



Long-term exercise maintenance in a selected group of Montana post coronary artery bypass graft surgery patients
by Karen Lea Hofstrand Salomon

A thesis submitted in partial fulfillment of the requirements for the degree Master of Nursing
Montana State University
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Abstract:

The purpose of this study was to determine whether post coronary artery bypass surgery (CABG) patients assume responsibility for self-care by long-term maintenance of a therapeutic exercise program and to determine what variables enhance or inhibit self-care or lack of self-care. The conceptual framework of the study was based on Dorothea Orem's nursing model in which the concept of self-care is the central theme.

The study was conducted using a descriptive survey design. Information was obtained by mailing questionnaires to a purposive sample of all persons who had undergone coronary artery bypass surgery between January, 1985, and August, 1987, at a hospital in northcentral Montana.

The questionnaire included items asking about maintenance of an exercise program after CABG surgery and the factors influencing self-care and lack of self-care.

Of the 141 post CABG patients responding, 43% indicated that they lived in an urban area at the time of surgery while 57% indicated that they lived in a rural area. Data were analyzed using descriptive statistics. Chi-square was used to determine relationships between geographic location and participation in a cardiac rehabilitation program, and the influence of cardiac rehabilitation programs on maintenance of a therapeutic exercise program.

Results of the study indicated that over half of the respondents maintained a therapeutic exercise program. The major factor indicated as helpful in maintenance of a program was "feeling better". Urban residents indicated that support from formal sources, the physician, the cardiac rehabilitation nurse and cardiac rehabilitation classes enhanced maintenance of an exercise program. Rural persons indicated that informal support systems, such as family and friends helped to maintain a therapeutic exercise program. For those who did not exercise, weather and lack of a place to exercise were major factors that inhibited maintenance of an exercise program. Participation in a cardiac rehabilitation program was a statistically significant variable in maintaining a therapeutic exercise program for urban patients but not for rural patients. Nursing implications include the need for more awareness of differences in health care requirements between rural and urban patients, and attention to assessing and utilizing both informal and formal support networks.

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GROUP OF MONTANA POST CORONARY ARTERY
BYPASS GRAFT SURGERY PATIENTS

by

Karen Lea Hofstrand Salomon

A thesis submitted in partial fulfillment
of the requirements for the degree

of

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ABSTRACT

The purpose of this study was to determine whether post coronary artery bypass surgery (CABG) patients assume responsibility for self-care by long-term maintenance of a therapeutic exercise program and to determine what variables enhance or inhibit self-care or lack of self-care. The conceptual framework of the study was based on Dorothea Orem's nursing model in which the concept of self-care is the central theme.

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Results of the study indicated that over half of the respondents maintained a therapeutic exercise program. The major factor indicated as helpful in maintenance of a program was "feeling better". Urban residents indicated that support from formal sources, the physician, the cardiac rehabilitation nurse and cardiac rehabilitation classes enhanced maintenance of an exercise program. Rural persons indicated that informal support systems, such as family and friends helped to maintain a therapeutic exercise program. For those who did not exercise, weather and lack of a place to exercise were major factors that inhibited maintenance of an exercise program. Participation in a cardiac rehabilitation program was a statistically significant variable in maintaining a therapeutic exercise program for urban patients but not for rural patients. Nursing implications include the need for more awareness of differences in health care requirements between rural and urban patients, and attention to assessing and utilizing both informal and formal support networks.

CHAPTER 1

INTRODUCTION

In 1983, cardiovascular disease was the cause of death of nearly one million Americans (American Heart Association, 1986). In 1985, the leading cause of death in Montana was from cardiovascular diseases; that total was 2,938 (Montana Vital Statistics, 1985).

The loss from cardiovascular disease is not only measured in mortality figures, but also in economic terms. The American Heart Association (AHA) estimated that the cost of cardiovascular diseases was almost 80 billion dollars in 1986. This cost included physician and nursing services, hospital expenses, and medication charges. Another economic loss is that of decreased output due to disability. This loss including benefits paid and production losses was estimated to be 13.6 billion dollars in 1986 (AHA, 1986). Potentially, these figures will continue to rise as cardiovascular disease is still the leading cause of death in the United States and its rate of incidence is uncontrolled.

Control of this disease is difficult because the disease begins in the early years of a person's life and continues to develop, unknown to the individual. Atherosclerosis is one example of cardiovascular disease that

affects the coronary arteries. Atherosclerosis is the buildup of fatty deposits along the inside walls of the arteries. This buildup can occur for years, usually 10 to 20, until the blood flow in the artery is partially or completely blocked by the fatty deposit. When this occurs in the coronary arteries which are the heart muscle's only source of blood supply, a heart attack and possibly death may result.

An effective way of correcting the above problem is coronary artery bypass graft surgery (CABG). In this particular surgery, the surgeon uses a vein, usually from the patient's leg, or an artery from the chest to detour or "bypass" the blockage in the coronary artery caused by atherosclerosis. In 1985, an estimated 230,000 coronary artery bypass surgeries were performed in the United States (AHA, 1986). During that same year, 723 cardiac heart surgery procedures were done in Montana (Montana Department of Health and Environmental Sciences, 1985). The majority of these cardiac heart surgery procedures were CABG surgeries.

The surgery, bypassing an occluded coronary artery, successfully diverts a potentially life-threatening event. However, to control the subsequent progression of coronary artery disease, the risk factor modification must take place. Identified risk factors that contribute to heart disease include age, sex, heredity, race, smoking, hypertension,

elevated blood cholesterol level, diabetes, obesity, stress, and lack of exercise (AHA, 1983). According to current research, lifestyle modifications can change many of these risk factors; the exceptions include age, sex, heredity, race, and diabetes (Pollock, Wilmore, & Fox, 1984).

The risk factor of interest for this study is the lack of exercise. "Possible benefits of exercise include improved weight control, an improved serum lipoprotein profile, and improved self-image. Exercise, for all these reasons, should continue to play a major role in the management of patients with coronary artery disease" (Hammond, 1985, p. 538). For the patient who has had a heart attack and/or cardiac surgery, a daily exercise routine is prescribed by the physician, just as medication use and dietary changes.

Adherence to an exercise routine can be a problem for anyone, including the post-bypass or post-heart attack patient. According to Roviato, Holmes and Holmsten (1983) greater adherence to regular exercise was found among patients who participated in group exercise provided by a cardiac rehabilitation program than in those who did not participate. Cardiac rehabilitation classes are based on an individual physician-prescribed exercise regime and are monitored by a staff of health

care personnel. Findings of studies conducted by Eyherabide and Yates (1985), and Shephard, Corey and Kavanagh (1979) also endorsed the group process for enhancement of exercise compliance, improvement in cardiovascular function, and improved quality of life.

Not all post CABG surgery patients have an opportunity to participate in the group process provided by cardiac rehabilitation classes. Some may chose not to participate because of personal or financial reasons, such as inadequate health insurance to cover the cost. For rural patients the geographical barrier of distance may prevent participation in the daily group exercise program provided by a cardiac rehabilitation class. Those unable to join a cardiac rehabilitation class may be sent home from the hospital with a written home program specifying how much exercise to do, and at what rate to advance.

While controversy exists about the safety of individual exercise at home, DeBusk, Haskell, Miller, Berra, and Taylor (1985) demonstrated that medically-prescribed, at-home exercise programs can be done safely with a substantial financial savings to the patient, and still achieve results comparable to those of cardiac rehabilitation group exercise programs. Comparing post CABG surgery patients who exercised with and without supervision, Stevens and Hanson (1984) found no significant differences in

functional capacity between groups and demonstrated that unsupervised exercise can be done safely and effectively.

"The amount of functional improvement achieved from a cardiac exercise program depends upon adherence to the program for months or years" (Hoepfel-Harris, 1980, p. 449). Long-term adherence to exercise reflects successful risk factor modification. Only one study (Ben-Ari et al., 1986) specifically addressed long-term adherence to exercise programs and the related influential factors beyond 36 months post CABG surgery. Additionally, all of the studies pertaining to cardiac rehabilitation and exercise compliance were conducted in urban settings where subjects had geographic access to cardiac rehabilitation programs.

Purpose

The purpose of the present study is to determine if post CABG surgery patients living in northcentral Montana have assumed responsibility for self-care with regard to long-term exercise recommendations and to describe the factors which influence self-care or lack of self-care.

The purpose of the study was addressed through the following specific research questions:

1. Do patients continue with a therapeutic exercise program one to four years post CABG surgery?
2. What do post CABG surgery patients identify as important variables in maintaining a long-term exercise program?
3. What do post CABG surgery patients identify as variables that inhibit maintenance of a long-term exercise program?
4. Do more post CABG surgery patients in urban areas participate in cardiac rehabilitation programs than those in rural areas?
5. Are persons who participated in the group process of a cardiac rehabilitation program following CABG surgery more likely to continue a therapeutic exercise program than those who did not participate?

The following assumptions are recognized as being relevant to this study:

1. Patient's perceptions of the importance of exercise influence their assuming responsibility for self-care with regard to an exercise program.
2. Patients can provide accurate information regarding their exercise program.

Operational Definitions

Operational definitions for terms used in this study are as follows:

1. Post CABG patient: a person who has experienced a coronary artery bypass graft surgery.
2. Northcentral Montana: a geographical area that has an approximate radius of 200 miles from the city of Great Falls.
3. Self-care: maintaining a program of exercising at least three times a week, for at least 30 minutes in duration.
4. Lack of self-care: not exercising at least three times a week for a minimum of 30 minutes in duration.
5. Therapeutic exercise program: a regular pattern of exercise, which can involve one or several modes of exercise, such as walking, bicycling, swimming, jogging, or aerobic dance.
6. Long-term: a period of one to four years.
7. Rural resident: the person living beyond a twenty mile radius of the city limits of Great Falls or any city with a population of 50,000 or more.
8. Urban resident: the person living within a twenty mile radius of the city limits of Great Falls or any city with a population of 50,000 or more.

Conceptual Framework

The concept usually referred to when determining whether patients

follow a prescribed program after experiencing illness and/or surgery is compliance. "Compliance is the extent to which a person's behavior coincides with medical or health advice" (Haynes, 1979). The area of specific interest in this study is the compliance of the cardiac rehabilitation patient following coronary artery bypass graft surgery (CABG). Successful rehabilitation of the CABG patient results in a joint effort by the patient and health care staff in establishing a plan of recovery that is acceptable to all and fosters compliance in the patient.

"Nurses view compliance within the broader context of a relationship with a patient or client, as a means to an end, and not as an end in itself" (Hogue, 1979, p. 248). The recovery of the patient who has had CABG surgery is viewed as progressing from close supervision by the hospital care team and compliance with the recommended medical regimen to that of health maintenance governed by self-care.

Self-care is the main concept of a conceptual nursing model developed by Dorothea Orem (1980). Therefore, her model serves as a framework for this study. A review of Orem's model is followed by a discussion of cardiac rehabilitation. Then the need for patients who have participated in a cardiac rehabilitation program to move from compliance behaviors to development of self-care abilities is considered. Finally, the

nurses' role in assisting the cardiac rehabilitation patient to assume self-care responsibility is discussed.

Orem's Conceptual Nursing Model

The main concept of Orem's (1980) model is self-care, the role an individual assumes in the care of his or her own health status. Orem defines self-care as "the practice of activities that individuals personally initiate and perform on their own behalf in maintaining life, health, and well-being" (p. 84).

According to Orem's model, when a health deficit is present which prevents the person from achieving total self-care, the nurse assists the patient in assuming responsibility for health care. In addition to helping fulfill patients' physical and emotional needs, the nurse encourages families to maintain an active role in enhancing the patients' health status. Family involvement varies, depending on the patients' abilities to care for themselves.

The nurse's abilities, or in Orem's terms, the "nursing agency", determine patients' needs using the nursing process. In the first step of the process, the nurse assesses patients' health, perceptions of health, requirements for self-care, ideal health status, and the abilities patients possess in assuming self-care. When this assessment has been completed,

the nurse identifies and plans appropriate strategies for health care assistance. The type and amount of health care to be provided by the nurse is directly related to the degree of independence of the patient. When the assessment has been accomplished, the next step of the nursing process, intervention, can be initiated. Nursing intervention often focuses on education. The nurse acts as a resource providing information to patients and the family members who may be involved in the patients' care.

The last step is evaluation, in which results achieved by nursing actions are evaluated against goals specified in the original plan of care developed with the patient. Results are evaluated positively if the patient's optimal self-care level is achieved, nursing actions have supported the patient in achieving and maintaining this self-care level, and family members have become more competent in making decisions that pertain to the patient's care.

Cardiac Rehabilitation

The area of specific interest in this study is cardiac rehabilitation of post CABG surgery patients. After surgery, a self-care deficit exists because patients, as "self-care agencies", are initially unable to meet the demands of self-care. As a result of surgery, there is a generalized weakness, sternal instability and tenderness, and often incisions on the

legs from graft sites are slow to heal. These factors contribute to patients' inability to achieve total self-care. The purpose of cardiac rehabilitation is to help patients overcome self-care deficits. Cardiac rehabilitation is a process through which the "nursing agency" assists cardiac patients in achieving optimal self-care and an improved quality of life.

Cardiac rehabilitation may be defined as the process of actively assisting the known cardiac patient to achieve and maintain his optimal state of health. Rehabilitation is accomplished by the patient, not administered by the nurse. The desire to accomplish rehabilitation goals must be intrinsic. The nurse cannot give the patient motivation in a capsule. However, if patient and nurse work together, identifying problems and planning solutions, the partnership can provide the assistance and support necessary to reach mutual goals (Comoss, Burke, & Swails, 1979, p. 2).

From Compliance to Self-Care

As indicated earlier, the recovery of patients who have had CABG surgery progresses from close supervision by health care staff and compliance with the recommended medical regimen to that of health

maintenance governed by self-care. While patients are still hospitalized, recovering from surgery, a therapeutic regimen for optimal recovery is presented to both patients and their families, with the goal of compliance to be achieved by the time patients are discharged from the hospital.

Compliance in rehabilitation programs is especially challenging because of the nature of chronic illness. The patient's losses are magnified when the program of treatment is long-term and expensive and lacks a guarantee that the patient will return to the former state of well-being. The patient must be willing to make the transition from dependence on the health care system to one of self-responsibility and confidence about decision-making in matters of health (Kinnaird, Yoham, & Kieval, 1982, p. 523).

As cardiac rehabilitation patients demonstrate compliance by adherence to the medical regimen, physical status usually improves over time, and patients become able to make independent decisions about aspects of their health care. For example, upon discharge from the hospital, patients are capable of following the recommended exercise program at home. As physical strength improves, patients independently increase the intensity of exercise, while monitoring and maintaining a

pulse rate that is within the limits specified by the physician. In this example, patients are demonstrating compliance to medical advice while simultaneously using self-care abilities in varying the exercise program.

Compliance in cardiac rehabilitation is more closely associated with short-term recovery of patients. Initially, patients need to be compliant with the recommended health care regimen, and are closely monitored by cardiac rehabilitation staff to insure safe and correct adherence to the regime. As recovery becomes long-term, patients' contacts with the cardiac rehabilitation team become infrequent and they have to rely more upon their abilities for self-care and health maintenance. The role of self-care in cardiac rehabilitation cannot be overemphasized, as the successful outcome of the surgical treatment depends on patients assuming responsibility for continuation of a long-term health care regimen.

Nurse's Role

In cardiac rehabilitation, the nurse first assesses patient's current health status, ability to change lifestyle, and the need for an appropriate exercise program. Once the assessment has been completed and the plan for self-care has been determined, the efforts of the nurse focus on interventions that satisfy the demands for self-care and insure that the

results of these efforts are productive (Orem, 1980). The cardiac rehabilitation nurse encourages patients to maintain a regular exercise program and other activities of self-care that can assist individuals toward optimal recovery. Techniques used by the nurse to support exercise as an aspect of self-care include demonstrating proper techniques of exercise, facilitating patient participation in a structured cardiac rehabilitation program and encouraging family members to exercise with the patient or in other ways support the patient's exercise program. For patients who are unable to attend exercise classes, the nurse can provide weekly or monthly follow-up telephone contacts. Through these contacts patients can have access to teaching and consultation regarding the exercise program which they are implementing at home.

"Self-responsibility should therefore be considered a major objective for cardiac rehabilitation programs, which should support patients so that they may by their own efforts regain as normal as possible a place in the community and lead an active, productive life" (Oldridge, 1986, p. 154).

The ultimate purpose of cardiac rehabilitation is to assist patients in resuming as productive a life style as possible and to reinforce the belief that individuals are responsible for their own self-care. As the

level of self-care increases, so does the level of confidence and independence. Positive reinforcement results when individuals are able to resume activity enjoyed prior to the onset of illness. Lifestyles that were once inhibited by the exacerbation of cardiac disease can be more productive and increase the self-worth of post CABG surgery patients.

CHAPTER 2

LITERATURE REVIEW

A review of the literature pertaining to cardiac rehabilitation, exercise, self-care, and compliance revealed that few studies specifically addressed the concept of self-care in cardiac rehabilitation. Therefore, this chapter summarizes the available information about self-care and includes literature about compliance and the cardiac/coronary artery bypass graft patient. Definitions of compliance are included for each of the studies quoted.

Exercise and Cardiac Rehabilitation

Thirty years ago the prescription for rehabilitating cardiac patients included six weeks of bedrest followed by abandonment of many activities to which the patient was accustomed such as driving, climbing stairs and golfing. However, during this same period of time physiologists were finding that strict bedrest for any person resulted in a significant detrimental effect on physiological function (Pollock, Wilmore, & Fox, 1984). After just a few days many patients experienced decreased cardiorespiratory fitness.

Questioning the conservative approach to recovery of the cardiac patient, cardiologists began developing exercise programs that were based upon a safe level of activity. Shown to have a positive effect on patient recovery, cardiac rehabilitation exercise programs have evolved from a few programs in select cities in the United States to large, highly technical cardiac rehabilitation programs found in most medical centers in the world. In order to further discuss the current concept of cardiac rehabilitation, a definition of the term will be presented.

The World Health Organization (1964) defined rehabilitation of the cardiac patient as "the sum of activity required to ensure them the best possible physical, mental and social conditions so that they may by their own efforts regain as normal as possible a place in the community and lead an active, productive life." Pollock, Wilmore & Fox (1984) defined cardiac rehabilitation as "the process of restoring psychological, physical, and social functions to optimal levels in those individuals who have had prior manifestations of coronary artery disease" (p. 298).

To provide for continuity of rehabilitative care, cardiac rehabilitation programs are implemented in three phases. Phase I begins in the hospital, where the heart attack has been diagnosed or the coronary artery bypass surgery has taken place. The purpose of Phase I is to reduce

the physical and psychological complications that may occur in patients recovering from heart surgery or heart attack. The focus of activities in Phase I center on patient and family education, and provide active and/or passive range of motion exercises for the patient whose activity level has been compromised by the cardiac event. The various range of motion exercises performed in Phase I not only prevent muscular stiffness and weakness because of prolonged inactivity, but allow the hospital staff to monitor the patient's heart rate response to exercise. Patient education in Phase I centers on understanding the physiology of coronary artery disease and the importance of physical activity after discharge from the hospital. Prior to discharge from the hospital, the cardiac rehabilitation nurse or therapist reviews with the patient and family the specific instructions regarding activity at home for the two weeks after discharge. At this time, a referral for Phase II is made. The patient who lives too far away to attend the Phase II outpatient program at the hospital is given instructions regarding a Phase II home exercise program.

Approximately three weeks post surgery, the patient enters the Phase II program. In this phase the activity centers on development of a safe, regular exercise regimen and modification of risk factors. Aerobic exercises are done primarily by use of exercise equipment such as

treadmills and stationary bicycles. Participants in structured outpatient programs are taught the proper method to warm up for exercise and cool down after each session. A portable telemetry unit is worn which allows the rehabilitation staff to monitor cardiac response to exercise. Patients are also taught to monitor their own pulse and stay within the guidelines for pulse rate dictated by the physician.

While exercise is the primary component of Phase II, risk factor modification also plays an important role. For those attending outpatient programs during this phase, risk factor modification is usually done through the group process, involving the rehabilitation staff and class participants. Family members are also encouraged to attend. A variety of health professionals such as dieticians, pharmacists, psychologists, and social workers provide information to participants about diet, use of medication, and methods of coping with everyday stressors. This aspect of the Phase II program acknowledges the fact that coping with coronary artery disease is an emotionally stressful task for the patient and family.

After completion of the 8 to 12 week Phase II program, patients enter Phase III. Phase III is the maintenance program, which the patient continues to follow as a part of long-term lifestyle modification. This phase can include a structured class or can be accomplished entirely at

home, with periodic consultation with the cardiac rehabilitation staff. In Phase III, the patient maintains the exercise program prescribed in Phase II. Patients are not continuously monitored by a telemetry unit, rather they check heart response to exercise by taking their pulse as learned in Phase II. Phases I and II follow a definite time frame, whereas Phase III is designed to continue indefinitely.

Benefits of Exercise

Although the overall cardiac rehabilitation program assists the patient in the physical and psychological adjustment to coronary artery disease, the primary component of the program is exercise and establishment of a regular exercise program. Perhaps the most definitive statement about benefits of exercise is the "Statement on Exercise" from the American Heart Association (1981).

Exercise training can increase cardiovascular function capacity and decreases myocardial oxygen demand for any given level of physical activity in normal persons as well as most cardiac patients. Regular physical activity is required to maintain the training effects. The potential risk of vigorous physical activity can be reduced by

appropriate medical clearance, education and guidance
Exercise may aid efforts to control cigarette smoking,
hypertension, lipid abnormalities, diabetes, obesity, and
emotional stress. Evidence suggests that regular,
moderate, or vigorous occupational or leisure time
physical activity may protect against coronary heart
disease and may improve survival from a heart attack.
(p. 4).

"In patients who have undergone coronary artery bypass graft surgery, physical activity has been found to decrease postsurgical stiffness and prevent complications of atelectasis. Other potential benefits of cardiac rehabilitation include a decrease of the incidence and severity of depression and anxiety" (Pollock, Wilmore, & Fox, 1984, p. 299).

Self-Care and Cardiac Rehabilitation

Toyama and her cohorts (1988) are nurses in a cardiac rehabilitation unit where the philosophy of care is based on the self-care theory. Their article described the use of the conceptual model of self-care in rehabilitation of the cardiac patient. According to these authors,

The nonmonitored patient's needs could best
be met within Orem's self-care system where

the client learns to perform the required self-care measures with the nurse providing support, guidance and an educational environment. Education equips clients with knowledge, skills, and positive attitudes, enabling them to make choices supportive of risk-factor modification. The need for individuals to be in control of their health and assume responsibility for meeting their health needs is instrumental in the development of a nonmonitored cardiac rehabilitation program (p. 15).

The focus of rehabilitative nursing is developing and restoring patients' abilities and potential by promotion of self-care. Current nursing literature reflects this principle. "The emphasis is on restoring the patient to independence or helping him regain his pre-illness. . .level of function" (Brunner and Suddarth, 1988, p. 214). Nursing assessment includes identifying patient problems and needs, setting realistic and mutual goals, and then implementing a program that fosters development of self-care abilities and is acceptable to patients.

The patient's motivation and involvement in rehabilitation is an essential factor in self-care. Efforts made by the cardiac rehabilitation nurse encourage patients' participation and decision-making in their plan

of care. One method that is effective is the use of an exercise log, where notations are made by either the nurse or patient. This permits the patients and the nurses to review and monitor patients' progress objectively. Other examples of objective data that show increased self-care ability are greater patient proficiency in taking and recording pulses during and after exercise, and the patient's ability to initiate and perform the correct warm-up and cool-down exercises.

"As patients become ready for more advanced activities...they need continuing genuine interest and support" (Phipps & Buergin, 1987, p. 435). Based upon the current clinical literature, having patients record their progress, and providing positive reinforcement for progress made, are key motivators in development of self-care in cardiac rehabilitation.

Factors Influencing Short Term Exercise Compliance/Self-Care

A chief factor influencing exercise compliance found in the literature was participation in the group exercise provided by cardiac rehabilitation programs. Roviato, Holmes and Holmsten (1984) confirmed the benefits of a structured cardiac rehabilitation program for cardiac patients. In their study a comparison was made between two groups of patients who had either experienced a heart attack or had undergone bypass

surgery. Twenty subjects participated in a structured cardiac rehabilitation program and twenty participated in "routine care", which included a recommended program of exercise at home. Placement in each group depended on geographical access to the program. Cardiovascular, psychological, and psychosocial functioning was assessed three and seven months after treatment or routine care. The treatment group was found to have increased cardiovascular functioning, better understanding of heart disease, improved psychosocial functioning and increased compliance with treatment recommendations when compared to the group who had routine care.

Eyherabide and Yates (1985) conducted a comparative retrospective study to determine the relationship between compliance and the extent of supervised cardiac rehabilitation in the coronary artery bypass graft (CABG) patient. The selected population (n=351) underwent CABG surgery a year prior to the study and were mailed structured questionnaires. A 67.2% response rate was obtained. Compliance was defined as exercising at a level that was congruent with the exercise prescription. Variables examined in the questionnaire included demographics, social support, cardiovascular history and present symptoms, other health problems, risk factors, and compliance to therapeutic regimen. Respondents were

categorized into four groups, where placement was determined by the amount of cardiac rehabilitation the respondents received. Group 1 participated in Phase I only, group 2 participated in Phase I and two Phase II visits, group 3 completed Phase I and Phase II, and group 4 completed Phase I, Phase II, and were active in Phase III. Results of the study indicated that supervised exercise programs were conducive to maintaining a therapeutic exercise level. However, because the study did not address other factors such as geographical access to rehabilitation programs, the need for further research was suggested.

Although these findings indicated the effectiveness of the group process, they do not address the issue of compliance/self-care of those patients who do not participate in cardiac rehabilitation programs. Several studies found that patients following a home exercise prescription did equally as well as those who participated in group cardiac rehabilitation programs.

Mulder (1981) studied a group of 39 subjects who were classified as either healthy or "cardiac" (having documented coronary artery disease). The percentage achieved of the prescribed exercise goal was the method in which compliance was measured. The author concluded that individuals having home exercise programs can be compliant to a prescribed regimen.

However, factors influencing compliance were not identified. An additional weakness of this study was the selected population, which identified only five cardiac patients in the entire group. There is a need for research involving the exercise compliance of cardiac patients with larger groups.

A study by Stevens and Hanson (1984) indicated that post CABG patients following a prescribed exercise program at home could safely achieve the benefits of exercise gained by patients in cardiac rehabilitation classes. The study group consisted of 204 post CABG patients similar in age, number of bypass grafts, preoperative left ventricular impairment and number of days hospitalized. Random assignment into two groups was done, with one attending cardiac rehabilitation classes and the second group following a home exercise program. Functional capacity was tested in both groups 44 and 115 days post-surgery. It was determined that both groups had significant increases in exercise capacity.

While not done specifically with post CABG surgery patients, a study by DeBusk et al. (1985) reached similar conclusions. Random assignment of 137 males who were at least 3 weeks post myocardial infarction was done, dividing the group into 66 for home exercise training and 61 for

cardiac rehabilitation classes. Group evaluation was done 3 and 26 weeks after the programs started. Not only was compliance and functional capacity equally high in both groups, but no training-related complications occurred with any of the participants.

Both of the above studies were principally addressing the safety of home exercise programs and did not specifically address factors influencing compliance/self-care. In both studies operationalization of compliance was a limitation. Neither study addressed long-term exercise compliance and movement of the patient towards self-care.

Factors Affecting Long-Term Compliance/Self-Care

Only one study specifically addressed long-term compliance to exercise following coronary artery bypass surgery. Ben-Ari et al. (1986) studied compliance to exercise in two groups of post cardiac surgery patients 58 months following surgery.

One group (n=51) participated in a comprehensive cardiac rehabilitation program that included physical training and counseling for control of risk factors. The other group (n=45) of patients had not participated in any organized group rehabilitation program or ever followed a regular, individual exercise program. Exercise tolerance was

tested at 6 to 12 months after surgery and 58 months post-surgery. The group participating in the cardiac rehabilitation program demonstrated greater exercise tolerance, reduction in risk factors, and a higher return to work status. The untrained group reported an increase in anginal pain, greater failure to return to work, decrease in exercise tolerance, and failure to modify cardiac risk factors.

Another study which provided information on long-term compliance was done with myocardial infarction patients. Shephard, Corey and Kavanagh (1981) studied the relationship between exercise compliance and recurrence of myocardial infarction. In this study, 610 subjects were observed weekly for exercise compliance for an average of 36.5 months. All participants were enrolled in a cardiac rehabilitation program and all had a history of having had a myocardial infarction. Compliance was defined as following the exercise prescription at least three times a week. Adherence to exercise was monitored by an exercise log in which the patient wrote times, symptoms, and pulse rates. Compliance was also measured by direct observation of the subjects exercising by the cardiac rehabilitation staff. At the conclusion of the study, 82.5% of the sample were found to be compliant. An absence of recurrence of myocardial

infarction was found in 95.6% of compliant subjects as compared with 78% in the non-compliant group.

Marston's (1970) review of the literature on patient compliance to prescribed medical regimens concluded that there is a wide variation in compliance of patients. Results of various studies showed that compliance to a medical regimen can fluctuate from 4% to 100% of selected populations. In the literature that was reviewed, it was found that there was minimal, if any, relationship between sociodemographic factors such as age, sex, and socio-economic status and compliance to medical recommendations. Increased knowledge of the disease process was also found to have no significant effect on patient compliance. According to Marston, the literature reviewed was in agreement that factors increasing compliance included severity of illness as perceived by the patient, patient satisfaction with their physician, individuals developing a fear towards illness, patient involvement in and agreement with medical recommendations, and simplicity of medical regimen. Marston suggested that "the problem of noncompliance with medical recommendations is a substantial one, and there is much we need to learn concerning the factors involved in helping people to take care of their health when they are not

under the direct surveillance of professional caretakers, such as physicians and nurses" (p.312).

CHAPTER 3

METHODS

Design

This study is an initial descriptive study; the results may be generalized with caution to other patients who have had coronary artery bypass graft (CABG) surgery in similar settings. The study used a questionnaire containing both closed and open ended questions.

Questionnaires were sent to all persons who had experienced CABG surgery from a single institution in northcentral Montana over a period of two and one half years. The questionnaire focused on whether post CABG surgery patients followed exercise recommendations and what factors influenced the self-care or lack of self-care. The questionnaire method was selected in order to access a large group of post CABG patients.

Sample

The sample for this study was purposive. It consisted of all patients who had had CABG surgery sometime between January, 1985, and August, 1987, at Montana Deaconess Medical Center in Great Falls, Montana.

All patients who received the questionnaire and returned it within the specified time frame were included in the study.

There were no age, sex or education limitations for the inclusion of patients in the study. The sample included both patients who had participated in structured cardiac rehabilitation classes after surgery and those who had not. All persons in the selected population were given an equal chance to respond to this study by completing the questionnaire and returning it within two weeks of receiving it.

Instrument

The questionnaire consisted of questions on maintenance of an exercise program after CABG surgery and the factors influencing this self-care or lack of self-care. The questionnaire was divided into three sections. The first section addressed exercise, the type of program used and how often the patient exercised. The second part of the questionnaire explored specific factors believed to influence maintenance of a long-term exercise program. The final section included demographics such as age, sex, marital status, and residence at the time of surgery. This tool was adapted from a questionnaire developed by Eyherabide and Yates (1985) in a study conducted at the University of Wisconsin at Madison and from a review of literature in which factors influencing compliance were

identified. Pilot testing of the questionnaire was done to determine clarity and readability. The names of five pilot subjects were obtained through a contact who knew subjects meeting the study criteria. Four of the five questionnaires were completed and returned. Respondents suggested no changes in the questionnaire and all participants indicated that the questions were clear and understandable.

Validity and Reliability

Content validity of the questions from the original tool by Eyherabide and Yates had been established through review by a cardiac rehabilitation staff. Questions pertaining to factors that influence participation were developed from a review of literature addressing compliance and from the researcher's experience as a cardiac rehabilitation nurse. Face and content validity of the latter group of questions were addressed by having the instrument reviewed by two clinical experts in the field of medical surgical nursing, one of whom is a clinical specialist in critical care nursing.

This study was a beginning effort to gather descriptive data about exercise compliance following CABG surgery and the factors influencing self-care and lack of self-care. No pre-existing questionnaire was available for acquiring this data.

Protection of Human Subjects

Participants' human rights were protected throughout the study. A cover letter to participants explained the purpose of the study, that their responses would be confidential, and that their participation was voluntary. A returned, completed questionnaire indicated consent to participate in the study. Following completion of the study, returned questionnaires were stored in a locked file on an extended campus of Montana State University and will be destroyed in three years.

Plan of Analysis

Descriptive statistics were used to summarize demographic data from the questionnaire. Frequencies were used to describe the respondents in relation to gender, marital status, geographic location and residence at the time of surgery. Means and ranges were calculated to describe respondents by age and level of education.

A portion of the questionnaire solicited information about whether patients maintain a therapeutic exercise program after coronary artery bypass surgery. Frequency distributions were calculated to determine if patients continued to exercise after surgery and the type of exercise that was used. Data were tabulated and graphed to indicated variables that

were positively or negatively related to maintenance of a long-term exercise program.

The Chi-square statistic was used to examine differences in cardiac rehabilitation program participation by urban versus rural location.

Chi-square was also used to examine differences in long-term maintenance of an exercise program between those who had participated in a formal cardiac rehabilitation program and those who had not. These differences were examined for all study subjects as well as for urban and rural subjects separately. For all Chi-square analyses, the $p = .05$ or greater level of significance was used.

CHAPTER 4

FINDINGS

Sample

Questionnaires were sent to the 298 patients who had undergone coronary artery bypass graft (CABG) surgery at a northcentral Montana hospital between January, 1985 and August, 1987. One hundred forty-two (N=142) questionnaires were returned representing a response rate of 56% from the potential pool of 254. Communication with the hospital (Wallace, May, 1989) revealed that 29 known deaths had occurred in the group. In addition, 15 questionnaires were returned because of no forwarding address. One questionnaire was only partially completed; therefore the study data were derived from a total of 141 questionnaires.

One hundred (71%) of the respondents were male and 41 (29%) were female. The age of participants ranged from 40 to 89, with a mean of 66 and a mode of 75 (n=11). Twenty respondents had eight or fewer years of school, 78 had 9 to 12 years of school, 24 had over 12 years of school, and 19 were college graduates. One hundred eighteen (83%) respondents were married, 19 (13%) were widowed, and 4 (5%) were divorced or separated.

Respondents were asked where their place of residence was at the time of CABG surgery. Rural or urban residency was determined according to criteria established for this study. Respondents indicated that at the time they had their coronary artery bypass graft (CABG) surgery, 61 (43%) lived in an urban area and 80 (57%) were rural residents.

From the total number of completed questionnaires (N=141), 44 (31%) indicated that they had participated in a formal cardiac rehabilitation outpatient program following their surgery, while 97 (69%) indicated that they had not participated. Of the 44 respondents who had participated in an outpatient cardiac rehabilitation program, 34 (77%) lived in an urban area while 10 (23%) were rural dwellers. From the total group of respondents (N=141), 32 (22%) indicated that they had had additional heart problems since surgery.

Participation in a Therapeutic Exercise Program

Respondents were asked if they presently followed an exercise program, and if so, how many days a week they exercised, and the length of sessions. Respondents were also asked to indicate if activity level was increased, reduced, or remained unchanged since CABG surgery.

Self-care, operationally defined as maintenance of a therapeutic exercise program for 30 minutes three times a week was indicated

by 74 (52%) of the respondents. For the total group who exercised therapeutically, 42 (57%) were rural residents and 32 (43%) resided in an urban area. Within this group, 22 (29%) said they were more physically active since CABG surgery, 19 (25%) indicated they were less active since surgery, and 33 (44%) indicated that there was no difference in level of activity since surgery.

Various types of exercise were listed, and respondents who maintained a therapeutic exercise program (n=74) were asked to indicate what type of exercise their program included. Table 1 displays the frequencies of responses for the types of exercise used by the respondents maintaining a therapeutic exercise program. The most frequent type of exercise reported was walking; 63 (85%) respondents checked that item. The least frequent form of exercise used was jogging; it was checked by only one respondent. Thirty-nine (52%) respondents exercised using a stationary bike, six (8%) alternately walked and rode a stationary bike, four (5%) did aerobic dance, four (5%) indicated swimming. Sixteen (21%) indicated that they did "other" forms of exercise. Other forms included using a rowing machine (3%), stretching (7%), situps (3%), weight-lifting (1%), racketball and volleyball (1%), and using a cross-country ski

simulator (1%). Forty-seven (63.5%) indicated that their program included more than one form of exercise.

Table 1. Methods of Exercise Used by Patients (n=74) Participating in a Therapeutic Exercise Program

Type of Exercise	Frequency	Percent*
Walking	63	85
Biking	39	52
Alternate walk/stationary bike	6	8
Aerobic dance	4	5
Swimming	4	5
Jogging	1	1.3
Other	16	21

* The total percent equals more than 100% as participants were asked to check all that applied.

Variables Helpful in Maintenance of a Therapeutic Exercise Program

Variables that are generally believed to be beneficial in maintenance of a therapeutic exercise program were listed. Respondents who maintained a therapeutic exercise program (n=74) were asked to indicate which variables had been important in assisting them to maintain their exercise program.

Table 2 lists frequencies for variables which patients (n=74) indicated were helpful in maintaining a therapeutic exercise program. The most frequent variable indicated was "made me feel better" (90%). Other

factors indicated were family support (61%), encouragement from a physician (57%), easy to follow exercise program (59%), someone to exercise with (39%), fear of heart attack (36%), having a prescribed home exercise program (35%), encouragement from a cardiac rehabilitation nurse (27%), participation in an outpatient cardiac rehabilitation program (23%), attendance at Mended Hearts meetings (11%), and two respondents checked "other" and indicated they had "read that exercise was a good idea". Sixty-four (86%) indicated two or more factors which were helpful in maintaining a therapeutic exercise program.

Table 2. Variables Indicated as Helpful by Patients (n=74) in Maintaining a Therapeutic Exercise Program

Variable	Frequency	Percent*
Made me feel better	67	90
Family support	45	61
Encouragement from a physician	42	57
Easy to follow exercise programs	44	59
Had someone to exercise with	29	39
Fear of heart attack	27	36
Having a prescribed home exercise program	26	35
Encouragement from a cardiac rehabilitation nurse	20	27
Participation in an outpatient cardiac nurse	17	23
Attendance at Mended Hearts meetings	8	11
Other - (read it was a good idea)	2	3

*The total percent equals more than 100% as respondents were asked to check all that applied.

Data were further analyzed to examine helpful factors in maintenance of a therapeutic exercise program for urban (43%) and for rural (57%) residents. Results of the comparison of these two population subgroups are summarized in Table 3.

Table 3. Variables Indicated as Helpful by Urban Patients (n=32) and Rural Patients (n=42) in Maintaining a Therapeutic Exercise Program

Variable	Urban		Rural	
	Frequency	Percent*	Frequency	Percent*
Made me feel better	29	91	38	90
Family support	21	66	24	57
Easy to follow exercise program	19	59	25	59
Encouragement from physician	18	56	24	57
Encouragement from cardiac rehabilitation nurse	13	41	7	17
Outpatient cardiac rehabilitation program	12	37	5	12
Prescribed home exercise program	12	37	14	33
Fear of heart attack	11	34	16	38
Someone to exercise with	10	31	19	45
Attendance at Mended Hearts meetings	4	12	4	9

* The total percent equals more than 100% as respondents were asked to check all that applied.

For those who live in an urban area, the most frequent variable which encouraged maintenance of a therapeutic exercise program was "made me feel better" (91%). Other variables included family support (66%), easy to follow exercise program (59%), encouragement from physician (56%), encouragement from a cardiac rehabilitation nurse (41%), participation in

an outpatient cardiac rehabilitation exercise program (37%), fear of a heart attack (34%), having someone to exercise with (31%), and attendance at Mended Hearts meetings (9%). For those who live in a rural area, the following factors were identified as helpful in maintaining an exercise program. Ninety percent indicated that they exercised because it made them feel better. Other variables were having an easy to follow exercise program (59%), family support (57%), encouragement from a physician (57%), having someone to exercise with (45%), fear of heart attack (38%), having a prescribed home exercise program (33%), encouragement from a cardiac rehabilitation nurse (17%), participation in an outpatient cardiac rehabilitation program (12%), and attendance at Mended Hearts meetings (9%). Thus, both groups indicated feeling better with exercise, family support, having an easy to follow exercise program, and encouragement from a physician as important factors that were helpful in maintaining a therapeutic exercise program.

The major differences between urban and rural groups were in relation to encouragement from a cardiac rehabilitation nurse, participation in an outpatient cardiac rehabilitation program, and having someone to exercise with. Urban residents indicated that formal support systems such as the cardiac rehabilitation nurse and cardiac rehabilitation

programs were helpful in maintaining an exercise program, while rural residents indicated that having someone to exercise with was a more important factor in maintaining an exercise program.

Variables Inhibiting Maintenance of a Long-Term Exercise Program

Sixty-seven respondents (47.5%) indicated they did not follow a regular exercise program. When asked about their present level of activity as compared with activity before surgery, 18 (27%) of those who did not follow an exercise program checked there was no difference in activity level, 15 (22%) were less active than before surgery, and 10 (15%) were more active since surgery. This contrasts with those who did maintain a therapeutic exercise program in that a greater percentage (29%) of those who maintained a therapeutic exercise program were more physically active since CABG surgery than those who did not exercise therapeutically (15%).

Respondents who did not regularly exercise were asked to indicate what factors prevented maintenance of a therapeutic exercise program. Table 4 lists frequencies for those variables preventing maintenance of a long-term exercise program. The most frequently indicated variable was "weather", checked by 20 (30%) of the non-exercisers. Other variables

checked were lack of a place to exercise (22%), not liking to exercise (21%), lack of time (12%), increase in chest pain, fatigue, shortness of breath (9%), uncertainty about the correct way to exercise (6%), no benefit gotten from exercise (4%), and family influence (3%). "Other" was checked by 13 respondents. Twenty-seven (40%) of non-exercisers indicated more than one variable which prevented maintenance of a therapeutic exercise program.

Table 4. Variables Indicated by Patients (n=67) as Preventing Maintenance of a Long-Term Exercise Program

Variable	Frequency	Percent*
Weather	20	30
Lack of Place to exercise	15	22
Do not like to exercise	14	21
Lack of time	8	12
Decrease in chest pain, fatigue, shortness of breath	6	9
Uncertain about the correct way to exercise	4	6
No benefit gotten from exercise	3	4
Family influence	2	3
Other	13	19

* The total percent equals more than 100% as respondents were asked to check all that applied.

The responses listed for "other" were categorized: "arthritis" (n=6), poor healing of incisions (n=1), impaired circulation to legs (n=1),

financial concerns (n=1), geographical distance (n=1), and walking at work in lieu of other exercise (n=2).

For those who did not exercise, data were subsequently analyzed to compare urban residents (43%) and rural residents (57%) in relation to factors that prevented maintenance of a therapeutic exercise program. Table 5 summarizes these results. For urban residents, (n=29) the variable indicated by the largest percentage of non-exercisers (27%) was simply not liking to exercise. Other variables included lack of time (10%), uncertain about the correct way to exercise (10%), lack of a place to exercise (10%), increase in chest pain, fatigue, and shortness of breath (7%), weather (7%), and no benefit gotten from exercise (3%).

For rural residents (n=38), the variable indicated by the largest percentage of non-exercisers (47%) as inhibiting maintenance of an exercise program was weather. Other factors indicated by rural residents included lack of a place to exercise (31%), do not like to exercise (16%), lack of time (13%), increase in chest pain, fatigue, shortness of breath (10%), family influence (5%), and uncertain about the correct way to exercise (3%). Thus, urban residents identified not liking to exercise more often as an exercise inhibitor, while rural residents focused on the weather as the primary inhibiting factor.

Table 5. Variables That Inhibit Maintenance of a Therapeutic Exercise Program as Indicated by Urban (n=29) and Rural (n=38) Residents

Variable	Urban		Rural	
	Frequency	Percent*	Frequency	Percent*
Do not like to exercise	8	27	6	16
Uncertain about the correct way to exercise	3	10	1	3
Lack of place to exercise	3	10	12	31
Lack of time	3	10	5	13
Increase of chest pain, fatigue, shortness of breath	2	7	4	10
Weather	2	7	18	47
No benefit gotten from exercise	1	3	2	5
Family influence	0	0	2	5

* The total percent equals more than 100% as respondents were asked to check all that applied.

Respondents who did not exercise regularly (n=67) were also asked to identify factors that would have helped to maintain an exercise program. Only 12 of the group of 67 non-exercisers responded to this question. Answers were summarized and categorized according to major themes. Themes identified were related to health, geographic location, support system and motivation. Factors listed under the theme of "health" were: "improved health" (n=1), "not having a stroke" (n=1), and "less pain" (n=1). Two respondents indicated that living closer to exercise facilities would help in program maintenance. Factors listed for the theme of "support system" included: someone to exercise with (n=3), a better

exercise class (n=1), physical therapy (n=1), and more support from the health care team (n=1). Factors listed under motivation were desire and ambition (n=2).

Urban Versus Rural Participation in Cardiac
Rehabilitation Programs

Chi-square analysis was used to determine whether there was a significant difference in participation in a cardiac rehabilitation program following CABG surgery by place of residence. Table 6 illustrates the results of this analysis.

Table 6. Chi-Square Analysis: Geographic Location and Participation in a Cardiac Rehabilitation Program

	Urban		Rural		Total
	Fo	Fe	Fo	Fe	
Participants	34	(19)	10	(25)	44
Non-participants	28	(43)	69	(54)	97
Column Total	62		79		141

df = 1	calculated $X^2 = 30$	Fo = Frequency observed
p = 0.001	critical $X^2 = 10.827$	Fe = Frequency expected

The results showed that there was a significant difference in participation in a cardiac rehabilitation program between those living in urban areas and those living in rural areas. In this sample a significantly larger number of those living in an urban area participated in a cardiac rehabilitation program than those living in a rural area.

Influence of a Cardiac Rehabilitation Program on Maintenance
of a Therapeutic Exercise Program

Chi-square analysis was used to determine whether there was a significant difference in maintaining of a therapeutic exercise program based on participation in a post-surgery cardiac rehabilitation program. Table 7 illustrates the results of this analysis.

Table 7. Chi-Square Analysis: Maintenance of a Therapeutic Exercise Program By Participation in a Cardiac Rehabilitation Program

	Participation		Non-Participation		Total
	Fo	Fe	Fo	Fe	
Therapeutic Exercise Program	24	(23)	50	(51)	74
No Therapeutic Exercise Program	20	(21)	47	(46)	67
Column Total	44		97		141
df =1	calculated $X^2 = .6$		Fo = Frequency observed		
Non-significant at p = .05	critical $X^2 = 3.841$		Fe = Frequency expected		

The results of Table 7 indicated no significant difference. For this sample, participation in a post-surgical cardiac rehabilitation program was not related to maintenance of a long-term therapeutic exercise program.

Chi-Square analysis was subsequently used to determine whether participation in a cardiac rehabilitation program had a significant effect on maintenance of a therapeutic exercise program for subgroups of the sample based on urban or rural residents. Table 8 & 9 illustrate the results of these analyses.

Table 8. Chi-Square Analysis: The Effect of Participation in a Cardiac Rehabilitation Program On Maintenance of a Therapeutic Exercise Program for Urban Residents

	Participation		Non-Participation		Total
	Fo	Fe	Fo	Fe	
Maintenance of Therapeutic Exercise	19	(18)	13	(14)	32
Not Maintaining Therapeutic Exercise	15	(16)	14	(13)	29
Column Total	34		27		61

df =1

calculated $X^2 = 4$

Fo = Frequency observed

p = .05

critical $X^2 = 3.841$

Fe = Frequency expected

Table 9. Chi-Square Analysis: Effect of Participation in a Cardiac Rehabilitation Program On Maintenance of a Therapeutic Exercise Program for Rural Residents

	Participation		Non-Participation		Total
	Fo	Fe	Fo	Fe	
Maintenance of Therapeutic Exercise	5	(5.2)	37	(36.7)	42
Not Maintaining Therapeutic Exercise	5	(4.75)	33	(33.25)	38
Column Total	10		70		80

df = 1 calculated $\chi^2 = .023$ Fo = Frequency observed
 Non-Significant at $p = .05$ critical $\chi^2 = 3.841$ Fe = Frequency expected

At a level of significance of $p = .05$, there was a difference in maintenance of a therapeutic exercise program based on participation in a post-surgical cardiac rehabilitation program for urban residents. However, for this sample, participation in a cardiac rehabilitation was not a significant factor in influencing maintenance of an exercise program among rural residents.

CHAPTER 5

DISCUSSION, IMPLICATIONS AND RECOMMENDATIONS

Maintenance of a long-term therapeutic exercise program is an important factor in successful rehabilitation of the post coronary artery bypass graft (CABG) surgery patient. Various studies (American Heart Association, 1981; Pollock, Wilmore, & Fox, 1984), attest to the fact that exercise enhances recovery of physiological and functional capacity of this group of patients. Failure of post CABG surgery patients to maintain a long-term therapeutic exercise program is a problem frequently noted by health care personnel working with this group. Because the literature revealed little research data both about long-term maintenance of a therapeutic exercise program beyond a year and about CABG patients living in rural areas, this study was conducted to ascertain whether post CABG patients living in northcentral Montana assume responsibility for self-care through maintenance of a long-term exercise program.

The theoretical framework for this study was Orem's self-care theory. Before hospital discharge, the patient is usually compliant to medical recommendations, and has the opportunity to consult frequently

with members of the health care team. As recovery continues at home, compliance with the medical regimen evolves into self-care; the patient consults less frequently with the health care team and becomes more responsible for positive lifestyle changes.

The study was conducted using a descriptive survey design. Information was obtained by mailing a questionnaire to all of the persons who had undergone a CABG surgery between 1985 and 1987 at a hospital in northcentral Montana.

The overall response rate to the one-time mailing of the questionnaire was 56%. This represents an increase in the response rate usually expected in mailed surveys (Polit & Hungler, 1983). One reason for the high response rate may have been the fact that the questionnaires were sent to a purposive sample, a group of persons with a particular health problem. Another reason for the high response rate may be attributed to the fact that more than half of the sample consisted of rural persons. The Montana State University Survey Research Center reports that the response rate in surveys sent to rural populations is usually higher than 50% (personal communication, Bender, March, 1989).

Methods of Exercise

Over half of the study respondents indicated that they maintained a therapeutic exercise program. The most frequent types of exercise used by these respondents were walking and bicycling. Respondents indicated that other forms of exercises used were stretching, situps, and using a rowing machine. It is reasonable to question whether the latter types of exercise can actually be done for 30 minutes or more. Respondents who used this type of exercise may not have had an accurate understanding of a therapeutic aerobic exercise program.

Variables Helpful in Maintenance of a Therapeutic Exercise Program

The major reason that respondents indicated that they maintained an exercise program was because exercising made them feel better. This finding supports those of Pollock, Wilmore and Fox (1984) who found positive psychological and physiological benefits resulting from maintenance of an exercise program.

Support was the next major factor reported as having positive influence in maintaining a therapeutic exercise program. This included support from family, physician, friends, the cardiac rehabilitation nurse, attendance at Mended Hearts meetings and participation in cardiac

rehabilitation classes. Support systems that have a positive influence differed for the urban and rural respondents. Urban patients indicated that the formal support system, the cardiac rehabilitation nurse and participation in a cardiac rehabilitation program, was important in maintaining a therapeutic exercise program. Rural patients indicated that an informal support system, such as having someone to exercise with, was more important in maintenance of exercise. This finding supports those of a study involving kidney dialysis patients conducted by Snyder (1979). She found that rural persons were more resourceful in obtaining the help of other rural residents coping with the same chronic illness than were persons living in urban areas.

One-fourth of all respondents participating in a therapeutic exercise program, both urban and rural, indicated that fear of a heart attack encouraged them to continue exercising. This supports findings of Marston (1970) that fear of developing an illness increased patient compliance with maintenance of a therapeutic health regimen.

Variables Inhibiting Maintenance of a Long-Term Exercise Program

Items related to health were noted as factors that inhibited exercise in both urban and rural patients. These included arthritis,

fatigue, shortness of breath and impaired circulation to legs. The findings indicate that these patients may not be aware of available forms of exercise that are specific to certain physical limitations and can reduce specific symptoms as well as enhance cardiac functioning. It is important for the nurse to be aware of the patient's physical abilities when planning an exercise program. For post CABG surgery patients with other physical limitations, some aerobic exercises may be contraindicated while certain aerobic exercises may help to relieve symptoms.

Forty-seven percent of rural residents who did not exercise indicated that weather was a major factor that inhibited maintenance of a exercise program. Over 30% of this same group also said that lack of a place to exercise inhibited exercise maintenance. This contrasts with urban residents who did not exercise; only seven percent said weather inhibited exercise and ten percent indicated lack of a place to exercise as a problem maintaining an exercise program. These results indicate a greater dependence among rural persons on the ability to exercise outdoors, where weather can often be an inhibitor. Thus, for rural persons, alternatives to outdoor exercise should be suggested, such as the use of a stationary bicycle or the development of a measured walk in the local school gymnasium, similar to those developed in urban shopping malls.

Maintenance of a Therapeutic Exercise Program

More than half of the respondents in this survey indicated that they maintained a therapeutic exercise program for a period of 18 to 49 months post CABG surgery. This supports findings from the small number of previous studies which addressed long-term exercise maintenance (Ben-Ari et al., 1986; Shephard, Corey & Kavanagh, 1981). These investigators found that the majority of subjects maintained a long-term exercise program; however, conclusions of both studies were that participation in group cardiac rehabilitation programs was a primary factor influencing maintenance of exercise. This contrasts with the present study which found that participation in a cardiac rehabilitation program was not related to maintenance of an exercise program for the overall study sample and for the subgroup of rural residents.

The majority (57%) of those exercising therapeutically in the present study were rural residents; this finding lends support to research findings by Snyder (1979), and Weinert and Long (1987) which showed that rural persons were more self-reliant in developing their own health care strategies. Snyder conducted a descriptive study of kidney dialysis patients living in western Montana; Weinert and Long analyzed qualitative data collected by Montana State University graduate nursing

students about rural residents' perceptions of their health, health needs, and health services. These data indicated that rural residents were more likely to be self-reliant persons who used informal networks rather than formal professional health care assistance for support and health care maintenance. Weinert and Long also found that rural residents perceived health as the ability to continue to work. In the present study, rural residents who responded that they exercised therapeutically may also have felt the need for optimal recovery in order to resume an active working status.

Urban Versus Rural Participation in Cardiac Rehabilitation Programs

The finding that more urban residents than rural residents participated in a cardiac rehabilitation program was expected. The location of cardiac rehabilitation programs in urban settings makes them more accessible to urban residents. However, an unexpected finding was that almost half of the urban respondents in this study had not participated in a cardiac rehabilitation program. A possible explanation for this finding is that the importance of participation in such a program was not adequately emphasized by the patient's local or family physician. Lack of insurance to cover the cost of the program and lack of

transportation to a cardiac rehabilitation program also have contributed to non-participation. Further, elderly persons having CABG surgery may be dependent on others for transportation. For this population, a hospital shuttle service to provide transportation to a cardiac rehabilitation program may enhance attendance at classes.

Influence of a Cardiac Rehabilitation Program on Maintenance
of a Therapeutic Exercise Program

The finding that the majority of respondents had developed long-term therapeutic programs without the group support provided by a cardiac rehabilitation program was unexpected. This finding did not support those of Roviario, Holmes, and Holmsten (1984), and Eyherabide and Yates (1985), who found that group rehabilitation programs were important in maintenance of an exercise program. However, the findings of the present study did support the findings of studies conducted by Mulder (1981), Stevens and Hanson (1984), and DeBusk et al. (1985). All of these studies involved cardiac patients who were prescribed a therapeutic exercise program for at-home use with periodic physiological testing to verify maintenance of the program. While these studies addressed short-term maintenance of an exercise program (one to six months), results indicated that patients can maintain a therapeutic exercise program at

home without participating in a post-surgical cardiac rehabilitation program. Results from the present study provided new data regarding long-term exercise compliance among persons who did not participate in a post-surgical cardiac rehabilitation program. The study also provided data which permitted contrasts of urban and rural residents. The present study found that participation in a cardiac rehabilitation program was a significant factor helping to maintain an exercise program for urban residents, but not for rural residents.

Nursing Implications

Results of the present study indicate the need to help patients understand both what a therapeutic exercise program is and the importance of maintaining such a program for optimal recovery from CABG surgery. The study's findings indicate that the majority of post CABG patients did not attend cardiac rehabilitation classes which permit exercise monitoring and insure correct implementation of exercise prescriptions. Those patients who do not participate in cardiac rehabilitation programs need to have a thorough understanding of aerobic exercise prior to hospital discharge because they will not be under the supervision of health care professionals. Prior to discharge from the hospital, classes that focus on the optimal recovery of the CABG patient

should be instituted for patients and their families. These classes should include a variety of audio-visual materials useful in teaching the concept of therapeutic aerobic exercise.

Because information obtained from the nurse when the patient is hospitalized for surgery may not be completely retained, a follow-up class for patients and families may be needed. Classes such as these allow patients to discuss questions and problems that may have occurred since hospital discharge, express unexpected emotions that may have developed after surgery, and allow for nurses to review educational materials that were previously presented to the patient during hospitalization. For those unable to attend such classes, telephone follow-up or periodic home visits by the cardiac rehabilitation nurse can provide the educational and emotional support that may be needed.

Determining whether a strong support system exists can be important in helping patients maintain an exercise program. Those who lack motivation to exercise can benefit from the support of family, friends, and health professionals. For both urban and rural residents, the nurse should assess the needs of the patient, determine what resources for support are available, and develop a plan of care which will enhance maintenance of a health care regimen in collaboration with patients, their

families and their physicians. The nurse should be aware that urban patients may rely more on formal support systems such as the cardiac rehabilitation nurse or the physician, while rural residents may be more self-reliant and make greater use of informal support systems. For all patients, the nurse should determine what support system, formal or informal, will be utilized the most by the patient and integrate this information into discharge planning.

Physician support was found to be an important factor in maintenance of a therapeutic exercise program. Thus it may be helpful for nurses to clarify the concept of cardiac rehabilitation for family practice physicians, physicians specializing in internal medicine and rural physicians in general practice. The family practice and internal medicine physician can assist urban post CABG patients by encouraging them to participate in formal cardiac rehabilitation programs. The rural physician can encourage rural post CABG patients to continue with a therapeutic exercise program after discharge. If the support of these physicians is achieved, the patient, whether urban or rural, may be more likely to maintain a long-term therapeutic exercise program.

Findings from the present study indicate that the role of the nurse differs for urban patients who have access to cardiac rehabilitation

programs, and for rural residents whose access to health care facilities may be limited. Results of this study reveal that participation in a cardiac rehabilitation program significantly influences maintenance of a therapeutic exercise program for urban residents but not for rural residents. The post CABG patient living in an urban area should be encouraged by the nurse to participate in a cardiac rehabilitation program to facilitate maintenance of a therapeutic exercise program. Since participation in a cardiac rehabilitation program does not appear to significantly influence the rural post CABG patient, the nurse should consider emphasizing use of informal support systems for rural residents. For those who live in an urban area, social isolation, the reluctance to associate with persons who have similar health problems, can easily occur because of the patient's tendency to utilize health care professionals in coping with problems of chronic illness (Snyder, 1979). It is important for the nurse to foster self-care by encouraging participation in group cardiac rehabilitation programs which can offer social interaction and development of comraderie among patients. For the rural patient, efforts of the nurse should not attempt to alter the individual's existing system of health care and support, but should instead adapt a plan of care to fit the patient's lifestyle. Use of informal support systems in rural areas can be

a powerful source of health care maintenance. These groups can encourage self-reliance and friendships that are enhanced because of mutually shared health problems.

Although findings from this study indicated that a greater number of rural residents assume responsibility for self-care than urban residents, it does not appear that health care professionals are not needed by the rural patient. It is important for the nurse to promote existing informal support systems and individualize health care to meet the rural patients' needs (Snyder, 1979; Weinert & Long, 1987). A variety of nursing interventions can be used, such as periodic telephone consultation with the patient and family, and visiting support groups, whether formal or informal, to provide educational materials and update currently used methods. A program could be offered such as one developed by DeBusk et al. (1985) which utilized a portable telemetry system that enabled the patient to periodically transmit an electrocardiogram over the telephone to a cardiac rehabilitation center while exercising. This enhances self-care by allowing the patient, physician and nurse to consult as a team by discussing the present exercise program and any changes that may be needed. Helping the rural patient to adapt an exercise program to fit into an existing lifestyle is more beneficial than advocating an

exercise program in a distant urban area that is not practical for the patient.

Since every patient's health care needs are unique, factors such as place of residence, occupation, support systems, patient motivation and extent of chronic illness need to be considered in developing a plan of care. The assistance provided by the nurse needs to adapt to the patient's lifestyle. For example, in developing an exercise program for a rural rancher, it is unrealistic to expect that exercise can be done outdoors all year or done at the same time every day. Considering the harsh winters in Montana and the erratic hours the rancher is required to work, the nurse needs to consult with the rancher about such options as use of an indoor stationary bicycle when weather is inclement, and modifications in an exercise plan during busy work seasons. Health practices which require radical changes are less likely to be accepted by the patient than modifications which can easily fit into an existing lifestyle.

Recommendations for Further Research and Education

Replication of this study in other geographic areas is recommended in order to assess the applicability of findings to other populations. Since few studies address long-term maintenance of a cardiac rehabilitation exercise program, more longitudinal studies are recommended. Also, a

qualitative study using in-depth interviews could be useful in determining why more urban persons do not participate in cardiac rehabilitation programs. The data obtained in this study and most previous studies has been based on self-report from participants. Studies involving periodic physiological assessment of post CABG surgery patients could serve to verify patients' perceived improvements in health.

Results of this study need to be incorporated into nursing education programs, particularly in those states with predominantly rural populations. Nursing students should be made aware of the differences in health care needs of urban and rural patients. Nursing course content should emphasize that rural persons are more likely to be self-reliant in incorporating health care strategies. Rural people use different resources than urban persons; they are more likely to make greater use of informal support networks. Thus, nursing students need to learn to assess the formal and informal support systems.

The nurse is most often the member of the health care team who is in frequent contact with the patient. As an educator, clinician, researcher, manager, and consultant, the nurse can use the theory of self-care with the post CABG surgery patient. In a rural state such as Montana, it is common that patients do not see or hear from a health professional for

months. Thus, patients must assume responsibility for self-care and must be adequately prepared for their role in managing chronic illness. If the nurse can reinforce self-care behaviors in patients and their families through effective teaching, periodic consultations, and use of existing patient support networks, post CABG surgery patients, both rural and urban, will be better prepared to maintain their own health.

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APPENDICES

APPENDIX A
HOSPITAL CONSENT

HOSPITAL CONSENT

March 2, 1989

Jean Schreffler
Education Director
Missoula Extended Campus
Missoula, MT

RE: Karen Solomon

Dear Jean:

I have reviewed the proposal for the research project presented by Karen Solomon, including the cover letter sent by Montana Deaconess Medical Center to find willing subjects and the actual questionnaires themselves.

I approve of this study and the way it is organized. I see no problems either in confidentiality or in the quality of clinical material.

If you have any questions, please feel free to contact me at 791-5715.

Sincerely,



Sharon Dieziger, RN
Director of Critical Care Services
MDMC

/yb

APPENDIX B

LETTER TO PARTICIPANTS FROM HOSPITAL



**Montana
Deaconess**

Medical Center

1101 Twenty Sixth Street South
Great Falls, Montana 59405-5193
406 761-1200

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LETTER TO PARTICIPANTS FROM HOSPITAL

March 7, 1989

Dear Former Patient,

Karen Solomon is a graduate student conducting research in the area of Cardiac Rehabilitation. Karen is a former employee of ours who managed our Cardiac Rehab program.

We have reviewed Karen's proposal and believe it would be a valuable study that could be beneficial to patients and our program.

We have maintained confidentiality of records by preparing the mailing requested in the study of coronary bypass patients between 1985 and 1987.

If you feel you can respond, we would encourage your participation.

Thank you very much.

Sincerely,

Gretchen Fitzgerald, RN
Vice President of Nursing

APPENDIX C

LETTER OF CONSENT FOR PARTICIPATION

Letter of Consent for Participation

Dear Sir/Madam:

I am a graduate student at the Montana State University school of Nursing, completing work for a Master's Thesis. I would like to enlist your help for completion of this study.

The purpose of my study is to evaluate whether persons living in northcentral Montana who have had coronary artery bypass surgery follow recommendations for exercise after surgery. I am also interested in identifying what factors may influence participation in an exercise program. I am aware that you have had bypass surgery, and therefore ask you to participate in the study by filling out the enclosed questionnaire.

I want to assure you that your participation is voluntary and you have the right to refuse to participate or withdraw from the study at any time. Your answers will remain confidential, as you are asked NOT to write your name on the questionnaire. All answers will be part of a group response, so your reply cannot be isolated from the others. Upon completing of the study, all questionnaires will be destroyed. Results of the study will be available by written request to me at the address below.

There are no physical or emotional risks from participation in the study, other than the inconvenience of filling out the questionnaire. Time estimated to complete the form is 20 minutes. Return of the completed questionnaire indicates that you agree to participate in this study.

If you decide to participate please complete the enclosed questionnaire and return it to me within TWO weeks of this letter. Enclosed is a stamped, self-addressed envelope for your convenience.

Thank you for your time and cooperation.

Karen Salomon, R.N.
Graduate Student, MSU
P.O. Box 266
Seeley Lake, MT 59868
Phone 677-2279

APPENDIX D
STUDY QUESTIONNAIRE

QUESTIONNAIRE

Please answer the following questions as best you can. There are no right or wrong answers. If you wish to make additional comments, feel free to write in the margin next to the question. Do NOT write your name anywhere.

1. What was the date of your heart surgery?
month _____ year _____

2. Did you participate in an outpatient cardiac rehabilitation program, like the Phase II program at Montana Deaconess Medical Center, following your surgery?
yes _____ no _____

3. Do you presently follow an exercise program?
yes _____ no _____ (if no, skip to #5)
(If you answer yes complete 4 a, b, c, d).

4a. What does your exercise program primarily consist of?

_____ walking

_____ stationary bicycling

_____ jogging

_____ alternate walk/stationary bike

_____ aerobic dance

_____ swimming

_____ other (please describe)

4b. Do you exercise for at least 30 minutes during your exercise session?

yes _____ no _____

4c. How many days a week do you generally exercise?

_____ 1-2 days/week

_____ 3-5 days/week

_____ 6-7 days/week

4d. If you regularly exercise, indicate which of the following are helpful in maintaining your exercise program. Check all that apply.

- _____ outpatient cardiac rehabilitation program
- _____ prescribed home exercise program
- _____ family support - spouse, children, brother/sister, other
- _____ attendance at Mended Hearts meetings
- _____ easy to follow exercise programs (ie., fits into daily routine)
- _____ encouragement from a cardiac rehabilitation nurse
- _____ fear of heart attack
- _____ made me feel better
- _____ had someone to exercise with
- _____ other (please describe)

5a. If you are NOT regularly exercising, indicate which of the following prevented you from maintaining a regular exercise program? Check all that apply.

_____ increase in chest pain, fatigue, shortness in breath

_____ family influence

_____ weather

_____ lack of place to exercise

_____ influence of friends

_____ lack of time

_____ do not like to exercise

_____ no benefit gotten from exercise

_____ uncertain about the correct way to exercise

_____ unclear instructions

_____ other (please describe)

5b. If you do NOT regularly exercise, what would have helped you maintain an exercise program?

6. How physically active are you compared to before your surgery?

_____ more active

_____ less active

_____ no real difference

7. Since your initial surgery, have you had

another heart surgery? yes _____ no _____

angioplasty? yes _____ no _____

heart attack? yes _____ no _____

other serious heart problems?

yes _____ no _____ (please describe)

8. What is your age?

9. Sex (please circle) M F

10. Current marital status

_____ married

_____ widowed

_____ never married

_____ separated

11. How many years did you attend school (please check)

0-8 years _____

9-12 years _____

over 12 years _____

college graduate _____

12. Did you live in Great Falls at the time of your surgery?

yes _____

no _____

13. If you did NOT live in Great Falls, how many miles from Great Falls did you live? _____

Thank you for taking the time to fill out this questionnaire.

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