CARDIAC KNOWLEDGE LEVELS AND ADHERENCE BEHAVIORS POSTMYOCARDIAL INFARCTION

by

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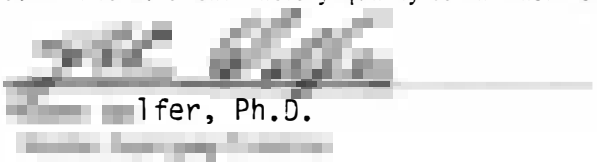

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ABSTRACT

The relationship between knowledge and adherence postmyocardial infarction was studied. Knowledge of cardiac disease and guidelines for rehabilitation was measured predischarge and at two and four weeks postdischarge. Each subject rated adherence to diet, smoking,and exercise guidelines at two and four weeks postdischarge. Knowledge and adherence scores were then correlated to assess the degree of relationship between the two variables. No significant relationship was found between the two variables. This may have been due to the small sample size or to changing guidelines for discharge.

Knowledge and adherence scores were also analyzed with respect to demographic variables. Age was significantly correlated with knowledge ($p < .05$). That is, as age increased, knowledge scores decreased. Decreasing scores in the aged may reflect sensory limitations diminishing test taking ability or lack of familiarity with multiple choice tests; also, the aged may have slower learning processes which would result in lower scores. ANOVA revealed a significant relationship between family size and test scores ($p < .05$). After discharge, the individuals with high numbers of children had significantly higher scores than the individuals with three or fewer children. Members of large families may have participated in answering the questions, or the men may have been under more

pressure to learn and rehabilitate so as to return to work. Only the variable hobbies was found to have a significant effect on adherence ($p < .05$). Analysis showed individuals with physically active hobbies were less adherent to exercise restrictions.

Finally, test scores were analyzed for change over time. There appeared to be an increase in scores from predischarge to postdischarge, but test scores were consistent after discharge.

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CHAPTER I

INTRODUCTION

Coronary artery disease (CAD), for the purpose of this study, is synonymous with the term coronary arteriosclerotic disease. CAD is defined as an atherosclerotic process which affects the intimal layers of the coronary arteries and produces patchy and nodular lesions. Two types of lesions occur, one of which precedes the other: (1) fatty streaks or lesions that begin to appear in coronary circulation during puberty with peak numbers reached during the third decade of life; some fatty streaks are precursors to the second type of lesion, and (2) plaques or raised lesions that appear after the peak development of fatty streaks. The plaques may be fibrous or show degenerative signs such as ulceration, thrombosis, or hemorrhage. Raised lesions are most common in the main stems of the coronary arteries and are generally limited to the extramural vessels.

During resting conditions, the myocardium extracts approximately 70% of the oxygen delivered by the coronary circulation. In periods of increased oxygen demand, the need is met by dilation of the coronary vasculature to allow greater blood flow. This response is mediated by coronary arterioles, while the larger arteries remain essentially nondilated. If the lumen of the vessels is

significantly narrowed, as in atherosclerosis, the amount of blood flow is diminished, even in the basal state. A pressure gradient is created across the obstruction which gradually decreases the dilatory reserve. If the myocardial oxygen demand exceeds supply, then angina or myocardial infarction may occur.

The National Heart, Blood, and Lung Institute estimated that in 1975, in the United States, 1.3 million people would experience symptomatic coronary artery disease. Of these, 675,000 would die, 175,000 prematurely or before the age of 65, presumably of myocardial infarction or the complications thereof. The absolute occurrence of myocardial infarction is unclear as mortality from CAD is most often cited rather than the number of infarctions.

A topic often cited in studies of cardiovascular disease is that of risk factors. Risk factors are associated with the increased risk for the development of coronary artery disease and include the following: (1) aging; (2) sex (before menopause, women have a much lower incidence of CAD than do men; exceptions to this are women of the black race and those who have diabetes); (3) cholesterol levels in excess of 220 mg per 100 ml and/or elevation of other serum lipids; (4) hypertension (defined as blood pressure levels in excess of 140/90 in men aged 45 to 65); (5) cigarette smoking; (6) diabetes mellitus; (7) obesity; (8) inactivity; (9) psychological factors such as personality type and levels of emotional stress; and (10) a family history of CAD (significant if only because characteristics such as personality, dietary, and activity habits may be passed from one generation to the next).

The development of coronary artery disease is insidious. An individual is often asymptomatic until the occurrence of angina pectoris, myocardial infarction, or sudden death. Due to the insidious nature of the disease it is often difficult to make the patient aware of the necessity of changing behaviors. Though an individual may be cognizant of risk behaviors, when asymptomatic, there is little threat to the system. It is less stressful to maintain familiar and comfortable habits which are not perceived as threatening than to expose oneself to the frustration of change. Perception of risk factors may or may not change after an insult to the system such as a myocardial infarction. After an infarct, the risk factors are still present, the disease process continues, and the occurrence of a second myocardial infarction can be a very real danger.

Following a myocardial infarction, the individual is often presented with a prescription which details a manner of handling daily activities such as exercise, diet, weight loss, smoking, sex, returning to work, and a basic amount of information about the heart and the heart attack. This information may be rendered by the physician or the nurse individually or such information may be included in a series of classes attended by a group of patients prior to discharge. At times, these classes may be carried over to the post-discharge period and serve to provide peer support for the participants. The purpose of such programs is: (1) to educate the patient about the disease and effective methods of lifestyle adjustment, (2) to rehabilitate the individual to preinfarction levels of

activity, and (3) to increase awareness of both risk behaviors and appropriate methods of decreasing these behaviors, thus diminishing secondary risk. Secondary risk refers to the tendency to have a second or recurrent myocardial infarction.

Purpose of the Study

Many studies have been published which deal with the compliance of the patient with myocardial infarction and with compliance, in general. Compliance has been associated with social class (Hackett & Cassem, 1971); body image (Billie, 1977); and with the type of cardiac education program (Rahe, O'Neil, Hagan, & Arthur, 1975). The purpose of this study is to focus on the level of understanding of heart function of the patient and the relationship of understanding to adherence behaviors after discharge.

Significance of the Study

According to the National Heart, Blood, and Lung Institute predictions for 1975, 1.3 million people would develop symptoms of CAD. Of this number, 600,000 experience myocardial infarction each year, yet only half of this population is successfully rehabilitated (Mead, 1977). Compliance is directly associated with rehabilitation in terms of diminishing complications, secondary risk, and ability to return to normal daily activities. In order for health workers to deal with this problem, investigation of variables impinging on compliance must be pursued.

CHAPTER II

REVIEW OF LITERATURE

The risk factors listed previously are topics of much discussion and are considered to be influential in the development of primary coronary artery disease and in the secondary risk of recurrent myocardial infarction. The amount of literature on risk factors is enormous and covers a wide range of topics.

Aging is implicated in development of CAD as the incidence of CAD increases with age. The age of the individual at the time of myocardial infarction is important in determining long-term survival which is felt to be lessened in the aged individual (Librach, Schadel, Seltzer, Hart, & Yellen, 1976). Personality type is another area of much research interest since Rosenman, Friedman, Strause, Wurm, Jenkins, and Messinger (1966) first reported a high correlation between Type A personality and CAD. The individual with Type A personality is highly achievement oriented, competitive, and seeks recognition. Additionally, the Type A person is involved in many activities, each of which is subjected to time limitations and has a high degree of mental and physical alertness. Type A behavior is brought out by challenging experiences and, thus may be more apparent in some occupations than in others. Therefore, a person with such a predisposition may be trained by life circumstances to perfect such traits. Type B personality, which has a low

correlation with the development of CAD, is the antithesis of the A personality. The A pattern is capable of increasing coronary risk by itself or by acting in concert with other risk factors. Likewise, these factors would affect perception of the disease process, reaction to a myocardial infarction, and coping mechanisms following a heart attack (Garrity & Klein, 1975).

Familial personality traits have also been explored. Sons of individuals who participated in the Western Collaborative Group Study have been tested and classified. This population was comprised of boys 11 years and older, and sons of both Types A and B were included. There was a significant correlation between classification of fathers and sons. Researchers felt that it was possible to detect precursors of Type A before occupational roles were engaged (Bortner, Rosenman, & Friedman, 1970). Many other risk behaviors can be attributed to family tendencies. Among these are traits of social origin such as dietary habits. Significant examples are adding salt to food, eating high quantities of animal fats, and smoking. Obesity patterns can often be seen in families. Obesity is often passively induced and may be associated with hyperlipidemia and increased sodium intake. The latter is, in turn, associated with hypertension (Grotto, Nichols, & Scott, 1978). Obesity increases the workload of the heart and thus can be connected to complications of heart disease and secondary risk.

Smoking is another factor which has been implicated in connection with heart disease. It is currently estimated that 40% of the males and 30% of the females in the United States smoke.

Research has established a link between smoking and the development of heart disease (U.S. Department of H.E.W., 1973). Smoking thus reduces life expectancy by increasing the risk of CAD. Smoking causes hypoxia due to increased levels of carbon monoxide and nicotine thus increasing catecholamine secretion. Using an aggressive approach in dealing with smoking behaviors in heart patients, Burt, Illingworth, White, Shaw, Thornley, and Turner (1974) were able to persuade 62% of the study subjects to stop smoking, while only 27.5% of the control group stopped smoking. The habit of smoking is strongly tied to one's health beliefs. Following a life-threatening event such as heart attack, men decreased their amount of smoking or switched to a pipe even in the presence of wives who smoked heavily (Croog & Richards, 1977). Other data implicate smoking in secondary risk. British researchers found that those individuals who continue to smoke after myocardial infarction had a higher mortality rate than those who stopped smoking.

Attitudes about postmyocardial infarction activity have changed drastically in the past 20 years. Even 10 years ago, the conservative approach was the rule. Bedrest for three to six weeks was not uncommon and walking was introduced at eight weeks post-infarct (Cook, 1976). Current trends in treatment are to return the individual to activity as soon as possible. Almost all patients are sitting in a chair prior to transfer from the Coronary Care Unit. Discharge for patients without complications is often two weeks following the infarct. Generally, it is felt that the individual should be capable of four mets of activity at discharge. One

met is the amount of oxygen (in leters) consumed per Kg of body weight per minute at seated rest and is approximately 3.5cc/Kg/min. Four mets is the equivalent of daily household chores. The main thrust of activity rehabilitation is to return the individual to a full range of normal activities in daily living and eventual physical reconditioning (Brummell & Niccoli, 1976).

The nature of the cardiac rehabilitation program varies greatly. In some areas, the programs may consist of advice from a physician or nurse, without formal instruction. Often, the instructions are vague and, if presented by more than one person, may be confusing. Other patients may be exposed to group teaching while hospitalized. Often, this type of program utilizes booklets and written instructions that serve to reinforce the postdischarge instructions. Still other patients are channeled through extensive inpatient and outpatient classes with much emphasis on return to prehospitalization activity (Nye & Poulsen, 1974). Mozingo and Medina (1976) estimated the cost of such a program to be $1,500 per patient, with third party insurance picking up 80% of the bill. Though it is not clear that exercise prolongs the life of the individual with CAD, exercise does have a beneficial effect on hypertriglyceridemia, glucose intolerance, and hypertension, as well as aiding relaxation.

Patient motivation is an important variable in the rehabilitation scheme (Kasl, 1975). While health professionals cannot rehabilitate a person who lacks interest, it is interesting to review literature comparing results of various rehabilitation programs.

Burt et al. (1973) utilized two groups in a study of smoking behaviors following myocardial infarction. The study group was treated aggressively, that is, the subjects were told to stop smoking because their health could not be guaranteed if they continued to smoke. This information was reinforced by all members of the health team, was presented in writing, and each person was followed in clinic and at home after discharge. Sixty-two percent of the people in the study group quit smoking. The control group given conventional advice such as 'stop smoking' and no follow-up showed a decrease in smoking of only 27.5%.

Psychiatry is another area that has been interested in the topic of cardiac rehabilitation. Group therapy has been used successfully in some cardiac rehabilitation programs. Reasons cited for success are the regularity of the meetings, opportunity to develop peer support, and regular exposure to health professionals who answer questions and allay fears (Bilodeau & Hackett, 1971). In studies comparing group and individual approaches, the members of the group are described as having fewer complications and greater knowledge (Rahe et al. 1975). On the other hand, Wallace and Wallace (1977) found that people in group therapy demonstrated greater anxiety which was attributed to the exposure to the worries and fears of other patients. However, the individuals in this study also expressed that the meetings were helpful in that information pertaining to diet and activity was presented and subjects became aware that other heart patients also worry about the future.

The relationship between behavioral changes and group

support and the relationship between behavioral changes and patient health personnel interaction remains unclear. In another project, the effects of increased attention from a health care provider were assessed. Both study and control groups received instructions about discharge activity. However, members of the study group were seen individually or in groups by a nurse rehabilitator each day during hospitalization and after discharge, phone contact was maintained. All study patients demonstrated an earlier return to work and a decrease in smoking (Posen, Stechmiller, Harris, Smith, Fried, & Voigt, 1977). In a study comparing men with CAD to those free of CAD, over a five-year period, Weinblatt, Shapiro and Frank (1971) found that there was not a significant difference of percentage of men with CAD who had retired compared to the controls. The study group maintained a decreased level of smoking and demonstrated an initial transient weight loss. No attempt was made to control for the level or type of teaching in the study group. In a similar study, Mallaghan and Pemberton (1977), using male and female subjects, found that the majority decreased or stopped smoking and lost weight; 60% of the men and 81% of the women decreased physical activity. Such changes were felt to be attributable to medical advice, the patients' views of the expediency of changing behavior and perception of the disease. Interestingly, personality characteristics were related only to activity changes in that persons who changed activity levels had a higher mean neuroticism score. Likewise, in a nine-year follow-up study of heart attack patients, there was no difference in Minnesota Multiphasic Personality scores for the individuals

who had participated in short-term psychotherapy and those who did not (Bruhn, Wolf, & Phillips, 1971).

There are studies which explore the efficacy of every type of rehabilitation program as well as the influencing variables. One variable of extreme importance is the patient's perception of the disease process and the treatment. As mentioned earlier, the modes of treatment of myocardial infarction have changed drastically and mortality figures have improved in recent years, however, public knowledge is not apt to change as rapidly. A recent survey of Chicago residents demonstrated that only 1% could name three coronary risk factors; that is, smoking, hypertension, and elevated cholesterol level, as contributory to CAD. While 75% of these interviewed expressed the feeling that heart disease is preventable, few could specify behaviors that could reduce risk (Shekelle & Liu, 1978). In many instances, the effectiveness of cardiac rehabilitation is hampered by the restrictive attitudes of the patient or the people close to the patient. The predominant feeling is that people who have had a heart attack should 'take it easy' or 'not overdo it.' Individuals who have known someone who has had a heart attack or have had a heart attack themselves, tend to be more restrictive in their views (Monteiro, 1973).

When examining patient behaviors, a multitude of variables are found which not only affect reactions to the myocardial infarction itself, but also subsequent experiences and behavior changes. For instance, one must be aware of patient self-perception, personalized reaction to stress, and the level of stress in the

patient's current life situation. Stress may have precipitated the acute event of myocardial infarction (Connolly, 1976). Problems may arise if the patient's self-image does not align with the perceptions of the family (Croog, Koslowsky, & Levine, 1976).

Another variable is the rate at which one's perception of self changes. If an individual with myocardial infarction has not internalized the event, then often, in-hospital teaching may be ineffective (Billie, 1977). The insult creates a change in self-image as well as a threat to self. The severity of the threat to self is perceived as an individual phenomena. Reactions will determine the response to illness, rehabilitation, and even secondary risk prevention (Aho, 1977). The Health Beliefs Model serves to explain the ties between perception of disease and demonstrated health behaviors (Becker, 1974). The model also explains sick role behavior as well as preventive health behaviors, and has been tested for internal validity and consistency (Maiman, Becker, Kirscht, Haegner, & Drachman, 1977).

Billie (1977) related compliance to body image; Oldridge, Wicks, Hanley, Sutton, and Jones (1978) tied lack of compliance to an exercise program to lack of motivation. Many other relationships have been postulated, but as of yet, no studies have focused on the area relating understanding to heart function in myocardial infarction patients to adherence to discharge orders.

CHAPTER III

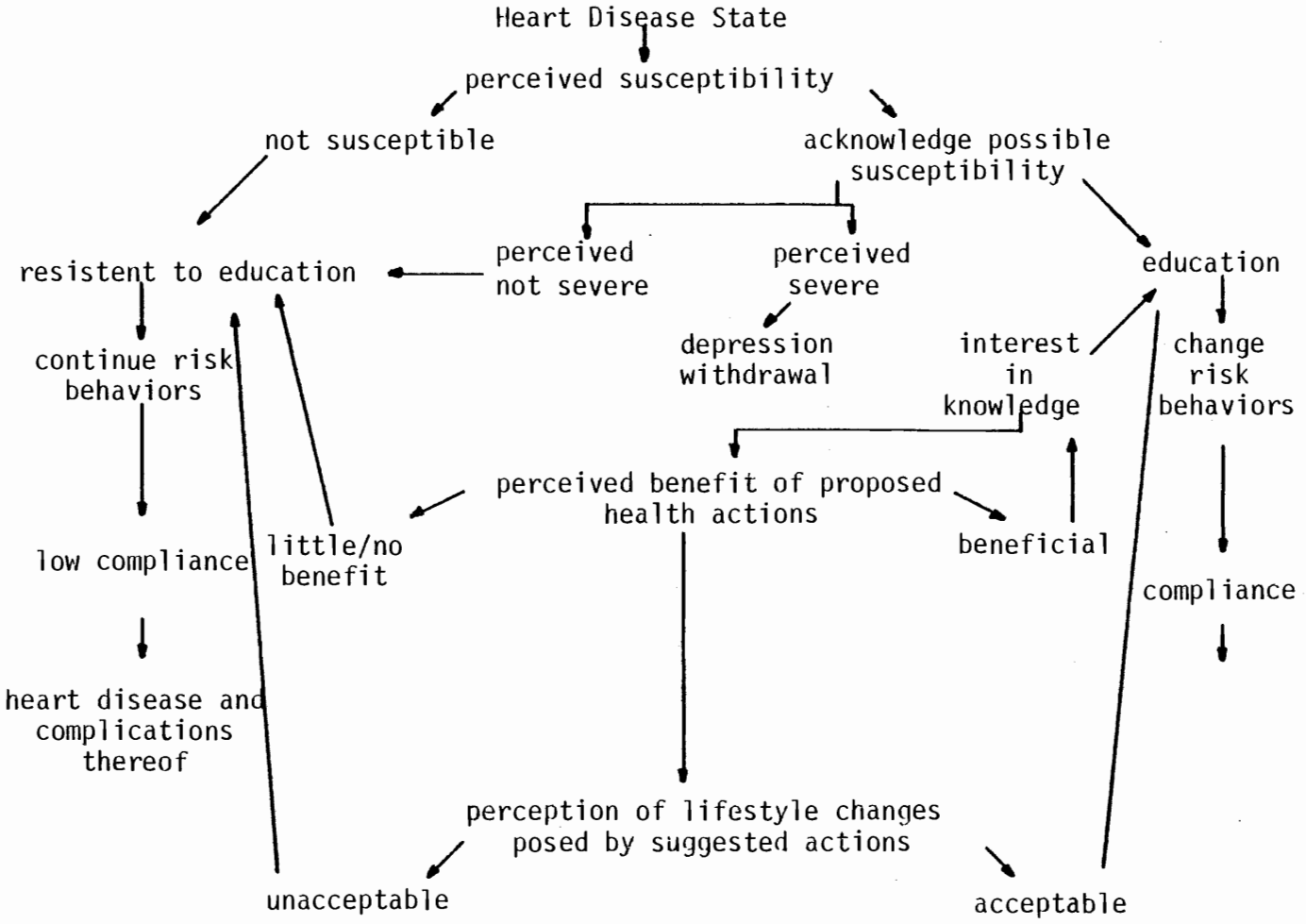
THEORETICAL FRAMEWORK

In an attempt to explain health behaviors which are used in adaptation to sick role and preventive behaviors, sociologists and health educators have proposed the Health Beliefs Model. The model has four major concepts which serve to explain various levels of demonstrated health behaviors. The first concept deals with one's perception of susceptibility to a condition. If susceptibility is perceived as low, the demonstrated behaviors may be risk behaviors. For example, though the person is warned of the hazards of smoking or obesity, behavior does not change if perception of disease susceptibility is low. This example is applicable in analysis of both primary and secondary risk.

The second concept indicates that health behavior varies with the perceived severity of an illness and illness consequences. Having acknowledged possible susceptibility, one is faced with evaluation of outcome if the condition is contracted. Again, if the illness is perceived as presenting little threat to one's lifestyle or well-being, the risk behaviors are not modified. In the context of secondary prevention, if an individual denies the occurrence or the impact of a disease state, the threat to self is minimized and educational efforts of health professionals will fail and behaviors

appropriate to reduce secondary risk will not be exhibited. The second concept is closely associated with the third concept of the model which states that the estimated potential benefits or efficacy of the recommended health actions in preventing or reducing susceptibility will directly influence health behaviors. This concept implies that the individual has accepted the existence of the illness and the threat to self. If the disease is perceived as too severe, the patient may become very depressed and all modifications of health behaviors are seen as useless. If the patient has not adopted a hopeless outlook, education will be beneficial and may provide an impetus for recovery.

The fourth and last concept of the model deals with the actual stipulations and guidelines which delineate the suggested health actions and the patient perception of the actions. The model postulates that the perceived psychological, social, and physical costs of the proposed behavior changes will dictate the degree of assimilation of new information and the degree of adherence with the recommended regimen. If, in addition to the stress of the illness, the proposed modifications add additional stress, compliance will not be high. Compliance varies with the perception of the illness and the value of the habit to be changed. In the figure, the various steps of The Health Beliefs Model are the expected behavioral changes are illustrated. In each step, the patient is faced with two choices. The first choice, rejecting the susceptibility or severity of the disease leads to continuation of the risk behaviors of the alternate choice, that of accepting the disease or the required health



Health Beliefs Model

modifications leads to a decrease in risk behaviors.

Conceptual Framework

The patient with a myocardial infarction might experience several problems during the postdischarge period. If the patient has not accepted illness, in-hospital cardiac teaching might not be as effective as planned. Upon returning home, the patient might immediately resume preinfarction activities, or, in the event that realization of the actual severity of the illness occurs after discharge, the patient may be at a loss as to what guidelines for activity should be followed. The perceived severity of the disease process and the level of understanding achieved from cardiac teaching classes will effect behavior changes. Retention and compliance are also affected by the attitude toward the disease state and rehabilitation.

Statement of the Problem

Most individuals who experience myocardial infarction receive some information about the disease process and the methods of coping, however, the correlation between an individual's understanding and compliance is unclear. Is there a relationship between the level of understanding of myocardial function and adherence to discharge teaching in a group of individuals with one uncomplicated myocardial infarction? For the purpose of this study, myocardial function will include information about the anatomy and physiology of the heart, the process of coronary artery disease, and the effect of infarction on the function of the heart. Adherence is a difficult parameter

to assess and is strongly influenced by many personal characteristics, among which are the individual's perception of discharge orders and the extent to which the instructions are followed, the perceived severity of the disease process, and the threat to self. In this study, adherence is measured through the use of a self-report tool designed to identify the level of knowledge of heart function, demographic characteristics, and the perceived degree of adherence.

Research Questions

1. Will those individuals with a high level of knowledge demonstrate a greater degree of adherence than those individuals with a lower level of knowledge?

2. Are there demographic characteristics influencing adherence of individuals following myocardial infarction?

3. Are there demographic characteristics influencing the level of knowledge attained following myocardial infarction?

4. Is there a change in knowledge level over time?

Objectives

1. To identify those factors influencing adherence to discharge teaching.

2. To identify those factors which influence the level of knowledge of myocardial function achieved.

3. To identify those groups of individuals in need of increased educational efforts to enhance rehabilitation.

Operational Definitions

1. Level of understanding of myocardial function--the ability to attain a score of 60% on a test pertaining to anatomy and physiology of the heart, the CAD process, and how a myocardial infarction might affect heart function. A score of 60% is considered an adequate level of understanding; scores of 65-80% equal good understanding, while scores over 80% equal excellent understanding. The score of 60% is the equivalent of 24 correct responses on the test which has 40 possible points.

2. Adherence to discharge teaching--the degree to which responses on a self-report tool (dealing primarily with diet, exercise, and smoking after myocardial infarction) correlate with the standard regimen suggested by health care providers.

Definitions of Other Variables

1. Change of dietary habits--weight loss, reported use of low sodium or low cholesterol diet.

2. Increased activity--reported use of recommended progressive exercise programs at home or in conjunction with a group; regular daily exercise.

3. Decreased smoking--any decrease in amount as compared with preillness levels.

4. Myocardial infarction--clinically diagnosed by the history of symptoms as related by the patient;

elevation of cardiac enzymes of isoenzymes; evolutionary changes on serial electrocardiograms leukocytosis and/or elevated temperature.

5. Uncomplicated myocardial infarction--without subsequent complications such as congestive heart failure, arrhythmias, pericarditis, shock or cardiac arrest.

CHAPTER IV

METHODS AND RESEARCH DESIGN

Design

This study was descriptive in nature. A questionnaire was utilized for data collection. The questionnaire revealed knowledge scores, adherence scores, and demographic data.

Study Population

The study population was composed of 25 male patients admitted to Latter-day Saints (LDS) Hospital between August 1, 1970, and December 20, 1979. All subjects had a clinically diagnosed myocardial infarction and attended a series of five daily classes about the cardiac disease process, risk factors, and basic guidelines for activities of daily living. Patients are accepted into the class only on referral from a physician. When such a referral is initiated, the patient is visited by the nurse in charge of the classes. The nurse explained the purpose, place, and time of the classes, and encouraged both the patient and family to attend each session for the remainder of the hospitalization. The patient received a booklet detailing the information to be covered in the classes. Referral to the series insures that each patient receives written material, which can be used as reference at home. However, the decision to attend class each day is left to the patient. All patients

included in the study attended cardiac class at least three of the five days of the cycle.

Criteria for Inclusion

The 25 male patients included in the study population met the following criteria:

1. No history of previous myocardial infarction or other significant chronic disease.
2. No complications such as shock, cardiac arrest, prolonged arrhythmias, congestive heart failure, or pericarditis.
3. The subject attended at least three classes prior to discharge.

The rationale for excluding individuals with previous myocardial infarction was to control for the effects of learned behavioral responses to the phenomena of myocardial infarction and to the specific rehabilitation process. Individuals with other chronic diseases were also excluded because the investigator felt that these individuals may already be involved in a compliance/rehabilitation scheme and may complicate interpretation of present reactions to myocardial infarction. Lastly, those individuals who experienced complications which would result in a prolonged recovery were excluded because of possible higher degrees of anxiety and more post-infarction restrictions than peers without complications.

The assumption was made that by including only patients who attended a minimum of three classes, all subjects could be expected

to be familiar with myocardial function and risk factors.

Instrument

A questionnaire was developed by the investigator using items which were thought to be representative of the material generally presented to postmyocardial infarction patients. Three distinct sections characterize the tool. Section I is a 28-item test which has a possible score range of 0 to 40 points and is comprised of multiple choice, true/false, and yes/no questions. Four questions deal with basic anatomy and physiology; five questions cover the process of coronary artery disease and heart attack, and one question deals with risk factors. Posthospitalization activity is the subject of all the remaining items. True/false and yes/no questions were included to decrease the length of the test.

Section II is a 13-item demographic scale and is comprised of questions regarding age, marital status, occupation, income, hours worked per week, educational background, religion, family size, hobbies, and social involvement. Responses to demographic items were coded to expedite statistical procedures. For example, marital status was coded as follows: Single = 0; Married = 1; Separated = 2; Divorced = 3; and Widowed = 4. Sections I and II were administered together as Questionnaire Form I and was completed by each subject prior to discharge from the hospital.

Sections I and III comprise Questionnaire Form II, and was mailed to each subject at two and four weeks postdischarge. Section III of the questionnaire is comprised of questions regarding

the subjects' perceptions of the degree of lifestyle change after myocardial infarction, as well as the subjects' perception of adherence to the suggested changes. Three specific areas are examined--diet, smoking, and exercise. For each area, the subject was asked to report any restrictions or habits peculiar in the area prior to myocardial infarction. Also, each subject was asked to report any modifications of these habits as suggested by the physician. The investigator felt that the items would provide an objective indication of the degree of change following discharge which could then be compared with the subjects' perception of change.

Next, each subject was asked to rate the difficulty of each change as well as the degree to which the instructions were carried out. Items indicating difficulty of each change had a four-point response scale such that 'no difficulty' was equal to a score of 1; 'very difficult' was scored 4. Total possible range of scores for this section was 3-12. Likewise, responses to adherence items were scored on a five-point scale such that 4 indicated a response of 'all the time,' while 0 indicated a response of 'not at all.' For adherence, the respondent had a possible score range of 0-12.

Three of the last four items on Section III dealt with the subjects' perceptions of disease susceptibility, seriousness of the myocardial infarction, and overall effect of changes on lifestyle. Item 5, or 'perceived seriousness of heart attack,' was rated on a scale such that 1 = low degree of seriousness; 4 = high degree of seriousness. Likewise, Item 6, or the effect of change on lifestyle, was scaled such that 1 = low degree of change; 4 = high degree

of change. Item 7, or perceived susceptibility to heart disease, regarded the subjects' expectation of susceptibility to heart disease. Finally, Item 8, or difficulties following discharge, regarded information of problematic areas since discharge.

Pilot Test

Prior to administering the questionnaire to the study population, the questionnaire, including Sections I, II, and III, was pilot tested on a group of 16 postmyocardial infarction patients who attended monthly classes sponsored by the Utah Heart Association. See Appendix A and Appendix B for the final questionnaire.

Procedure

Personal contact was established by the investigator with the nurse in charge of the cardiac class at LDS Hospital. The nurse was familiarized with the objectives and criteria of the study and the investigator initiated regular contact three times weekly with the nurse to obtain names of appropriate patients for the study. Each patient who met the study criteria was visited by the investigator during involvement with the class, but prior to the day of discharge. The investigator explained the purpose of the study and what would be involved if the patient decided to participate. Individuals who expressed a desire to be included were given a consent form to read and sign. Each participant also wrote full name, address, and phone number on a separate card. Consent forms and index cards were placed in a separate manila folder and all index cards were destroyed at the end of the data collection.

After signing the consent form, the subject was given Questionnaire Form I which was to be completed at the subject's leisure, but prior to discharge. No names were used on the questionnaire to insure subject anonymity.

Ten days after discharge, Questionnaire Form II, a cover letter, and a stamped, self-addressed envelop was sent to each subject. At this time, the participant was contacted by telephone and informed that the questionnaire had been mailed. The investigator believed that personal contact would increase questionnaire return. If the form was not returned by day 21, the subject was contacted again to request that the form be returned as soon as possible. On day 26, Form III, the cover letter, and a stamped, self-addressed envelop were sent to each subject to measure adherence and knowledge at one month postdischarge. Again, the subject was contacted by phone when the packet was mailed and if the packet was not returned by day 35, the investigator again phoned to request return of the form. Twenty-three of the 25 subjects returned all forms. Thus, 23 completed packets were available for analysis ($N = 23$). Of the two patients who failed to return questionnaires, one moved, leaving no forwarding address or phone number. The investigator spoke with the wife of the second individual failing to return the questionnaires. According to the wife, this subject was having difficulty coping with the illness and unemployment.

CHAPTER V

DATA ANALYSIS

Statistics

All statistics were computed by hand with the assistance of an HP 33E Programmable Scientific Calculator. The calculator has eight storage registers, 49 lines of program memory, unconditional and conditional branching, and three levels of subroutines. In addition to programming, the calculator has single keystroke functions for statistical functions as follows: summation, mean, standard deviation, linear regression, linear estimate, and correlation coefficient.

Each of the sections comprising Questionnaires Form I and Form II, were analyzed separately using descriptive statistical procedures. Descriptive statistics utilized in the study are frequency distribution, range, mean scores, and standard deviation. The relationships between knowledge scores and adherence scores, knowledge scores and demographic data, and adherence scores and demographic data was analyzed using the Pearson product-moment and the inferential measure analysis of variance (ANOVA).

Descriptive Statistics

Demographic Data

The demographic variables of interest in this study are:

age, occupational status, income, the number of hours worked each week, years of education, type of education, who provides income for family, number of children in family, religious preference, hobbies, inclusion of other family members in hobbies, and attendance of significant others at cardiac class. Table 1 illustrates the frequency distribution for each demographic variable.

The 23 male subjects included in this study were males ranging in age from 42 to 79. Ten subjects (43.5%) were over the age of 65; three subjects (13.0%) were between the ages of 61 to 65; six subjects (26.1%) were between the ages of 56 to 60; and four subjects (17.4%) were under the age of 56. Of the 23 subjects, 22 or 95.6%, were currently married; the one exception reported marital status as 'separated'.

Data concerning occupation were categorized as retired, nonprofessional, and professional. Those in the professional category comprised 47.8% of the total ($\underline{N}$ = 11). Occupations assigned to this category included law, dentistry, physics, executive positions, ministry, education, and accounting. Five individuals (21.7%) listed occupations which were classified as nonprofessional. These occupations were plumbing, railroad labor, salesman, security guard, and construction work. The remaining seven subjects (30.4%) listed 'retired' under occupation. Six of the seven individuals were over the age of 65. Three of the remaining individuals over the age of 65 were employed in the professions, and the fourth was employed as a security guard.

Reported incomes ranged from $6,000 to $35,000 and those

Table 1

Frequency Distribution of Demographic Variables

Variable	Frequency	Percentage	Variable	Frequency	Percentage
Age			Sole Provider of Family Income		
< 35	0	0	Yes	15	65.2
35 - 40	0	0	No	8	34.8
41 - 45	1	4.3			
46 - 50	2	8.7			
51 - 55	1	4.3	Number of Children		
56 - 60	6	26.1	0	1	4.3
61 - 65	3	13.0	1	5	21.7
> 65	10	43.5	2	2	8.7
			3	4	17.4
			4	2	8.7
Occupational Status			5	4	17.4
Retired	7	30.4	6	3	13.0
Nonprofessional	5	21.7	7	1	4.3
Professional	11	47.8	8	1	4.3
Annual Income			Religion		
≤ $8,000	5	21.7	Other	4	17.4
$ 8,000 - $12,999	2	8.7	Protestant	2	8.7
$13,000 - $22,999	8	34.8	Catholic	0	0
$23,000 - $32,000	5	21.7	Jewish	1	4.3
≥ $32,000	3	13.0	LDS	16	69.6
Hours Worked Per Week			Hobbies		
≤ 40	7	30.4	Travel	2	8.7
40	4	17.4	Physically Active	14	60.1
41 - 50	5	21.6	Relaxing	3	13.0
51 - 60	6	26.1	Church	2	8.7
≥ 60	1	4.3	Inactive	2	8.7
Years of Education			Others Involved in Hobbies		
< 8	0	0	Family	15	65.2
8 - 12	9	39.1	Wife	7	30.4
13 - 16	6	26.1	Solo	1	4.3
> 16	8	34.8			
Type of Education			Significant Others Present at Cardiac Class		
High School	7	30.4	Yes	15	65.2
College	4	17.7	No	8	34.8
Technical	6	26.1			
Professional	6	26.1			

subjects who were retired reported the lowest income levels. Eight individuals (34.8%) reported incomes from $13,000 to $23,000 and eight individuals (34.8%) reported incomes in excess of $23,000.

The fifth item on the demographic scale was concerned with the number of hours worked per week. Response selections were as follows: under 40, 40, 41-50, 51-60, and over 60. Interestingly, 30.4% reported working less than 40 hours per week; these were the same subjects who reported 'retired' to Item 3 'occupation.' Four individuals (17.4%) reported a 40-hour work week; five subjects (21.7%) reported 41-50 hour work weeks; six subjects (26.1%) reported 51-60 hour work weeks, and one individual worked in excess of 60 hours per week. Of those individuals characterized as professionals, 63.5% (N = 7) reported work weeks greater than 51 hours.

All subjects had completed elementary education, 39.1% had completed high school only, 60.9% pursued postsecondary education, and 38.4% pursued graduate education. When asked to describe the type of educational program attended, the subjects misconstrued technical versus professional. Some technically skilled individuals answered 'professional training'; 17.5% related technical education, while 52.2% selected college and professional training. This figure does not agree with the categorization of occupation in which 47.8% were classed as professionals.

Fifteen of the subjects (62.5%) were the sole family income providers. Nine of the 15 subjects who described themselves as sole providers of income were heads of families with three or more children. Of the total population, 65.2% had three or more children,

and 26.1% had children under the age of 22. Two men reported children under the age of 12, while four subjects had children under the age of 18. Lastly, 69.6% of the subjects were members of the Church of Jesus Christ of Latter-day Saints; 17.4% reported religious preference as 'other' to be distinguished from Catholic, Protestant, and Jewish religions.

Fourteen subjects (60.1%) reported hobbies which were classified as physically active, that is, golf, bowling, hunting, hiking, and tennis. Seven of the study population reported hobbies which were classified as sedentary and included reading, fishing, and church activities. Subjects reporting physically active hobbies tended to list a greater number of interests than those individuals listing sedentary hobbies. Fifteen subjects (62.5%) stated that hobbies included the family; seven subjects (30.4%) stated that hobbies included only the wife. One individual described hobbies as solitary. Lastly, 15 subjects (62.5%) reported that a relative attended cardiac class and was generally the wife.

Knowledge Test

The knowledge test was scored in such a manner that each correct response was awarded a score of one. The 28-item test had 40 correct responses as some items had two or more answers. The potential score range was 0-40, however, the observed range was narrower. The observed range of scores for the first test in the hospital was 21-37. Thirty-three was the most frequently observed score with eight individuals (34.8%) receiving this score. Scores

of 30 and 32 were each attained by three individuals (13.0%). Scores 34 and 35 were attained by two individuals each (8.7%). All other scores in this range were attained once. The mean score for this administration was computed as 31.56; the standard deviation was computed as 3.53, and the variance was 12.4.

Analysis of test scores for test administration at two weeks' postdischarge revealed a score range of 24 to 37. Two individuals scored 24 points, and a lapse is observed until the score 28. At least one individual attained each score from 28 to 37. The score 31 was most frequently observed as four individuals (17.4%) received this score. Scores of 33, 34, and 36 were attained by three subjects each. Scores for this test were more evenly distributed than for Test 1 and the range was narrower. The mean score for this administration was 32.1; the standard deviation was computed as 3.48; and the variance was 12.1.

The third and final administration of this test occurred at one month postdischarge. Analysis of the test results revealed a score range of 21 to 38. Again, one subject scored 21, and a lapse of scoring was observed until the score of 28. Four subjects (17.4%) attained scores of 34; this was the most frequently observed score. Scores 31, 32, 33, and 36 were attained by three individuals each, while 35 was scored twice. All other scores were attained once. The mean score for this administration was 32.8; the standard deviation was 3.53; and the variance 12.4.

Each individual's scores were averaged and analyzed for range, frequency, mean, standard deviation, and variance. The range

of the average scores was 24 to 36.7. Four individuals averaged the score of 34. The mean score was 32.2; the standard deviation was 3.06; and the variation score was 9.39.

Adherence

The third and last section of the questionnaire dealt with adherence to dietary, smoking, and exercise guidelines after discharge. Section III had three major subsections. The first is concerned with the past habits of the individual in the three areas: diet, smoking, and exercise. The second subsection asks the subject to rate the difficulty of each suggested guideline and to rate the degree to which this guideline is followed. Lastly, the third subsection deals with the subjects' perceptions of the seriousness of the heart attack, the overall difficulty of lifestyle changes following the heart attack, expectation of heart disease before the occurrence of the myocardial infarction, and problems encountered since discharge.

Analysis of past habits revealed that 15 subjects (62.5%) had not followed specific dietary restrictions prior to the myocardial infarction. However, eight individuals (34.8%) had been following dietary regimens. Diets were described as low sodium, low fat, low calorie, and low cholesterol. Three subjects continued such dietary protocol after discharge. The remaining five subjects (21.6%) were requested to change diet to include additional restrictions.

Seventeen (74.0%) of the study group had never smoked and,

subsequently, received no advice from the physician indicating a change in habit. Of the remaining six (26.1%), two individuals related a history of tobacco use in the past, but were not smoking at the time of the hospitalization. The remaining four subjects (17.4%) were smoking at the time of the myocardial infarction and were told by the physician to quit.

Fourteen individuals (60.9%) denied exercising regularly prior to hospitalization. Nine subjects reported regular exercise, including bowling, golf, walking, and tennis. None were involved in a formal exercise program.

Items 2, 3, and 4, on the adherence section, dealt with changes in diet, smoking, and exercise requested by the physician, if any, as well as the difficulty of change and the extent to which advice was followed. For each item--diet, smoking, and exercise--difficulty of change was rated on a 1 to 4 scale such that 1 = least difficulty, and 4 = most difficulty. When the scores were tallied, a range of 3 to 12 could be expected. Likewise, adherence to dietary, smoking, and exercise prescriptions was rated on a scale of 0 to 4; no adherence was equal to 0, while total adherence was equal to 4. Rating was the original scheme of analysis.

In actuality, analysis was complicated by several problems. For instance, 74% of the study population had never smoked; 82.5% were not smoking at the time of the myocardial infarction. Subjects who had not smoked were not advised to change. Usually, nonsmoking is requested. Evaluation of adherence to advice about smoking was awkward. The subjects were not smoking which is desirable in medical

terms, but does not reflect a behavior change. Some of the individuals who had no previous history of smoking and who received no advice from the physician concerning smoking, rated themselves as being totally compliant in not smoking.

Likewise, three subjects who had no previous dietary restrictions received no information concerning dietary habits, yet, gave self-ratings for difficulty of change and adherence for diet. Two individuals who received no guidance as to exercise regimen also gave change and adherence ratings for that particular item.

The investigator felt that the ratings of difficulty of change and adherence must be in respect to some guidelines presented to the patient. Therefore, scoring of these adherence items--diet, smoking, and exercise--was revised accordingly. For diet, smoking, and exercise items, four possible points were available; if no change had been suggested by the physician, no points were given. The total adherence score (or difficulty of change), then, was computed according to the following equation:

$$A = SX$$

A = adherence; S = the number of suggested changes; X = the total rating as given by the subject; SX is a raw score; by converting the raw score to a percentile, a workable value for adherence is obtained. The following equation was used to obtain a percentile score for the adherence rating:

$$A = \frac{X}{4} \times 100.$$

The actual range of scores for adherence, than, is 0 to 100%. The procedure was followed in analyzing results from each of the two administrations of the adherence measure as well as the average scores for these administrations.

For the administration of the adherence measure at two weeks postdischarge, 18 subjects (78.2%) reported that a physician suggested modifications in dietary and exercise habits. The 18 subjects then had possible scores for diffculty of change of 2 to 8, and for adherence, 0 to 8. Two individuals reported modifications in all areas--diet, smoking, and exercise. Therefore, the possible score range for the two subjects was 3 to 12 for difficulty of change, and 0 to 12 for adherence. The three remaining subjects reported that physicians recommended changes in exercise only, and the individuals had a score range of 1 to 4 and 0 to 4 for difficulty of change and adherence, respectively.

The observed range of scores for difficulty of change for the second administration was 1 to 10. The mean score was 4.35, and the standard deviation was 2.40. Adherence scores were converted to percentiles. The range of scores for adherence was 50 to 100%. One individual scored 50%; seven subjects (30.4%) scored 100%, which was the most frequently scored value. Six subjects (26.1%) scored 75%: four subjects (17.4%) scored 87.5%; three individuals (13.0%) scored 62.5%; and one subject each scored 61.5% and 83.3%. The mean score was 81.8%, and the standard deviation was 15.5%).

For the second administration of the adherence measure at four weeks postdischarge, 18 individuals again reported that physicians

suggested modification of dietary and exercise regimen. Likewise, two individuals were asked to modify diet, smoking, and exercise, while the remaining three were asked to change exercise habits only.

The observed range of scores for difficulty of change for the two-week administration was 1 to 8. The mean score was 4.08, and the standard deviation was computed as 1.88. Range of scores for adherence was again 50 to 100%. One individual scored 50% (not the same subject as for the first administration). Analysis of the second set adherence scores revealed that eight individuals (34.8%) scored 87.5%; seven individuals scored 75%, and five subjects (21.6%) scored 100%. One subject each scored 83.3% and 62.5%. The mean for this administration was 76.5%; standard deviation was computed as 25.2%.

Analysis of average scores revealed a score range for difficulty of change as 1 to 8. For the average scores, the mean was computed as 4.21 and standard deviation as 2.14. Average scores for adherence ranged from 56.3 to 100%. The mode was 93.7%, obtained by six subjects (26.1%). Average scores revealed a less densely packed curve than for either of the two administrations. The mean adherence score for the averages was 79.1%; the standard deviation was 20.3%.

Findings Specific to Research Questions

Question 1

Will those individuals with a high level of knowledge demonstrate a greater degree of adherence than those individuals with a lower level of knowledge?

Scores for each knowledge test were assigned to one of two groups--high scores and low scores--in such a manner that two nearly equal groups were formed. Corresponding adherence scores were evaluated using the Pearson product-moment. The procedure was carried out six times in order that the relationship between each of the three knowledge tests and the two adherence scores could be evaluated.

Knowledge Test I had a score range of 21 to 37. Thirteen subjects had scores in the range of 33 to 37, and comprised the high knowledge group for Test I. Ten scores were in the range of 21 to 32, and comprised the low knowledge group for Test I. Pearson product-moment procedure on the data revealed an r value of -.27 ($p > .05$) for the high knowledge group and adherence scores at two weeks postdischarge. Analysis of low knowledge scores and adherence scores at two weeks postdischarge revealed an r value of -.07 ($p > .05$). R values of .11 and -.15 were obtained from analysis of high knowledge and low knowledge scores, respectively, and adherence scores at four weeks postdischarge. There was no relationship between knowledge scores prior to discharge and adherence levels after discharge.

ANOVA procedure was also used to analyze the data to further evaluate differences in group scores. The ANOVA procedure on the data yielded an F ratio of .47 ($p > .05$) for knowledge Test I and adherence scores at two weeks postdischarge. An F ratio of .11 ($p > .05$) was obtained from analysis of knowledge Test I and adherence scores at four weeks postdischarge. Again, no relationship between knowledge scores prior to discharge and postdischarge

adherence levels.

At two weeks postdischarge, knowledge scores ranged from 24 to 37. Twelve individuals scored in the range 33 to 37, inclusively; 11 individuals scored in the range 24 to 32. Analysis of the relationship between high knowledge scores and adherence at two weeks postdischarge revealed an r of .61 ($p < .05$). The r value for the low knowledge group was -.45 ($p > .05$). The r value for the second test and adherence at four weeks postdischarge was computed as .58 ($p < .05$) for the high knowledge group and -.53 ($p > .05$) for the low knowledge group.

ANOVA procedure on the data from two weeks postdischarge (knowledge and adherence scores) revealed an F ratio of 4.52 ($p < .05$). The F ratio for the second knowledge test and adherence scores from four weeks postdischarge was computed as 3.22 ($p > .05$).

Finally, knowledge scores for the third administration at four weeks postdischarge had a range of 21 to 38. Eleven individuals scored in the range 34 to 38; 12 subjects scored in the range 21 to 33. Analysis of the high knowledge scores and two week adherence scores revealed an r of -.10 ($p > .05$); the r value for low knowledge scores and two week adherence scores was -.27 ($p > .05$). Computation of r values for four week adherence scores and high and low scores for the third test revealed $r = .21$ and $r = 51$ ($p > .05$), respectively.

ANOVA calculations for the third knowledge test revealed similar results. The F ratio for the third knowledge test and two week adherence values was .56 ($p > .05$). Analysis of knowledge

Test 3 and adherence scores at four weeks postdischarge, yielded an F ratio of 1.05 ($p > .05$). Table 2 illustrates knowledge scores, adherence scores, and corresponding r values and F ratios.

Question 2

Are there demographic characteristics influencing adherence after myocardial infarction?

Demographic variables on a continuous scale--age, income, education, and family size--were analyzed with respect to adherence scores using the Pearson product-moment. R values calculated for adherence scores at two and four weeks postdischarge, with respect to age, revealed $r = .41$ and $r = .43$ ($p < .05$), respectively. R values for adherence at two and four weeks with respect to income, education, and family size, were low and not statistically significant. Table 2 illustrates the r values.

The relationship between demographic variables and adherence scores was analyzed using ANOVA also. The first step was to dichotomize each demographic variable and was done in a manner that allowed nearly equal numbers in the groups. Item 2, marital status, was not analyzed as 22 of the 23 subjects were married. Likewise, Item 12--others included in hobbies--was not included in the ANOVA calculations as 22 subjects reported participation of wife or family in the hobbies. See Table 3 for dichotomized demographic variables corresponding adherence scores.

The ANOVA procedure was carried out for each of the 11 dichotomized variables and adherence scores at two and four weeks

Table 2

Correlation of Major Study Variables

	T_1	T_2	T_3	A_1	A_2	Age	Income	Education	Family Size
T_1	x	.50*	.57*	-.19	-.12	-.31	-.16	.10	.02
T_2		x	.87*	-.34	-.30	-.16	.08	.01	.28
T_3			x	-.27	.04	-.22	.22	.04	.28
A_1				x	.61	.41*	.12	.18	-.19
A_2					x	.43*	-.08	.04	-.12
Age						x			
Income							x		
Education								x	
Family Size									x

*($p < .05$)

Table 3

Knowledge Scores and Adherence Scores

Test Administration I						Test Administration II						Test Administration III					
High Knowledge			Low Knowledge			High Knowledge			Low Knowledge			High Knowledge			Low Knowledge		
K_1	A_1	A_2	K_1	A_1	A_2	K_2	A_1	A_2	K_2	A_1	A_2	K_3	A_1	A_2	K_3	A_1	A_3
33	62.5	50.0	21	83.3	83.3	33	50.0	75.0	24	100.0	87.5	34	75.0	75.0	21	87.5	100.0
33	75.0	75.0	26	87.5	87.5	33	62.5	62.5	24	87.5	100.0	34	75.0	75.0	28	100.0	87.5
33	75.0	75.0	27	87.5	100.0	33	87.5	87.5	28	100.0	100.0	34	87.5	87.5	30	100.0	87.5
33	75.0	87.5	27	100.0	87.5	34	62.5	62.5	29	100.0	87.5	34	100.0	87.5	31	50.0	75.0
33	87.5	87.5	30	50.0	100.0	34	75.0	75.0	30	100.0	100.0	35	62.5	75.0	31	100.0	100.0
33	87.5	75.0	30	75.0	75.0	34	75.0	75.0	31	75.0	75.0	35	75.0	75.0	31	100.0	100.0
33	100.0	87.5	30	100.0	100.0	35	75.0	75.0	31	75.0	87.5	36	62.5	75.0	32	83.3	82.3
33	100.0	100.0	32	62.5	62.5	35	75.0	87.5	31	83.3	83.3	36	75.0	75.0	32	87.5	87.5
34	66.6	75.0	32	100.0	87.5	36	62.5	75.0	31	100.0	87.5	36	100.0	100.0	32	100.0	87.5
34	75.0	75.0	32	100.0	87.5	36	87.5	100.0	32	66.6	75.0	37	87.5	100.0	33	62.5	62.5
35	62.5	75.0				36	100.0	100.0	32	87.5	87.5	38	75.0	87.5	33	66.6	83.3
35	87.5	100.0				37	100.0	87.5							33	7.50	87.5
37	75.0	87.5															

Key: K_1 = Knowledge, Test I
K_2 = Knowledge, Test II
K_3 = Knowledge, Test III
A_1 = Adherence score at two weeks postdischarge
A_2 = Adherence score at four weeks postdischarge

dichotomized variables and adherence scores at two and four weeks postdischarge. F ratios for the following characteristics were not significant ($p > .05$) at two nor at four weeks postdischarge: age, occupation, income, hours worked per week, years of education, sole provider of income, religion, family size, and presence of significant others at cardiac class.

The demographic characteristic 'hobbies' was dichotomized in such a manner that 14 individuals were placed in a group whose hobbies were described as physically active. Such hobbies were: golf, bowling, tennis, skiing, and walking. The remaining nine individuals described more sedentary activities such as reading, church activities, travel, and gardening. Analysis of the adherence scores at two weeks postdischarge for these groups revealed an F ratio of 2.33 ($p > .05$). However, analysis of adherence scores for each group at four weeks postdischarge revealed an F ratio of 4.93 ($p < .05$). Table 4 illustrates the complete analyzed results of adherence and demographic variables.

Question 3

Are there demographic characteristics influencing the level of knowledge obtained by an individual following myocardial infarction?

Again, demographic variables on a continuous scale--age, income, education, and family size--were analyzed with respect to knowledge scores using the Pearson product-moment. No statistically significant relationships were found ($p > .05$), though there was a

Table 4

F Ratios, Demographic Data, and Adherence Scores

Variables	*F* Ratio	
	A_1	A_2
Age	1.09	1.42
Occupation	.08	.04
Income	.27	.22
Hours Worked Per Week	1.43	1.18
Education	.69	.62
Type of Education	4.14	1.36
Sole Provider of Income	.16	.26
Religion	.12	.87
Family Size	2.28	.55
Hobbies	2.35	4.93*
Significant Others at Class	.03	.43

*($p < .05$)

weak negative correlation between age and knowledge scores and a weak positive relationship between family size and knowledge scores at two and at four weeks postdischarge. The r values can be found in Table 2.

The relationship between knowledge scores and demographic data was analyzed using ANOVA also. As with Question 2, all demographic variables were dichotomized with the exception of marital status and others included in hobbies.

The ANOVA procedure was carried out for each of the 11 dichotomized variables and each of the three knowledge test scores. Analysis of each set of test scores revealed F ratios which were not significant ($p > .05$) for the following demographic categories: occupation, income, hours worked per week, years of education, type of education, sole provider of income, religion, hobbies, and presence of others at cardiac class. Table 5 illustrates the complete analyzed results of demographic characteristics and knowledge tests.

Two demographic variables were found to be statistically significant: age and family size. The demographic variable of age was dichotomized in such a manner that 13 individuals, 65 or under, and 10 individuals over 65, were placed in groups. Analysis of test scores from the first administration of each group revealed an F ratio of 6.99 ($p < .05$). Analysis of test scores for each group at two weeks postdischarge, yielded an F ratio of 3.29 ($p > .05$). However, analysis of test scores from four weeks postdischarge yielded an F ratio of 5.35 ($p < .05$). Thus, age appeared to be related to the level of knowledge obtained. The mean score for all test

Table 5

F Ratios, Demographic Data, and Knowledge Test Scores

Variables	*F* Ratio		
	K_1	K_2	K_3
Age	6.99*	3.29	5.35*
Occupation	3.98	.78	.05
Income	1.50	.002	.08
Hours Worked Per Week	1.83	.24	1.30
Education	.73	.23	.17
Type of Education	.37	.18	.004
Sole Provider of Income	.09	.06	.14
Religion	2.14	.25	.06
Family Size	.19	5.14*	5.48*
Hobbies	.73	1.54	2.30
Significant Others at Class	.18	.06	.06

*($p < .05$)

administrations for the group of individuals 65 and under was 33.5, while the mean for the group of individuals over 65 was 30.4.

The demographic variable family size was dichotomized such that the 11 subjects with three or fewer children comprised one group and the 12 subjects with four or more children were assigned to a second group. Analysis of the test scores from the predischarge administration yielded an F ratio of .19 ($p > .05$). ANOVA procedure on the knowledge scores for the two groups at two and at four weeks postdischarge, revealed F ratios of 5.14 and 5.48 ($p < .05$), respectively. Thus, family size appears to influence knowledge levels attained. The mean score for all test administrations for those in the group with three or fewer children was 31; while the mean score for all test administrations for those subjects with four or more children was 32.2.

Question 4

Is there a change in knowledge over time?

Each set of test scores was compared with the other sets by utilizing the correlation coefficient. The test scores from two and four weeks postdischarge had a highly positive correlation, thus there was little change from two to four weeks in knowledge levels ($r = 0.87$). Test 1 administered before discharge had a moderate positive correlation with both Tests 2 and 3 ($r = 0.50$ and $r = 0.57$), respectively. These data imply that there was a change in knowledge levels before and after discharge, but that the scores after discharge were consistent ($p < .05$).

Other Research Findings

The final section of the adherence measure dealt with the subjects' perceptions. Item 5 perceived seriousness of the heart attack, was scored on a 1 to 4 scale (1 = low seriousness; 4 = high seriousness). At two weeks postdischarge, six subjects (26.1%) ranked the heart attack as 1; 10 subjects (43.5%) ranked the heart attack as 2; one individual ranked the heart attack as 3; and lastly, six subjects (26.1%) ranked the heart attack as 4. At four weeks postdischarge, five subjects ranked the heart attack as 1; again, 10 subjects (43.5%) gave a rank of 2, and one gave a rank of 3; the remaining seven (30.4%) ranked the heart attack as 4.

Item 6, degree of change and effect on lifestyle, was rated on the same 1 to 4 scale. At two weeks postdischarge, five individuals (21.6%) felt the changes were minimal and ranked changes as 1; eight individuals (34.8%) gave a rank of 2; six subjects (26.1%) ranked change as 3, and the remaining four subjects (17.4%) felt that the changes were severe and ranked change as 4. At four weeks postdischarge, seven subjects (30.4%) reported change as 1; seven subjects (30.4%) also ranked change as 2; six individuals (26.1%) felt changes to be more severe and ranked them as 3, and the remaining three individuals (13.0%) rated changes as 4.

Item 7 dealt with expectation of the heart attack prior to its occurrence. Seventeen subjects (73.8%) felt that they were not prone to heart attack before. These individuals sited family history, angina, and stress as reasons for this expectation. There was no change in this figure of expectation from two to four weeks

postdischarge.

Finally, Item 8 dealt with problems experienced by the patient or family since discharge. At two weeks postdischrage, 10 subjects (43.5%) denied problems; 13 (56.6%) reported problems. At four weeks postdischarge, 16 individuals (69.5%) denied problems; while seven of their peers reported continuing problems. Problems related were finances, decision to retire prematurely, and the family interactional difficulties. Table 6 illustrates the frequency distribution for data in Items 6, 7, and 8.

In order to analyze the significance of variation of the responses to the last four items at two and four weeks postdischrage, the Chi-square procedure was done. Item 7, expectation of heart attack, was not analyzed as there was no variation in response proportions from two and four weeks postdischarge.

Chi-square procedure on Item 5 perceived seriousness of the heart attack revealed a value of .09 ($p > .05$). Likewise, Item 6, degree of change and effect on lifestyle, when analyzed using Chi-square, yielded a value of .52 ($p > .05$). Lastly, Item 8, problems after heart attack, yielded a value of 3.18 ($p > .05$).

Summary of Research Findings

When analyzing the relationship between knowledge and adherence, a significant value was obtained for knowledge and adherence scores at two weeks postdischarge ($p < .05$). When adherence scores were analyzed with reference to demographic data, there was a weak positive correlation with age ($p < .05$). ANOVA calculations

Table 6

Patient Perceptions of Illness

Two Weeks			Four Weeks		
Score	Frequency	Percentage	Score	Frequency	Percentage
		Perceived Seriousness of Heart Attack			
1	6	26.1	1	5	21.6
2	10	43.5	2	10	43.5
3	1	4.3	3	1	4.3
4	6	26.1	4	7	30.4
		Degree of Change and Effect on Lifestyle			
1	5	21.7	1	7	30.4
2	8	34.7	2	7	30.4
3	6	26.1	3	6	26.1
4	4	17.4	4	3	13.0
		Problems After Heart Attack			
0	10	43.5	0	16	69.5
1	13	56.5	1	7	30.4

for adherence in relation to demographic data revealed a statistically significant relationship ($p > .05$) between hobbies and the reported adherence measures. Knowledge levels had a weak negative correlation with age and a weak positive correlation with family size ($p > .05$). ANOVA calculations for knowledge and demographic data revealed significant relationships between age and knowledge levels and family size and knowledge ($p < .05$).

Analysis of test scores of all three administrations indicated that postdischarge test scores were consistent and did not change over the time of observation. However, scores did change somewhat from the predischarge to the postdischarge period.

The majority of subjects reported that the myocardial infarction was of low rather than high seriousness. Likewise, most individuals reported low degree of effect on lifestyle of the requested discharge changes. Seventeen subjects (73.9%) of the study population did not expect heart disease prior to the myocardial infarction. Lastly, most individuals denied specific problems following the myocardial infarction, and the number reporting specific problems decreased during the time of the observation.

CHAPTER VI

DISCUSSION

The basic characteristics of this study population, as described under demographic data, are not dissimilar from the general population of Salt Lake City, Utah. Twenty-three males, between the ages of 42 to 79, comprised the study population. Twenty-two were married and one was separated from the spouse. Latter-day Saint Church members comprised 69.9% of the population. Also, the population had characteristics similar to those ascribed to the Type A personality. Of the total group, 52.1% worked in excess of 40 hours per week; 69.3% had pursued education beyond the secondary level; and 65.2% were the sole income providers for their families. While 17 subjects (73.9%) did not perceive themselves as being susceptible to heart disease prior to the myocardial infarction, six individuals (26.1%) related fears of susceptibility because of positive family history for heart disease.

A brief review of the Health Beliefs Model is helpful before further discussion of findings. This model proposes four steps through which the individual progresses in adaptation to disease and in prevention of secondary risk or recurrence of the disease. At each step, one has the option of accepting the threat to self and modifying behaviors or rejecting the threat and persisting in risk

behaviors. The steps are: (1) perceived susceptibility to a disease state, (2) severity of the threat of the disease state, (3) perceived benefit of proposed health actions, and (4) perception of the lifestyle changes which will result from the suggested health actions.

The data obtained from this study were focused primarily on three factors within this scheme. The first of these factors is the actual relationship of education and adherence. The figure illustrates the choices of related pathways of the steps in the model. The pathways imply that once education is chosen, compliance will ensue. A more subtle implication is that the individual has played an active role in the decision to seek education, has considered various alternatives as illustrated in the figure, and is motivated. Quite likely, compliance will follow such efforts.

The first research question of the study dealt with the relationship between knowledge and adherence. Pearson product-moment calculations, comparing adherence scores of individuals with high and low knowledge scores, revealed a high correlation between knowledge and adherence at two weeks postdischarge. For the high knowledge group, the relationship was positive, while for the low knowledge group, the relationship was negatively correlated. Relationships between the remaining knowledge tests and the adherence scores were weakly correlated except for the relationship between the low knowledge group of Test 3 and the four week adherence scores. The ANOVA calculations for the high and low knowledge groups revealed a statistically significant ($p < .05$ relationship for

knowledge and adherence scores at two weeks postdischarge. Also, knowledge and adherence scores from four weeks postdischarge may be of practical significance. At two weeks postdischarge, the low knowledge group had a higher mean adherence score which was the opposite of what was expected. In light of the fact that this is the only significant result of all the tests, it may be a spurious result. However, two weeks postdischarge may be a time of high adherence due to other factors such as lack of well-being, limited activity, and uncertainties as to what activities or restrictions to follow. The Health Belief Model has been tested for consistency, thus, the question remains as to why there is not a significant relationship between knowledge and adherence in this study.

Methodological reasons could be cited. The sample size is small; the subjects did not attend all five of the classes and thus, may not have been familiar with all the subject areas covered by the questions. Yet, there seem to be other factors affecting the relationship. Consider the Health Belief Model, the person within the scheme weighs options, makes a decision, and pursues the chosen option. The subjects in this study were referred to the classes. Though they did have the ultimate choice of attending each session, consider how many attended because of encouragement from physician and nurses. How quickly the individual internalizes the threat to self is unclear; the rate of progress through the steps of the Health Belief Model or the sick role is also unclear. Though the subjects attended classes, subjects might not have been at the point of readiness for learning. Additionally, the subjects were

exposed to education at a time when, still hospitalized, they could not weigh the benefits of proposed health actions or the impact of lifestyle changes suggested after myocardial infarction. Timing of the educational intervention is a factor affecting the relationship between knowledge levels and adherence. A third psychosocial consideration is whether individuals within the first month postdischarge are feeling well enough mentally and physically to objectively judge the impact of proposed lifestyle changes. At this point, can lack of physical well-being and the fears of other family members act to reinforce limitations imposed and thus increase adherence? Consider what would happen to the relationship between knowledge and adherence if the subjects were followed until they returned to work. Adherence may fall.

That the subjects learned or had information reinforced by attendance at the cardiac class is beyond doubt. All subjects scored over 50% on all tests administrations. Over half of the subjects scored 80% or better on all test administrations. Adherence scores on the self-report tool were also 50% or better for both administrations of that tool. Literature in this area indicates that though knowledge aids patients in compliance, a factor of greater importance appears to be a high degree of contact between the patient and health professionals; this is especially true when the contact continues after discharge. Kasl (1975) felt that patient motivation was a very important component in tying knowledge to compliance. Burt et al. (1973), however, found that professionals can artificially increase motivation and, hence, adherence by aggressive treatment which

included reinforcing knowledge, reinforcing guidelines, providing written information and follow-up in clinics and at home. Similarly, Pozen et al. (1977) found that those individuals seen every day during hospitalization by a nurse rehabilitator and followed after discharge, returned to work earlier and decreased smoking significantly.

The second factor of the Health Belief Model focused on in this study was perception of lifestyle changes following myocardial infarction. This is the last of the four steps of the model. As will be recalled for each of the three areas--diet, smoking, and exercise--the subject was asked if change was suggested, to rate the difficulty of this chagne and to rate the degree to which this advice was followed. Additionally, each subject rated, on a 1 to 4 scale, the degree of severity of all lifestyle changes imposed after myocardial infarction. The mean score for severity of all lifestyle changes was 2.4; these scores had a very low correlation with adherence scores ($\underline{r}$ = -.08).

Considering the perceived difficulty of change for the measured variables--diet, exercise, and smoking--there was a range of scores of 1 to 10. Eighteen individuals had two changes suggested at discharge, two subjects reported advice to change habits in all three areas, and two subjects only changed exercise habits. The correlation between these total scores for difficulty of change and total adherence score was low ($\underline{r}$ = .35) for the administration at two weeks postdischarge and low again at four weeks postdischarge ($\underline{r}$ = .41). Hence, there is a slight positive correlation between difficulty of change scores and adherence. However, consideration

of total scores for these parameters is misleading as it may mask significant relationships of these variables for the individual parameters of diet, smoking, and exercise. It follows then that the analysis of total scores only may mask changing risk behaviors in one of the areas of diet, smoking, and exercise.

Only four individuals in the study population were smoking at the time of the myocardial infarction. All were told distinctly by physicians to quit smoking. Of the four subjects, two reported difficulty scores of 4 (most difficult), and gave self-ratings for adherence as 1 to 2 (less than half the time). The remaining two reported difficulty scores of 2--'not too difficult'; these subjects rated adherence as 3 or 'most of the time.' None of these subjects reported that they had quit smoking by one month postdischarge. As smoking is highly implicated in the secondary risk of recurrent myocardial infarction, the advice given to patients is precise--quit, not cut down on numbers smoked. This information is presented in cardiac class, it is present in written materials given to the patients prior to discharge, and reinforced by the physicians. One is hesitant to state that these individuals are resistent to education, but they are resistent to changing smoking habits. It may be that other stresses present at this time complicate the effort to stop smoking. Obvious stresses are unemployment, altered self-image, fears of impending death, and so forth.

The second parameter examined in the postdischarge period is exercise. In cardiac class and in the written booklet, information is provided about measuring activity in mets or the amount of

oxygen consumption with various activities. Patients are counselled to gradually increase exercise and thus activity tolerance. Most subjects reported advice given about their particular exercise scheme as vague and including guidelines such as 'take it easy,' 'don't over do it,' 'don't tire yourself.' Though the majority of subjects reportedly received such vague guidelines, only two individuals reported this behavior change as 'very difficult' at two weeks postdischarge and only one felt that this exercise advice was 'very difficult' to follow at four weeks postdischarge. Most subjects reported that exercise guidelines were a moderately difficult change, yet, all stated that they followed the advice half of the time or better. At one month postdischarge, 20 subjects (86.0%) stated that they followed this advice 'most of the time.' Adherence ratings for exercise were not significantly different for those who stated that they exercised regularly before myocardial infarction and those who denied preinfarction exercise habits.

At one month postdischarge, individuals with uncomplicated myocardial infarction are generally exercising regularly in the form of daily walking. If it is presumed that these subjects are following a similar activity plan, it may be assumed that they perceive the benefits of regular exercise as helpful and are adhering to such advice. On the other hand, though these individuals may be engaged in regular low-grade exercise at this time, most have not yet returned to work. Thus, walking may provide a welcome diversion in the daily routine and a chance to leave the house and the family.

The third adherence item examined in this study is diet. Eight individuals had been on low sodium and/or low cholesterol diets prior to the myocardial infarction. Five of these subjects were given additional dietary restrictions following hospitalization. An additional three subjects who were not following specific dietary prescriptions prior to hospitalization were given no dietary advice at discharge. All of the subjects given advice concerning dietary modifications reported that this change was of little or no difficulty. There was one exception and this subject perceived dietary controls as being of moderate difficulty. However, without exception, all subjects reported following this advice most or all of the time.

Dietary advice was reported as reducing sodium and cholesterol intake in most cases. Only one subject was on a reducing diet and had been on this diet prior to the myocardial infarction. It appeared that subjects did not find these dietary controls to be unacceptable and, hence, changed their eating habits. Also, one must consider the clarity of the advice given and the fact that in most situations, the wife is preparing the food. The subject may not be actively choosing the foods eaten; appetite may be limited by limited activity. It is of interest to consider if this high level of adherence will persist when the subjects return to work and other outside activities.

In summary, when analyzing the relationship between difficulty of change and adherence for the individual factors, it appears that as difficulty increases, adherence decreases. Other extraneous

factors decrease the directness of this relationship. The first of these factors is the clarity of the advice received by the subject. The second is the degree of direct family involvement in the particular habit.

Man does not live in an isolated community, stimuli constantly barrage the organism. Even personal characteristics act as stimuli which influence individual reactions to situations. Every individual reacts differently to the illness phenomenon. Each progresses through the steps of the Health Beliefs Model in a unique manner. Thus, the outcome of the option within the model are individualized and are, themselves, affected by individual phenomena. The second and third research questions of the study dealt with the relationship between demographic characteristics and knowledge levels attained postmyocardial infarction and the relationship between demographic characteristics and adherence. Of the 13 demographic variables examined in the study, the four continuous variables--age, income, education, and family size--were analyzed with relation to knowledge and adherence using the Pearson product-moment. Age was found to have a weak negative correlation with knowledge ($p > .05$), while family size was found to have a weak positive correlation with postdischarge test scores ($p > .05$). Age also had a statistically significant ($p < .05$) and positive correlation with adherence.

Of the 13 demographic variables, 11 were analyzed with regard to knowledge test scores utilizing the ANOVA calculations. Only two of the variables were found to have a statistically

significant relationship ($p < .05$) in terms of test scores. While nine demographic variables were found to not have a statistically significant affect on test scores, it is possible that a practical significance exists for factors such as occupation, income, and hobbies.

It may be that the small sample size contributed to insignificant findings in these areas. Also, it is important to note that the cluster of factors income, educational background, and occupation did not appear to have a significant influence on attained knowledge scores. Health providers should be cautious in presuming that the more highly educated individual is skilled in self-care and knowledge necessary for successful rehabilitation following myocardial infarction.

The first demographic variable found to be related to attained knowledge levels was age. The weak negative correlation indicated that as age increased, knowledge decreased. For ANOVA calculations, age was dichotomized such that there was a group of 13 subjects 65 years of age or under and a group of 10 subjects over the age of 65. The mean score for the knowledge test increased from the first to the third administrations of the test for both groups. Mean scores were higher for all three administrations for the group of subjects 65 years of age or under. ANOVA calculations for these data indicated that the variation in tests scores was influenced significantly by the age variable.

In light of the fact that the older group had had lower test scores, it is tempting to speculate that there is a correlation

between knowledge levels attained and increasing age such that knowledge levels decrease as age increases. Reasons for the lower test scores of the older individuals in the study may be attributed to other factors. The aged may have less experience taking this type of test. Slower processing time and diminished sensory perceptions may impair test taking abilities. Whichever may be the case, age is an important variable and warrants further study. The incidence of myocardial infarction increases with increasing age, thus providing a substantial number of older individuals in the heart disease population who may be in need of increased educational and follow-up activities.

The second demographic variable which appears to be related to knowledge levels, is family size. The relationship between knowledge and family size is intriguing. Tests scores and family size have a weak positive correlation postdischarge. The study population was dichotomized such that 11 subjects who had three or fewer children were placed in the first group and the remaining 12 subjects with four or more children were assigned to the second group. There was no significant difference between test scores for the first test administration which took place prior to discharge from the hospital. However, test scores for the two groups differed significantly at two and at four weeks postdischarge. Mean scores for the groups revealed that the group with four or more children scored higher than those individuals with three or fewer children. Possibly, the subject with a large family may feel added pressure to recuperate, return to work, and family reponsibilities, thus education may be

interpreted as a means to expedite recovery.

Aside from the possibility that subjects with large families may be more responsive to cardiac teaching due to personality or responsibilities, there is yet another point to consider. In the hospital test scores were not significantly different for the groups. However, scores after discharge were significantly different. It may be that for the individuals with large families, there was more family input to fill out the questionnaire. Also, there may have been increased effort of the family to learn as a group those things which were important for the fathers' recuperation, such efforts could increase the subjects' knowledge base.

Family size does not appear to be related to adherence. When adherence scores were analyzed, using the Pearson product-moment, age was found to have a statistically significant (p .05 correlation to adherence. Using ANOVA calculations, the aged were found to have higher mean adherence scores, but the higher scores were not statistically significant ($p > .05$). Analysis with ANOVA computation revealed only one demographic characteristic to have a significant ($p < .05$) influence on adherence--hobbies.

That aged individuals had higher adherence scores could be attributed to many factors. The aged may be more trusting and/or dependent on the physician's orders. The aged may have slower recuperative phase or less of a state of well-being and so adherence, particularly to activity, would appear higher. Finally, the aged individual may reside with younger family members who reinforce physicians' orders, prepare meals according to the discharge regime,

and leave little choice to the actual patient.

All subjects rated themselves as 50% or over for total adherence. The data may be skewed from that obtained from a general population due to several factors. First of all, few subjects in the study population smoke, and smoking is one of the most difficult habits to change. Second, only three variables were examined in the study, though other restrictions may have been imposed on the subject's lifestyle. A third factor is that adherence was rated on a self-report tool and analysis assumes respondent objectivity. Lastly, adherence was measured early in recuperation when lifestyle and activity have not really returned to normal levels. For instance, occupation is a subtle demographic characteristic and during early recuperation, it may exert only a passive influence on adherence behaviors. Such may not be the case once the individual returns to work.

The case of 'hobbies' and the significant relationship with adherence is an interesting parallel. The study population was dichotomized into two groups such that the 14 individuals who reported physically active hobbies were placed in one group. Nine remaining subjects described sedentary leisure pursuits and were placed in the second group. At two weeks postdischarge, there was no significant difference in reported adherence scores for the two groups. However, at four weeks postdischarge, the difference in scores was significant ($p < .05$). In both cases (two and four weeks), the individuals reporting sedentary hobbies exhibited higher mean scores for adherence than those with physically active hobbies.

Ten individuals with physically active hobbies reported that at four weeks postdischarge, they were following the activity guidelines most of the time; five individuals with sedentary hobbies reported following the guidelines all of the time. At four week postdischarge, activities are still relatively low-keyed. Individuals who reported hobbies classified as physically active generally reported a variety of hobbies. It may be that such individuals quickly become bored with limited activity and unemployment. The wide diversity of activities may be another reflection of Type A personality and the need to satisfy a higher degree of mental and physical alertness.

A final item on the questionnaire was that of problems encountered by the subject and family after discharge. The investigator hoped that answers to this item might help to identify problem areas on which health educators should focus greater attention. At two weeks postdischarge, 13 individuals related problems. Finances, decisions to retire, family interactions, depression, and uncertainty about activity limitations were problems cited. At four weeks postdischarge, six individuals reported continuing problems in all areas mentioned above except depression. Obviously, some of the areas cannot be dealt with in a didactic manner. Problems encountered, such as finances, depression, decisions to retire are examples; these problems do lend themselves to anticipatory guidence, group therapy, and other methods of postdischarge follow-up.

Summary of Discussion

Only one significant relationship was found between knowledge

levels and self-rated adherence scores, one wonders about a practical relationship. Analysis of test scores at two weeks postdischarge revealed statistically significant (p .05) r values and F ratios. It is possible that with a larger sample size, the relationship would consistently be statistically significant. Also, it is interesting to consider the manner in which guidelines given the subjects gradually change through the course of recuperation (as reported by the subjects) and the effect of the changing guidelines on the relationship between knowledge and adherence. The changing guidelines are of particular interest in this case since there was no ongoing education at a formal level.

Knowledge levels changed from predischarge to postdischarge measurements, but were consistent for the two postdischarge measurements. There is no guarantee that knowledge levels will remain unchanged as recuperation progresses.

Demographic characteristics found to influence attained knowledge levels were age and family size. Factors influencing adherence were hobbies and age. Possibly, other activity-related variables would have an influence on adherence at a latter period of time--for instance, occupation. With a larger sample size, it may be possible to find other demographic characteristics which were important to learning and adherence.

Limitations

Many of the limitations of this study have been previously mentioned. First and foremost, is the small sample size which was

due to time and financial constraints of the investigator. Second, is the short-term follow-up of the subjects; there may have been demographic characteristics affecting adherence as subjects returned to normal daily activities and to jobs. Thirdly, is the use of a self-report tool for adherence which may have skewed observed adherence scores. Lastly, only three variables were examined to measure adherence and one of those variables--smoking--occurred less in this population than in the general population.

CHAPTER VII

IMPLICATIONS

Nursing Implications

Because of nursing's inherent role in patient education and the large number of patients experiencing myocardial infarction each year, the implications for nursing are profound. Nurses are involved in education of the myocardial infarction patient during hospitalization and after discharge, though the degree of this involvement is not at maximal levels.

Though few statistically significant relationships are revealed in this study, practical or clinically significant relationships may exist between the major variables of the study. If the nurse approaches health education from the Health Belief's Model framework, there exist many opportunities for patient education which must continue until education is conclusively proven to be of no benefit to the patient population. Additionally, the nurse is valuable in objectively guiding the patient through the adjustment to illness. In this manner, the patient can objectively weigh the options of changing risk behaviors and can approach education with a readiness to learn. Nursing guidance in these areas then may lead to increased patient compliance. Literature supports the value of prolonged patient education postmyocardial infarction and

increased contact between the patient and health care professionals may increase compliance and expedite return to normal activities.

From the study, it appears that there may be an effect of age on attained knowledge levels. Incidence of myocardial infarction increases with age. The aged are also prone to depression, poor eating habits, and reluctance to change life-long habits. This group of individuals represents a greater challenge for nursing. If such individuals are to decrease secondary risk, they need added attention from nursing in terms of education, written activity, diet and medication guidelines, and follow-up after discharge since education alone does not appear to increase patient adherence.

Nurses can make a valuable contribution to cardiac rehabilitation by organizing, managing, and evaluating in-hospital teaching programs for all myocardial infarction patients. Cardiac education cannot be merely didactic, but should provide time for the patient and family to ask questions, voice concerns, and receive anticipatory guidance. Written material, simply but clearly detailing the patient's specific discharge orders, is necessary. The Family Nurse Practitioner with a background of caring for myocardial infarction patients is well qualified to provide guidance, explanations, postdischarge phone contact, and follow-up as well as managing postdischarge education.

The second characteristic that appears to effect patient knowledge levels is family size. A good nursing history can identify the patients who may be subject to added pressures due to a large family and increased financial responsibilities. Patients with

large families are in need of much anticipatory guidance to aid dealing with financial, career, and family problems. Follow-up is very important to assess coping, resolution of postdischarge difficulties, and the need of social services such as vocational rehabilitation in the event that the occurrence of the myocardial infarction poses a threat to job and financial security. The occurrence of the myocardial infarction has profound effects on the entire family unit. Each family member, but particularly spouses, have need of anticipatory guidance and counseling. The spouse may have worries and concerns equal in severity to the concerns of the patient. Nurses can be instrumental in organizing activities for spouses and other family members.

If increased knowledge levels in subjects with large families are a manifestation of Type A behavior patterns, then the drive to return to work and/or conquer the disease could be detrimental to the well-being of the patient and should be explored and analyzed with the patient and family. Such individuals may benefit from learning relaxation techniques. Likewise, the individuals whose adherence patterns were affected by preference for physically active hobbies, may also benefit from relaxation techniques as well as enrollment in a formal graded exercise program.

The major implication for nursing is to motivate its wealth of manpower to organize in-hospital and postdischarge group sessions for patients and families, to organize graded exercise programs, inform families of community services, and provide and evaluate written booklets, articles, and to provide other means of effective

follow-up for myocardial infarction.

Recommendations for Further Research

Due to the scope of this problem, the areas for further research are many. All variables assessed in this study could be re-evaluated utilizing a larger population. Adherence should be explored with a more objective tool. This is of great importance since adherence is directly tied to decreasing secondary risk by diminishing risk behaviors. It follows that the variables affecting adherence need to be delineated to a greater degree. Thirdly, the use of continuing postdischarge education in terms of increasing compliance needs to be explored more fully.

Individuals of older ages should be investigated in terms of learning and coping needs following myocardial infarction. Not only do myocardial infarctions occur more frequently in the aged, but aged individuals are subjected to a wider gamut of problems than are younger peers, not the least of which is loss of significant others. A second group needing further study, based on these results, are those individuals who have a large family and thus greater financial responsibilities.

Lastly, further research into the use of programmed activity and exercise plans to divert high energy levels of Type A individuals, is necessary. It would also be of benefit to examine the effects of premature retirement, patient's perceptions of secondary risk, and possibly impending death and effects on adherence. In general, research of the value of using intensive re-education of health

behaviors to diminish secondary risk postmyocardial infarction is necessary.

APPENDIX A

QUESTIONNAIRE, FORM I

Please choose the most appropriate answer(s) and circle it.

1. The heart is a:

   a. muscle
   b. tendon
   c. ligament

2. There are:

   a. 2 chambers in the heart
   b. 6 chambers in the heart
   c. 3 chambers in the heart
   d. 4 chambers in the heart

3. The function of the heart is to:

   a. circulate the blood throughout the body
   b. clean blood of impurities
   c. to help maintain balance

4. Coronary blood vessels:

   a. bring blood from the lungs to the heart
   b. bring carbon dioxide to the heart
   c. bring oxygen to the heart muscle
   d. direct blood from one chamber of the heart to another

5. Coronary heart disease is:

   a. complete blockage of blood flow to the heart muscle
   b. a narrowing of the passageway for blood flow to the heart muscle
   c. a narrowing of the passage of blood going to the lungs

6. A heart attack is:

   a. insufficient blood supply to the heart muscle due to a narrowing of the blood vessels serving the heart
   b. a blockage of one or more of the chambers of the heart
   c. failure of the heart to work

7. The damage of a heart attack is due to:

   a. too much fat in the blood
   b. too little blood in the heart muscle
   c. too little blood going into the heart chambers
   d. a clot in a blood vessel going to the heart

8. The pain involved in a heart attack is from:

   a. heart irritability
   b. too little oxygen getting to the heart muscle
   c. too little blood in the heart chambers
   d. damaged heart muscle

9. The pain of angina is due to:

   a. temporary lack of oxygen to the heart muscle
   b. permanent damage to the heart muscle
   c. cholesterol build-up in the blood vessels of the heart

10. The healing of the heart following a heart attack is:

    a. never complete, leaving a 'soft spot'
    b. totally complete, leaving no trace of damage
    c. leaves a scar but is not complete

11. The chances of a new heart attack:

    a. decrease markedly over your first few days in the hospital
    b. can be influenced by the things you learn about your heart
    c. are increased by a calm atmosphere

12. The following is a list of factors to which many of us are exposed: If a factor contributes to heart disease, circle the word "yes"; if the factor does not contribute to heart disease, circle the word "no."

Yes	No	Smoking
Yes	No	Lack of exercise
Yes	No	Diabetes
Yes	No	Underweight
Yes	No	Passive personality
Yes	No	Low cholesterol diet
Yes	No	Family history
Yes	No	High blood pressure
Yes	No	Increasing age
Yes	No	Occupation

13. A progressive exercise program after a heart attack is important in order to:

    a. safely maintain body weight
    b. safely reach a productive level of activity
    c. speed the development of collaterol circulation

14. A restrictive diet after a heart attack is important to:

    a. reduce or stabilize body weight

b. assure adequate nutrition
c. place a greater workload on the heart

15. It is important to reduce risk factors in order to:

a. maintain a good level of activity
b. return to work as soon as possible
c. reduce the chance of having another heart attack

Mark the following statements as True or False.

16. T __ F __ After a heart attack, one should stay in bed for two or three weeks.

17. T ___ F ___ After a heart attack, one may not return to previous levels of activity.

18. T ___ F ___ After a heart attack, one's sex life must be reduced.

19. T ___ F ___ By gradually increasing activity in the six months following a heart attack, one can regain previous levels of fitness.

20. T ___ F ___ Probably too much activity causes heart attack.

21. T ___ F ___ It is important for the healing process that activity is gradually increased.

22. T ___ F ___ Too much animal fat in the diet contributes to high cholesterol levels and heart disease.

23. T ___ F ___ As a rule, salt is bad for your heart.

24. T ___ F ___ I won't be able to eat rich foods again.

25. T ___ F ___ Even an occasional cocktail is bad for the heart.

26. T ___ F ___ If you have smoked for a long time, quitting now will not help.

27. T ___ F ___ Smoking has definite psychological and physical side effects.

28. T ___ F ___ Smoking tends to keep your body weight down.

PLEASE CONTINUE ON THE NEXT PAGE. THANK YOU.

1. Age: _____

2. Marital Status:

___ Single
___ Married
___ Separated
___ Widowed
___ Divorced

3. Occupation: _____

4. Income (estimate yearly income): _____

5. Hours worked per week (include time spent on business at home):
___ Under 40
___ 40
___ 41-50
___ 51-60
___ Over 60

6. Number of years of education: _____

7. Type of education:

___ High School
___ Technical Program after High School
___ College
___ Professional Training

8. Have you been the sole source of family income? _____

9. Religion:

___ Protestant
___ Catholic
___ Jewish
___ LDS
___ Other: _____

10. Number and age of children: _____
_____

11. What are your hobbies and social activities? _____
_____
_____

12. Would you describe your activities as:

___ Including your family
___ Including just your wife
___ Including just yourself

13. Did your spouse, family members, or a friend attend cardiac classes with you? (If 'yes," specify): _____

_____

_____

_____

_____

APPENDIX B

QUESTIONNAIRE, FORM II

Please choose the most appropriate answer(s) and circle it.

1. The heart is a:

   a. muscle
   b. tendon
   c. ligament

2. There are:

   a. 2 chambers in the heart
   b. 6 chambers in the heart
   c. 3 chambers in the heart
   d. 4 chambers in the heart

3. The function of the heart is to:

   a. circulate the blood throughout the body
   b. clean blood of impurities
   c. to help maintain balance

4. Coronary blood vessels:

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   b. bring carbon dioxide to the heart
   c. bring oxygen to the heart muscle
   d. direct blood from one chamber of the heart to another

5. Coronary heart disease is:

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   b. a narrowing of the passageway for blood flow to the heart muscle
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6. A heart attack is:

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   b. a blockage of one or more of the chambers of the heart
   c. failure of the heart to work

7. The damage of a heart attack is due to:

   a. too much fat in the blood
   b. too little blood in the heart muscle
   c. too little blood going into the heart chambers
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8. The pain involved in a heart attack is from:

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9. The pain of angina is due to:

   a. temporary lack of oxygen to the heart muscle
   b. permanent damage to the heart muscle
   c. cholesterol build-up in the blood vessels of the heart

10. The healing of the heart following a heart attack is:

   a. never complete, leaving a 'soft spot'
   b. totally complete, leaving no trace of damage
   c. leaves a scar but is not complete

11. The chances of a new heart attack:

   a. decrease markedly over your first few days in the hospital
   b. can be influenced by the things you learn about your heart
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12. The following is a list of factors to which many of us are exposed: If a factor contributes to heart disease, circle the word "yes"; if the factor does not contribute to heart disease, circle the word "no."

Yes	No	Smoking
Yes	No	Lack of exercise
Yes	No	Diabetes
Yes	No	Underweight
Yes	No	Passive personality
Yes	No	Low cholesterol diet
Yes	No	Family history
Yes	No	High blood pressure
Yes	No	Increasing age
Yes	No	Occupation

13. A progressive exercise program after a heart attack is important in order to:

   a. safely maintain body weight
   b. safely reach a productive level of activity
   c. speed the development of collaterol circulation

14. A restrictive diet after a heart attack is important to:

   a. reduce or stabilize body weight

b. assure adequate nutrition
c. place a greater workload on the heart

15. It is important to reduce risk factors in order to:

a. maintain a good level of activity
b. return to work as soon as possible
c. reduce the chance of having another heart attack

Mark the following statements as True or False.

16. T __ F __ After a heart attack, one should stay in bed for two or three weeks.

17. T ___ F ___ After a heart attack, one may not return to previous levels of activity.

18. T ___ F ___ After a heart attack, one's sex life must be reduced.

19. T ___ F ___ By gradually increasing activity in the six months following a heart attack, one can regain previous levels of fitness.

20. T ___ F ___ Probably too much activity causes heart attack.

21. T ___ F ___ It is important for the healing process that activity is gradually increased.

22. T ___ F ___ Too much animal fat in the diet contributes to high cholesterol levels and heart disease.

23. T ___ F ___ As a rule, salt is bad for your heart.

24. T ___ F ___ I won't be able to eat rich foods again.

25. T ___ F ___ Even an occasional cocktail is bad for the heart.

26. T ___ F ___ If you have smoked for a long time, quitting now will not help.

27. T ___ F ___ Smoking has definite psychological and physical side effects.

28. T ___ F ___ Smoking tends to keep your body weight down.

PLEASE CONTINUE ON THE NEXT PAGE. THANK YOU.

Please answer the following questions as briefly but completely as possible. Thank you.

1. Describe your habits prior to your heart attack by answering 'yes' or 'no' to the following questions:

   a. Were you on a special diet before your heart attack? (if 'yes,' explain) _____

   b. Did you smoke before your heart attack? _____

2. Diet

   a. After your heart attack, did your physician suggest that you change your diet in any way? (If 'yes,' explain) _____

   b. How would you estimate the difficulty of this change?

   ___ very difficult
   ___ difficult
   ___ not too difficult
   ___ no difficulty at all

   c. Would you estimate that you have been able to follow these instructions:

   ___ all of the time
   ___ most of the time
   ___ about half the time
   ___ very seldom
   ___ not at all

3. Smoking

   a. After your heart attack, did your physician give you advice about smoking? (If 'yes,' explain) _____
   _____

   b. How would you estimate the difficulty of following this advice?

   ___ very difficult
   ___ difficult
   ___ not too difficult
   ___ no difficulty at all

   c. Would you estimate that you have been able to follow these instructions:

   ___ all of the time
   ___ most of the time

___ about half the time
___ very seldom
___ not at all

4. Physical Activity

   a. After your heart attack, did your physician suggest that you limit your activity in any way? (If 'yes,' explain) _____

   b. How would you estimate the difficulty of following this advice?

      ___ very difficult
      ___ difficult
      ___ not too difficult
      ___ not difficult at all

   c. Would you estimate that you have been able to follow these instructions:

      ___ all of the time
      ___ most of the time
      ___ about half the time
      ___ very seldom
      ___ not at all

5. On a scale of 1 to 4, how would you rate the seriousness of your heart attack? (1 is the lowest degree of seriousness; 4 is the highest degree of seriousness) _____

6. After a heart attack, many changes in daily habits are sometimes required. How would you rate the effect of such changes on your life? (1 is the least degree of change; 4 is the highest degree of change). _____

7. Before you actually had your heart attack, did you ever feel that you were going to have problems with your heart? (If so, why?) _____
   _____

8. Have there been areas that have presented problems or uncertainties for either you or your family since your return home after the heart attack? (If 'yes,' explain) _____
   _____
   _____

THANK YOU FOR COMPLETING THIS FORM

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