The Relationship of Knowledge and Understanding

and Compliance in Clients

with Essential Hypertension

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TABLE OF CONTENTS

LIST OF TABLES

FIGURE

Introduction

Systemic arterial hypertension is a chronic health problem confronting millions of Americans today. It is an illness that is often asymptomatic yet can lead to devastating consequences including cardiac disease, cerebral vascular accidents, and renal dysfunction. Risks of hypertension can be reduced significantly with effective therapy. Lifestyle modifications such as weight loss and sodium reduction, alone or in conjunction with pharmacologic therapy, are standard components in the treatment of hypertension.

Compliance is a problem that is frequently encountered in the clinical setting with clients experiencing hypertension. If a client does not comply with the therapeutic regimen, complications that lead to a decrease in the quality of life, an increase in the number of hospital admissions, and possibly a premature death are likely to result (Andreoli, 1981). Studies have suggested that approximately three-quarters of the clients abandon therapy within five years of hypertension detection (Caldwell, 1970; Haynes et al, 1882). The reasons for this attrition are unclear.

Compliance is a complex problem. Numerous studies have been conducted which attempt to identify factors

that influence a client's decision to adhere to a prescribed regimen (Andreoli, 1981; Dawson, 1985; Croog et al, 1986; Hershey, Morton, Davis, & Reichgott, 1980; Kerr, 1986; Swain & Steckel, 1981; Webb, 1980; and Yoos, 1981). Many of these studies have produced contradictory findings. What one study identifies as important is often refuted in the next study. Knowledge is one factor that has been studied to determine if clients with knowledge of their disease are more likely to comply than those who lack this knowledge. Most studies, however, have found that knowledge does not lead to adherence, yet education of the client is one of the primary interventions used to improve client compliance. The question that remains is why information dissemination does not lead to improved compliance. Perhaps the information is able to be reiterated but is not truly understood by the patient.

The present study attempts to distinguish between the knowledge and the understanding of the hypertensive disease consequences, to determine if clients who understand the disease are more likely to comply than those who have only a basic knowledge of high blood pressure. This study seeks to answer the following question:

Is there a relationship between a client's understanding of the consequences of uncontrolled hypertension, as measured by the Understanding Questionnaire; knowledge of hypertension, as measured by the Knowledge Questionnaire; and compliance with therapy as measured by the Compliance Interview, in clients with essential hypertension?

This problem is significant for nursing in its role of promoting compliance in hypertensive clients. Nurses have traditionally focused on client education as a means to enhance compliance. However, studies indicate that education alone is not sufficient in improving compliance (Kerr, 1985; Swain & Steckel, 1981; & Webb, 1980). That information needs to be imparted is not questioned, but perhaps nursing needs to focus more on the client's understanding of the information provided. This study attempts to determine if the client who can take the information one step further and apply it, demonstrates more compliance than the client who only knows the information.

Review of Literature

Problems related to compliance with treatment regimens suggested for the management of hypertension have been extensively discussed within the literature. A review of literature specific to hypertension, compliance with hypertension therapy, and the effect of knowledge acquisition on compliance behavior will be presented in this discussion. The relative lack of studies which specifically explore understanding with respect to the consequences of uncontrolled hypertension will also be discussed.

Hypertension

Hypertension is defined as a chronically increased arterial pressure (Vander, Sherman, & Luciano, 1985). This increase is a result of an increase in either cardiac output or vascular resistance, or both. Essential hypertension results from a failure in the normal blood pressure regulating mechanism. The emphasis of this study is the individual who exhibits essential hypertension of unknown etiology.

The review of literature indicates that a consensus is not achieved with regard to terminology, diagnostic measurements, or classification of hypertension. Most sources indicate that hypertension exists when the blood pressure is greater than or equal

to 140/90 mm Hg in adults 18 to 49 years of age, and 160/95 mm Hg in adults over 50 years of age (National Institute of Health, 1984). Kaplan (1982) and Braunwald (1980) differentiate categories of hypertension for adults with respect to age and gender. The National Institute of Health (1984) and Hurst (1982) categorize hypertension according to the diastolic blood pressure. Braunwald (1980) indicates that the diagnosis of hypertension should be made with great care because "the diagnosis of hypertension imposes heavy psychological and socio-economic burdens and implies a commitment to lifelong therapy" (p.853).

The pathophysiology existing within those individuals classified as having moderate, severe or accelerated hypertension may be varied. Cardiovascular involvement depends upon the level of the arterial pressure, the degree of total peripheral resistance, and the degree of cardiac enlargement.

Hypertension is the most prevalent of all circulatory disorders (Hurst, 1986; Kaplan, 1982) with the incidence being the highest in the developed nations of the western world (Mann, 1986). Essential hypertension usually develops between the ages of 35 and 50 (Ames, 1985). Males are more frequently affected with hypertension than are females (Freeman,

et al, 1983), and blacks have a higher incidence than whites (Ames, 1985). Systolic hypertension has a higher incidence in the older population (Kaplan, 1982).

Studies suggest that many factors may be positively correlated with hypertension. Obesity is a strong predisposing factor (Dustin, 1985; Van Itallie, 1985), with hypertension being 10 times more common in persons 20% or more overweight (Guyton, 1986; Mann, 1986). Essential hypertension occurs more frequently in children of hypertensive parents. Alcohol (Arkwright, Beilin, Vandongen, Rouse, & Lalor, 1982; Klatsky, Friedman, Sieglaub, & Gerard, 1977) and cigarette smoking (Cryer, Haymond, Santiago, & Shak, 1976) are noted to be factors related to hypertension. Other diseases and conditions, including cancer, uterine fibromyoma, color blindness, and increased intraocular pressure, have been noted more frequently in individuals with essential hypertension (Dyer, Berkson, Stamler, Lindberg, & Steveno, 1975; Kaplan, 1982). In epidemiologic studies, sodium intake has been noted to be closely associated with increased blood pressure (Fink, 1981).

The complications of hypertension are directly related to the increased arterial pressure and/or to

the changes that occur as a result of the increased pressure. Examples of complications related to increased pressure are cerebral hemorrhage, hemorrhage of renal vessels, congestive heart failure, and dissecting aneurysms. Changes that occur as a result of the increased pressure are from an acceleration of the atherosclerotic process. These changes are exemplified by coronary artery disease and peripheral vascular disease (Guyton, 1986; Smith, 1977). Angina, myocardial infarction, and sudden death are manifestations of coronary artery disease (Dunn, 1983).

Hypertension is ranked as the second leading cause of death in the United States (Kaplan, 1982; Page, 1977). Untreated hypertension shortens the life span by 10 to 20 years, essentially through an acceleration of atherosclerosis (Braunwald, 1980; Pickering, 1972). Coronary disease which encompasses coronary artery disease, congestive heart failure, and left ventricular failure, is the most frequent cause of death. This is followed by cerebral vascular disease (Russell, 1975), with renal involvement being the least frequently occurring complication related to hypertension (Guyton, 1986).

Clinical trials have demonstrated the benefits of reducing blood pressure in hypertensive individuals

(Fink, 1981; Henson, 1981; Hypertension Detection and Follow-Up Program Cooperative Group, 1979). The level of the blood pressure is indicated to be directly related to the frequency of cardiovascular disease and death (Hurst, 1986).

The Joint National Committee on the Detection, Evaluation, and Treatment of High Blood Pressure was formed to develop a systematic approach for the treatment of hypertension (Hutchins, 1981). Recommendations were made for a uniform pharmacologic treatment, known as the stepped care approach. Step 1 usually begins with a diuretic. If the blood pressure goal is not achieved, small doses of an adrenergic blocking agent may be added. Vasodilators are used if it is necessary to employ Step 3. Step 4 consists of adding or substituting guanethidine or other adrenergic blockers for a Step 2 drug.

Non-pharmacologic therapy provides expanded options for blood pressure control for all clients with essential hypertension, not only those individuals with higher pressures who require drug therapy (Nonpharmacologic Approaches to the Control of High Blood Pressure, 1986; Stamler et al, 1987). Nonpharmalogic therapy may also be appealing to those individuals for whom medications result in unpleasant

side effects, interfere with their lifestyles, or are prohibitive due to their cost.

Several alternative types of therapies have been recommended. The positive correlation between obesity and increased blood pressure is an indication for the recommendation of weight loss in the treatment of hypertension (Ashley & Kannel, 1974; Grobbee & Hoffman, 1986; Stamler et al, 1980; Watt et al, 1983). Dietary sodium reduction in the control of blood pressure has become a controversial issue within the last few years (Grobbee & Hoffman, 1986; Hamlyn, & Blaustein, 1986; Houston, 1986; Watt et al, 1983). Recent studies have identified an inverse relationship between serum calcium levels and blood pressure determinations (Ackley, Barrett-Connor, & Suarez, 1983; Belizan et al, 1983). Moderation in alcohol consumption is suggested as a non-pharmacologic adjunct treatment of hypertension since chronic alcohol consumption increases blood pressure (Arkwright et al, 1982; Harburg, Ozgoren, & Hawthorne, 1980). The use of stress reduction techniques, or behavioral therapy, to lower blood pressure in hypertensive individuals derives from the belief that stressful stimuli stemming from the individual's environment are factors in the development and maintenance of the hypertensive state

(Nonpharmacological Approaches to the Control of High Blood Pressure, 1986).

<u>Compliance</u>

Essential hypertension is a chronic condition requiring a continuing commitment of compliance behaviors by the client. Unfortunately long-term compliance rates of clients tend to be lower than desired, with some estimates of 30-50% nonadherence with the prescribed regimen (DeVon & Powers, 1984). Numerous studies have attempted to identify factors which contribute to or impede client compliance. Although often contradictory, a summary of the major factors involved in compliance follows.

McCord (1986) summarizes these compliance factors into two major areas: clinical characteristics and client characteristics. Under clinical characteristics, specifics of the health care setting such as decreased waiting time, decreased time between referrals, and individual rather than group appointments are positively associated with compliance (Felman, 1982). The therapeutic regimen is also a clinical characteristic that influences client compliance. Increased complexity of the regimen, interference with daily routine, increased duration of treatment, increased cost, and increased side effects

are all associated with decreased compliance (Haynes,
1976; Eraker, Kirscht, & Becker, 1984; Caldwell, Cobb,
Dowling, & DeJongh, 1970).

Of the client characteristics presented,
demographic features and physiologic and psychosocial
factors were examined. Of the demographic features,
age, gender, and race/ethnic background appear to have
no influence on compliance behavior (Sackett & Haynes,
1976; & Yoos, 1981). Educational level of the client
has yielded mixed results: some studies state that
educational level has no influence (DeVon & Powers,
1984) and others support some relationship (Sands &
Holman, 1985). Physiologically, the severity of the
illness and diagnosis have no correlation with
compliance; however, increased duration of illness is
associated with decreased compliance (Yoos, 1981).
Psychosocially, family support (Klinger, 1984) or
support from significant others (Felman, 1982), a
positive body image (Bille, 1977), and an internal
locus of control (Kerr, 1986) are all associated with
positive compliance behaviors. Psychosocial
maladjustment, on the other hand, was noted to be
related to lower adherence rates (DeVon & Powers,
1984).

The client-provider relationship is also a factor that has been noted to affect compliance behavior. The characteristics of client satisfaction, communication, and caring by the health care provider have been noted to be positively associated with compliance (Given & Given, 1984). Clinician empathy was identified by Dawson (1985) as also being important. A supportive nonjudgmental client-provider relationship can also be seen as a motivator for compliance (Padrick, 1986). Other aspects of the relationship such as the quality of the relationship (Blackwell, 1979), the use of personal communication patterns (Kasch & Knutson, 1985), and continuity of care (Felman, 1982) have been identified as important elements leading to positive compliance behavior.

Health perceptions or health beliefs are additional factors which appear to influence compliance behavior as demonstrated by several studies utilizing the Health Belief Model (HBM) as the framework for the research study (Kirsch & Rosenstock, 1977; Hershey, Morton, Davis & Reichgott, 1980; Becker & Maiman, 1975). Perceived susceptibility, perceived severity, perceived benefits of professional interventions, and perceived barriers are those aspects of the HBM which influence a client's motivation to comply with therapy

(Rosenstock, 1975). For the current study, the influence of the long term consequences of noncompliance is an especially important aspect that has been studied by several researchers. Kirscht and Rosenstock (1977) in a study of 132 hypertensive clients noted that clients who revealed higher levels of personal susceptibility to the effects of hypertension (i.e., stroke, heart disease, and kidney disease) adhered better to the regimen. Nelson, Stason, Neutra, Solomon, and McArdle (1978) interviewed 142 clients in a general medicine clinic and noted that the major perception that predicts medication taking is concern that failure to comply will lead to serious illness. They also noted a positive correlation between self-reported medication taking and blood pressure control. In agreement with the above researchers, Hershey, Morton, Davis, and Reichgott (1980) noted that some aspects of the HBM suggested a trend toward a positive relationship with compliance. The aspects of perceived severity and concern over one's health were those aspects that were noted to influence compliance behavior in the study population of 132 hypertensive clients. While there are contradictory reports that indicate that compliant and noncompliant clients do not differ in their health

beliefs (Cronin, 1986; Andreoli, 1981; and Watts, 1982), clients' perceptions of the long term consequences of noncompliance are believed by the present researchers to influence compliance behavior.

Knowledge and Understanding

The effect of knowledge acquisition on compliance behavior has been studied by many researchers. Sands and Holman (1985) in their study of 93 subjects age 65 or older who were receiving medical treatment for hypertension, noted no relationship between a subject's score on a knowledge test and one's score on a compliance questionnaire. They did find an inverse relationship between compliance and both age and educational level. No relationship was documented for the variables of gender or marital status.

Client education as a means to increase knowledge has frequently been used as a strategy to increase compliance. Studies have yielded results, however, that indicate that knowledge alone is not sufficient for compliance to occur. Sackett et al (1978) tested two strategies for assisting hypertensive clients with compliance behavior. These strategies included teaching clients about their disease and its treatment, as well as providing follow-up care. Neither strategy significantly influenced medication compliance.

Bille (1977) investigated the effect of one aspect of body image, body cathexis, and the achievement of knowledge about life after a heart attack on the client's compliance with post-hospitalization therapy prescriptions. Results of the study indicate no significant relationship between body image and the amount of information learned in the teaching program. There was also no significant relationship between knowledge gained and the ratio of reported compliance.

Tanner and Noury (1981) examined the effect of structured teaching about essential hypertension on diastolic blood pressure (DBP) control in individuals with essential hypertension. The results of the study noted that there was no difference between the experimental and control groups in DBP control at the end of the study, while there was a significant difference between the groups on post-test scores on the knowledge test about hypertension. The authors concluded that the teaching had no siginificant effect on DBP control. The instruction increased knowledge but not compliance.

In another study of 115 clients receiving medical care for hypertension (Swain & Steckel, 1981), the client education treatment group was the group that had the highest drop out rate when compared to the routine

care group and the group that had received contingency contracting. The clients in the education treatment group also did not have adequate blood pressure control. The authors reported anecdotal information from the clients in the education group who displayed feelings of guilt, because they knew what they were supposed to do and felt guilty about not following advice. This could explain the higher drop out rate.

In 1985, Morisky, DeMuth, Field-Fass, Green, and Levine provided hypertension information in small group sessions to family members of hypertensive clients. The clients whose family members received this educational intervention had greater compliance than the control group which received no intervention. The problem with this study is that one cannot distinguish whether the family support or the education influenced the compliance behavior.

Powers and Wooldridge (1982) compared four aspects of educational programs (number of meetings, client responsibility and participation, directiveness of the intervention, and emphasis on the negative consequences of uncontrolled hypertension) in an attempt to determine factors that might impact client knowledge and compliance. Their study sample was comprised of 160 hypertensive subjects from various types of primary

health care facilities. Although no significant effects were obtained in BP control, the number of meetings with the project nurse was significant in increasing client knowledge. Other results of the study were that emphasis on negative consequences tended to promote learning for patients with long-standing diagnoses, but to retard learning for recently diagnosed clients. Also, additional meetings and emphasis on client responsibility, in combination, tended to produce increased learning.

Webb (1980) also conducted a study to determine the effectiveness of patient education on compliance. Her sample consisted of 123 low income, rural, black hypertensive clients who were randomly assigned to one of three groups: group client education, individual psychosocial counseling, and regular physician visits only. The results of this study noted that there were no significant differences (by Chi-square analysis) in blood pressure control between or within groups.

In an attempt to separate the effects of intervention from social support, Kerr (1985) studied a group of 116 clients to explore whether teaching clients about hypertension, or the self-care strategy of monitoring one's blood pressure, or a combination of both, without further supervision or support would

promote adherence to antihypertensive regimens. The results of the study noted no significant differences in adherence rate between the groups. A negative relationship was actually found between client education and self-reported adherence. As in the previous studies, knowledge acquisition does not seem to improve compliance behavior.

While knowledge alone does not appear to have a positive impact on compliance, most authors state that understanding is essential for adherence. However, knowledge is important as a means of achieving understanding and awareness of the risks of noncompliance and the benefits of compliance (Sands & Holman, 1985). The difficulty is that most studies do not distinguish between knowledge and understanding. Knowledge can have several different meanings: specific information about the regimen; general medical information; or, the rationale for treatment. The interpretation of many of the studies becomes difficult without explicit operational definitions.

Although there are no studies that explicitly explore a client's understanding of the consequences of uncontrolled high blood pressure, there are several studies that have investigated the client's understanding in general. Edwards and Pathy (1984)

noted an increased compliance in elderly groups who received drug counseling. They attributed this increased compliance to an increased understanding of the drug regimen. Kirscht and Rosenstock (1977) in a study of the health beliefs of hypertensive clients concluded that the understanding of the hypertensive condition was less important than the understanding of the purpose of the regimen. This finding relates to the present study in that the understanding of hypertension is associated more with general knowledge or facts about the disease, which is believed by the researchers not to be sufficient in itself to improve compliance behavior. On the other hand, understanding of the purpose of the regimen, in terms of avoiding the long term negative consequences of hypertension, is believed by the researchers in this study to be associated with improved compliance behavior.

Other authors relate noncompliance to poor comprehension (Blackwell, 1979; Jette, 1982), which is seen by the researchers of this study as decreased understanding. Blackwell (1979) states that possibly two-thirds of the real problems in adherence stem from faulty comprehension. He recommends assuring client understanding by health care personnel evaluation using such statements as "Tell me what you heard me say".

Studies by Hulka, Kupper, Cassel, Efredi, and Burdette (1975) also note that what is labeled as noncooperative client behavior often may be involuntary. A disparity may exist between what the client thinks is expected behavior and that behavior which the provider believes the client is performing.

In summary, knowledge of hypertension in itself has not been noted to be associated with higher rates of compliance behavior. Educational strategies to improve compliance have often yielded no improvement in compliance and occasionally lead to negative outcomes. While most authors state the importance of client understanding in achieving compliance, little attention has been given to research in operationalizing and examining this variable. The current study explores one aspect of the client's understanding, the understanding of the consequences of uncontrolled blood pressure, and its relationship to compliance. Client knowledge will also be examined because it is a prerequisite to understanding.

Conceptual Framework

The conceptual framework for this study, which
appears in Figure 1, explains the potential outcomes of
therapy for a person with essential hypertension who
exhibits varying degrees of compliance behavior.
Compliance in this study is defined as the extent to
which a person's behavior (in terms of following diets,
taking medications, and executing life-style changes)
coincides with the health professional's advice
(Sackett & Haynes, 1976). In this framework,
compliance behavior can take one of three possible
pathways--compliant, partially compliant, and non-
compliant. These pathways are described in the
following discussion.

Person

The person, whether in a sick role or not, must be
recognized as being continuously acted upon and
reacting to numerous stimuli. These stimuli include
emotions, socioeconomic status, culture, physiologic
factors, environment, and health behaviors. It is
these stimuli that must be identified by the nurse in
order to assist the individual in setting mutually
agreeable goals in the treatment of essential
hypertension. Although the nurse may be able to effect
change in certain of these stimuli via therapeutic

Conceptual Framework


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                    ┌─────────────┐
                    │   Person    │◄──────────────┐
                    └─────────────┘               │
                          │                       │
                          ▼                 ┌───────────┐
                    ┌─────────────┐         │   Nurse   │
                    │  Essential  │         └───────────┘
                    │Hypertension │               │
                    └─────────────┘               │
                          │                       │
                          ▼                       │
                ┌───────────────────┐             │
                │    Compliance     │◄────────────┘
                │     Behavior      │
                └───────────────────┘
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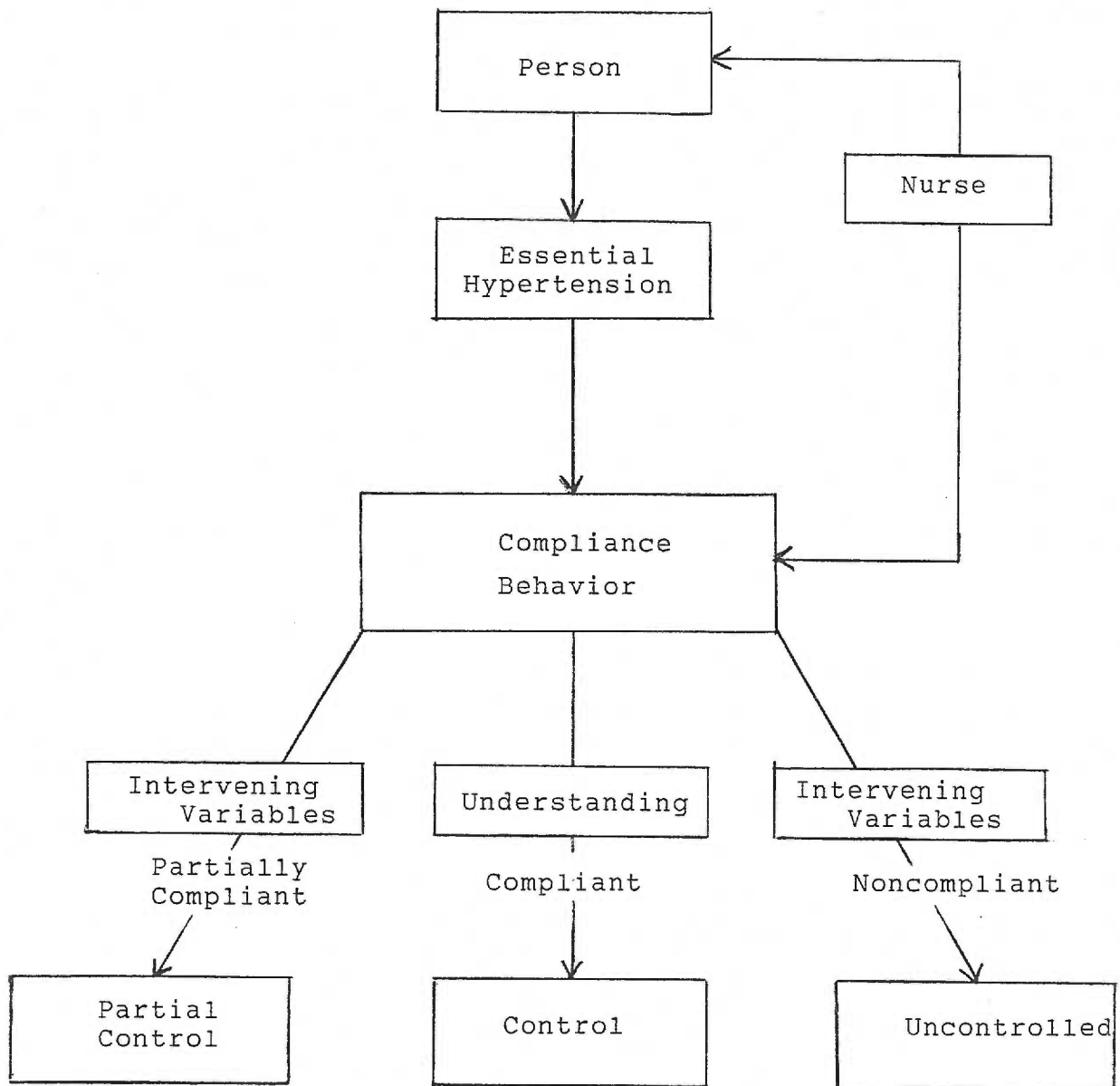| Intervening Variables	Understanding	Intervening Variables
Partially Compliant	Compliant	Noncompliant
Partial Control	Control	Uncontrolled

Figure 1

interventions, other factors are unalterable. For example, an individual's socio-economic status and culture are less likely to be impacted by nursing interventions. However, the effect of these factors on one's lifestyle, personality, and attitudes cannot be denied.

Physiologic factors affecting the individual are considered in this framework to be those genetic and predisposing factors over which one has little or no control. The individual may participate in health behaviors (i.e., exercise, diet control, smoking cessation, etc.) in an effort to reduce one's perceived susceptibility to hypertension. However, these behaviors will not provide one with the certainty that essential hypertension will not develop.

Emotional stress can have a major effect on the person's life. The emotional stability of the individual affects one's behavior and is, in turn, influenced by one's life events. Unfortunately emotional stability is not a static factor in one's life.

Closely related to emotions is the support system available to the individual. Support is obtained from those persons the individual feels are important. Although many individuals derive support from immediate

family members, other persons outside the immediate family may provide a strong source of support. It should be noted that support may be either positive or negative for the individual. Negative support may lead to noncompliant or partially compliant behaviors (Padrick, 1986).

Environment refers to the physical setting in which the individual exists. The environment often has a direct effect on the resources available. The accessibility of health care facilities must always be considered when assessing an individual's environment. An additional consideration for the health care provider is the educational opportunities present in the individual's current environment, as well as those in previous environments.

Compliance behavior

The outcome of hypertension in terms of blood pressure control and compliance with therapy is based on a variety of factors. These factors include certain characteristics of the client, the therapeutic regimen, the health care setting, the client-provider relationship, and the health perceptions of the client. For this study, the focus is on the factors of knowledge and understanding and their influence on compliance behavior.

Knowledge and understanding are believed to be important dimensions that affect compliance behavior. Studies which have examined client knowledge have yielded mixed results, although most authors report that knowledge of the regimen has no influence on compliance behavior. It has been postulated, however, that some knowledge is important as a means of achieving understanding and awareness of the risks of noncompliance and the benefits of compliance (Sanders and Holman, 1986).

Understanding of the long term consequences of hypertension is the important aspect of successful outcome that is being examined in this study. It is believed that this understanding is essential for successful outcomes to occur. In the operational definitions of the study, knowledge is defined as the ability to recall facts, the state of knowing clear and certain facts; understanding is the ability to perceive, to comprehend the nature and significance of facts, and the ability to apply information. The understanding of perceived consequences of hypertension has not previously been studied. However, most authors state that understanding is essential to achieve compliance and improve quality of life.

Based on the individual's response to the variety of factors that been noted to influence compliance behavior, one of three pathways is possible for the person in this conceptual framework. Noncompliance with any treatment modality suggested for the individual with hypertension results in serious consequences. Noncompliance is defined in this study as the conscious decision by the individual to not follow the prescribed therapy. The acceleration of the atherosclerotic changes shortens life by ten to twenty years. Vascular changes also result from the elevated pressure. Myocardial infarction, cerebral vascular accident, renal failure, and dissecting aneurysms are some of the causes of death associated with uncontrolled hypertension.

The person who is partially compliant follows some aspects of therapy but omits others. This person experiencess a decreased quality of life. When the blood pressure is not sufficiently reduced, atherosclerotic changes continue to occur, but at a lesser rate than with totally noncompliant behavior. Transient ischemic attacks, peripheral vascular disease, angina, and congestive heart failure are manifestations of these hemodynamic alterations.

Compliance with hypertensive therapy leads to controlled blood pressure. This is defined as a blood pressure of 140/90 or less that is maintained on lifelong hypertension therapy. The long-term consequences of uncontrolled blood pressure are avoided. The individual experiences an increased quality of life in this pathway.

Nurse

Nursing influences the compliance behavior of the individual through the diagnosis and treatment of human responses, with compliance being such a response (ANA, 1980). Utilizing the nursing process, nurses complete a physical assessment of the hypertensive client, plan, implement, and evaluate interventions. A complete family and environmental assessment also aids in the outcome by providing the nurse with a broader base from which to assist the client in formulating goals, planning care, and dealing with problems that arise. Utilizing the client's present support system and providing options for social support can help achieve the desired behavior. Working within the client's present coping system and aiding the client with coping strategies will also assist the client to achieve personal and health care goals.

The nurse also has available a variety of behavioral strategies that have been noted to aid therapeutic outcomes in improving compliance behaviors. Such techniques as self monitoring (Young, 1986), reminder cards (Feldman, 1982), and contingency contracting (Swain & Steckel, 1981; Young, 1986) have been noted to improve compliance behavior.

Nursing's role in the education of the client is one of the primary ways in which the client and the nurse interact. Client education is a main strategy used to increase client knowledge of hypertension. Although many studies note that knowledge is not associated with compliance, the presentation of information is still considered to be a necessary nursing intervention. Nurses need to assess whether learning has occurred and whether clients can apply the information provided. In this framework, understanding is associated with a change in behavior, where teaching is the giving of facts and is associated with knowledge in this framework. Understanding can be improved by the nurse's consideration of the emotional state of the client when communicating. States such as anxiety or fear may interfere with understanding (Padrick, 1986). Written instructions can be used by nurses to provide clients with a means to review information necessary

for optimal health and to improve the understanding necessary to impact compliance behavior.

Blackwell (1979) suggests several ways to improve compliance behavior, including comprehension. Making certain the client hears what is being said in language that is meaningful aids communication. Blackwell also (1979) suggests that the nurse-client interaction end with a general statement such as "Tell me what you have heard today". Such client feedback enhances comprehension. Feedback is an extension of enhanced communication skills.

Assessment of the client's understanding of the long-term consequences of hypertension is believed to be an important nursing component in this framework. It is this understanding that influences a client's compliance behavior in a positive manner.

Hypotheses

This study tested the following hypotheses:

1. There is no relationship between knowledge of hypertension and compliance with therapy in clients with essential hypertension.

2. There is a positive relationship between a client's understanding of the consequences of uncontrolled hypertension and compliance in clients with essential hypertension.

Methodology

This study was designed to determine the relationship between knowledge and compliance, and understanding and compliance in clients with essential hypertension.

Design

This study utilized a descriptive correlational design. The variables of knowledge and understanding were studied in relation to compliance behavior. A sample size of 61 was selected since at least thirty subjects are necessary for appropriate statistical analysis (Polit & Hungler, 1987). By doubling the sample size, more confidence can be placed in the statistical analysis. Further increases in sample size would increase statistical confidence, but for this study 61 subjects were selected as an adequate number for the time frame of the study.

Potential threats to the internal validity of this study included history, instrumentation, and selection. The threat of history was possible because of the time frame of this study. It could not be predicted, however, because one is unable to predict the occurrence of events that may influence study participants. History as a threat was controlled

somewhat because data collection occurred only one time with each subject.

Instrumentation was a potential threat due to changes that could have occurred in the interviewers which would have affected the obtained measurements. Such changes in the interviewers include becoming more experienced in the data collection, more discriminating, more fatigued or careless. In part this was controlled due to the short time period required for actual data collection.

Selection was the primary threat to the internal validity of this study due to the lack of random selection of subjects. The study involved a convenience sample. In an attempt to decrease the problem of selection bias, a demographic data questionnaire was used to determine possible extraneous variables. Nonparticipation could also add to the selection threat since subjects who chose to participate may be inherently different from subjects who refused to participate in the study.

Potential threats to external validity included the Hawthorne effect and experimenter effect. The Hawthorne effect was a potential problem due to the possibility of subjects overestimating their compliance behavior because of their inclusion in this study. The

measurement technique of self-reports reflects this
problem (Hilbert, 1985). It is also possible that
health care providers overestimate the compliance
behaviors of their clients. This study attempted to
control for this effect by including blood pressure
determinations as an objective measure of the subject's
control of hypertension and as a reflection of
compliance.

Experimenter effect was possible because there
were three researchers collecting data. It is possible
that the experimenters unconsciously communicated their
expectations to the subjects. Experimenter effect was
minimized by a careful study protocol that explicitly
defined the steps of data collection. A standardized
instrument format also facilitated the collection of
data in a consistent manner.

As with experimenter effect, inter-rater
reliability was a potential problem with this study due
to the collection of data by three researchers. It is
possible that data might not have been collected and
scored identically by the three researchers. The
research protocol assisted with the collection of data
in a consistent, systematic manner. Inter-rater
reliability was determined by having all three
researchers present on three client interviews. One

researcher interviewed and scored the responses while the other two researchers independently scored the same responses. Each researcher had the opportunity to interview one client while the others observed and simultaneously scored the responses. A comparison of the scoring was done after the interview was completed and an inter-rater reliability of 100% was obtained.

<u>Subjects</u>

For this study, a convenience sample of clients between the ages of 18-65 with a diagnosis of essential hypertension as recorded by a health care provider (physician or nurse practitioner) on a medical record was selected. This age range was selected since the diagnosis of essential hypertension can usually be first made at age 18 (with the usual range of initial diagnosis being made between ages 18 and 50). A cutoff age of 65 was used since the atherosclerotic vascular changes are usually accelerated in the elderly population due to the aging process. The diagnosis of essential hypertension had to have been made one or more years prior to the study to avoid including newly diagnosed clients. This group of clients was excluded from the study because of the probablilty that they lack both knowledge and understanding of hypertension and would have confounded the results of the study.

They also would be experiencing the stress related to a new diagnosis, which can affect blood pressure. Finally, the newly diagnosed client is unlikely to have had the opportunity to become familiar with the therapeutic regimen for hypertension control.

Subjects had to able to read and speak English. Other criteria included no documentation of renal involvement, an absence of cerebral vascular or myocardial infarction within the past year, and no hospitalizations for hypertension-related conditions within one year. These selection criteria were included to control for the extraneous variables related to the presence of a medical condition or crisis which might influence behavior. Some of these conditions could also cause secondary increases in systemic blood pressure which might affect the provider's ability to identify essential hypertension.

The final subject inclusion criterion was that all subjects had to be receiving pharmacologic therapy for hypertension. This provided at least one measure about which to question the client regarding the adherence with therapy, along with lifestyle changes. Adherence with pharmacologic therapy is also the criterion most often used by researchers in studying compliance in the hypertensive population. Lastly, it is the

pharmacologic therapy that is the component of the
client's regimen that is often the most difficult to
follow due to side effects, multiple dosing, and
frequent adjustments by the health care personnel. It
is this aspect of therapy, however, that can decrease
the possibility of complications of hypertension for
most clients by reducing the blood pressure.

Setting

The subjects were accessed in outpatient clinic
settings in the greater Portland area. The clinic
sites selected for this study were a university-
affiliated medical center and Veteran's Administration
Outpatient Clinics.

Data Collection Methods

The data collection methods that were used for
this study included a demographic interview, the
Knowledge Questionnaire, the Understanding
Questionnaire, and the Compliance Interview. The
client was seen only once by one of the three
researchers for data collection. An informed consent
was signed prior to data collection (Appendix A).

The demographic interview (Appendix B) was used
to document such factors as marital status, education,
income, and social support. Specific questions related
to the client's hypertension were also asked, such as

length of time since diagnosis and medication history. Questions were also asked about educational sources that the client may have had contact with regarding hypertension. The total interview time for obtaining the demographic information was approximately five to ten minutes.

Knowledge Questionnaire

The Knowledge Questionnaire (Appendix C) was designed to assess the client's knowledge about general information related to hypertension. The questions were phrased in a nonpersonal format. There were a total of 16 questions in the instrument. These questions were adapted from two questionnaires that were used by other researchers to assess a client's knowledge about hypertension (Sands & Holman, 1985; Grimm, 1981). Reliability and validity data for the original instruments were not reported. Therefore, it was necessary to conduct a pilot study (n=10) to determine these data for the new instrument.

The content validity for this instrument was determined by a panel of nurse experts. The internal consistency was obtained by use of the Kuder-Richardson formula. A reliability coefficient of .70 was desired for this instrument. The reliability coefficient obtained was .67 which approached the desired

reliability level. This coefficient could have been increased to .73 with the elimination of a question which related to smoking and its effect on blood pressure. After consultation with the content panel, it was decided to retain this question because it provided important information regarding the client's knowledge. Cigarette smoking was also assessed in the compliance interview. Retaining this question was consistent with the construct of the study. A total of 16 questions were maintained for scoring purposes. The completion time for this questionnaire by the subject was 5-10 minutes.

The raw scores on the Knowledge Questionnaire could range from 0 to 16. A hypertension knowledge score of 75% (12 of 16 questions answered correctly) was chosen to indicate a knowledge of hypertension. It is unlikely that a person would score this by chance. For purposes of analysis and discussion, a hypertension knowledge score of 75% or higher was considered to be representative of those persons having knowledge, while a score of less than 75% was indicative of not being knowledgable about hypertension.

Understanding Questionnaire

The Understanding Questionnaire (Appendix D) was
developed specifically for this study and was designed
to assess the client's ability to understand the long
term consequences of uncontrolled high blood pressure
and the ability to apply that understanding to new
situations. The questions were presented in a scenario
fashion with a response format of "yes" or "no". A
total of seven scenarios were used, five of which
related to the major consequences of uncontrolled
hypertension. The remaining two scenarios were
"distractors" which related to cancer and arthritis as
consequences of uncontrolled hypertension. It was
thought that a client who truly understands the
consequences of uncontrolled hypertension would
correctly select a "no" response to these scenarios.

The content validity for this instrument was
determined by a panel of nurse experts. Reliability
data were determined by conducting a pilot study
(n=10). A Kuder-Richardson test was performed with a
reliability coefficient of .70 or greater being
desired. The reliability data obtained for this
instrument were initially below this desired level.
The reasons for this low reliability were possibly
related to the small number of items in the instrument.

Based on the content panel's suggestions, the scale was revised and repiloted.

Twelve scenarios comprised the revised instrument. A Kuder-Richardson test was performed on this revised instrument, with five scenarios being eliminated based on the obtained reliability coefficient. A total of seven questions were retained with a reliability of .64. This reliability, although slightly less than desired, was accepted because the questions reflected the important concepts to be studied. Further deletions would have altered the conceptual construct of the study. The total time required to complete this questionnaire by the subject was approximately 5-10 minutes.

The possible scores for the Understanding Questionnaire ranged from 0 to 7. The raw scores obtained were utilized for data analysis. For the analysis, persons scoring 100% were considered as having understanding of the long term consequences of uncontrolled hypertension.

Compliance Interview

A structured interview format (Appendix E) was developed to assess a client's compliance with medications and the therapeutic regimen. The interview format consisted of two parts, a nine question self-

report section and a six question record/provider section. Since all subjects in this study were receiving pharmacologic therapy, and most studies assess medication-taking behavior to measure compliance, the majority (five out of nine) of the questions on this scale assessed compliance with medications. The remaining questions assessed the client's compliance with diet, weight control, smoking, and alcohol consumption.

The record/provider section was included to provide additional information to assess compliance and to supplement the self-report scale. An additional reason for including this section was to attempt to control for any bias that could occur as a result of the Hawthorne effect, as was previously discussed. The subject's blood pressure readings on the day of the interview and from the two previous clinic visits were obtained from the client's record. Additional compliance behavior was assessed by noting the documentation of the number of clinic appointments missed during the six months prior to the interview. The providers were also interviewed to determine their perception of the subject's compliance with medication and diet. This combination of subjective and objective data was thought to provide a more accurate measure of

the subject's compliance behavior. The time required
for completion of the self-report section was 5
minutes. Time variation occurred with the
record/provider section of the instrument because it
was necessary to access both the chart and the health
care provider of the subject.

Questions in the Compliance Interview were phrased
to result in answers that equated with degrees of
compliance--compliant, partially compliant, and
noncompliant. The content validity for this new
instrument was determined by the panel prior to the
conduct of the pilot study. The reliability was
determined using the Kuder-Richardson formula. A
reliability coefficient of .70 or greater was desired
to indicate the reliability of the instrument, with the
pilot study results achieving a reliability coefficient
of .81. This analysis was performed after the
conclusion of the pilot study (n=10).

The Compliance Interview format provided raw
scores with a possible range of 15 to 45. The
literature suggests that a compliance rate of 80% with
pharmacologic therapy is necessary to obtain and
maintain control in hypertension (Eraker, Kirscht, and
Becker, 1984). For this study, scores of 36 to 45 (80%
or greater) were considered to indicate compliance.

The remaining scores were divided to provide equal distribution of compliance behaviors. Scores of 26 to 35 were considered to indicate partial compliance, and scores of 15 to 25 were considered to indicate noncompliance.

Content panel

Content validity for all of the instruments was obtained prior to conducting the pilot study, using a panel of five content experts who met the following criteria: (1) Master's prepared nurses; (2) currently in clinical practice; and (3) currently working with clients diagnosed as hypertensive, either in a general medical clinic, primary care setting, or hypertension clinic. All members of the content panel had a minimum of two years in practice working with hypertensive clients. The range of clinical experience with a hypertensive population for the content experts was 2-16 years. The content experts evaluated the questionnaires using the forms in Appendix F. Revisions suggested by any of the content experts were presented to all panel members for review. When 100% agreement was reached by all panel members on all questions, the instruments were determined to have content validity.

Data collection procedure

The procedure utilized for data collection in this study was:

1. Subjects were informed of the purpose of the study.

2. A consent form was signed by each of the participants (see Appendix A).

3. Demographic data were obtained per interview by the researcher (see Appendix B).

4. A paper and pencil knowledge questionnaire was administered to each subject and collected after completion of the test (see Appendix C).

5. A paper and pencil test assessing the subject's understanding of the consequences of uncontrolled hypertension (see Appendix D) was administered and collected.

6. Closure was affected through a final interview which determined the client's perception of his/her compliance behavior (questions #1-9) related to the prescribed hypertension therapy regimen (see Appendix E).

7. The compliance questionnaire (questions #9-15) was completed by the researchers by obtaining the remaining information (see Appendix E) from the client's record and the provider.

<u>Data analysis</u>

The variables in this study are the scores received on the hypertension knowledge questionnaire, the understanding questionnaire, and the compliance interview. The correlations between the knowledge score and the compliance score, and the understanding score and the compliance score were determined using Pearson's r on the ordinal data that were obtained. In addition, Fisher's exact test was used to determine the relationship between the degree of knowledge and the degree of compliance, as well as the relationship between the degree of understanding and the degree of compliance. Statistical analysis using chi square was originally selected to test these relationships. However, due to the small number of subjects in certain cells, Fisher's exact test was determined to be more appropriate. The data analysis was performed using the raw scores obtained.

The demographic data were coded for analysis. Descriptive statistics were used to determine the frequency, mean, range, variability, and standard deviation for these data. These data were compiled in order to obtain a description of the sample. No statistical correlations were calculated for the demographic data.

Results

The results of this study were obtained using descriptive statistics for the characteristics of the sample and inferential statistics to test the hypotheses developed from the conceptual framework and the review of the literature.

Characteristics of the sample

The sample in this study (n=61) was accessed in outpatient clinics in a university-affiliated medical center and Veteran's Administration Outpatient Clinics in a large metropolitan area. The subjects were primarily caucasian (88%) males (87%) who were married and living with their spouse (61%). The ages of the subjects ranged from 29 to 65 years, with a mean of 54 years (SD 8.8). The mean educational level of the subjects was approximately equal to completion of high school (X=11.9 years, SD 3.1, range 4-17 years). These data supported the fact that the subjects would be able to read and comprehend the instruments used in this study.   A large proportion of the subjects in this study (68%) earned less than $20,000 during the year prior to the interview date. Incomes ranged from less than $5,000 (8.5%) to $50,000 or more (8.5%) with a mean income of $10,000-$19,999 (30.5%, SD 1.6). No analysis was done to determine a correlation between

the subjects' income and their educational level. No attempt was made in this study to determine a correlation between the subjects' income and their scores on the Understanding Questionnaire. These data were collected to assist in the description of the sample and to provide data for possible secondary analysis.

The mean length of time elapsed since the diagnosis of hypertension was made for subjects in this study was 11.6 years (SD 8.9, range 1-40 years). The mean number of antihypertensive medications taken by the subjects in this sample was 1.8 (SD 0.8), with 40% taking only one medication and 40% reporting taking two antihypertensive medications. No subject reported taking more than four antihypertensive medications.

Forty-five of the subjects in this study (74%) reported that they were additionally being treated for other chronic health conditions. The two most frequently cited conditions were diabetes and athritis. Sixty-two percent (62%) of the subjects reported that their therapy for these other chronic health conditions included pharmacologic therapy. Although only a small number of subjects stated that their hypertension had been diagnosed within the past one to two years (13%), 53 of the 61 subjects (87%) stated they had received no

formal education concerning hypertension and its management. The sources of hypertension information most often cited by subjects were informal information from physicians or other health care personnel (87%), books or printed literature (69%), and TV (69%). This study did not attempt to control for the subjects' sources of information, which could have influenced individual scores on the various instruments in the study.

Analysis of data

Descriptive and inferential statistics were used to analyze the data obtained from the Knowledge and Understanding Questionnaires and the Compliance Interview. A descriptive analysis of the responses to the Knowledge Questionnaire revealed that all but four subjects scored 75% or greater (raw score of 12 to 16) on the instrument. The remaining four subjects obtained a raw score of 11 (68%). The largest group of respondents (n=19) achieved a score of 15 correct out of a possible 16. The questions most frequently answered incorrectly addressed the issue of antihypertensive therapy and the side effects that can occur when initially starting pharmacologic therapy, and the duration of medical follow-up required for treating high blood pressure. The mean score on the

instrument was 14 (SD=1.4) indicating a high level of knowledge of hypertension in the sample group.

A descriptive analysis of the responses to the Understanding Questionnaire revealed a range of five to seven correct responses, with 29 subjects obtaining 100% correct, indicating a high level of understanding. The mean score was 6 (SD=0.8). The most frequently missed item was one that related arthritis to hypertension. Twenty subjects believed that arthritis could be a consequence of uncontrolled hypertension.

The scores on the Compliance Interview format ranged from 26 to 44, with no subjects in the noncompliant group (raw scores 15-25), seven subjects in the partially compliant group (raw scores 26-35), and 53 subjects in the compliant group (raw scores 36-45). The mean score was 38 (SD=3.1).

Statistical analysis using Pearson's r correlation coefficient was performed to determine the relationship between knowledge and compliance, and between understanding and compliance. The results indicate that there was no relationship between a subjects's knowledge about hypertension and the degree of compliance (r=.023; p=0.86). The relationship between understanding and compliance was slightly more positive than the relationship between knowledge and compliance

d(r=0.153; p=0.24), but this relationship similarily failed to achieve statistical significance.

Additional statistical procedures were performed using degrees of knowledge and understanding and their relationship to the degree of compliance. The knowledge scores were transformed into "low knowledge" (less than 75% correct; raw scores 0 to 11) and "high knowledge" (75% or more correct; raw scores 12 to 16). The understanding scores were transformed into "no understanding" (raw scores 0-6) and "high understanding" (raw score of 7; 100% correct). As discussed in the conceptual framework, the compliance behavior was thought to fall into three groups: noncompliant (raw scores 15 through 25), partially compliant (raw scores 26 through 35), and compliant (raw scores 36 through 45). Because no subjects in this study were determined to be in the noncompliant category, the noncompliant and partially compliant groups were combined to yield two groups: less compliant (raw scores 15 through 35) and more compliant (raw scores 36 through 45). Due to the small number of subjects in several of the groups (the low knowledge and less compliant groups), Fisher's exact test was used for the statistical analysis rather than Chi-square. The results indicate no significant

relationship between the degree of knowledge and the degree of compliance ($p < 0.39$, one-tailed). The relationship of the degree of understanding and the level of compliance approached significance ($p < 0.068$, one-tailed) where six of the seven "less compliant" subjects had no understanding.

The correlation matrices for these relationships appear in Tables 1 and 2. In these tables, understanding, "high knowledge", and "more compliant" subject scores are represented by the number "1". Zero indicates the absence of knowledge, understanding, as well as "less compliant" subject scores.

Table 1

Correlation Matrix of the Relationship between Knowledge
and Compliance using Fisher's Exact Statistical Test

Cell contents: Frequency/Row percent/ Column percent/Exp. Freq.

Compliance

	0	1	
0	1 25.00 14.29 0.46	3 75.00 5.56 3.54	4 6.56
1	6 10.53 85.71 6.54	51 89.47 94.44 50.46	57 93.44
	7 11.48	54 88.52	61

Knowledge

p less than 0.3940 (One-tailed)

Table 2

Correlation Matrix of the Relationship between Understanding

and Compliance using Fisher's Exact Statistical Test

Cell contents: Frequency/Row percent/Column percent/Exp. Freq.

Compliance

	0	1	
0	6 18.75 85.71 3.67	26 81.25 48.15 28.33	32 52.46
1	1 3.45 14.29 3.33	28 96.55 51.85 25.67	29 47.54
	7 11.48	54 88.52	61

Understanding

p less than 0.0680 (One-tailed)

Discussion

The objective of this study was to determine the relationships between knowledge and understanding and compliance in clients with essential hypertension. The first hypothesis, there is no relationship between knowledge of hypertension and compliance with therapy in clients with essential hypertension, was supported by the findings of this study. Pearson's r, which was determined based on the ordinal data obtained, indicated that there was no relationship in these subjects. A grouping of the data was done in order to determine the relationships between the degree of knowledge and the degree of compliance and between the degree of understanding and the degree of compliance. Fisher's exact test, used to determine the relationship between knowledge and compliance, also indicated no relationship. This concurs with the discussion of the relationship between knowledge and compliance that appeared in the review of the literature.

The second hypothesis, there is a positive relationship betwen a client's understanding of the consequences of hypertension and compliance with therapy in clients with essential hypertension, was supported by virtue of its positive relationship. However, the analysis of ordinal data, using Pearson's

r, indicated that the relationship was not statistically significant. The grouping of data into degrees of knowledge, understanding, and compliance allowed for analysis using Fisher's exact test. With this test, the relationship between degrees of understanding and degrees of compliance approached statistical significance ($p < 0.068$).

The conceptualization of this study suggested that three distinct behaviors, noncompliant, partially compliant, and compliant with the prescribed therapeutic regimen, are exhibited by those individuals receiving treatment for the management of essential hypertension. This study sought to further identify one of the factors which might contribute to or impede client compliance. In order to effectively correlate groupings, it was expected that all degrees of compliant behavior would be represented in a sample of 61. Furthermore, based on the review of the literature, it was anticipated that as many as 30% to 50% of the scores would be in the noncompliant grouping DeVon & Powers, 1982). The significant absence of scores in the noncompliant grouping in this sample was unexpected. The reasons for this deviation are unclear. Several factors may have been operating in this sample, either alone or in combination.

One explanation may be that the Hawthorne effect was operating as a threat to external validity. The Hawthorne effect was anticipated prior to data collection. The client's responses generally indicated high compliance. Such self-reported high compliance may reflect an overestimation of compliance behavior (Marston, 1970). Self reports have been noted to have the disadvantage of the halo effect, where persons have the tendency to represent themselves in the best light. There is a tendency for compliant behavior to be exaggerated and noncompliant behavior to be underestimated (Haynes et al, 1982; Westfall, 1986). Also, the provider might overestimate the subject's compliant behavior. The instrument was designed to include both subjective and objective data to assist in minimizing the Hawthorne effect. This counterbalance may not have been achieved. Rather, an accentuation of compliant behavior may have been reported.

Another explanation for the deviation in expected findings, may be that the compliance instrument was not a true measurement of the individual's compliance behavior. An expert panel was utilized to determine the content validity of all of the instruments prior to the commencement of the study and a pilot testing of the instrument indicated a reliability of 0.81.

However, it may be that even with these safeguards, the instrument was not able to truly measure compliance in this sample.

The lack of individuals in the noncompliant grouping may be due to the anticipated primary threat to internal validity of this study, that of selection. This sample may not be representative of the true population of hypertensive clients. For this sample, there may in fact be only those individuals who are partially compliant or compliant. Hilbert (1985) suggests that researchers place confidence in the self-report data, which may indicate that these individuals are truly compliant with their treatment regimen. The individuals included in the sample were those who had elected to come to the clinic for their scheduled appointment. Furthermore, 85% of these individuals had missed none of their clinic appointments for the past six months. This may indicate that the expected number of noncompliant individuals was not accessed for this study. This could account for the findings of an unexpected number of compliant clients in the sample.

The client-provider relationship may also account for the high compliance exhibited by the sample. During data collection, several respondents stated that they always followed their health care provider's

orders, because that was what they told them to do. Newcomb, Turner, and Converse (1966) suggested that compliance is an interpersonal response sequence aimed at complying with the perceived wishes of another person, especially if that person has skill, experience, and sophistication. Also the characteristics of client satisfaction, communication, and caring by the health care provider have been noted to be positively associated with compliance (Given & Given, 1984). Clinician empathy was identified by Dawson (1985) as also being important. A supportive nonjudgmental client-provider relationship can also be seen as a motivator for compliance (Padrick, 1986). Other aspects of the relationship, such as the quality of the relationship (Blackwell, 1979), the use of personal communication patterns (Kasch & Knutson, 1985), and continuity of care (Felman, 1982), have been identified as important elements leading to positive compliance behavior. This study did not examine the characteristics of the client-provider relationship which may have affected the clients' compliance behavior.

The degree of compliance may also have been related to the relative simplicity of the treatment regimen. The mean number of medications was 1.8, with

79% of the subjects taking only one or two medications to control their hypertension. An increased complexity of the regimen, interference with daily routine, increased cost, and increased side effects are all associated with decreased compliance (Caldwell, Cobb, Dowling, & DeJongh, 1970; Eraker, Kirscht, & Becker, 1984; Haynes, 1976). The data from this study indicate a less complicated regimen, and a low number of medications required for the management of hypertension, thus minimizing this barrier to compliance.

Lastly, 67% of the study group had a blood pressure reading of 150/95 or lower on three consecutive visits. Only 10% of the group had a blood pressure reading of greater than 170/110 on any visit. Based on the conceptual framework, exhibiting blood pressure control was an essential component of compliance with prescribed therapy. This further indicates that this sample may have had a larger than expected number of individuals in the partially compliant or compliant categories.

Limitations of the study

Some aspects of the study methodology may have influenced the results. The design of this study used a convenience sample. Individuals in the sample were

obtained through self-selection. This has been discussed as a factor which resulted in the sample having an absence of noncompliant individuals, which would limit the generalizability of the results to the general hypertensive population. Homogeneity (87% of the sample were males) would further limit generalizability.

The length of time spent in client visits was not controlled for in this study. Those clients who consistently receive longer appointments could have more of their questions and concerns addressed, which could be a factor in increased compliance. Whether the individual was seen by a nurse practitioner or a physician may also be related to the length of appointment visits. Patients managed jointly or solely by nurse practitioners, with a physician review of management, achieve better blood pressure control than patients managed only by physicians (Reichgott, Pearson, & Hill, 1983). This study did not control for differentiation according to the type of care provider. Therefore, no analysis of this factor was done on the current sample. Before generalizing these results, this variable would have to be considered.

The knowledge and compliance instruments used in this study were adaptations of other instruments and

the understanding instrument was developed for this study. It should be noted that of the seven questions in the understanding instrument, five were correct with a "yes" response, and two were correct with a "no" response. The acquiescence response set bias may have accentuated the results (Polit & Hungler, 1987).

An additional limitation of this study may be related to the reliability coefficients obtained on the newly developed Knowledge Questionnaire and the Understanding Questionnaire. These coefficients were below the desired level of .70. Therefore, less confidence can be placed in the results obtained using these instruments in this sample.

Problems with the measure of compliance may be related to the client's self-report contributing the most to the score in the instrument. Sixty percent of the possible total compliance score was related to the client's perception of his/her behavior. This could result in a skewing of results that may not have been noted if an equal distribution of subjective and objective measures were utilized.

Strengths of the study

Several strengths of the study should be noted. Specific inclusion criteria were deemed necessary in order to control for extraneous variables which could

have influenced the results. Several measures were used in an attempt to view a true composite of compliance behavior. History and instrumentation, which were viewed as possible threats to the internal validity of the study, did not become significant factors. The data collection took place within a three week period when no significant events related to hypertension were noted to have occurred. This time frame also did not create difficulties in relation to instrumentation.

The primary benefit of this study was the exploration of the concept of understanding of the consequences of hypertension. The utilization of scenarios in an attempt to ascertain an individual's understanding elicited many positive responses. The decision of which items to include in the various instruments allowed for collaboration with various hypertension experts throughout the country. It was frequently suggested that the concept of the understanding of consequences needed to be explored. Interest was expressed in how this concept could be measured. Several of the experts also expressed a desire to receive a copy of the results of the study.

The subjects were interested in the testing procedure. Frequently, questions arose during the

testing procedure. Subjects were told that a discussion of items could not occur during the procedure. They were assured that time would be spent after the data collection to address their questions and concerns. On some occasions, the researcher followed up with a discussion of the concepts. For others, this appeared to provide them with an opportunity to discuss their understanding of their condition and its management with their health care provider.

Summary

This study utilized a descriptive correlational design to answer the question: Is there a relationship between a client's understanding of the consequences of uncontrolled hypertension, knowledge of hypertension, and compliance with therapy in clients with essential hypertension? A review of literature supported the researchers' beliefs that the relationship between a client's understanding of the consequences of uncontrolled hypertension and compliance with therapy had not been adequately studied. The researchers believed that the answer to this research question could be significant to nursing in its role of promoting compliance in hypertensive clients.

The conceptual framework for this study indicates that nursing influences a client's compliance behavior via numerous strategies, including family and environmental assessment, behavioral strategies, and education of the client. An important nursing component in this framework is the assessment of the client's understanding of the long term consequences of uncontrolled hypertension. This understanding is believed by the researchers to influence a client's behavior in a positive manner.

Two of the instruments used for this study (the Knowledge Questionnaire and the Compliance Interview) were adapted from instruments used in other studies and reported in the literature. Reliability and validity data were determined for each of these adapted instruments.

The remaining instrument, the Understanding Questionnaire, was developed for use in this study. This aspect of client education had not been previously studied. Consultation with nurse experts led the researchers to develop the instrument in its scenario format. Reliability and validity data were also determined for this instrument.

Data collection was preceded by a determination of interrater reliability and by a pilot study (n=10). The actual data collection for the study occurred over a three week period and was done at a university-affiliated outpatient clinic and at two Veteran's Administration outpatient clinics located in a large metropolitan area. After a brief interview to obtain demographic data, each subject completed the Knowledge Questionnaire followed by the Understanding Questionnaire. The subject's interview ended with the Compliance Interview. The chart was reviewed for blood pressure determinations on the day of interview as well

as the two previous clinic visits. Providers were asked for their determinations of the degree of the subject's compliance with medications and diet.

Statistical analysis using Pearson's r yielded a very low correlation between knowledge and compliance (0.0236) and a slightly higher, but still low, correlation between understanding and compliance (0.153). Neither results achieved statistical significance (p=.85 and .23 respectively).

Because of the small sample size (n=61) and the small number of subjects determined to be non-compliant, Chi-square analysis was replaced with Fisher's exact test. Again, statistical significance was not obtained when testing for a relationship between a client's understanding and compliance with therapy (p=.068).

Implications for further research

This study was conducted to add to the body of knowledge on compliance in a hypertensive population. While this goal was achieved by studying a variable that has not previously been addressed in the literature, understanding of the consequences of uncontrolled hypertension, further research is needed in the area. Suggestions for future research are enumerated below:

1. A replication of the study should be done using a larger sample size of 150-200 subjects to determine if statistical significance increases with a larger sample.

2. Future research is needed on developing instruments to measure a client's understanding of a disease. Scenario presentation appears to be a more useful method than factual types of question, but additional investigation of this method is needed.

3. Future research is also needed to develop instruments to measure compliance. The current study attempted to combine several measure of compliance including self-report, blood pressure, appointment keeping, and provider report to yield one compliance score. This may be a useful strategy for future instrument development because it combines both subjective and objective data rather than relying solely on one type of information. The response format needs to be examined to increase the sensitivity of the instrument.

4. Implementation of an experimental design should be done comparing two groups of subjects regarding their level of compliance. One group would consist of routine care (control group) and the other group would

receive interventions designed to increase understanding (experimental group).

5. Further research is also needed in accessing persons who do not keep clinic appointments. These individuals may be less compliant than the sample used in this study. This information may provide a more balanced picture of factors that influence compliance behavior.

6. Replication of this study is needed using instruments with a reliability of .70 or greater.

This study represents an initial attempt to identify a client characteristic which may impact compliance. Additional research in the area of understanding of the consequences of uncontrolled hypertension is necessary in order for nurses to assist clients in improving their compliance with the prescribed therapeutic regimen.

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Appendix A

Consent Forms for Human Research

INFORMED CONSENT FORM

I,_____, herewith

agree to serve as a subject in the investigation named

"The Relationship of Knowledge and Understanding and

Compliance in Clients with Essential Hypertension",

conducted by Sue Fagan, R.N., Jackie Walczyk, R.N., and

Pat Franklin, R.N., under the supervision of Charold

Baer, R.N., Ph.D., at the Oregon Health Sciences

University, School of Nursing. The research seeks to

discover how my knowledge and understanding of

hypertension affects my ability to participate in the

treatment of my hypertension. I understand that my

participation will involve:

1. Participating in a brief interview with one of

the researchers during one of my regular clinic visits.

2. Participating in two (2) paper and pencil

tests during this same clinic visit.

3. All information that I give will be handled

confidentially. My anonymity will be maintained on all

documents, which will be identified by code numbers.

4. I will not benefit directly, but my

participation in this study will help nurses in

planning nursing care for patients with hypertension.

5. I understand that I am free to withdraw from

this study at any time and it will in no way affect my

relationship with, or treatment from Oregon Health Sciences University or _____.

6. The researchers have offered to answer any questions I might have about the study and what is required of me.

I have read the explanation and agree to participate as a subject in the study described.

Date_____   Signed_____

                         Witness_____

Appendix B

Demographic Interview Format

ID No._____

Site_____

Demographic Interview Format

1. Gender: Male   Female

2. Age:

3. Race: Caucasian Black Asian Indian Hispanic Other

4. What is your present marital status?

    a. Married: living with spouse

    b. Married: not living with spouse

    c. Divorced or separated

    d. Widowed

    e. Never married

5. What is the highest grade of school you completed?

    1 2 3 4 5 6 7 8 9 10 11 12

    College: 13 14 15 16

    Postgraduate: 17+

6. Would you please try to estimate your total income
    (including spouse's income, if any) from all
    sources for the past 12 months?

    a. $50,000 or more

    b. $40,000-$49,999

    c. $30,000-$39,999

    d. $20,000-$29,999

    e. $10,000-$19,999

f. $5,000-$9,999

g. Less than $4,999

7. Who are the persons that you rely on most frequently for support? (more than one choice may be circled)

a. Spouse   e. Neighbors

b. Boy/girlfriend   f. Friends

c. Children   g. Special group

d. Other relatives   h. Pet

         i. Other (list types)

Please answer the following questions about your high blood pressure.

8. How many years have you known that you have high blood pressure?_____

9. Have you been hospitalized for problems related to your high blood pressure in the past year? YES NO Please indicate the reason for your hospitalization

_____

10. Have you received information about high blood pressure from any of the following sources? (Indicate all that apply).

a. Newspaper

b. TV

c. Books or printed literature

d. Community programs

e. Doctor or other health personnel

f. Friends

g. Family

h. Other:_____

i. Have not yet received information

11. Have you ever had any formal education classes
about high blood pressure?   YES   NO

12. Are you on any medications for high blood pressure?
YES   NO

   If yes, how many?_____

Are you on any other medications for other

conditions?   YES   NO

(If yes) How many?_____

13. Besides your high blood pressure, do you have any

other chronic diseases, health problems, or

disabilities (such as diabetes, arthritis, cancer,

kidney problems, heart problems)?

YES   NO

(If yes) What are these problems?

Appendix C

Hypertension Knowledge Questionnaire

Hypertension Knowledge Questionnaire

Please answer the first group of question by circling "YES" or "NO". If you believe the statement is true, circle "YES". If you do not agree with what is said, circle "NO".

1. A person can always tell when   YES   NO
    he/she has high blood pressure.

2. The more overweight a person is,   YES   NO
    the more likely it is that his/her
    blood pressure will be high.

3. Sometimes the doctor changes   YES   NO
    medications for some people with
    high blood pressure.

4. The amount of nervous tension in   YES   NO
    a person's life is likely to affect
    his/her blood pressure.

5. All people with high blood   YES   NO
    pressure take the same type of
    medications.

6. Smoking cigarettes lowers blood   YES   NO
    pressure.

7. Some people feel worse when they   YES   NO
    first start taking medications for
    high blood pressure.

8. High blood pressure can affect   YES   NO

more than one member of the
family.

9. Some of the medicines sold for   YES   NO
colds and stomach upsets may be
bad for a person with high blood
pressure.

10. People with high blood pressure   YES   NO
often feel well.

11. People with high blood pressure   YES   NO
can stop taking their medications
when they feel better.

12. The only way to tell for sure   YES   NO
whether a person's blood pressure
is up is to have someone measure it.

Please answer the second group of questions by circling
the answer you think is right.

13. Hypertension means the same thing as:

a. Nervous tension

b. High blood pressure

c. High blood sugar

14. The part of a person's diet that will most likely
cause blood pressure to go up is:

a. Salt (potato chips, pretzels)

b. Sugar (candy, cakes)

    c. Starch (potatoes, pasta)

15. People with high blood pressure need to follow the doctor's advice for:

    a. 5 years

    b. 10 years

    c. Until their blood pressure is normal

    d. Life

16. Which of the following is related to high blood pressure?

    a. Being overweight

    b. Being underweight

    c. Too much exercise

    d. Too little exercise

Appendix D

Understanding Questionnaire

Understanding Questionnaire

Please read each situation carefully. At the end of
each situation, you are asked a question. Please
decide if the answer is "YES" or "NO", then circle your
answer.

Situation #1

     Mrs. Doe has had high blood pressure for many
years. She has a hard time believing it because she
feels so well. She enjoys snacks such as pretzels and
potato chips, especially while watching TV. She also
has not been too active lately due to the hot weather.
One day she had chest pain and called her daughter to
take her to the hospital. The doctor told her she had
a heart attack. She was surprised because she had
never had heart problems before. Could having a heart
attack be related to having high blood pressure?

     YES   NO

Situation #2

     Mr. Black came to the clinic for a routine
physical examination. He has had high blood pressure
for years but no other health problems. He needed the
physical examination for a new job. When his blood
work came back, he was told that his kidneys were

somewhat damaged and he would have to be careful so he would not develop kidney failure. Could high blood pressure affect an individual's kidneys?

YES   NO

Situation #3

Mr. Brown has had high blood pressure for many years. He has not always taken his medicine because he often forgets. About one year ago, he started having a severe cough and problems exercising. He would get very short of breath. His friend told him he should see a doctor, so he decided to go to the clinic. After a series of tests, he was told he would need surgery for lung cancer. Could Mr. Brown's cancer be related to his high blood pressure?

YES   NO

Situation #4

Mr. Smith has been feeling well despite being told he has high blood pressure. He takes his medication about half of the time, when he remembers to do so. He suddenly had to be admitted to the hospital when he had weakness and trouble speaking. The doctor told him had had had a stroke. Could the stroke be related to his high blood pressure?

YES   NO

Situation #5

Mrs. Jones has had high blood pressure for 15 years. Within the last years, she has had trouble doing her needlework, her favorite pasttime activity. She noticed that her fingers get swollen and are hard to move. When she finally broke one of her favorite china cups because her fingers just could not hold on to it, she made an appointment with the doctor. He told her she had arthritis. Could the arthritis be related to her high blood pressure?

YES   NO

Appendix E

Compliance Interview Format

Compliance Interview Format

The following questions are related to your high blood pressure and its management.

1. Most people miss taking their medicine some of the time. Do you ever miss taking your medicine?

   YES   NO

   (if yes) How many times a week do you miss it?

   a. 5-7

   b. 1-4

   c. Never miss

2. When you feel well, do you sometimes stop taking your medicine?   YES   NO

   (If yes) How many times per week?

   a. 5-7

   b. 1-4

   c. Never stop

3. Sometimes, if you feel worse when you take your medicine, do you stop taking it?   YES   NO

   (if yes) How many times per week?

   a. 5-7

   b. 1-4

   c. never stop

4. Do you ever forget to take your medicines on time?

   YES   NO

   (if yes) About how many times per week do you

forget to take them on time?

a.   5-7

b.   1-4

c.   take on time

5. Do you ever miss some pills on one day but remember
    to take others that same day?   YES   NO

    (if yes) How many times per week?

    a.   5-7

    b.   1-4

    c.   remembers all

6. Do you follow a special diet for your high blood
    pressure?   YES NO What type?_____

    (if yes) How many times per week do you follow it?

    a.   does not follow a special diet

    b.   1-4

    c.   5-7

7. Do you currently smoke cigarettes of cigars?

    YES   NO

    (If yes) How many packs per day?

    a.   1 or more

    b.   less than 1 pack

    c.   does not smoke

8. What is your pressent weight and height?

    weight_____   height_____

    a.   Weight > 30% of ideal

b. Weight > 15-30% of ideal

c. Weight within 0-15% of ideal

9. Do you drink alcoholic beverages?   YES   NO

(if yes)   How many drinks per week?

a. 8 or more

b. 5-7

c. 0-4

(End of interview. Thank client for participation)

The following questions are to be answered from chart and provider.

CHART

10. Blood pressure of client the day of interview plus

a. SBP > or = 170 or DBP > or = 110

b. SBP 151-169 or DBP 96-109

c. SBP < or = 150 or DBP < or = 95

11. Blood pressure last clinic visit (visit prior to study date)

a. SBP > or = 170 or DBP > or = 110

b. SBP 151-169 or DBP 96-109

c. SBP < or = 150 or DBP < or = 95

12. Blood pressure clinic visit prior to reading obtained in #11 (2 visits before study date).

a.   SBP > or = 170 or DBP > or = 110

b.   SBP 151-169 or DBP 96-109

c.   SBP < orr = 150 or DBP < or = 95

13.   Client's missed appointments over the last six
months.

a.   Missed 50% or more

b.   Missed < 50%

c.   Missed none

PROVIDER

14.   In your best estimate, do you think the client is
compliant with his/her medications?

a.   No

b.   Somewhat

c.   Yes

15.   Do you think the client is compliant with his/her
prescribed diet?

a.   No

b.   Somewhat

c.   Yes

Appendix F

Content Validity Forms

Content Validity Form (Part 1)

Please evaluate the instrument "Hypertension Knowledge
Questionnaire" by assessing whether each question
measures knowledge about hypertension. Please base
your response on the following operational definition
of knowledge: Knowledge is the state of knowing clear
and certain facts or truths. Indicate your response to
this assessment by circling either YES or NO. If NO is
circled, please indicate what changes you would make to
improve the question.

1. YES   NO

2. YES   NO

3. YES   NO

4. YES   NO

5. YES   NO

6. YES   NO

7. YES   NO

8. YES   NO

9. YES   NO

10. YES   NO

11. YES   NO

12. YES   NO

13. YES   NO

14. YES   NO

15. YES   NO

16. YES   NO

Content Validity Form (Part 2)

Please evaluate the instrument "Understanding of the
Consequences of Hypertension" by assessing whether the
question assesses understanding of the consequences of
hypertension based on the following operational
definition: Understanding is the ability to perceive
and comprehend the nature and significance of and the
ability to apply factual information. Indicate your
response to the assessment of each question by circling
YES or NO. If NO is circled, please indicate any
changes that would improve the question.

1. YES   NO

2. YES   NO

3. YES   NO

4. YES   NO

5. YES   NO

6. YES   NO

7. YES   NO

8. YES   NO

9. YES   NO

10. YES   NO

11. YES   NO

12. YES   NO

Content Validity Form (Part 3)

Please evaluate the instrument "Compliance Interview Format" by assessing whether each question is a measure of patient compliance with hypertension therapy.

Please base your answers on the following operational definition of compliance: Compliance is the extent to which a person's behavior (in terms of following diets, taking medications, and executing life-style changes) coincides with the health professional's advice. Indicate your response by circling either YES or NO. If NO is circled, please indicate changes that would improve the question.

1.   YES   NO

2.   YES   NO

3.   YES   NO

4.   YES   NO

5.   YES   NO

6.   YES   NO

7.   YES   NO

8.   YES   NO

9.   YES   NO

AN ABSTRACT OF THE

MASTER'S RESEARCH PROJECT OF

SUE FAGAN

PATRICIA T. FRANKLIN

JACQUELINE R. WALCZYK

For the MASTER OF SCIENCE

Date of Receiving this Degree: June 10, 1988

Title: THE RELATIONSHIP OF KNOWLEDGE AND UNDERSTANDING

AND COMPLIANCE IN CLIENTS WITH ESSENTIAL

HYPERTENSION

APPROVED:_____

Charold L. Baer, R.N., Ph.D., MRP Advisor

The purpose of this investigation was to determine whether there was a relationship between a client's knowledge of hypertension, understanding of the consequences of uncontrolled essential hypertension, and compliance with hypertensive therapy.   Of concern was the problem: Is there a relationship between a client's understanding of the consequences of uncontrolled hypertension, as measured by the Understanding Questionnaire; knowledge of hypertension, as measured by the Knowledge Questionnaire; and compliance with therapy as measured by the Compliance Interview, in clients with essential hypertension?

A convenience sample of 61 subjects was accessed in outpatient clinic settings in the greater Portland area. Subjects were interviewed and tested on one occasion only, with data collection occurring over a three week period. Demographic data were collected for each subject, who then participated in the completion of the Knowledge Questionnaire, the Understanding Questionnaire, and the Compliance Interview Format which were designed for the study.

Statistical analysis using Pearson's r yielded a very low correlation between knowledge and compliance (0.0236), and a slightly higher, but still low correlation between understanding and compliance (0.153). Neither result achieved statistical significance (p= 0.85 and 0.23 respectively). Fisher's exact test reconfirmed that no relationship exists between knowledge and compliance (p < 0.3940, one-tailed), while the relationship between understanding and compliance approached statistical significance (p < 0.068, one-tailed).

Certain factors limit the generalizability of these study results. Self-selection and the Hawthorne effect may have influenced the unexpected finding of increased compliance in this sample. Also, those subjects who consistently received longer appointments

could have had more of their questions and concern addressed, which might be a factor in increased compliance.

This study reaffirms that knowledge of hypertension does not have a positive correlation with compliance with therapeutic regimens for the management of hypertension. Implications for nursing practice may well rest in the exploration of an individual's understanding of the consequences of hypertension. Acquiring this understanding may assist in the compliance of the individual, thus significantly reducing the untoward consequences of uncontrolled hypertension.