape and slide program in conjunction with a pretreatment and posttreatment examination. This was considered to be an educational program, the results of which were measured by a hypertension mastery exam. They found no increase in compliance as a result of this program, although exam scores
increased as a result of the program. Another conflicting research result was provided by a study by Spector, McGrath, Uretsky, Newman, and Cohen (1978). Their program involved a nurse to individual patient educational intervention emphasizing the monthly repetition and explanation of basic high blood pressure information. They found that the nurse to individual educational program group showed more compliance than the general clinic population but did no better than a nonintervention control group which just had blood pressure readings checked once per month. Because of the fact that in the Sackett et al. (1975) study and the Spector et al. (1978) study no attempts were made to control for the non-specific effects of differential attention to blood pressure (the Hawthorne Effect of Roethlisberger and Dickson 1939), or the increased professional attention or awareness of treatment expectations, no firm conclusions regarding the effectiveness of informational programs can be drawn (Podell 1975, Haynes et al. 1976).

Nonetheless, the aforementioned research studies have had considerable impact upon the design of the present study. First of all, because of the fact that informational programs have been unable to significantly increase patient compliance, yet seem to provide the patients with considerable extra attention, they are ideal as an attention-placebo control condition. They are useful in helping to truly and accurately assess the effectiveness of proposed compliance
increasing strategies. Thus, the control subjects in the present research were presented with an audiotaped didactic informational program as an attention equating placebo treatment. In addition, since treatment noncompliers were specifically recruited as subjects, it was assumed that the traditional nurse provided individual hypertension treatment had already proven ineffective with these subjects and thus, would not be a clinically active treatment. Then, in summary, the control subjects in the present study were provided with a weekly taped Hypertension Information Program (H.I.P.) as well as the traditional nurse-provided individual hypertension treatment in an attempt to create a useful attention-placebo control condition.

Secondly, the cited past research has highlighted the ineffectiveness of mere information provision in increasing patient compliance. It was necessary then, to create a new educational program that would allow the individual to interpret, integrate, and reflect on the information in such a manner as to bring about attitudinal or behavior change (Rosenberg 1971). The educational component of the experimental treatment made information available as needed and desired by the patients. They were allowed to take the responsibility for tailoring the information into the quantity and form that they could most readily assimilate. As Freire (1970) generalized, the more pertinent topics and information are to the problems or solutions of people, the
more effective those topics would be as educational models. The freely available information tailoring approach of the experimental condition was an attempt to create a genuinely educational program rather than a mere informational one. Levels of information were measured by a Hypertension Mastery Questionnaire which assessed basic knowledge of hypertension (Ziesat 1975, Sacket et al. 1975).

A technique which has proved to be very useful in increasing compliance in many psychological treatment populations is that of peer operated self-help groups. In a population particularly prone to noncompliance to treatment regimens, i.e., alcoholics, it has been shown that the use of peer operated self-help groups in Alcoholics Anonymous organizations increased compliance to medication regimens and abstinence from alcohol intake (Gellman 1964, Thomas 1968). Peer operated groups have also been found to be effective in bringing about beneficial psychotherapeutic outcomes in psychiatric clients (Lieberman, Yalon, and Miles 1973; Everly 1975; Lurie 1977). They have also been shown to be effective in higher education (Powell 1974). But peer operated self-help groups have never before been used in hypertension treatment. The closest that past research has come was a program of nurse led small group discussions for which no specific compliance results were provided (Conte et al. 1974). Nonetheless, peer operated self-help groups have been shown to be effective in the
varied treatment areas to which they have been applied. In self-help groups, there tends to be a problem oriented focus; helping and sharing among the group members is the norm; and power and leadership tend to be horizontal rather than vertical in flow (Katz 1970). Communication likewise tends to be horizontal rather than vertical. Personal involvement and responsibility are emphasized in the group functioning (Katz 1970).

The work of Festinger (1957) has shown that the involvement of a person in making and being responsible for decisions about his own care, as well as his public commitment to those decisions, can bring about behavior change and increased compliance to the course of action set by those decisions (Insko and Schopler 1972). In addition, when the individual is able to attribute his behavior changes to his own personal choice rather than to the pressures of external forces, the changes tend to have a greater probability and duration of maintenance (Tedeschi and Lindskold 1976). It was precisely this increased commitment, involvement, responsibility, and self-attributed behavior change which the patient operated hypertension groups of the present research attempted to utilize to help increase the compliance of the patients to their treatment regimens and thus, gain control of their hypertension.
Summary of the Present Study

The present study sought to determine the effects of a new compliance increasing strategy: Patient Operated Hypertension Groups. This strategy was a synthesis of many supplemental components into a comprehensive compliance program using the peer operated self-help groups as the basic presentation format. The experimental treatment components included: decreased waiting time, continuity of staff personnel relationships, telephone follow-up for missed visits, self-monitoring of weekly blood pressures, greater freedom of choice regarding medication and dosages, and an individually tailored educational program. The control condition was a true attention-placebo treatment in which patients received a didactic informational program in addition to individual treatment in a nurse operated, physician supervised hypertension clinic. The dependent measures upon which treatment effects would be shown were: diastolic and systolic blood pressures, pill counts, scores on a Hypertension Mastery Questionnaire, group attendance and frequencies, and durations of group interactions. It was hypothesized that the control subjects would show increased compliance and decreased blood pressures as a result of increased professional attention and an awareness of treatment expectations. Likewise, it was also hypothesized that the experimental group subjects would evidence greater increases in compliance, and as a consequence, greater drops
in blood pressures as the active treatment took effect over the eight week course of treatment. It was expected that the effects would be maintained at the 2-month and 6-month follow-up points. Experimental group subjects also should have gained more knowledge and attended more sessions throughout the treatment program.
METHOD

Subjects

Fifty-two veterans with uncontrolled essential hypertension were randomly assigned to either an experimental or control treatment condition. All subjects had at one time either been treated or screened by the Hypertension Clinic of the Tucson Veterans Administration Hospital but were considered noncompliant or treatment dropouts at the time of recruitment. The records of the Hypertension Clinic were reviewed and the patients who met the study inclusion criteria were identified. A letter (see Appendix A) was then sent to each potential subject explaining the dangers of untreated hypertension and inviting them to participate in a new hypertension treatment program. The patients were assigned using a random numbers table when they contacted the Hypertension Clinic. To be eligible for inclusion in the present study, a patient had to: (1) have uncontrolled essential hypertension, that is, a mean of three blood pressure readings that exceeded 140/90mm Hg as measured at the time of initial study treatment contact, either the first group session or control appointment; (2) not have been in contact with the Hypertension Clinic for a period of greater than four months, nor could they have been treated by another clinic or physician during that period;
(3) be able to give informed consent (see Appendix B for Patient Consent Form); (4) understand verbal information; and (5) complete study questionnaires. As long as the patient fulfilled criteria 1 through 5, there was no restriction on the basis of past diagnosis or treatment for hypertension. Due to the fact that transportation funds were not available, subjects had to live within ten miles of the Tucson city limits. In addition, due to considerations of space and staff limitations, two cycles of patients had to be run subsequent to one another. Experimental and control groups were run simultaneously within each cycle. Also, both experimental and control subjects were offered Saturday treatment in order to enable a sample of the employed veteran population to participate in the present research program. Only one woman veteran qualified for inclusion and was randomly assigned to the control condition, in which she received exactly the same treatment as all of the male patients.

Procedures

Experimental Group

The twenty-six veterans assigned to the experimental condition participated in the Patient Operated Hypertension Groups. The groups sought to create an atmosphere of individual patient responsibility for and involvement with informed decision making, through an individually tailored
education program, discussion, and self-help approach. Educational information regarding physiological and hypertension related topics, medical complications, medications, and side-effects was made available as needed and requested by the patients in a discussion format. There were two research nurses involved and each group was seen by the same nurse every week. The researcher and nurse served as informational resources to the group members. By this procedure, the patients were allowed to set the level and quantity of information available to them. Each patient elicited only the information which he could clearly integrate and understand. As Freire (1970) found in teaching illiterates in Brazil, learning and assimilation were facilitated when currently relevant problems and questions were the subject matter. Within the present experimental groups, the individuals had the freedom to tailor their education to problems and topics of immediate relevance.

Individual responsibility and informed freedom of choice were also emphasized with regard to the set up and follow through on a treatment regimen formulated by each patient for himself within the framework of the standard drug treatment protocol (see Appendix C) and with strict physician supervision to prevent unwise or hazardous regimens. Group members had the freedom and responsibility (with medical supervision) to make and institute decisions as to drug choices, dosages, and changes in regimen if their
hypertension did not come under control. They elicited information as needed from the information resources and from peer input. Group patients were allowed to adjust their own treatment to simplify the drug regimens, minimize side-effects, and gain controlled levels of their hypertension (diastolic blood pressure below 90mm Hg).

The self-control of the patients was also enhanced through training in the use of mercury sphygmomanometers (Burch and DePasquale 1962, Lancour 1976) by which all blood pressures were obtained. Weekly blood pressures were monitored and recorded by group members themselves. This served to familiarize them with this common procedure and give the patients a physical involvement in their own care. Validation of patient determined blood pressure techniques and readings was accomplished by the researcher or research nurse monitoring performance with a dual-earpiece teaching stethoscope. As patient skill and accuracy increased and was verified, they began to provide verification for the readings of one another.

The Patient Operated Hypertension Groups met weekly for 90 minutes for a period of eight weeks. Two-month and 6-month follow-up groups were scheduled to determine the longevity of group effects. The researcher and the same nurse were present each week at all group sessions to monitor group interactions and serve as factual information resources. Group sessions were audiotape recorded in order
that researcher, nurse, and group behavior and interaction patterns could be analyzed to determine the flow of group process. It was expected that initially the researcher and nurse would be required to be more active in the group. The patients were new to the group situation and each other, and did not know quite what to expect or how to behave. Blood pressure training served as a stimulant to the group interaction process. As patients became more competent at taking blood pressures and better acquainted with one another, the researcher and nurse slipped more into the background and served merely as consultants. Thus, the goal was for the patients to take over the operation of the groups for weekly blood pressure training and discussion; and for the researcher and nurse to decrease in activity and importance to group functioning. (Details of group content and topics discussed are presented in Appendix D).

Control Group

Twenty-six veterans comprised the control condition of the present research. They received the traditional, individual medical treatment in the nurse operated, physician supervised Hypertension Clinic combined with the taped Hypertension Information Program. There were two research nurses involved and each control patient saw the same nurse every week. She was responsible for adjusting the antihypertensive medications of each patient in order to
achieve the control level of diastolic blood pressure below 90mm Hg. Medication adjustments were made as called for in the clinic drug treatment protocol (see Appendix C). The Hypertension Information Program served as an attention placebo condition. It was an attempt to equate the frequency and amount of professional attention and information received by both experimental and control patients. It, in fact, equated frequency of contact as the control patients were seen weekly for individual appointments for eight weeks plus 2-month and 6-month follow-up appointments. However, the amount of professional attention was only approximated as the Experimental Groups lasted 90 minutes, while the typical individual session plus tape cassette lasted 45 minutes.

There were no previously existing educational programs which were deemed adequate for use in the present research. The very short (1 hour) tape and slide program used by Sackett and Haynes (1976) was far too brief and superficial to serve as an in-depth educational program. In fact, their own research found that it was ineffective in increasing compliance. In order to meet the demands of the present study a new in-depth Hypertension Information Program was composed. The taped program consisted of 6 tapes which covered such topics as: blood pressure, physiology, hypertension, medications, behavioral techniques for weight control, and behavioral tips to increase the ease of
compliance (see Appendix E for the complete transcripts of the Hypertension Information Program tapes). Each week after seeing the clinic nurse to have blood pressure readings taken, treatment status and needs checked, the patient listened individually and privately to one of the 6 educational tape cassettes. There were no tapes for week 1 or week 8 due to the administrative tasks which were performed during those appointments. The 2-month and 6-month follow-up appointments were performed individually as well, but without a tape cassette component.

Dependent Measures

In the present research, pill counts served as the most direct measure of compliance. All patients were asked to turn in to the hypertension nurse any old antihypertension medications they had at home. All patients were issued and had filled new medication prescriptions. They were then asked to bring their bottles each week so that the group nurse or clinic nurse might count the number of pills remaining in the bottles. Other than monitoring actual blood levels of medications, pill counts have been shown to be accurate measures of compliance (Roth, Caron, and Hsi 1970).

Because new prescriptions were issued on week 1, pill counts could only be obtained commencing from the second week. Also, no pill counts were obtained for 2-month and 6-month follow-up. It was felt that there was too great
a time period between these sessions and too many extraneous factors could come into play regarding the pill counts. Given the very strict pill count compliance criterion, if a patient missed taking even one pill over 2 or 6 months, that patient would have been considered noncompliant. Yet, to change the criterion for those sessions would have diluted the results and made the pill counts meaningless. In addition, if a patient missed a meeting or an appointment, the pill count was taken at the next meeting or appointment attended. At that point, compliance was judged on the basis of the number of pills the patient should have taken during that period compared with the number of pills actually taken.

The pill count criteria based on the judgments of the researcher were set for the present study. The first criterion was particularly strict and rigid: the patient had to comply perfectly to his medication regimen in order to be considered compliant, any deviation at all from the exact prescription directions was scored as noncompliance. The second criterion applied to the pill counts was more liberal: the number of weeks the patient was compliant out of the seven possible weeks that pill counts could have been taken was tallied.

Blood pressures were taken for all patients weekly and at 2-month and 6-month follow-up. These readings were the most important indirect measures of compliance. The paramount purpose of antihypertension treatment is to gain
control of blood pressure. Equal emphasis has been placed on diastolic and systolic blood pressures in the present study. Both blood pressures tend to be the criteria upon which most treatment judgments are based, although diastolic readings tend to be more stable over time than systolic pressures. Nonetheless, both readings were of particular import as dependent measures upon which to compare experimental and control conditions.

Since both experimental and control procedures had an informational component, it was necessary to evaluate the amount of information gained by the patients over the course of their treatment. All subjects whether in the experimental or control group, were administered a pre- and post-treatment Hypertension Mastery Questionnaire in order to assess the changes in their information levels. The Hypertension Mastery Questionnaire was formulated and used by Ziesat (1975) in a program that tested the effects of lectures on patient hypertension information levels. The Questionnaire is short (27 items, originally 25 but two items were added for the present study) and efficient to use. However, it has never been validated nor has its reliability been tested. Nevertheless, it was felt to be an appropriate measure of hypertension information and would be responsive to changes due to educational programs.

Attendance at the groups and at weekly appointments was kept as another direct measure of compliance. It was
felt that the patients who attended more meetings or appointments could be viewed as the more compliant. Actually, attendance was prompted by reminder phone calls whenever a patient in either the experimental or control condition missed a meeting or appointment. Also, all subjects received reminder phone calls within 24 hours of the 8-week, 2-month, and 6-month follow-up evaluation sessions or appointments.

The number of medications prescribed to the subjects was determined at the beginning and end of treatment. This measure was thought to be illustrative of any tendency for greater numbers of prescriptions to be written and thus, for any declines in blood pressure to be attributable to more medication, and not to increased compliance.

In order to assess the flow of group process and to determine whether, in fact, the researcher and nurse became less active and the patients more involved as the weeks of group treatment progressed, measures of group interaction were taken. Frequency counts of initiation of interaction, that is, whether initiation was prompted by researcher, nurse, or patients, were tallied. Also, the durations of communications by researcher, nurse, and patients were measured. These measures were taken from the audiotapes of the group sessions by three independent raters. A very informal measure of patient satisfaction was an interview between the researcher and patients at the 2-month follow-up
session. The patients were asked what they had found helpful about the groups and how they would improve the groups in the future.

Lastly, while not actually a dependent measure, data on the demographic characteristics of the fifty-two subjects were obtained. The factors of age, marital status, education, occupation, socioeconomic status, and number of medical problems were felt to be relevant to compliance and needed to be assessed in order to analyze whether the samples of veterans in the experimental and control condition were comparable or in any way biased by demographic differences despite randomization.

In summary then, it was assumed that the aforementioned measures would be sensitive to the influence of the independent treatment variables of Patient Operated Hypertension Groups versus individual nurse operated care plus the taped educational cassettes. It was also assumed that they were accurate and useful measures of compliance with hypertension treatment.
RESULTS

Recruitment Rate

The number of recruitment letters mailed, number returned as undeliverable, and return rates are reported in Table 1. Also included in Table 1 are the number and percentage of recruits who contacted the Hypertension Clinic or kept their first appointment or group session but were found to be unwilling or ineligible to participate. The number and percentage of subjects actually recruited as well as the total response and rate is included for the sake of completeness. The total number of letters mailed was 675, while the total response was 180 (36.1%). Out of the total number of letters presumed delivered (498), 52 (10.4%) were recruited and included in the research study.

Demographic Comparisons

The frequencies of patients in the discrete categories of each demographic variable were compared for the experimental and control samples. Visual inspection of the means of data from cycle 1 and cycle 2 showed that no apparent differences existed between the cycles. Therefore, the data from both cycles was combined for all analyses. Descriptive data regarding the experimental and control samples appear in Table 2' (means and standard deviations
Table 1. Recruitment Rate

<table>
<thead>
<tr>
<th></th>
<th>Number Mailed</th>
<th>Number Returned--Undeliverable</th>
<th>Number Responding--Uninterested or Ineligible</th>
<th>Number of Subjects Recruited</th>
<th>Total Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>675</td>
<td>177 (26.2%)</td>
<td>128 (25.7%)</td>
<td>52 (10.4%)</td>
<td>180 (36.1%)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2. Demographic Variables—Description of Experimental and Control Samples

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description of Samples</th>
<th>Experimental Group</th>
<th>Control Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td>Mean 56.88</td>
<td>Mean 53.77</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S.D. 11.05</td>
<td>S.D. 11.34</td>
</tr>
<tr>
<td>Marital Status</td>
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<td></td>
<td>Married—20</td>
</tr>
<tr>
<td></td>
<td>Single—2</td>
<td></td>
<td>Single—4</td>
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<tr>
<td></td>
<td>Divorced or Separated—3</td>
<td></td>
<td>Divorced or Separated—2</td>
</tr>
<tr>
<td>Race</td>
<td>Caucasian--20</td>
<td></td>
<td>Caucasian--19</td>
</tr>
<tr>
<td></td>
<td>Black--3</td>
<td></td>
<td>Black--2</td>
</tr>
<tr>
<td></td>
<td>Mexican-American--3</td>
<td></td>
<td>Mexican-American--5</td>
</tr>
<tr>
<td>Education</td>
<td>College Degree--5</td>
<td></td>
<td>Graduate Training--2</td>
</tr>
<tr>
<td></td>
<td>Partial College--7</td>
<td></td>
<td>Partial College--9</td>
</tr>
<tr>
<td></td>
<td>High School Graduate--8</td>
<td></td>
<td>High School Graduate--10</td>
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<tr>
<td></td>
<td>Partial High School--3</td>
<td></td>
<td>Partial High School--0</td>
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<tr>
<td></td>
<td>Less than Junior High--3</td>
<td></td>
<td>Less than Junior High--5</td>
</tr>
<tr>
<td>Occupation</td>
<td>Retired--9</td>
<td></td>
<td>Retired--6</td>
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<tr>
<td></td>
<td>Administrative Personnel, Small Business, Semi-Professional--6</td>
<td>Administrative Personnel, Small Business, Semi-Professional--2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clerical, Sales, Technician--4</td>
<td></td>
<td>Clerical, Sales, Technician--2</td>
</tr>
<tr>
<td></td>
<td>Semi-skilled--2</td>
<td></td>
<td>Semi-skilled--3</td>
</tr>
<tr>
<td>Socio-economic Status&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Mean 3.58</td>
<td>Mean 3.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S.D. .90</td>
<td>S.D. 1.10</td>
<td></td>
</tr>
<tr>
<td>Medical Problems (including hypertension)</td>
<td>Mean 3.04</td>
<td>Mean 3.38</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S.D. 2.14</td>
<td>S.D. 2.21</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup>Based on Hollingshead and Redlich (1958).
are included where appropriate). Chi-square values, degrees of freedom, and statistical significance levels are presented in Table 3.

The comparisons of the experimental and control samples revealed no statistically significant differences between them. Both conditions were comprised of essentially similar groups of persons in terms of demographic characteristics.

**Blood Pressure Results**

**Diastolic Blood Pressures**

Diastolic blood pressures were compared between conditions and over time by use of a 2 x 3 mixed design with repeated measures on diastolic blood pressures (Bruning and Kintz 1968). Visual inspection of the means for blood pressures from cycle 1 and cycle 2 showed that no apparent differences existed between the cycles, therefore the data were pooled for all further analyses. Since equal numbers of readings were obtained for each condition on pretreatment, posttreatment, and 2-month follow-up, the data for these occasions were utilized in one analysis. Cell means are depicted in graphic form in Figure 1. Sample means and summary table appear in Table 4.

The 2 x 3 mixed design analysis of variance showed that significant group differences existed, but the presence of a significant A x B interaction prevented further
Table 3. Demographic Variables—Experimental Versus Control Conditions; Chi-Square Analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Chi-Square</th>
<th>df</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1.03</td>
<td>3</td>
<td>Nonsignificant</td>
</tr>
<tr>
<td>Marital status</td>
<td>0.89</td>
<td>2</td>
<td>Nonsignificant</td>
</tr>
<tr>
<td>Race</td>
<td>0.73</td>
<td>2</td>
<td>Nonsignificant</td>
</tr>
<tr>
<td>Education</td>
<td>0.88</td>
<td>3</td>
<td>Nonsignificant</td>
</tr>
<tr>
<td>Occupation</td>
<td>1.89</td>
<td>3</td>
<td>Nonsignificant</td>
</tr>
<tr>
<td>SES</td>
<td>0.19</td>
<td>2</td>
<td>Nonsignificant</td>
</tr>
<tr>
<td>Medical Problems (including hypertension)</td>
<td>0.78</td>
<td>3</td>
<td>Nonsignificant</td>
</tr>
</tbody>
</table>
Figure 1. Cell Mean Diastolic Blood Pressures (mm Hg); Pretreatment, Posttreatment, and 2 Month Follow-up
Table 4. Diastolic Blood Pressures (in mm Hg), Experimental Versus Control ANOVA Results

<table>
<thead>
<tr>
<th>Condition</th>
<th>Pretreatment</th>
<th>Posttreatment</th>
<th>2 Month Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group</td>
<td>102.23</td>
<td>85.00</td>
<td>85.92</td>
</tr>
<tr>
<td>Control Condition</td>
<td>100.30</td>
<td>91.08</td>
<td>91.92</td>
</tr>
</tbody>
</table>

Summary Table

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment A</td>
<td>446.8</td>
<td>1</td>
<td>446.8</td>
<td>5.4748</td>
<td>&lt;.025*</td>
</tr>
<tr>
<td>Error between Ss</td>
<td>4080.3</td>
<td>50</td>
<td>81.61</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Treatment B</td>
<td>5689.9</td>
<td>2</td>
<td>2844.95</td>
<td>88.3662</td>
<td>&lt;.01**</td>
</tr>
<tr>
<td>(repeated measures)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A x B interaction</td>
<td>549.3</td>
<td>2</td>
<td>274.65</td>
<td>8.5308</td>
<td>&lt;.01**</td>
</tr>
<tr>
<td>Error within Ss</td>
<td>3219.5</td>
<td>100</td>
<td>32.195</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

*Significant at .05.

**Significant at .01.
interpretation. Thus, a post hoc analysis was required to illuminate the areas of difference. The Tukey (a) Test also known as Tukey's HSD (test for Honestly Significant Differences) was chosen as the most conservative technique with which to perform pairwise comparisons on cell means (Winer 1962). The results of the Tukey (a) analysis are presented in Table 5.

Table 5. Diastolic Blood Pressures (in mm Hg)--Post Hoc Analysis Tukey (a) Test for Cell Means

<table>
<thead>
<tr>
<th>Cell Means</th>
<th>E-Post 2210</th>
<th>E-2 mo 2234</th>
<th>C-Post 2368</th>
<th>C-2 mo 2390</th>
<th>C-Pre 2608</th>
<th>E-Pre 2658</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-Post 2210</td>
<td>--</td>
<td>--</td>
<td>158**</td>
<td>180**</td>
<td>398**</td>
<td>448**</td>
</tr>
<tr>
<td>E-2 mo 2234</td>
<td>--</td>
<td>--</td>
<td>134*</td>
<td>156**</td>
<td>374**</td>
<td>424**</td>
</tr>
<tr>
<td>C-Post 2368</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>240**</td>
<td>290**</td>
</tr>
<tr>
<td>C-2 mo 2390</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>218**</td>
<td>268**</td>
</tr>
<tr>
<td>C-Pre 2608</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>E-Pre 2658</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

Critical difference .05 = 119.19.
Critical difference .01 = 142.05.
*Significant at .05.
**Significant at .01.
This analysis revealed that at the time of pretreatment measurement, the mean diastolic blood pressures of the samples were not significantly different from each other. The blood pressures of both experimental groups and control subjects decreased significantly as a result of treatment. However, at posttreatment the experimental group had blood pressures that were significantly lower than the control subjects. In fact, the experimental sample as a group reached goal blood pressure (diastolic blood pressure of less than 90mm Hg) while the control subjects as a group did not. It was also found that the decreases in blood pressures for both conditions were maintained at 2-month follow-up, but that the experimental group remained significantly lower than the control subjects. As a group, the experimental sample was still in a state of controlled blood pressure.

An additional analysis was performed, comparing the mean diastolic blood pressures of the experimental and control samples at 2-month follow-up and 6-month follow-up. A 2 x 2 mixed design (with repeated measures on diastolic blood pressures) analysis of variance was performed. Due to unequal sample size, an unweighted means solution was used (Winer 1962). In addition, subjects who did not contribute readings to both 2-month and 6-month follow-up data were dropped from this analysis. Cell means are depicted in
This analysis revealed that the conditions were still significantly different at 6-month follow-up as they had been at 2-month follow-up. In other words, the diastolic blood pressure changes that existed at posttreatment and 2-month follow-up for both conditions were maintained at 6-month follow-up. The decay that had occurred was minimal. Also, at 6-month follow-up, the experimental group still had significantly lower diastolic blood pressures than the control sample. The experimental group as a whole was still in control of its blood pressure.

In order to test whether the changes in diastolic blood pressure were significantly greater for the experimental group than for the control subjects, a t-test was performed on change scores obtained by subtracting posttreatment from pretreatment blood pressure readings. The results of this t-test as well as the mean change figures appear in Table 7. This t-test indeed confirmed that the magnitudes of the changes in diastolic blood pressures from pretreatment to posttreatment in the experimental group were significantly greater than the changes in the control sample.

Systolic Blood Pressures

Systolic blood pressures were compared between conditions and over time in the same manner as were the
Figure 2. Cell Mean Diastolic Blood Pressures (mm Hg); 2 Month and 6 Month Follow-up
Table 6. Diastolic Blood Pressures (mm Hg) Experimental Versus Control, ANOVA Results; 2 Month vs. 6 Month Follow-up (Unweighted Means Solution)

<table>
<thead>
<tr>
<th>Condition</th>
<th>2 Month Follow-up</th>
<th>6 Month Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Experimental Group</strong></td>
<td>85.92</td>
<td>86.64</td>
</tr>
<tr>
<td>(n = 25)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Control Condition</strong></td>
<td>91.43</td>
<td>91.81</td>
</tr>
<tr>
<td>(n = 21)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Summary Table

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment A</td>
<td>648.26</td>
<td>1</td>
<td>648.26</td>
<td>15.81</td>
<td>.01**</td>
</tr>
<tr>
<td>Error between Ss</td>
<td>1803.99</td>
<td>44</td>
<td>41.0</td>
<td></td>
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</tr>
<tr>
<td>Treatment B</td>
<td>6.82</td>
<td>1</td>
<td>6.82</td>
<td>3.45</td>
<td>NS</td>
</tr>
<tr>
<td>(repeated measures)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A x B Interaction</td>
<td>.91</td>
<td>1</td>
<td>.91</td>
<td>.046</td>
<td>NS</td>
</tr>
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<td>Error within Ss</td>
<td>870</td>
<td>44</td>
<td>19.77</td>
<td></td>
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</tr>
</tbody>
</table>

**Significant at .01.

Table 7. Change Scores—Pretreatment Versus Posttreatment Diastolic Blood Pressures, Experimental Versus Control, t-Test Analysis

<table>
<thead>
<tr>
<th></th>
<th>Mean Change</th>
<th>S.D.</th>
<th>t</th>
<th>df</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group</td>
<td>-17.23</td>
<td>10.55</td>
<td>3.19</td>
<td>50</td>
<td>&lt;.01**</td>
</tr>
<tr>
<td>Control Condition</td>
<td>-9.38</td>
<td>6.78</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Significant at .01.
diastolic blood pressures. A 2 x 3 mixed design with repeated measures on systolic blood pressures was used (Bruning and Kintz 1968). Pretreatment, posttreatment, and 2-month follow-up were combined into one analysis. Cell means are shown in graphic form in Figure 3, while sample means and summary table are presented in Table 8.

The 2 x 3 mixed design analysis of variance showed that significant interaction effects existed in the data. This necessitated the use of a post hoc analysis to clarify the nature of the group differences. Again, the Tukey (a) test was chosen for the pairwise comparisons. The results of the Tukey (a) analysis are presented in Table 9.

This analysis revealed that at pretreatment, the systolic blood pressures of the samples were significantly different but the readings of the experimental group were actually higher. The systolic blood pressures for both groups decreased significantly between pretreatment and posttreatment. But the difference between the conditions at posttreatment only approached significance. At that point, however, the experimental group readings had crossed over and were now the lower set. At 2-month follow-up, the difference between the groups was significant with the experimental group significantly lower in systolic blood pressure. It would seem, then, that the differences increased over time between posttreatment and 2-month follow-up. Thus, the results in relation to systolic blood
Figure 3. Cell Mean Systolic Blood Pressures (mm Hg); Pretreatment, Posttreatment, and 2 Month Follow-up
Table 8. Systolic Blood Pressures (in mm Hg), Experimental Versus Control, ANOVA Results

<table>
<thead>
<tr>
<th>Condition</th>
<th>Pretreatment</th>
<th>Posttreatment</th>
<th>2 Month Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group</td>
<td>154.54</td>
<td>130.23</td>
<td>131.46</td>
</tr>
<tr>
<td>Control Condition</td>
<td>143.54</td>
<td>136.23</td>
<td>139.85</td>
</tr>
</tbody>
</table>

Summary Table

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment A</td>
<td>49.5</td>
<td>1</td>
<td>49.5</td>
<td>0.1084</td>
<td>N.S.</td>
</tr>
<tr>
<td>Error between Ss</td>
<td>22825.1</td>
<td>50</td>
<td>456.502</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Treatment B (repeated measures)</td>
<td>7538.2</td>
<td>2</td>
<td>3769.1</td>
<td>64.9050</td>
<td>&lt;.01**</td>
</tr>
<tr>
<td>A x B Interaction</td>
<td>2905.4</td>
<td>2</td>
<td>1452.7</td>
<td>25.0159</td>
<td>&lt;.01**</td>
</tr>
<tr>
<td>Error within Ss</td>
<td>4807.1</td>
<td>100</td>
<td>58.071</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

**Significant at .01.
Table 9. Systolic Blood Pressures (in mm Hg), Post Hoc Analysis, Tukey (a) Test for Cell Means

<table>
<thead>
<tr>
<th>Cell Means</th>
<th>E-Post</th>
<th>E-2 mo</th>
<th>C-Post</th>
<th>C-2 mo</th>
<th>C-Pre</th>
<th>E-Pre</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-Post</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3386</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>250**</td>
<td>346**</td>
<td>632**</td>
</tr>
<tr>
<td>E-2 mo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3418</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>218**</td>
<td>314**</td>
<td>600**</td>
</tr>
<tr>
<td>C-Post</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3542</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>190**</td>
<td>476**</td>
</tr>
<tr>
<td>C-2 mo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3636</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>382**</td>
</tr>
<tr>
<td>C-Pre</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3732</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>286**</td>
</tr>
<tr>
<td>E-Pre</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4018</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

Critical Difference .05 = 160.1
Critical Difference .01 = 190.8

**Significant at .01.
pressure were not as clear-cut as they were for diastolic blood pressure readings.

A 2 x 2 mixed design with repeated measures on systolic blood pressures analysis of variance was performed comparing conditions at 2-month and 6-month follow-up. Due to unequal sample size, an unweighted means solution was used (Winer 1962, Myers 1972). Also, subjects who did not contribute readings to both 2-month and 6-month follow-up data were dropped from this analysis. Cell means are shown in graph form in Figure 4. Cell means and summary table are presented in Table 10.

Visual inspection of these data showed that apparently mean differences existed between the experimental and control samples. These differences were maintained from 2-month to 6-month follow-up and were in the predicted direction; i.e., the experimental group blood pressures were lower. Nevertheless, these differences only approached but did not reach statistical significance.

In order to assess whether the changes in systolic blood pressure were significantly greater for the experimental than for the control condition, a t-test was performed on change scores obtained by subtracting posttreatment from pretreatment systolic blood pressure readings. The results of this t-test as well as the mean change scores appear in Table 11. The magnitude of the mean changes in systolic blood pressures from pre- to posttreatment for
Figure 4. Cell Mean Systolic Blood Pressures (mm Hg); 2 Month and 6 Month Follow-up
Table 10. Systolic Blood Pressures (in mm Hg), Experimental Versus Control, ANOVA Results; 2 Month vs. 6 Month Follow-up (Unweighted Means Solution)

<table>
<thead>
<tr>
<th>Condition</th>
<th>2 Month Follow-up</th>
<th>6 Month Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Experimental Group (n = 25)</strong></td>
<td>131.44</td>
<td>135.60</td>
</tr>
<tr>
<td><strong>Control Condition (n = 21)</strong></td>
<td>140.00</td>
<td>144.29</td>
</tr>
</tbody>
</table>

Summary Table

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment A</td>
<td>1690.89</td>
<td>1</td>
<td>1690.89</td>
<td>3.76</td>
<td>N.S.</td>
</tr>
<tr>
<td>Error between Ss</td>
<td>19785.7</td>
<td>44</td>
<td>449.68</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Treatment B (repeated measures)</td>
<td>405.96</td>
<td>1</td>
<td>405.96</td>
<td>4.00</td>
<td>N.S.</td>
</tr>
<tr>
<td>A x B Interaction</td>
<td>0.0</td>
<td>1</td>
<td>0.0</td>
<td>0.0</td>
<td>N.S.</td>
</tr>
<tr>
<td>Error within Ss</td>
<td>4468.8</td>
<td>44</td>
<td>101.56</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

Table 11. Change Scores—Pretreatment Versus Posttreatment—Systolic Blood Pressure; Experimental Versus Control, t-Test Analysis

<table>
<thead>
<tr>
<th>Condition</th>
<th>Mean Change</th>
<th>S.D.</th>
<th>t</th>
<th>df</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group</td>
<td>-24.77</td>
<td>14.70</td>
<td>3.98</td>
<td>50</td>
<td>&lt;.01**</td>
</tr>
<tr>
<td>Control Condition</td>
<td>-11.77</td>
<td>7.85</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Significant at .01.
experimental versus control samples were significant. The experimental group had significantly greater drops in blood pressures than did the control subjects.

Pill Counts

Pill counts were a direct measure of compliance to medication regimen. The frequencies of patients in the discrete categories of compliant versus noncompliant were compared for the experimental versus control samples. Chi-square values, degrees of freedom, and statistical significance levels are presented in Table 12. These analyses revealed that at the start of treatment the subjects did not differ significantly in compliance to their medication regimens. Yet, at the end of treatment, the experimental group was significantly more compliant. On the other hand, both samples of patients at posttreatment had improved their compliance significantly over the levels at pretreatment.

An additional analysis was performed on the pill count data. This t-test analysis was based on the number of weeks out of seven possible weeks on which each individual was compliant. Group means, standard deviations and t-value, degrees of freedom, and significance level are presented in Table 13. This test indicated that based on the number of weeks they complied, the experimental group complied significantly more frequently than did the control group.
Table 12. Pill Counts—Experimental Versus Control, Compliant Versus Noncompliant Chi-Square Analysis

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Chi-Square</th>
<th>df</th>
<th>Significance</th>
<th>Direction of Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 2(^a) -- Start of Treatment</td>
<td>.34</td>
<td>1</td>
<td>N.S.</td>
<td>No difference</td>
</tr>
<tr>
<td>Week 8 -- End of Treatment</td>
<td>4.79(^b)</td>
<td>1</td>
<td>.05*</td>
<td>E Group more compliant</td>
</tr>
<tr>
<td>Week 2 vs. Week 8 -- Experimental Group</td>
<td>11.94</td>
<td>1</td>
<td>.01**</td>
<td>Week 8 more compliant</td>
</tr>
<tr>
<td>Week 2 vs. Week 8 -- Control Subjects</td>
<td>3.82</td>
<td>1</td>
<td>.05*</td>
<td>Week 8 more compliant</td>
</tr>
</tbody>
</table>

\(^a\) Week 2 was first week pill counts could be performed, as new prescriptions were issued on Week 1.

\(^b\) Yates' correction for continuity was utilized (Guilford 1965).

*Significant at .05.

**Significant at .01.

Table 13. Compliance Analysis—Pill Counts — Number of weeks compliant out of 7 possible weeks; experimental versus control; t-test analysis

<table>
<thead>
<tr>
<th>Weeks Compliant Mean S.D.</th>
<th>t</th>
<th>Df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental group</td>
<td>4.62</td>
<td>1.75</td>
<td>2.42 50</td>
</tr>
<tr>
<td>Control condition</td>
<td>3.31</td>
<td>2.13</td>
<td></td>
</tr>
</tbody>
</table>

**Significant at .01.
**Attendance**

Weekly attendance was taken and recorded at each experimental group and each time a control patient kept an appointment. Attendance tallies and percentages appear in Table 14. These figures indicated that from week 2 through week 7 and at 6-month follow-up, attendance was higher for the experimental than for control subjects. Attendance was a direct measure of compliance and results show that experimental group members were more compliant.

**Hypertension Mastery Questionnaire**

The level of hypertension knowledge of the patients was assessed by a Hypertension Mastery Questionnaire. Scores based on the number answered correctly were compared on a pretreatment versus posttreatment basis with a 2 x 2 mixed design (with repeated measures on the Hypertension Mastery Questionnaire) analysis of variance. Cell means are depicted in graph form in Figure 5. Sample means and summary table are presented in Table 15.

This analysis showed that significant group differences existed, but the presence of a significant A x B interaction clouded further interpretation. A post hoc analysis was required to highlight the areas of difference. The Tukey (a) test was performed to assess the nature of the pairwise comparisons of cell means. The results of the Tukey (a) analysis are shown in Table 16.
<table>
<thead>
<tr>
<th>Condition</th>
<th>Week</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>2 Month</th>
<th>6 Month</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental Group</td>
<td>26</td>
<td>24</td>
<td>25</td>
<td>24</td>
<td>23</td>
<td>22</td>
<td>20</td>
<td>26</td>
<td>25</td>
</tr>
<tr>
<td>Number Present</td>
<td>100</td>
<td>92.3</td>
<td>96.2</td>
<td>92.3</td>
<td>88.5</td>
<td>84.6</td>
<td>76.9</td>
<td>100</td>
<td>96.2</td>
</tr>
<tr>
<td>Percentage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>26</td>
<td>21</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>18</td>
<td>16</td>
<td>26</td>
<td>21</td>
</tr>
<tr>
<td>Number Present</td>
<td>100</td>
<td>80.8</td>
<td>69.2</td>
<td>73.1</td>
<td>76.9</td>
<td>69.2</td>
<td>61.5</td>
<td>100</td>
<td>80.8</td>
</tr>
<tr>
<td>Percentage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 5. Hypertension Mastery Questionnaire—Mean Number Correct
Table 15. Hypertension Mastery Questionnaire (Mean Number Correct), Experimental Versus Control Conditions — ANOVA Results

<table>
<thead>
<tr>
<th>Condition</th>
<th>Pretreatment</th>
<th>Posttreatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group</td>
<td>17.39</td>
<td>21.81</td>
</tr>
<tr>
<td>Control Condition</td>
<td>17.92</td>
<td>20.65</td>
</tr>
</tbody>
</table>

Summary Table

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment A</td>
<td>2.46</td>
<td>1</td>
<td>2.46</td>
<td>0.18</td>
<td>N.S.</td>
</tr>
<tr>
<td>Error between Ss</td>
<td>674.69</td>
<td>50</td>
<td>13.49</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Treatment B (repeated measure)</td>
<td>332.65</td>
<td>1</td>
<td>332.65</td>
<td>92.66</td>
<td>.01**</td>
</tr>
<tr>
<td>A x B Interaction</td>
<td>18.62</td>
<td>1</td>
<td>18.62</td>
<td>5.19</td>
<td>.05*</td>
</tr>
<tr>
<td>Error within Ss</td>
<td>179.23</td>
<td>50</td>
<td>3.59</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

*Significant at .05.

**Significant at .01.
Table 16. Hypertension Mastery Questionnaire—Post Hoc Analysis Tukey (a) Test for Cell Means

<table>
<thead>
<tr>
<th>Cell Means</th>
<th>E-Pre 452</th>
<th>C-Pre 466</th>
<th>C-Post 537</th>
<th>E-Post 567</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-Pre 452</td>
<td>--</td>
<td>--</td>
<td>85**</td>
<td>115**</td>
</tr>
<tr>
<td>C-Pre 466</td>
<td>--</td>
<td>--</td>
<td>71**</td>
<td>101**</td>
</tr>
<tr>
<td>C-Post 537</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>E-Post 567</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

Critical difference .05 = 36.37.

Critical difference .01 = 44.92.

**Significant at .01.
The groups were not significantly different in knowledge and questionnaire scores at the start of treatment. The scores of both groups increased significantly over the course of treatment. However, while posttreatment scores for the experimental Group were higher than the control subjects, the difference only approach significance with the conservative Tukey test. To test a researcher hunch, a Newman-Keuls analysis was performed on the same data. The Newman-Keuls test is a less conservative procedure (Winer 1962) and it was hypothesized that the group differences would be seen as significant with this technique. This was in fact the case. The Newman-Keuls test for the control-post versus experimental-post had a critical difference value at the .05 level of 27.48. The obtained difference was 30, which was thus significant at the .05 level. It could be possible, then, to select a less conservative test in order to find significance where a more conservative test would not find significance.

Another analysis dealt with the number of high blood pressure medications the patients were prescribed. The comparisons by Chi-square analysis showed no significant differences between the groups at any point: at the start or close of the treatment, nor on pre- versus posttreatment comparisons. This analysis was performed to insure that the positive treatment results were not just an effect of closer
supervision and more medications being prescribed, but were due to an increase in actual compliance.

**Experimental Group Interactions**

**Frequency of Initiation**

Frequency counts for the initiation of communications and interactions were tallied from audiotapes. The counts given are the mean of three raters. Interrater reliability was 84.9% on the frequency counts. These counts were performed as a method of monitoring the group process. Frequencies are presented in graphic form in Figure 6. Frequencies, percentages, Chi-square values, degrees of freedom, and significance levels appear in Table 17. Visual inspection of the results indicated the levels, directions, and changes in the interactions. A considerably amount of time during the groups was unscorable as far as interactions were concerned. These randomly distributed periods occurred when blood pressure readings were being obtained or when too much conversation and interaction occurred which made it impossible to determine who specifically was talking. The patients initiated most interactions, while the nurse initiated least. The researcher was intermediate and patient-to-patient was quite high in frequency. The Chi-squares show that the patient initiated frequencies did not increase significantly, nor did the researcher initiated interactions decrease significantly. The nurse
Figure 6. Experimental Group Interactions; Frequency Counts; Initiation of Exchange — No tapes were made of weeks 1 and 8.
Table 17. Experimental Group Interactions—Frequency Counts

<table>
<thead>
<tr>
<th></th>
<th>Week</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Pt Init</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freq</td>
<td>75.00</td>
<td>71.50</td>
<td>87.00</td>
<td>88.00</td>
<td>86.00</td>
<td>91.67</td>
</tr>
<tr>
<td>%</td>
<td>41.80</td>
<td>41.20</td>
<td>42.50</td>
<td>47.20</td>
<td>45.50</td>
<td>45.70</td>
</tr>
<tr>
<td>χ² = 3.79</td>
<td>df = 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.79</td>
<td>df = 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N.S.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Researcher Init</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freq</td>
<td>40.00</td>
<td>40.00</td>
<td>35.50</td>
<td>32.60</td>
<td>27.75</td>
<td>24.00</td>
</tr>
<tr>
<td>%</td>
<td>22.30</td>
<td>23.00</td>
<td>17.60</td>
<td>17.50</td>
<td>14.70</td>
<td>12.00</td>
</tr>
<tr>
<td>χ² = 6.38</td>
<td>df = 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6.38</td>
<td>df = 5</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>N.S.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Nurse Init</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Freq</td>
<td>29.75</td>
<td>31.75</td>
<td>22.50</td>
<td>13.00</td>
<td>16.00</td>
<td>12.67</td>
</tr>
<tr>
<td>%</td>
<td>16.60</td>
<td>18.30</td>
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<td>χ² = 16.84</td>
<td>df = 5</td>
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<td>Significant at .01</td>
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a Frequency counts were the mean for 3 raters. Reliability of rates was 84.9%.

b No tapes were made for week 1 or week 8 due to the nature of the group activities—questionnaires, etc.
significantly decreased her frequency of initiation while the patient-to-patient interactions increased dramatically.

Duration of Interactions

The durations of time spent interacting among group participants, researcher, and nurse were tallied from audio-tapes. The durations given are the means of three independent raters. Interrater reliability was 86.4% for this measure. Durations were also felt to be reflective of the occurrence of group process. Durations are depicted in graph form in Figure 7. Durations, percentages, Chi-square values, degrees of freedom, and significance levels are presented in Table 18. The results show that at the start of treatment, durations were fairly small and equally distributed. Over the course of training, however, the patient duration decreased significantly.

Patient Interviews

At the 2-month follow-up session, patients were interviewed about their thoughts and feelings regarding the Patient Operated Hypertension Groups. The universal comment of all the patients was that they felt it had helped them to become better informed about hypertension and the need for lifelong blood pressure control. Patients stated that the greater understanding of antihypertensive medications, their actions, and the need to take them daily were factors that aided compliance. Group members appreciated the greater
Figure 7. Experimental Group Interactions; Duration of Comprehensible Interactions (in Seconds) -- No tapes were made of weeks 1 and 8 due to the nature of the tasks involved.
Table 18. Experimental Group Interactions—Duration of Comprehensible Interaction\(^a\) (in Seconds).

<table>
<thead>
<tr>
<th>Week</th>
<th>Patient Duration (%)</th>
<th>Researcher Duration (%)</th>
<th>Nurse Duration (%)</th>
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<td>7</td>
<td>1815.33</td>
<td>243.33</td>
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</table>

\[\chi^2(\%) = 20.59 \quad \text{df} = 5 \quad \text{Significant at .01}\]

\[\chi^2(\%) = 23.27 \quad \text{df} = 5 \quad \text{Significant at .01}\]

\[\chi^2(\%) = 11.88 \quad \text{df} = 5 \quad \text{Significant at .05}\]

\(^a\)Durations were the mean for 3 raters. Interaction reliability was 86.4%.

\(^b\)No tapes were made for week 1 and week 8 due to the administrative nature of the group activities.
participation and personalized relationships in the group. They felt that patients helping other patients was an excellent idea. The patients universally made positive comments about the group format and stated that it helped to know that others had the same problems and that they were not alone in coping with hypertension. The sharing of hints and information was seen as a positive factor in the group. Group members had no negative comments about the Patient Operated Hypertension Groups. The only negative comments involved the waits to have prescriptions filled at the pharmacy (despite the fact that at the start of treatment all patients were encouraged to have prescriptions mailed to them as a means of eliminating the notorious pharmacy wait). Thus, from an admittedly subjective interview procedure, the patient comments were universally positive regarding the groups. It did seem to be an excellent approach to the hypertension care problem and the patients endorsed it as a technique that should prove very useful with other patients as well. It should be noted that similar information was not elicited from the control subjects. The reason for this omission was the presumption based on previous research that the control procedures would merely be an attention-placebo treatment. It was presumed that the control procedure would not be a significantly effective treatment in itself and the patients would have no specific reactions to it. Therefore, such subjective information would be useless.
DISCUSSION

Sample

The total response rate to the recruitment letter (36.1%) was lower than would have been desired and the actual number of subjects (52) recruited out of the number of letters presumed to have been delivered (498) was only 10.4%. Thus, while the samples of subjects obtained and randomly assigned to the conditions were not significantly different from each other in terms of demographic characteristics and seemed to be typical representatives of the patients in the Veterans Administration Hospital population, there was undoubtedly a motivational self-selection process operative among the subjects in the present study. It may have been the case that the people who responded to the recruitment letters and then expressed interest in participating in the research program were a self-selected group of well-motivated individuals (despite the fact that they were all noncompliant dropouts of the regular Hypertension Clinic Treatment Program). This possible biasing factor must be kept in mind when the results of the present study are interpreted. The demographic comparisons showed no significant differences between the groups of subjects, therefore any effects of the demographic variables on compliance should have been held constant across conditions and should
not have been a factor in the experimental results obtained in the study.

The recruitment rate in the present research, while not unusually low in relation to the rates for most mail-out recruitment or questionnaire programs, is low enough to highlight the need for different, more aggressive approaches to patient recruiting. Future recruitment programs (Zifferblatt 1975) could attempt to use the mail-out approach but with brightly colored rosters and brochures rather than letters. Telephone contacts might increase participation. Coupon campaigns that provided tangible incentives for program participation might increase recruitment rates. Another method of increasing recruitment would be to develop a joint program wherein as part of the population screenings of the Heart Association or other organizations, recruitment brochures were distributed, directing people to specific treatment programs for which they would be eligible. After all, the compliant patient is the one who seeks out care on his own and for whom the traditional care system can work, while it is the patient who tends to be noncompliant or drop out of treatment at whom future more aggressive recruitment campaigns must be directed. For, if the patients can not be recruited, they can not be treated.
Blood Pressures

The primary emphasis of the present research was on compliance. And while blood pressures and their changes are only indirect measures of compliance, they are vitally important measures. They are indirect measures in that, as the patient adheres more closely to his drug treatment regimen, by definition, his compliance level will increase. This increase in compliance should be accompanied by a commensurate decrease in blood pressure (if the correct medications and dosages have been found for that person). This relationship was assumed to exist in the present study.

Diastolic blood pressure was the primary emphasis because it tends to be the measure on which treatment versus nontreatment decisions are based. It tends to be more stable over time and does not fluctuate as widely from second to second due to external environmental factors as does systolic blood pressure.

The diastolic blood pressure readings for the Patient Operated Hypertension Groups decreased significantly over the course of treatment. By the end of treatment, Group members as a whole had a mean blood pressure of 85mm Hg diastolic versus readings averaging 102.23mm Hg at pre-treatment measurement. The mean decline was 17.23mm Hg, but most importantly 24 of the 26 members of this condition lowered their diastolic blood measures to what was considered the treatment goal blood pressure (90mm Hg, or
below). Even the group mean decreased to below the 90mm Hg level. These results indicated that the Patient Operated Hypertension Groups were very effective in increasing patient compliance as measured indirectly by the marked decreases in mean blood pressure of the Group. As the patient compliance increased, the diastolic blood pressures decreased because the Group members began to reach therapeutic levels of their medications. The effects of decreased blood pressure and increased compliance were maintained at the 2-month and 6-month follow-up measurements. There was a small tendency for decay of the treatment effect to occur. The group mean at 2-month follow-up was .92mm Hg higher; while at 6 months it was 1.64mm Hg higher than the mean at the end of the initial 8-week treatment period. But despite the small decay effect on group mean blood pressures; at 2-month follow-up, 25 of the 26 members still were under control. At 6 months posttreatment, 24 of the 25 members from whom readings were obtained remained under control. In fact, the group mean stayed below the treatment goal cut-off point of 90mm Hg diastolic blood pressure. Such results indicated that the Patient Operated Hypertension Group approach was extremely effective in increasing the compliance (and thus, decreasing the diastolic blood pressures) of a group of patients who had proven themselves to be noncompliant in their previous traditional treatment experiences. The effects were very powerful and maintained
very well over the 6 months duration of the present research program.

By the same token, the control program which consisted of the Hypertension Information Program tapes plus individualized nurse operated care was also significantly effective in and of itself, in bringing about increased compliance and thus, decreased blood pressures. The mean decline from pre- to posttreatment was 9.22mm Hg, from a mean of 100.5mm Hg at pretreatment to a mean of 91.08mm Hg at the end of the 8-week program. The decrease was statistically significant, although the group mean stayed above the usual 90mm Hg goal of treatment. On the other hand, 14 of the 26 subjects were sufficiently compliant to bring their blood pressures under control. In addition, these effects were maintained with very little decay from the end of treatment through the 2-month and 6-month follow-up evaluations.

Rather than being an inert attention-placebo as the result of the Sackett et al. (1975) research would have led one to expect, the informational program used in the present study was significantly effective in leading to decreased diastolic blood pressure. The results supported the hypothesis that while the mere presentation of a one or two hour tape and slide program may increase scores on a test based on the presentation itself, it will be inadequate to increase patient compliance (Sackett et al. 1975). On the
other hand, an intensive 6-tape program (see Appendix E for tape transcripts) covering the topics of blood pressure, hypertension, various medications and behavioral techniques for weight control can be much more effective and in fact, can be a significantly effective treatment approach in its own right. But for purposes of the present study, this treatment served as an excellent control procedure for any potential Hawthorne effect based on differential attention. It equated the frequency of professional contact between the control and experimental groups while approximating the quantity of time spent in treatment sessions in each condition. It also proved to be an excellent treatment against which to compare the effects of the Patient Operated Hypertension Groups.

The effects of the control procedure were significant and maintained well, but the effects of the Patient Operated Hypertension Groups were even greater and significantly so. The decreases were also maintained equally well. But, a t-test comparison of the change scores between experiment and control conditions showed that the mean changes in the experimental sample were significantly greater than the changes in control condition diastolic readings. The experimental treatment seemed to be a very useful technique to use with a sample of patients who had previously been noncompliant, treatment dropouts. At the start of treatment, none of the patients had controlled
blood pressure, yet at the end of 8 weeks of Patient
Operated Hypertension Group sessions, 24 of the 26 subjects
had reached or bettered goal blood pressure (90mm Hg
diastolic). Further research and replications would be
required to assess the reliability of the results of this
self-help group treatment approach and to make certain they
were not an artifact of the present sample of subjects.
Nevertheless, the effects shown in the present study are
quite impressive.

However, the effects of treatment were not as clear-
cut on systolic blood pressure readings as they were on the
diastolic. At the start of treatment the samples were sig-
nificantly different, however, the experimental group had
significantly higher systolic blood pressures than the
control subjects at that point. This may have been due to
the general lability of systolic blood pressure over time or
due to the novelty effects and anxiety of the initial group
meeting. At posttreatment, the two condition means were not
significantly different. However, the fact that a crossover
interaction occurred muddled the statistical results.
Visual inspection (see Figure 3) provided the answer. From
a mean reading 11mm Hg above the control at pretreatment,
the experimental group mean at posttreatment dropped to 6mm
Hg below the control subject mean. The mean decreased by
24.31mm Hg for the experimental group participants and only
7.31 for the control subjects. Certainly, while both
declines were statistically significant, the experimental group mean declined in the predicted direction and with a greater magnitude of drop than the control condition. A t-test of the change scores confirmed that the mean magnitude of change was significantly greater for the experimental group. Interestingly, at 2-month follow-up, the difference between the experimental and control samples attained significance. The experimental group mean was significantly lower at that point. Once again, as with diastolic readings, the effects on systolic blood pressure were maintained at 2-month follow-up with little decay. But the 2-month versus 6-month follow-up comparison was less clearly drawn. Visual inspection of the means (see Figure 4) revealed that mean differences did exist and were in the predicted direction despite only approaching statistical significance. This may be accounted for by the fact that because of a lack of 6-month follow-up readings, six subjects were not included in this analysis. This may have caused an inflation of the error variance and a decrease in the number of degrees of freedom available.

In summary, blood pressures in both conditions decreased significantly. This indirect measure should have been reflective of increased compliance to treatment regimens in both samples of subjects. The experimental group did significantly better in decreasing blood pressures than did the control subjects. The effects were well maintained
for both groups, but the experimental group mean remained lower. The rate of treatment decay was small and almost identical between the experimental and control conditions. Thus, in the present study, two significantly effective treatments were applied to two samples from a noncompliant dropout population, the results were significant decreases in the blood pressures of both groups with the blood pressures of the Patient Operated Hypertension Groups showing a significantly greater decline.

Pill Counts

Pill counts are a direct measure of compliance in that, by definition, if a person takes all medications as prescribed, that person is compliant. If, on the other hand, the patient does not take the medications exactly as prescribed, that patient is noncompliant. In the present research, the results bore out the assumption that as compliance (pill counts) increased, blood pressure readings should decrease. Pill count data paralleled the blood pressure results. At the start of treatment, the subjects did not differ significantly in their compliance rates. By the end of treatment, both groups had significantly increased their compliance but the experimental group was found to be more compliant. The experimental group took their medications in amounts (number of pills) that more nearly equalled the amounts they had been prescribed. Also,
on the basis of the number of weeks they had been compliant, the experimental group members were significantly more frequent in their compliance (4.62 weeks out of 7, versus 3.31 weeks out of 7 for the control condition). Even utilizing the very rigid, strict, and conservative perfect compliance criterion, this most direct method of measuring compliance showed that the Patient Operated Hypertension Groups succeeded in increasing compliance more than did the control condition (although both were of significant effectiveness).

Attendance was another direct measure of compliance. The attendance each week was generally very good for both groups, but again attendance was better for the experimental group. This result indicated that once the patient could be induced to attend in the first place, they could be made to feel sufficiently involved to continue attendance. After week 1, when ineligible and uninterested patients were eliminated, there were a number of misses sessions and appointments but no dropouts. Another factor in creating the good attendance was the follow-up attendance procedure.

Whenever a patient missed a group session or failed to keep an appointment, he received a telephonic reminder within 24 hours of his next session or appointment prompting him to come. This was done for all subjects in both conditions. In addition, all subjects were telephoned and reminded of the importance of attending their week 8 meeting.
Attendance at the 2-month and 6-month follow-up evaluations was also prompted by telephone reminders. The results obtained in the present study highlight the effectiveness of investing the extra time required to call patients with appointment reminders. The attendance rates can be increased by this procedure and the patients must attend their treatment program sessions for maximum effectiveness to occur.

**Hypertension Mastery Questionnaire**

The same pattern of results that occurred on blood pressures and pill counts was also revealed for the increases in information measured by the Hypertension Mastery Questionnaire. At pretreatment testing, the samples of subjects were not significantly different as far as their level of hypertension information was concerned. In fact, the experimental group actually had lower test scores at the start. But after 8 weeks of treatment, while both groups increased their levels of information (and test scores) significantly, the experimental group did better than the control subjects. This latter difference only approached significance. The obtained results again highlighted the fact that both treatment approaches were in fact significantly powerful in their effects. It would seem that although level of information may be tied to increased compliance, the relationship was not as close as expected, nor
was it as close as the relationship between blood pressure and pill counts. The results of the present study showed that the tailoring of information to the specific level of understanding and assimilation of the patient was not significantly more effective in increasing knowledge than the didactic Hypertension Information Program tapes. The trends toward significance existed, but a significant level of group difference was not reached. It is important to educate the patients about their hypertension, but it is unclear from the results of this study which method is best in achieving that goal.

**Experimental Group Interactions**

The analysis of the group interaction data indicated that once the group process was started and as is progressed, the patient involvement in the groups increased dramatically. Patient initiated interactions and patient to patient interactions became far more frequent than researcher or nurse initiated interactions over the course of the 8 weeks of group meetings. Inspection of the group interaction data (Figures 6 and 7) showed that as the Patient Operated Hypertension Groups progressed and developed, the patients became more active, while the researcher and nurse faded out. This was a necessary progression of group development. Initially, the members were unsophisticated as group participants and the nature of the behavioral demands of the
situation were unknown to them. But as the group self-help relationships developed, the members came to recognize their responsibilities in reaching the goals of the group. There was a concomitant increase in the number and duration of interactions among patients. This result was accomplished through the high blood pressure training and group discussion techniques and without formal or sophisticated group process enhancing procedures. In short, the experimental groups were successful in increasing the involvement of the members by informally allowing them to operate their own self-help groups, while the researcher and nurse decreased their roles to those of resource consultants.

Implications of the Present Study

The present study was an attempt to assess the effects of a new treatment approach that could serve as a useful supplement to medical therapy by helping to increase patient compliance to drug regimens. It was not meant as a substitute for medical treatment as were some behavioral techniques cited previously. The Patient Operated Hypertension Group treatment involved a total approach which incorporated many diverse components into the self-help group format. Because of this combination of components it would be difficult to separate out exactly which components were actively affecting behavior. Yet, the research previously cited has shown that the component parts tested individually
have had only marginally effective results. And given the excellent results of the present approach, it was possible that the effects of the individual components were additive and only when applied all together as a total treatment approach did their effects become significant.

The Patient Operated Hypertension Groups attempted to increase the involvement and interest of the patients in their own treatment, as well as to enhance their responsibility for gaining and maintaining hypertension control. The groups provided the patients with information that was tailored to the level of understanding and needs of each individual member. There was a great deal of problem sharing and solving among the group members. There was also much group support, informal modeling, and vicarious reinforcement for the behavioral implementation of positive lifestyle and compliance changes. There was much discussion about medications, their effects, the rationale for usage, and the need to make medication taking a part of daily habit patterns. Each week blood pressure readings were taken and recorded by the patients themselves. This procedure gave them weekly feedback and reinforcement from the other group members for making progress in bringing their hypertension under control. The group patients saw the same staff and peers at each meeting. Close therapeutic relationships were allowed to develop. Any time an appointment or meeting was missed the patients received a telephone reminder within 24
hours of the next session to insure follow-up and continued attendance. Waiting time was decreased as the groups started promptly at a set time. The group subjects also received more peer and staff attention as a whole than would an individual patient in the traditional clinic setting.

The Patient Operated Hypertension Group approach was very efficient as well as effective. It provided a means by which 8-10 patients could be treated and monitored in a 90 minute time span. The time limited nature of the eight weeks of primary group sessions was another distinct treatment advantage. It seemed that the intensive level of treatment was useful in helping patients initially gain control of their hypertension. Once that control was gained, group follow-up meetings every 2-3 months could be used to maintain close contact, continued monitoring, and group involvement. If the treatment benefits (compliance) decayed, the patient or group could be asked to participate in another eight week intensive group program.

Because of the short supply of physicians and the time pressure they are usually under just to deal with acute treatment needs, the group approach would be beneficial in allowing them to serve in a supervisory capacity as far as routine medication and long term care was concerned. In the Patient Operated Hypertension Groups, close contact between the patients and staff involved would allow for close monitoring and the immediate awareness of any
change in the condition of any group member that indicated the need for more direct physician care of secondary medical problems.

A typical group oriented program would involved an initial screening and medical tests in order for the physician to eliminate the possibility of secondary hypertension and confirm the presence of essential hypertension. The patient would then be assigned with 8-10 others to a Patient Operated Hypertension Group for an intensive eight week experience. Then, once the blood pressure was brought under control, the patient would only need to meet with his group every 2-3 months in order to monitor blood pressure, renew prescriptions, maintain group affiliation, and discuss problems. This format could provide long term follow-up care of indefinite duration, with intensive 8 week group experiences provided as needed to maintain compliance.

Because of the excellent results obtained by the patients in the present study, a number of future projects should be undertaken to further assess the effects and effectiveness of the self-help approach and to remedy a possible design flaw present in this study. It should be noted that the designer of the present study was also the researcher who monitored and participated in the experimental groups. This could have had an affect on the obtained results due to the influence of experimenter bias and the demand characteristics of the group situation. Ideally,
future replications should be performed such that personnel involved in designing the study would not be involved in the administration of the groups. This would tend to minimize the effects of experimenter bias. In addition, an exact replication of the present design with different samples of patients would be useful. This would insure that the obtained results were not merely artifacts of the particular samples of subjects in the present study but in fact were due to the operation of the treatment approach. Even an exact replication using patients new to treatment, rather than the proven noncompliant dropouts of the present study could have an enlightening effect on the usefulness of the group approach with a normal clinic population. Or the pretest-posttest control group design with randomization (Campbell and Stanley 1963) used in the present study could be modified to include another control condition which would strictly receive the traditional nurse operated physician supervised clinic treatment. Although for the sample of subjects in the present study, this technique had been ineffective in the past, the proposed research would provide a test by which to directly compare the presumed greater effectiveness of the Hypertension Information Program tapes and Patient Operated Hypertension Groups with the results of the traditional care system approach. Because of the fact that the group approach was multifaceted, it would be interesting to replicate the groups while deleting one component
at a time in order to determine the effect of treatment outcome. For example, it would be particularly relevant to run one group cycle with telephone reminders and one without in order to see if attendance was affected. It would also be an excellent idea to improve and expand the Hypertension Mastery Questionnaire as well as to determine its reliability and validity as a knowledge assessment tool.

As is typical of most research, the present study in its attempt to assess the effects of a specific compliance increasing strategy has also highlighted the need for further experimental explorations using the very promising Patient Operated Hypertension group approach. This exploration should occur not only in the treatment of hypertension but also in the other areas of medicine, such as cardiopulmonary rehabilitation and renal dialysis where compliance has proven to be a problem. The Patient Operated Hypertension group approach is ideally suited to the purposes and goals of a cardiopulmonary rehabilitation program. Educational information must be provided and assimilated by the patients in such areas as cardiac functioning, medications, decreasing risk factors, and dietary modifications. For treatment to be successful, the patients must comply to their physical training and medication regimens. They must deal with life situations and role changes that can be particularly stressful. The group format could be particularly useful in allowing patient discussion and sharing of
their problems and solutions. The notion of patients helping other patients is appropriate in this area. During their stay in the cardiac care unit patients are typically too physically ill to participate, but certainly the group experience should start upon their transfer from intensive care to the regular ward. Patients should be assigned to the same ward and could begin group activities and education even while confined to bed rest. A daily inpatient group could begin involvement and initiate group process. This would be followed by weekly outpatient group meetings to support compliance and provide close follow-up. Family members and significant others could also attend group meetings for educational or supportive purposes. The efficiency and effectiveness apparent in the Patient Operated Hypertension Groups would also be expected if such an approach was applied in the cardiac rehabilitation setting.

The high frequency of communication inherent in the Patient Operated Group approach would be of great usefulness on renal dialysis units. Typically, the current treatment involves the same group of patients being dialyzed three times per week. Yet, while the dialysis machines are only five to six feet apart, there is very little communication between patients. They become totally self-absorbed and communicate as little as possible with other patients or staff. The nature of the dialysis procedure and need for patient responsibility for dietary and health monitoring
requires much information to be conveyed to the patient. Rigid compliance is essential to maintain well-being. The group approach would provide heightened communication, support, and problem sharing among the dialysis patients. Family members could also become involved in the groups as desired. The numbers of patients already exist in the dialysis units, but nothing is done to create the patient helping patient atmosphere so necessary to increasing effective compliance. The Patient Operated Group techniques should be tested for effectiveness in this setting as well.

Clearly the format in which clinics are run affects compliance and control. Thus, format must be carefully considered and evaluated if the clinic approach to health care delivery is to be made more effective and efficient. The Patient Operated Groups were shown to be very useful in the present study and deserve to be tested in other settings and with other medical compliance problems. The patients deserve the best care possible and the Patient Operated Groups may well provide superior care to that which is typically provided in most clinics.
APPENDIX A

RECRUITING LETTER

Veterans Administration Hospital
Tucson, Arizona 85723

Dear Sir:

The Veterans Administration Hospital Hypertension Clinic is offering a new program to help you more easily control your high blood pressure. High blood pressure if left untreated can lead to dangerous, life-threatening medical problems. The new program offers personal attention and fewer hassles.

We would like to check your blood pressure and include you as a part of the new program. You will have the option of being seen for treatment during the regular 8a.m.-4p.m. Clinic hours; or in addition, for those who work during the week, we will offer treatment on Saturdays as well.

Please call or have your wife call the VA Hypertension Clinic by Jan. 28, and ask to be part of the new program. Please call 792-1450 Ext. 400 between 9a.m. and 4p.m. and be sure to ask for Don or Sharon. If the line is busy, please call again.

Thank you,
APPENDIX B

PATIENT CONSENT FORM

A Comparison of Two Methods for Improving Patient Compliance in Hypertension Treatment

Research Procedure Description

The purpose of this study is to find out which of two treatment programs is best in helping patients with hypertension keep their blood pressure under control. Inadequately treated hypertension is a major medical problem and can lead to increased likelihood of heart disease, stroke, and kidney failure. The benefit to all participants in this project is improved control of hypertension by improved treatment methods. Some patients will be seen by the nurse in the Hypertension Clinic. She will teach patients about hypertension and attend to the individual needs of each patient in order to improve control of their blood pressure. Other patients will be seen in groups, where they will learn enough about high blood pressure so that they can decide what medicines they are going to take to try to control their high blood pressure. All medications will be supervised by a physician and all patients will use the same types of standard hypertension medicines. You will be taught to take your own blood pressure. Blood pressures will be taken every week at the group meetings. You will be asked to come in weekly for an 8 week period. At the beginning and end of the study, you will be asked some questions to check your knowledge about hypertension. All sessions will be tape recorded so that what goes on in the sessions can be monitored by the researcher. After this phase of the study, you will be asked to come in for 2-month and 6-month follow-up appointments. We will need to record your name and patient number for prescription and record keeping purposes, but only the responsible researcher, clinic research nurse, and coinvestigators will have access to this information. At any time, you have the right to drop out of the study. Dropping out of the study will not affect our willingness to handle your hypertension in the Hypertension Clinic. We will be glad to answer any questions about the study or your participation.
Procedure Demands and Discomforts

Restriction of Diet:

You will be given advice on caloric restriction (eating less food) if you are overweight and on decreasing your intake of table salt. Being overweight and eating large amounts of salt may make your hypertension harder to control and may counteract the effects of the medication you take.

Drug Effects, Possible Symptoms and Hazards:

All of the medicines used in treating your hypertension will be standard drugs known to be helpful in controlling high blood pressure. As with all medicines used in the treatment of high blood pressure, these medicines may in rare instances cause side effects. Sometimes serious toxic reactions can occur, such as anemia, fever or jaundice; but more frequently mild effects such as rash, itching, upset stomach, diarrhea, sleepiness, stuffy nose and fast heart rate may be found. In addition, if you are taking too much medicine your blood pressure may be made too low and you may feel dizzy and faint. If you have mild reactions to the drugs for the treatment of high blood pressure, you may decide it is worthwhile to continue taking the medicines because of the risk to your health if your high blood pressure is untreated. On the other hand, if you have severe reactions, it may be necessary to decrease the amount of medicine you take or to take a different drug. Also, if you have reactions which show that the drugs you are taking are lowering your blood pressure so much that you become dizzy and weak, it may be necessary to decrease the amount of medicine you take. Your medicine should be adjusted so that you get the best control of your high blood pressure with the least discomfort to you.

The nature and demands of the study have been clearly explained to me and I understand and accept the hazards involved. I also understand that if some unforeseen complication occurs, it, too, is considered to be one of the hazards of being a volunteer. Furthermore, I understand that I may withdraw from the study if I find that I am unable to continue.

Volunteer's signature Date
I have carefully explained the nature, demands, and foreseeable risks of the above study to the volunteer.

Investigator's signature __________________________ Date __________

Patient identification (Name, Unit No., Birthdate, sex, race, department location)
APPENDIX C

DRUG TREATMENT PROTOCOL

Hypertension Protocol

Start Rx if BP persistently > 104 or 91 with pathology or on Rx for HBP

Hydrochlorothiazide (H)

H 50 mg/d and decreased NaCl. If diastolic > 90 ↑ to H 100 mg/d or chlorthalidone 50 mg/d
Add KCl 10% 1 tbsp, bid, or Klorvess 1 tab bid or triamterine 100 mg bid; for patients on digitalis or with complaints suggesting ↓ Ser K.

If BP diastolic continues 90 (mean) add:
Reserpine (R)

R 0.25 mg/d

Avoid with Hx of hospitalization for depression. Warn pt re depression.

If BP diastolic continues 90 (mean) add:
Propranolol (P) Hydralazine (Hy)

P 20 mg tid
P 40 mg tid
P 80 mg tid
P 80 mg tid + Hy 25 mg tid
P 80 mg tid + Hy 50 mg tid
P 160 mg tid + Hy 75 mg tid
P 160 mg tid + Hy 75 mg tid
P 320 mg tid + Hy 75 mg tid

P. Avoid with asthma, heart failure, greater than first degree block, bradycardia.

Hy. Avoid with angina, mitral stenosis.

Note: Stop drugs slowly
For pts who cannot tolerate H use

Chlorthalidone 50 mg/d

For pts with renal failure (Ser Cr > 2 mg/dl) use

Furosemide for a diuretic in place of Hydrochlothiazide
Chlorthalidone (Check with MD for Rx).

For pts who cannot tolerate P use

Methyldopa (Aldomet. A)

A 250 mg bid or tid
A 500 mg bid or tid
A 750 mg bid or tid

or

Clonidine (C)

C 0.1 mg bid
C 0.1 mg tid and add 0.3 mg/d to max 2.4 mg/d

Do not stop this drug abruptly

If no other drugs are adequate discontinue ineffective
drugs and start

Guanethadine (G)

G 12½ mg/d
G 25 mg/d
G 37½ mg/d

Continue at higher doses and ↑ 25 mg per wk. (Take BP
sitting and standing. Decrease with orthostatic
hypotension or if diastolic < 90 standing.)

Note: Stop drugs slowly.
For severe hypertension use multiple drugs
at onset.
APPENDIX D

CONTENT OF PATIENT OPERATED
HYPERTENSION GROUPS

Meeting 1 *

The first group session provided the patients with an introduction to the research study, the researcher, and nurse. Pretreatment Hypertension Mastery Questionnaires were administered and demographic data were gathered. The nurse took blood pressures this week. The group members introduced themselves and described how they originally had found out that they had hypertension. Medications were discussed and all new prescriptions were written (see Appendix C for drug treatment protocol).

Meeting 2

Blood pressure training commenced and led to much discussion regarding blood pressure, hypertension, physiology, and sphygmomanometers. Also discussed were the topics of hydrochlorothiazide (a diuretic) and potassium supplements. The nurse did pill counts and helped patients record blood pressures. The researcher instructed the patients in

* No tapes were made of Group Meeting 1 or 8 due to the administrative nature of the tasks. Nor were tapes made of the 2-month and 6-month follow-up groups.
use of a sphygmomanometer and the meaning of blood pressure readings (Burch and DePasquale 1962, Lancour 1976).

Meeting 3

Blood pressure training was continued but now patients both took and recorded their own blood pressures. Most of their interactions centered on taking blood pressures. The nurse did pill counts and discussed medication questions and any new prescriptions that were needed. The researcher supervised the techniques used by patients to take blood pressures and monitored the validity of the readings gained by the patients. A dual stethoscope was used to monitor the accuracy of the readings.

Meeting 4

Blood pressure training was the initial task and again served to get patients interacting and the group process moving. The group discussed medications with the emphasis on reserpine. They shared hints as to how to more easily remember to take medications. The nurse again took pill counts and answered specific questions raised in discussion about prescriptions. The researcher supervised blood pressures and discussion.

Meeting 5

Blood pressure training occupied the first half of the group. Group discussion centered on medications again,
especially propranolol and hydralazine. Pill counts were taken by the nurse and prescriptions were discussed. Supervision was provided by the researcher, who also discussed any problems specifically addressed to him and that were of relevance to the general group.

Meeting 6

Blood pressures were taken and recorded by the patients. Group discussion was far ranging as usual, but behavioral techniques for weight and diet control were discussed. The nurse took pill counts and answered any prescription or medication questions. The researcher monitored the blood pressure taking and serves as the moderator to the discussion of diet and weight control.

Meeting 7

Blood pressure taking and recording spurred discussion which included the topics of medications, relaxation, diet, and exercise. The researcher supervised and validated blood pressures and functioned as a discussant along with the group members. The nurse took pill counts and discussed medication issues.

Meeting 8

Blood pressure taking and recording was the group task. This was followed by the posttreatment administration of the Hypertension Mastery Questionnaire. The researcher
provided a closing summary of the progress and gains of group members and discussed the correct answers for the Hypertension Mastery Questionnaire. The nurse took pill counts, issued final prescriptions if needed, and discussed any medication questions. Patients were advised to continue close monitoring of their blood pressures and medications. They were advised to seek medical supervision as needed during the period after the eight week group sessions ended. They were told that the 2-month and 6-month follow-up meetings would merely be to monitor blood pressures.

2-Month Follow-Up Group*

Patients again took and recorded their own blood pressures. Discussion of the problems or events of the past two months filled the group. Questions were answered. Pill counts were not taken on this occasion. But subjective, narrative feedback was elicited in an interview between patient and researcher. This feedback consisted of patient answers to questions regarding those aspects of the groups that helped them become more compliant and their notions of what could be done to improve the groups in the future.

*No tapes were made of Group Meeting 1 or 8 due to the administrative nature of the tasks. Nor were tapes made of the 2-month and 6-month follow-up groups.
6-Month Follow-Up Group*

This group served merely to measure the blood pressures of the patients in order to assess whether decay of treatment effects had occurred. Patients took their own blood pressures once again. They were thanked for their cooperation and participation. It was again emphasized that continued close monitoring of blood pressure readings and medications could lead to life-long hypertension control.

*No tapes were made of Group Meeting 1 or 8 due to the administrative nature of the tasks. Nor were tapes made of the 2-month and 6-month follow-up groups.
You have been chosen to participate in a special treatment program for hypertension. The purpose of this program is to provide you with information about the disease of hypertension, so that you will understand more about it and be able more easily to control it. You will come in once a week for eight weeks. You will have your blood pressure checked by the nurse as you did today and your medicine will be checked too. So be sure to bring in your medicine bottle with you each week. Also you will hear a new tape each week with new information about hypertension.

Hypertension—-you often hear that word, especially around the hospital. And now you've been told that you have hypertension. But what exactly is hypertension? And why is it such a big deal; and why worry about it?

Hypertension means high blood pressure. It is a disease in which the pressure in the blood vessels is increased above normal. Blood circulates around in your bodies in a complicated set of tubes or vessels called...
arteries, capillaries, and veins. Blood pressure is the force with which blood pushes against the walls of your blood vessels. The force is determined by the size of the arteries. They can change in size according to the needs of your body. These size changes are regulated by a system of hormones, chemicals, and certain nerve cells which try to keep the pressure fairly steady. The narrower your blood vessels, the harder your heart has to work to move the same amount of blood to all of the parts of your body. For example, wide arteries like when you are resting or laying down, calm and relaxed, mean lower blood pressure. While when you're tense or angry or anxious, your blood heart vessels narrow, and narrow arteries mean higher blood pressure. It's like when you squeeze a hose with water running through it or a balloon with air in it. The pressure builds behind the squeeze. If you turn the faucet on more or blow harder, the pressure gets even higher. In your body, both of these things can happen: the blood vessels may become squeezed or narrow and the heart may pump blood harder than it really needs to. Now, hypertension or high blood pressure happens when there is a constant tightening up of the arteries because something has gone wrong with the system that regulates their size. But there are no real symptoms that tell you that you have hypertension. Sometimes you may feel breathless or have nosebleeds with no apparent cause. Sometimes severe headaches of recent origin
in one part of the head accompanied by nausea and occurring early in the morning as well as progressively worsening vision can be warning signs. Or if your diastolic pressure is above 110 (that's the lower figure the nurse tells you when your blood pressure is being taken) you may experience dizziness (but on the other hand, fainting is not a symptom of high blood pressure, but rather of low blood pressure). But again remember these symptoms do not necessarily mean hypertension and you can have hypertension without any of the symptoms. Again let me repeat: usually hypertension has no symptoms to tip you off that you have it. The symptoms of hypertension present themselves usually in the form of life-threatening medical complications.

One out of every ten people has hypertension. That means there are almost 25 million people in the United States who have high blood pressure. Only one out of ten people with hypertension has what's called secondary hypertension. That means their high blood pressure is a result of another disease, for example, a problem like with body chemistry or a narrowing of blood vessels in the kidneys which can raise the blood pressure. For these few people, if the second disease is treated properly, oh like, through surgery or medication, the blood pressure will return to normal. But for the other nine out of ten people with high blood pressure the cause is unknown. This is most probably your own case. These people have essential hypertension,
this means they have unexplained hypertension or high blood pressure. Researchers have some ideas about its cause, but no one really knows for sure what causes this essential hypertension. Some researchers have said that too much salt or fat in what we eat may cause it or it could be caused by the body's inability to handle the salt or fat properly. Some others have said that a lifestyle of continual frustration or stress can lead to hypertension, but may I add that only if you're already prone to hypertension will your lifestyle affect it. Heredity may play a part because high blood pressure does tend to run in families, but this does not mean that all other members of your family will necessarily have to get it as well. Other researchers have said that an excess of renin, a kidney hormone in the blood which is released when the kidney become diseased, could raise blood pressure. On the other hand, others have said that the absence of some substances like kidney secretions or the presence of trace minerals like cadmium or nitrates in food or water may cause hypertension. But let me emphasize, nobody knows for sure whether there is only one cause or many, many causes.

Sometimes during a period of stress, troubles, and worried, people develop high blood pressure but usually this goes away when the personal problems end. Later on, however, many of these people develop permanently increased blood pressure that won't come down without medical help, no
matter if the personal problems that they're experiencing go away. For almost everyone with high blood pressure, no matter what the cause, the hypertension lasts for the whole life and continues to cause damage to the body as long as it is left untreated and the blood pressure stays high. It is necessary to continue to take medicine every day for the rest of your life in order to control your high blood pressure. Although there is no known cure for hypertension, it can be controlled by medicine in pill form. Generally, the medicine in the pills relaxes the blood vessels and reduces the over-pumping of your heart. Something like relaxing the squeeze in the hose or the balloon and turning down the tap of water. The result is that the blood pressure falls back toward normal and the harmful effects of the high blood pressure are stopped. But for your blood pressure to stay down you must take your medicine each and every day. High blood pressure is not like a cold or flu for which you can take pills for a week or two and then have it go away. High blood pressure must be treated every day for the rest of your life.

Frankly, though, many people do feel worse after they start taking their pills than they did before they started, at least for a little while. This happens for two reasons: First, high blood pressure in its early stages causes little or no pains and no other symptoms until it causes a block in the blood supply to a part of the body,
like for example, in a stroke or heart failure. So, people often feel healthy when they first develop hypertension and even for a few years after it starts. The second reason is that the pills used to treat hypertension cause some symptoms in some of the people who take them. As a matter of fact, the symptoms some people get when they start to take their medication usually simply means that the pills are doing the job they are supposed to do. For example, you may feel like you have to urinate a lot, or you may feel a little dizzy or light headed if you stand up too fast or you may develop slight heartburn or feel a bit sleepy or weak. This just shows that the medicine is doing what it is supposed to. Your body very often gets used to the medication effects and the symptoms go away within a few weeks.

Only a small number of people develop these symptoms when they start on high blood pressure medicine. And I must repeat, most people get used to the medicine in a few weeks and the side-effects go away. Most of these symptoms are annoying but are harmless and simply mean the pills are working to lower your blood pressure. But you should continue to take your pills and also tell the clinic nurse about any side-effects and she will decide on any changes in your medicine. But it's very important that you never stop taking the medicine or change the dosage without talking to clinic personnel because the pills can only do their job of
reducing your blood pressure and protecting your body from permanent damage as long as you are taking them regularly and in the proper dosage.

If you have any questions or comments, feel free to talk them over with the nurse in the Hypertension Clinic. Next week, we will talk about what the numbers the nurse tells you when you get your blood pressure checked mean. We'll also talk about who gets hypertension and why worry about it anyway. We will also talk about the medicines which you're taking to help control your hypertension. So, have a good week and don't forget to take your pills. Be sure, also, to bring your pill bottle and the pills you have left with you next week for your appointment. See you next week.

This ends the first tape cassette. Press the play button again to stop the machine. Then, touch rewind to rewind the tape. When it has rewound completely, stop the tape by pressing the rewind button again. Also turn the machine off before you leave. Thank you very much. Now press the play button again to stop the machine.

Tape 2—Blood Pressure Readings, Physiology, and Medical Complications

You have just had your blood pressure taken by the clinic nurse, but do you know the name of the instrument used or what the numbers for your blood pressure reading mean? Your blood pressure might have been taken on a
sphygmomanometer. Sphygmomanometer, that is a real mouth-full. That is the cuff, inflater, and meter device that the nurse puts on your arm and pumps up to stop the flow of blood in your main artery. Air is then let out of the cuff. That's where the stethoscope comes in. The nurse uses that to listen through. As the air is let out of the cuff, the cuff loosens, allowing the blood to start flowing again. The nurse listens for the first sound of your pulse in your arm as the blood flow resumes when the cuff is loosened. When she first hears your pulse she looks at the meter. This reading is the systolic pressure--the systolic pressure. That's the higher number in your blood pressure reading. That is the number that is placed above the line in your blood pressure reading. It is the force of the blood at the moment that the heart beats, forcing the blood into the blood vessels. That again, is the systolic blood pressure. The force of the blood at the moment your heart beats. Then, in the procedure of taking a blood pressure reading, the air continues to be let out of the cuff and the nurse listens until the thud of your pulse can't be heard any longer. She again looks at the meter and this reading is the diastolic pressure. Diastolic pressure is the pressure in your blood vessels when the heart is resting between beats. Once again, the diastolic pressure is the pressure in the blood vessels while your heart is resting between beats. For example, here's how the readings work: if your
blood pressure reading is in the normal range, it will be around 120/80. The 120 stands for the systolic pressure or pressure force when the heart beats. The 80, the lower figure, is the diastolic pressure or pressure force when the heart is resting between beats.

The systolic pressure, the upper number, can vary from minute to minute depending on whether you're nervous or upset or just came walking down the hall into the clinic. But the diastolic pressure (the lower number) tends to stay pretty much the same most of the time, regardless of the activities you've been doing. If normal blood pressure is around 120/80, when does blood pressure become hypertension? Usually a reading of over 160/95 is considered to be high and requiring treatment. If your blood pressure is over 160/95 and is left untreated you run the definite risk of the occurrence of medical problems.

Hypertension usually begins to be a problem some time between the ages of 30 and 50. Rarely does essential hypertension of unknown cause first start after 50 years of age. Men, and most veterans are men, tend to have higher blood pressures than women and thus have hypertension more often than women. But women may develop hypertension during pregnancy or when taking birth control pills. Also, women over 55 years of age tend to have higher blood pressures than men of the same age. Blacks have higher systolic and diastolic blood pressures and more hypertension on the
average than do whites. The death rate from hypertension especially in the 30-50 age group is three times higher for blacks than for whites. In fact, hypertension is the leading cause of death among blacks. It has been said that for every black patient who dies of sickle cell disease, at least 100 die from hypertension or hypertension-caused disorders. People with certain body types seem to get hypertension more frequently. Short, heavy body types or those who are overweight have high blood pressure more often. The higher the weight goes the higher the blood pressure goes too. And by the same token, if weight goes down so does your high blood pressure tend to come back under control. Too much salt in the diet can contribute to high blood pressure, too. Salt relates to the extracellular fluid volume including the plasma volume of your blood. The sodium in the salt is the major determinant of extracellular fluid volume. Usually the kidneys can handle the salt, until hypertension occurs. It is only when the salt intake is decreased so that the extracellular fluid shrinks that the blood pressure will go down. This is the same action that anti-hypertensive diuretic drugs like hydrochlorothiazide have. Also, hypertension is related to diabetes. Hypertension also tends to run in families, so that the relatives of people with hypertension may also be prone to get it. But having a person with hypertension in the family does not necessarily mean that all other members will get
hypertension as well. But, why should you care if you have hypertension? You feel fine, so what's the big deal?

Actually, hypertension, if it is left untreated can be a very, very serious disease. It affects your body every moment of the day and night, even if you can't feel it. On the average, men with untreated high blood pressure die 16 years sooner than men without high blood pressure. Over half of these men with untreated hypertension may have a stroke, a heart attack, kidney failure, or even be dead within 5 years of the time when their hypertension is first found. Unfortunately, these things can happen with little or no warning.

This is how the hypertension does its internal damage: The blood vessels are really quite tough. They can take the high blood pressure (if it isn't too high) for months or even years without complaining at all. But during all of this time your blood vessels are being affected. They may become narrower, harder, and scarred. They become brittle and are no longer able to change with the blood flow and the needs of the body. This is called arteriosclerosis, better known as hardening of the arteries. Once again, this hardening of the arteries is arteriosclerosis. There may also be a build up of fat and cholesterol and other materials inside the artery walls and these deposits can impede the flow of blood. This is called atherosclerosis. The build up of fat and cholesterol and other material is
called atherosclerosis. In either case, eventually the arteries may become so narrow that they stop supplying blood to part of the body. All parts of the body need blood to perform their jobs. Blood carries the food and the oxygen needed for the body to continue working. When the blood stops flowing to an organ, the organ stops working properly and may become damaged beyond repair.

The heart may be affected in three ways: it may have to pump harder to push the blood through the arteries, this causes the heart to become enlarged and less effective. Or the heart may not receive enough blood if the coronary arteries get clogged or narrowed, the result is a heart attack or coronary. Or the pressure and stress on the arteries may become so great that the artery balloons out or bulges out. This is called an aneurysm. These can burst without warning causing a hemorrhage and death. The person with high blood pressure has a five times greater chance of heart trouble than those with normal range blood pressure, that is, readings lower than 160/95.

Two things can also happen in the brain if you have hypertension: The arteries might get clogged and stop the flow of blood to the brain, this can cause permanent brain damage. Or, the arteries can become weakened and balloon out causing an aneurysm and if this breaks open a cerebro-vascular accident may occur. Such brain problems are referred to commonly as strokes and can leave a person unable
to walk, move, talk, or think. The eyes can also be affected by hypertension. The blood vessels in the retina, the back of the eyes, are constantly strained by the high blood pressure and the walls can become swollen and soft. They may then pass through substances called transudates or cotton wool blood exudates in the optic fundi and create hemorrhages which may lead to blindness.

Hypertension can affect the kidneys, too. The walls of the arteries inside the kidneys thicken progressively. In the kidneys, which require a high blood flow, the loss of functioning tends to be gradual and progressive. Since the kidneys remove waste from the blood, when there is a reduced blood flow they can no longer work properly. The wastes begin to build up in the blood, eventually poisoning the whole body.

In any case, these are the problems that result from untreated high blood pressure. To repeat, over half of the men with high blood pressure may experience one or more such medical complications within five years if their hypertension goes untreated.

But for those who faithfully take their blood pressure pills, however, the risk of having one of these complications is three times less. The risk is three times less than if no medicine is taken. The medicines work extremely well, but only if you take them as prescribed. This is very important! You must take your medicine daily
as prescribed for it to do its work to help control your blood pressure. The medicines do no good if left inside the bottle.

Next week we will discuss some of the other medicines for hypertension and how they work. We will also in the future talk about ways to more easily remember to take your pills, to lose weight if you need to lose weight, and to eat right to help your blood pressure come down.

If you have any questions or problems feel free to tell the clinic nurse who took your blood pressure. Have a good week and again, don't forget to take your pills. Be sure to bring your pill bottle and the pills you have left next week for your appointment. See you next week.

This ends the tape cassette for week 3. Press the play button again to stop the tape. Then, touch the rewind to rewind the tape. When it has rewound completely, press the rewind button again to stop the tape. Also, turn the machine off before you leave. Thank you. See you next week. Now, press the play button to stop the tape.

Tape 3—Hydrochlorothiazide and its Effects

Hello. This is the tape for week four of the hypertension program. Today's topic will deal with the anti-hypertensive medications. Particularly today, I'd like to talk about the class of drugs called diuretics. Diuretics are often called water pills. They act to reduce the amount
of water present in your body. The principal action of
these agents is to induce salt and water loss by affecting
the kidney's ability to transport sodium in your body.
Present evidence indicates that the principal site of action
is near the kidney surface. Also, the excretion of potas-
sium is increased. In fact, the excretion of potassium can
reach a level that can create a problem for the patient. We
will discuss this problem a bit later on in this tape.

Particularly, what we would like to discuss is the
drug hydrochlorothiazide. That's the drug that is initially
used in our hypertension clinic to treat high blood pressure.
It's a long sounding word and it's sort of a tongue twister
but if you break it up into the syllables, it is fairly
easy to say. Hydro|chloro|thia|zide. Hydrochlorothiazide
is one of the diuretic drugs. In other words, it is a water
pill. Usually when a thiazide type diuretic is given to a
hypertensive patient in continuing daily dosages, the fol-
lowing sequence of events occurs: Sodium, chloride,
potassium, and water are excreted in excess for the first
two or three days. In other words, when you start on hydro-
chorothiazide, you can expect to have to urinate quite
frequently. The peak excretion occurs on the first day
after you start taking the diuretic drug. Then, it gradu-
ally falls so that after three or four days the excretion
of sodium returns to the pretreatment level and the excess
of urination stops, despite the fact that you're continuing
treatment. So, the water pill will act in the first day to increase the amount that you have to urinate and it may create somewhat of an irritation because you do have to urinate more frequently. But that just proves, really, that the drug is working properly. Then, after three or four days, your amount of urination will go back to the regular amount that you had to urinate before you started taking the drug. This is the importance of taking the diuretic every day without fail. Your body reaches a fluid level, after three or four days of taking the hydrochlorothiazide, at which you no longer have to urinate to excess. If you skip a day, the body's level of fluid increases during that day. Then, the next day or the day after when you start taking your hydrochlorothiazide once again, you'll find increased urination as the drug has to lower the amount of fluid in your body. So, skipping a day really takes you back to a point where the drug has a lot of water to take out of your body. It is important to take it every day to stay at the point where you don't have to urinate so frequently.

Research in which measurements of fluid volume were taken before and after the excess of urination has indicated that excess salt and water depletion during the first two to three days of treatment represents extra cellular fluid loss. This is how the diuretic drug works to decrease or lower your blood pressure: it creates a lesser amount of extra cellular fluid, and your body has less fluid pushing on the
blood vessels. Roughly, one to two liters of extracellular fluid are excreted in your urine. Present evidence indicates that the loss is more or less maintained for as long as the patient keeps taking hydrochlorothiazide. The fluid loss is reflected in a decrease of body weight of several pounds. It's a good quick way to lose a couple of pounds, although the weight tends to climb back up there. The blood pressure falls during this period of urination suggesting that it is related to the excess of urination and possibly to the reduction of extracellular and plasma volumes. This again is how the diuretic drugs work to lower your blood pressure. The important thing is that a reduction of blood pressure does not occur until there is the excessive urination. Without the excessive urination, your blood pressure will not be affected. That's why, as I have said, the urination is a good sign, because it shows that the drug is working and doing what it's supposed to be doing.

Usually, although the diuretic dose may vary from individual to individual, it ranges from 25 to 100 milligrams. In our clinic, there are two dosages of hydrochlorothiazide that are given: either 50 milligrams a day or 100 milligrams per day. That's either 1 or 2 of the peach-colored tablets. But for some patients even large doses of hydrochlorothiazide are ineffective, as for individuals with kidney failure or inadequate kidney filtration. With others, especially elderly patients, they may be quite
sensitive to even a small reduction in extracellular and plasma volume; and their dosage of hydrochlorothiazide may be as low as 25 milligrams once a day. The effective dose of hydrochlorothiazide also depends upon the amount of sodium intake. In other words, when we say sodium intake, we're talking about salt, common table salt, which is called sodium chloride. The chemical name is sodium chloride. And what we're talking about when we say sodium intake, is the amount of salt you eat. If a patient is adhering to a salt restricted diet, a smaller dose of hydrochlorothiazide will be needed. On the other hand, if you are taking a large amount of salt, the dose of hydrochlorothiazide must be increased in order to be effective. The salt in your diet, the salt that you eat, has the effect of retaining water. It causes your body to hang on to more water and therefore have a larger extracellular fluid content. The hydrochlorothiazide works to decrease the amount of water in your body. So as you can see, if you're taking a lot of salt, it's going to be combating the actions of the hydrochlorothiazide and creating problems because you will need to take more hydrochlorothiazide for the same effect. That is why very often a patient with hypertension is asked to decrease the amount of salt they eat, that is, to use less salt on their food and to attempt as much as possible to use low salt foods, to avoid such things as canned vegetables that have very much salt, to avoid such things as
most breads, which also have a great deal of salt. So, in other words, if you can decrease the amount of salt you eat and use as seasoning in your food and cooking, you will need less hydrochlorothiazide to help decrease your blood pressure. We find that very often a patient with moderate to severe hypertension will require continuous diuretic coverage and salt restriction at least during the initial four to six months of treatment, while some patients with very mild forms of hypertension or those who have been well controlled for long periods may be able to control their hypertension while still eating a little bit of salt. If the latter pattern of dosage is used, in other words, a little bit of salt every now and then, it's important to check blood pressure during periods when there is no diuretic dosage. In other words, if you go back to eating salt, and you're not taking medication, it's very important to have your blood pressure checked quite frequently to make sure it stays in control.

Now, one of the principal side-effects of taking hydrochlorothiazide is a problem called hypokalemia. Hypokalemia occurs in one-fourth to one-third of patients who are receiving continuous dosages of hydrochlorothiazide. Hypokalemia is rarely severe and usually not that much of a problem. But hypokalemia reflects a depletion of potassium in your body and represents a reduction of extracellular concentration of potassium. Potassium reduction or
hypokalemia can cause muscle weakness and fatigue during the first few months of treatment. Generally, we find that with hypokalemia a person may develop quite severe cramps in the calves. But when treated with a potassium supplement, the cramps, weakness, and fatigue tend to go away.

Now, another problem related to taking hydrochlorothiazide is a disorder called hyperuricemia. Hyperuricemia means low uric acid. Maybe you've heard of a disorder called gout. Well, hyperuricemia is the fancy medical term for gout. Typically, what happens is that in the body joints there are concentrations of uric acid. Now, when one takes the hydrochlorothiazide the fluid level of the body is decreased and the concentrations of uric acid can increase in the joints, especially the joint of the big toe. What can happen, then, is swelling and a great deal of pain. Anybody who has had gout can well attest to the fact that it's no fun. Again, this can be easily treated if it occurs. It's very important to continue to take your hydrochlorothiazide and to report any goutee or weak, fatigued types of symptoms to the hypertension clinic.

But again, let me emphasize the importance of continuing to take your medication as prescribed, every day. And to report the symptoms that you may have. Again, it's very important that you continue to take your medications as prescribed. Hydrochlorothiazide is a very effective anti-hypertensive treatment.
This ends the tape for week 4 of the high blood pressure treatment program.

**Tape 4--Reserpine and Its Effects**

This is tape four of the hypertension program series, today dealing with the drug, reserpine. Reserpine is generally the drug which is added to your prescription if hydrochlorothiazide proves to be ineffective in bringing your blood pressure under control. By control, we mean bringing your diastolic blood pressure below 90 with medications. If hydrochlorothiazide is given in dosages of 100 milligrams per day, and yet proves to be ineffective in bringing your blood pressure under 90, generally, the next drug that is added is reserpine. It is considered to be the next most powerful drug. It works in a different way than hydrochlorothiazide and is generally used in conjunction with hydrochlorothiazide, so that you would both take hydrochlorothiazide and reserpine every day.

Reserpine is not by itself an effective antihypertensive medication. But it is very effective when given along with the hydrochlorothiazide diuretic. It is very effective in that we find that many individuals who have not been able to bring their hypertension under control using only hydrochlorothiazide can with the addition of reserpine bring it completely under control and keep it under control. However, it must be noted that reserpine can
have one very serious side-effect, in that it can create emotional depression. The experience has been, however, that such depression is much more frequently induced in patients who strive for a high level of intellectual, economic, and social accomplishments. And it's unusual for such depression to occur in patients who work primarily with their hands. Reserpine induces depression in individuals who are apt to react to emotional stress with an anxiety depression. There is some evidence to suggest that this depression can be due, again, in individuals who are predisposed to depression to a depletion of certain substances and hormones (amino acids) in the brain. However, in a great majority of patients who depend upon a clinic, rather than a private physician for their medical care, reserpine in moderate dosages is a safe and often effective antihypertensive agent.

Again, when combined with hydrochlorothiazide, the reserpine/hydrochlorothiazide combination has some distinct advantages in clinical practice. The dosage schedules are simple and convenient. Thus, hydrochlorothiazide/reserpine given in the commercially available fixed dose combination twice daily is effective in the majority of patients who are responsive to any therapeutic dosage of these medications. For even greater convenience one can use long acting agents which are also available commercially and given once a day rather than twice a day. The thiazide/reserpine combinations
are quite reasonable in cost. And, therefore, impose less of a squeeze on the budget of working people who must pay for their medications.

The anti-hypertensive effect and side effects of reserpine are due to the action in depleting catecholamines, which are amino acids in the brain. The sympathetic nervous system responds to stimulation, that's the part of the nervous system which responds when you are angry or afraid. But when you're taking reserpine, the sympathetic nervous system reacts somewhat more sluggishly and the level of muscle tone appears to be reduced. The net effect is a blunting of sympathetic tone and reflex responsiveness which when combined with the central tranquilizing effect of reserpine, probably accounts for the way it can bring your high blood pressure under control. The depletion of catecholamines results in reduced sympathetic control and consequent parasympathetic dominance. In other words, what can happen is your nervous system tends to be quite calmed. The parasympathetic nervous system calms, whereas the sympathetic nervous system activates your body.

Another false concept concerning reserpine is that the reduced contractability of the heart that it causes can precipitate or lead to cardiac failure in hypertensive patients. In fact, the reverse is true. That is, the reserpine given properly protects the patient against congestive heart failure. The first reason is that the fall of
blood pressure reduces the myocardial demand for oxygen, in other words, reserpine reduces the demand that the heart has for oxygen, greatly decreasing the load of the heart. The second reason is that the diuretic, in other words, the hydrochlorothiazide in combination tablet form, prevents the development of fluid retention. Thus, the benefits of reduced fluid retention and prevention of heart overwork greatly outweigh the disadvantages of reduced heart contractions.

Another discomforting effect of reserpine is nasal stuffiness. This is probably due to failure of nasal constriction in nasal membranes. Nasal stuffiness is generally most troublesome at night and some patients may require nose drops at night to help them breathe.

Also, with reserpine there can be an increase in the secretion of gastric acids. However, in the usual dosages given, reserpine does not result in a significant increase in gastric acids. In fact, in a study of VA patients, the incidence of peptic ulcers was only slightly and insignificantly higher in reserpine treated as compared to control patients. While reserpine in large doses definitely increases gastric acidity, the risk with maintenance oral dosages of generally between .2 and .5 milligrams daily is negligible. It is only in the presence of an active or bleeding ulcer that there is an indication that the drug should not be used.
In addition to its potential ability to bring on severe depression, reserpine more commonly induces a tranquilizing effect. The patient's drive for attainment may be replaced by a listless sort of lassitude as ambition gives way to a more philosophical approach toward life. One becomes less hard driving, less ambitious and pushed to succeed. In patients who generally have the habit of superior attainment, particularly intellectual attainment, this reaction is decidedly unpleasant and interferes with their normal way of life. However, in other patients the mood induced by reserpine is a pleasant one, especially for those whose occupations and way of life allow much more physical activity. Fatigue is another related side-effect with reserpine. It is often difficult to differentiate in deciding on the causation of the fatigue whether it is an emotional change induced by reserpine or loss of energy which can result when the blood pressure is lowered. If it is due to the lowering of the blood pressure, the patient should be reassured that the adjustment to a reduced blood pressure is a slow one, but it will occur over a period of months and that one will then recover from the present fatigue. If the fatigue is not so much physical as emotional and mental, the chances are that the patient is complaining of the mood changes induced by reserpine and that some other regimen of drugs may be required. Another effect of reserpine on the body can result in a great deal
of large intestinal movement with increased frequency of bowel movements for a certain period of time. In addition, increased gastric acid may result in increased appetite. However, these are usually quite minor problems in comparison with the importance of controlling the blood pressure.

Although reserpine is generally regarded as being ineffective in the treatment of severe hypertension, there are many exceptions to this rule. In our patient practice, it is not at all uncommon to find that the addition of reserpine will control the blood pressure of patients who have seemingly been unable to control their blood pressure, even with larger doses of hydrochlorothiazide. It is possible that the effects of the reserpine and thiazide go together to better control the high blood pressure. But again, let me repeat that reserpine added to your blood pressure regimen generally will help to bring your blood pressure under control, particularly if it is given in addition to the diuretic, hydrochlorothiazide. Again, the reserpine serves to have a calming effect on your body and on your heart and at the same time, the hydrochlorothiazide prevents the build up of salt and therefore water retention in your body. It is very important to note whether you feel anything beyond the normal tranquilizing effect of the reserpine. Repeating that, you must note any effects beyond a small tranquilizing effect, a calming effect, which is
possible with the reserpine. Should you discover a great deal of fatigue, or depression, or feeling down in the dumps or having the blues, having no ambition, having trouble sleeping and once getting asleep having trouble staying asleed and waking in the early morning hours, report these symptoms at once. These are the effects that we call or refer to as depression. If you notice such things occurring, be certain to report them to the hypertension clinic. But continue to take your medications until told to stop.

This ends tape four of the hypertension series.

Tape 5--Propranolol and Hydralazine

This is tape five in the high blood pressure series. Today, we are continuing to deal with anti-hypertension medications. Specifically, today we would like to talk about the drugs propranolol and hydralazine. Propranolol is given when an individual's high blood pressure remains high even though the person is taking hydrochlorothiazide or hydrochlorothiazide plus reserpine. When an individual is taking those medications yet his hypertension remains uncontrolled, that is, if his blood pressure readings are over 90 diastolic, then the drug propranolol is added to the medication he is already taking. So for those individuals whose high blood pressure is not controlled, then propranolol will be added to the hydrochlorothiazide and reserpine
that they are already taking. Propranolol is initially given in dosages of 20 milligrams four times a day. It is increased by doubling the dosage every two weeks until the blood pressure lowers below 90mm Hg diastolic. It may take up to six weeks to attain the maximum effect at each step in the drug dosage. The maximum dosage of propranolol is 1.3 grams per day.

The action of propranolol in your body is to decrease cardiac output. In other words, your heart does not pump as much blood as it did before you started taking propranolol. In much the same way as turning down the tap on a hose reduces the pressure in that hose, so too does propranolol have a similar effect on the pumping of your heart. Thus, it lowers your blood pressure. When your heart is not working as hard pushing the blood as hard and in as great a quantity, your blood pressure is reduced. Another action of propranolol on your body is to decrease your heart rate. It decreases your heart rate. In other words, lower cardiac output and decreased heart rate go hand in hand. That is, when your heart beats less often and with less force, your blood pressure is decreased. Certain individuals however, as with all drugs, should not take propranolol. It should not be taken by individuals with uncontrolled heart failure or cardiogenic shock or shock which has come about due to heart attack or heart problems. It should not be given for individuals who have an
obstruction of their airway or diseases such as asthma. Propranolol should also not be taken by individuals who have a very slow heart rate, or a heart rate of 50 beats per minute or less before starting on propranolol. Also, individuals who are taking certain types of anti-depressant medications should not be taking propranolol at the same time. If you are taking an anti-depressant medication be very certain to tell your nurse or physician the name of that drug and they will make sure that there is no conflict between that drug and your propranolol.

As with all medications used and taken in the body, we give the medication for certain therapeutic purposes. But all drugs affect the body as a whole in addition to the therapeutic effects. Therefore, side-effects can be created in addition to the therapeutic effects of lowered blood pressure. Some side-effects can occur with propranolol, but again keep in mind that not everyone develops these side-effects, nor should you necessarily worry about developing them. You should only pay attention to your physical condition and any possible changes that may occur after you begin to take the drug, propranolol, or any new medication for that matter. Some of the possible side-effects of propranolol are a slowing of the heart rate (a noticeable slowing of the heart rate) and should the dosage of propranolol be too great for you, it can lead to hypotension which means low blood pressure. Hypertension is
high blood pressure, while hypotension is low blood pressure. Also, for individuals who have asthma or other lung problems, propranolol can increase those problems. In addition, certain individuals may develop nausea, or diarrhea when taking propranolol.

Propranolol is in the same class or category of drugs as reserpine. Because of this, it also works to block the action of the sympathetic nervous system. It tends to have a calming effect on your body and on your blood vessels and heart. Because of this blocking of the sympathetic or excitatory portion of your nervous system, as in reserpine, an individual may develop such things as fatigue, tiredness, listless feelings which are called malaise, and possibly even depression (although depression is less likely with propranolol than with reserpine). However, it is important that an individual on propranolol notice any changes in ambition or ability to perform activities. Also, an individual taking propranolol who may develop symptoms of low blood sugar may have those symptoms obscured by the propranolol effects. In other words, for individuals who are diabetic and taking the substance insulin, care must be used in prescribing propranolol, for it can hide low blood sugar or a condition of low blood sugar. Propranolol is generally given as mentioned earlier, when hypertension does not respond completely to or come under complete control of
hydrochlorothiazide plus reserpine. It is the next drug in the regimen to be used.

After having been placed on propranolol for a period of time, should an individual continue to have high blood pressure, which means readings above 90 diastolic, the next drug which would be used is called hydralazine. Hydralazine is given to individuals who are taking hydrochlorothiazide, reserpine, and propranolol yet still are unable to bring their blood pressure under control. Hydralazine works in the body by the direct relaxation of vascular smooth muscles. In other words, it works directly to relax the artery walls. It does not affect the veins. It works to relax and decrease the peripheral resistance or the resistance which occurs in your arteries to the blood. Sometimes, hydralazine if given alone would cause a reflex increase in heart beat and the force of the heart contraction. But, in order to prevent this reflex, which would occur if hydralazine were only given by itself, it is given in conjunction with hydrochlorothiazide, reserpine, and propranolol. These drugs are given in a grouping for individuals who can not bring their blood pressure under control. This prevents any increase in heart rate or in heart force strength in a very effective combination. Hydrochlorothiazide, reserpine, propranolol, and hydralazine.
Hydralazine should not be given, however, to individuals who have shown a tendency toward coronary artery disease, heart valve disease, or for pregnant women. One of the most troublesome side-effects of hydralazine can be severe headaches. These may be caused by an opening of the cerebral arteries, a relaxation of those arteries. It is most prominent in the early stages of treatment and if the dosage is built up gradually, the headaches are minimized. If the headaches persist, you may have to reduce the amount or frequency of dosages or may have to discontinue the drug completely. Hydralazine also can cause nausea, vomiting, loss of appetite, diarrhea, some trembling or muscle cramps as well as difficulty in urinating. It can increase heart pains for people who have angina pectoris. It can also create skin rashes, anemia, and sometimes liver problems. However, these problems do not necessarily occur in all individuals and should merely be known and noticed if they do occur.

Thus, end tape five, dealing with propranolol and hydralazine.

Tape 6--Behavioral Techniques for Weight Control

Hello, this is tape six in the high blood pressure series. Today, discussing the behavioral techniques of weight control. Eating is a learned habit. We learn to eat not necessarily out of hunger, which is the way it starts
for an infant, a tiny baby. But we very quickly learn to eat according to the clock, according to what time it is. If it's noon, it must be lunch time. Or we learn to like the taste of food. Food tastes good so we learn to like it and eat it. We may also learn to eat according to our moods. Some people eat when they are blue or lonesome or just plain bored. In short, we learn to eat without being hungry. This is the source of much of the problem with overeating. We are not eating just what our body needs to satisfy its hunger and nutritional needs, we rather eat as a learned habit. This can lead to overeating and weight build up. There are some behavioral techniques which can be used to help cut down on the amount of food eaten. By cutting down on the amount of food eaten, weight loss is caused. When an individual's weight goes down, their blood pressure can also go down. For some individuals with mild hypertension a loss in weight can cause their blood pressure to drop back to within the normal range.

Some behavioral techniques which can help decrease the amount of food we eat are: first of all to eat very slowly, and then to cut very small pieces and to chew very thoroughly. In other words, pick up knife and fork, cut a real small piece, and then put both the knife and fork down while chewing. Chew quite thoroughly. Then pick up the knife and fork again. The idea is to stretch your meal out at least one-half hour or more. Generally, it takes about
20 minutes from the start of a meal for your stomach to signal a full feeling to your brain. If you eat a great deal within your 20 minutes, before your brain receives a full feeling message from your stomach, you can very easily overeat, and consume more calories than you need to maintain your body. It is a good idea in trying to stretch the meal to try to take 30 seconds between each bite. This, you should work up to a 2-minute pause between each bite. This will stretch out the length of the meal and allow your stomach more time to signal the full feeling to your brain. If you are very hungry, it is also a good idea to eat low calorie vegetables or low calorie foods at the start of the meal. This is the time when you tend to eat most rapidly. That way you will eat a fewer number of calories than if you start with a great deal of potatoes and gravy. Start with carrots or something with low calories.

Also, you should avoid eating that last little piece or that last little bit. You know, that piece you just don't want to save but really don't want to throw away either. Well, the most effective way is to throw it away. When you feel full, either put the food aside for leftovers or throw it away. It's that last little piece or little bit that will end up putting weight on your body. It's also a good idea to fill your plates in the kitchen and not bring the big serving bowls to the table. Just fill your plates with one serving in the kitchen and bring them into the
dining area. If you bring the big serving bowls or platters of food to the table, it's just too easy to take seconds and load your plate up again. You want to make it as difficult as you can to eat seconds or to eat more than you really need. Another good thing to do is to keep a diet diary in which you list all of the foods you've eaten that day. You may be surprised when you write down exactly all of the things you've eaten during the day and the quantity—that includes each potato chip. Any drinks, soft drinks, beer, or anything that you drink should go in the diet diary, too. Then, afterwards, you can look up the calorie counts for those foods and get a good idea of just how much you're eating every day.

Another good thing would be to follow the saying, "Out of sight, out of mind." That's a good idea when it's applied to dieting. If you keep high calorie food like candy, chocolate, beer, and whiskey out of your house and out of sight (in a hidden area if you have to have them in your house), you will be less likely to eat or drink at times when you are, in fact, not hungry. Even if you get a craving for a piece of candy, if there is no candy in the house, you can't eat it.

Also another good idea is to only eat when you eat; no TV, reading, nor any other activity. When you eat, only eat. When you watch TV, only watch TV. Do not do the two activities at once. It's too easy to lose track of how much
pie you're eating or how many potato chips or pretzels you're eating when you're watching TV or reading a book or magazine.

At times when you feel most hungry (and most people feel hungry at some certain times of the day; such as, a lot of people feel hungry about 10 a.m. or 2 p.m., or 8 or 9 at night), at those times you know that you will feel most hungry, keep yourself occupied with some substitute behavior that will prevent you from eating. Some activity would be useful that will prevent you from eating such as working on something with your hands, playing a game, or cards. Something like that.

Also, try not to eat when you're in an upset or bad mood. Very often then, if you do eat when you're in a bad mood, you'll end up overeating, because you will eat and eat until the mood is gone, not until your hunger is gone. The trick is to only eat when hungry and to only eat enough to take away your hunger.

Another very important thing that we have mentioned briefly, is to avoid snacking between meals. Very often a person can eat enough in their meals to provide all of the calories and nutrition that the body needs, then any calories that come from snacking just turn into fat in the body. So it's a good idea to avoid snacking. If you must snack, eat raw vegetables or fruit or something like that which will allow you to snack but won't put on excessive
calories. It is also important to fix only a little bit at a time. Only fix one serving or have your wife fix only one or two servings of a meal. This will prevent overeating, for if there is no more food prepared, you can't eat it. Again, the trick is to make it hard to overeat. Also, again, eat slowly. Even use a knife and fork on such things as a sandwich and put the utensils down between bites. If you eat slowly, it will seem like you are eating more.

Another useful trick is to delay any snacking, even if it's eating raw vegetables or fruit, until you perform a certain activity. Say to yourself, "Well, I'd sure like that snack, but I won't have a snack until after I've finished reading this magazine, or after this TV show is over, or after I've fixed something around the house." Link the eating to the performance of an activity.

Also, you may eat less food at a meal, so that you can eat a snack or dessert from your supper at a point in time after your supper. In other words, you may skip your dessert at the time of supper and eat it at 7 or 8 at night; that way you're not increasing the amount of calories you eat, you're only spreading them out. This is a very useful way to keep from eating dessert with supper and then, also having an additional snack later on.

Also, never reward yourself for exercise with food. Never say, I'll drink that beer or have that piece of cake
when I finish mowing the lawn, or something like that. It's a bad idea to make that kind of linkage. Exercise is effective, but exercise will only firm up your muscles. It will not take off weight unless you exercise a very, very great deal indeed. Also, you can note your current activities in the form of exercise. Just how much do you walk or stoop or lift or do gardening? Once you know the level of activities that you currently do, you can come up with a reasonable exercise program. I'm not talking about calisthenics or going into a great series of lifting weights and body building but just to say, "I'll walk to the corner store or I'll walk to the mail box instead of driving. I'll walk those couple blocks to get a paper rather than taking my car. I'll do a little bit of extra gardening around the house rather than letting it pass." Dieting and exercising should not be punishment if you allow yourself to be reasonable. You must set reasonable goals.

You can pay yourself for skipping a snack, give yourself a dollar to spend on an activity--if you skip those pretzels or potato chips in the evening.

Keep in mind that there are plateaus in weight loss. You may lose 8 pounds quickly and then find that for two weeks you can't lose any more. This is a perfectly natural thing. There are plateaus in weight loss. Also, it is helpful to record your weight every day, so you can see the results immediately as you lose pounds. Be sure to set very
modest goals so that you can be successful in losing a pound or two a week.

Again, make it difficult to overeat and make it easy for yourself to meet your goals, and you will help lose weight, as well as reduce your blood pressure.

This ends tape six, on behavioral techniques of weight control.
APPENDIX F

HYPERTENSION MASTERY QUESTIONNAIRE

1. What does the word "hypertension" mean?
   a. bad nerves
   b. high blood pressure
   c. overanxiety

2. The most likely cause of high blood pressure is:
   a. emotional pressure, worry, anxiety
   b. overweight
   c. overexertion
   d. unknown

3. Does high blood pressure cause other illnesses or symptoms?

4. If high blood pressure does cause other illnesses, it may cause:
   a. strokes
   b. heart attacks
   c. kidney problems

5. How likely is it that you can have high blood pressure without any obvious symptoms? (put a check mark on the correct line)
   unlikely ___ ___ ___ ___ ___ very likely
   1    2    3    4    5

6. How helpful are high blood pressure medicines in treating high blood pressure?
   useless ___ ___ ___ ___ ___ very helpful
   1    2    3    4    5

7. Are patients usually cured of high blood pressure or must treatment usually continue?
   are cured ___ ___ ___ ___ ___ must continue treatment
   1    2    3    4    5

157
8. How important is it to take your high blood pressure medicine regularly?

very important ______ 2 ______ 3 ______ 4 ______ not at all important ______

9. Rate the seriousness of each of the following diseases on a scale from 1 (not serious) to 5 (very serious)

a. high blood pressure ______ ______ ______ ______ ______
b. lung cancer ______ ______ ______ ______ ______
c. flu ______ ______ ______ ______ ______

10. If you stopped taking medicine for your high blood pressure, how likely would it be that you would have a serious illness caused by high blood pressure (such as stroke, heart attack, kidney failure, etc.) within the next five years?

less than 1 chance in 10 ______ ______ ______ ______ ______ ______ 5 chances in 10

11. If your high blood pressure is untreated, how much more likely are you to die this year than a man your age who doesn't have high blood pressure?

no more likely ______ ______ ______ ______ ______ ______ more likely ______ ______ ______ ______ ______ ______

12. People with untreated high blood pressure frequently get angina pectoris (a crushing feeling in the chest following exercise). If you start having pain like that, how likely are you to die within the next five years?

less than 1 chance in 10 ______ ______ ______ ______ ______ ______ 5 chances in 10

13. People with untreated high blood pressure frequently get congestive heart failure. If you get congestive heart failure, how likely are you to die within the next five years?

less than 1 chance in 10 ______ ______ ______ ______ ______ ______ 5 chances in 10
14. Rate the following in terms of how true or false it is:
If your high blood pressure is not controlled you are likely to get a stroke. People with strokes frequently have half their bodies paralyzed, can't talk correctly, and lose control of their bladder and bowel.

definitely true 1 2 3 4 5 definitely false

15. If you stoped your treatment, what is the likelihood you will get your high blood pressure back?

very unlikely 1 2 3 4 5 very likely

16. If you have any bad effects while on high blood pressure pills you should: (check the best answer)
   a. stop taking the pills right away ___
   b. take an antacid with the pills ___
   c. call the Hypertension Clinic to report it ___
   d. take fewer pills ___

17. A good way to remember to take your pills is to take them just before an activity you do every day, such as getting out of bed, shaving, or eating dinner.

   yes ___ no ___

18. If you take pills more than once a day it is often easier to put the number of pills you will need that day in a small pill box so you can taken them with you.

   yes ___ no ___
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