A COMPARISON OF THE THREE-MONTH AND SIX-MONTH POST PHASE II CARDIAC REHABILITATION PROGRAM EXERCISE VARIABLES

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EXERCISE VARIABLES

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CHAPTER I

INTRODUCTION

Introduction

Cardiovascular disease is the leading cause of mortality in the United States and accounts for almost 50 percent of deaths each year. Coronary heart disease (CHD) represents one of the cardiovascular diseases. CHD, with its clinical manifestations of stable angina pectoris, unstable angina, acute myocardial infarction, and sudden cardiac death affects nearly 14 million Americans (Franklin, Balady, Berra, Gordon, & Pollock, 1998; Balady, Fletcher, Froelicher, Hartley, Krauss, Oberman, Pollock, & Taylor, 1994). This number includes those with angina pectoris (chest pain) as well as persons with impairment of the heart's ability to pump effectively (congestive heart failure), resulting in inadequate blood flow to the organs and tissues. Nearly 1.5 million Americans have heart attacks each year, and about a third of them die. Heart attacks are equal opportunity killers, as about half of the nearly 500,000 annual heart attack deaths are among women. Every year more than 700,000 patients with heart disease undergo either bypass surgery or balloon angioplasty (Franklin, et al., 1998). The morbidity and subsequent disability incurred from coronary heart disease alone have far-reaching medical and socioeconomic implications. The 700,000 coronary revascularization procedures performed each year, together with the associated hospital stays, medications, medical personnel, and health care facility charges, resulted in a cost of more than $56 billion for coronary heart disease in 1994. More than 14 percent of this cost was due to lost productivity from temporary or

permanent disability. Thus, continued major efforts in primary prevention as well as continued advances in medical and surgical techniques combined with effective programs in cardiac rehabilitation (CR) are critical to help reduce overall incidences and to manage the consequences of CHD (Balady, et al., 1994).

It has been reported that each year in the United States approximately 650,000 individuals have a first heart attack. Heart attack survivors are at increased risk for recurring heart attacks, cardiovascular complications, and sudden cardiac death (Ayala, Orenstein, Greenlund, Kroft, Neff, & Mensah, 2003). Sedentary lifestyle is recognized as an independent risk factor for the development of cardiovascular disease by contributing to an estimated 250,000 deaths each year (Fletcher, 1992). Considering this data, CR programs should be considered as a major component of risk-reduction strategies for individuals with heart problems. Such programs consist of counseling that includes the management of lipid levels, hypertension, weight, and diabetes; smoking cessation; psychosocial interventions; and physical activity counseling and exercise training (Balady, Ades, & Comoss, 2000). In addition, analyses of clinical trials illustrate that exercise prescription with supervision can lower mortality rates among individuals with cardiovascular disease as well as improve their psychosocial functioning. Researchers have demonstrated reductions of 20 to 25 percent in the overall mortality for CR participants compared to those who did not take part in such a program (Suter, Suter, Perkins, Bona, & Kendrick, 1996). Although cardiac rehabilitation programs have been associated with substantially improved survival rates (Whellan, Shaw, & Bart, 2001), the majority of eligible patients do not participate in the programs (Blackburn, Foody, & Sprecher, 2000). According to the findings of the study conducted in 19 US states by

Ayala, et al. (2003), less than one third of individuals that have had a heart attack have participated in a cardiac rehabilitation program. Thus, including a cardiac rehabilitation program in all intervention plans for eligible patients with coronary heart disease should remain a key strategy for reducing further disability (Ayala, et al., 2003).

Admitting eligible individuals to CR programs is only one of two concerns. The second concern that remains is the compliance of Phase II graduates to a newly acquired behavior, such as a demanding diet and exercise program, as a new lifestyle. Dropout rates among CR participants are as high as 25 percent in the first 3 months following discharge from the CR program and up to 50 percent in just the first 6 months (Bock, Albrecht, Traficante, Clark, Pinto, Tilkemeier, & Marcus, 1997). Current research also shows that this behavior pattern is consistent with the behavior of the general population starting exercise training. Approximately one out of every two American adults who start an exercise program will drop out within a year (Bock, et al., 1997).

Statement of the problem

The problem in this study was to investigate long-term compliance to an exercise program among the graduates of Phase II CR program at St. Francis Hospital in Tulsa at three and six months following discharge from the program. The long-term compliance was to be represented by whether or not the Phase II graduates maintained the exercise behaviors developed while participating in the CR program for at least three and six months after completion.

Purpose of the study

Cardiovascular disease is the leading cause of mortality in the United States with approximately 650,000 individuals having their first heart attack each year (Ayala, et al., 2003). In addition heart attack survivors are at increased risk for recurring heart attacks, cardiovascular complications, and sudden cardiac death. The major reversible causes of coronary heart disease are thought to be smoking, raised cholesterol, uncontrolled hypertension, diabetes, poor diet, and the lack of physical activity. Thus, a major component of risk-reduction strategies for individuals with these risk factors should be a cardiac rehabilitation program consisting of nutritional and physical activity counseling as well as exercise training. CR programs have been associated with substantially improved survival rates among its participants (Whellan, et al., 2001). However, current research also shows that approximately one out of every two American adults who start an exercise program will drop out within a year (Bock, et al., 1997). The latter data as well as the interest of the Saint Francis Hospital personnel made it very tempting to investigate whether this statistic also applies to the graduates of the Saint Francis Phase II CR program. By conducting this study we could determine what is the approximate number of individuals who continue exercising at least three times per week at three and six months after graduation from the Phase II CR program. The information derived from this study may be found useful for the Saint Francis Phase II CR program, as well as other CR program developers, in creating, modifying, or improving existing Phase II CR programs so they result in greater compliance to exercise and diet changes over a longer period of time among its graduates.

Hypotheses / Research Questions

The following null hypothesis was examined:

Ho 1

There will be no difference between the responses at the three- and six-month time periods to the exercise related questions on the Lifestyle Questionnaires.

Delimitations

The study had the following delimitations:

1. The subjects were all from the same mid western community.
2. The sample subjects were participants of a single Phase II CR program.
3. The subjects were successful graduates of a specific Phase II CR program.
4. The subjects had to voluntarily participate in the study.
5. The subjects had to answer all of the questions on the questionnaire in order for their information to be considered as a part of the final results of the study.
6. Only patients who had been referred to the CR program by their physician were included in the study.

Limitations

The research was limited by the following:

1. The subjects were asked to self-evaluate and self- report their compliance to their exercise program and diet plan and there was no control over whether the patient answered honestly or gave the answer he/she believed was desired.

2. There was no control over regular attendance or completion of the Phase II CR program.
3. Except for randomization, there were no attempts made to account for variability due to existing physical or mental status of the subjects.
4. The subjects represented an uneven number of male and female graduates from the Phase II CR program.

Assumptions

The following assumptions were made:

1. It was assumed that each subject on their own answered the questions provided by the researcher.
2. It was assumed that each subject made an honest effort in answering the questions on both questionnaires.
3. It was assumed that the patients performed the exercises correctly.

Definition of terms

Acute myocardial infarction – another word for heart attack. Scarring or death of heart muscle due to lack of oxygen. Oxygen-rich blood is blocked by a blood clot in a coronary artery, usually due to plaque-related narrowing of the artery (Garrett, 2002).

Angina – chest pain usually caused by a lack of oxygen from restricted blood flow to the heart (heart ischemia). Pain may also spread to the neck, jaw, or arm. It is the primary symptom of coronary artery disease. There are two main types of angina; stable and

unstable. Stable angina is the most common type and it occurs when the heart is working harder than usual. Its main characteristics are a regular pattern (after several episodes person learns to recognize the pattern and can predict when it will occur) and a pain that usually goes away in a few minutes after person rests or takes angina medicine. Unstable angina is a very dangerous condition that requires emergency treatment. It is a sign that a heart attack could occur soon. Unlike stable angina, it does not follow a pattern. It can occur without physical exertion and is not relieved by rest or medicine (Garrett, 2002).

Balloon angioplasty – a procedure for the treatment of narrowed arteries. A balloon tipped catheter is inserted into an artery, most commonly the coronary arteries, to press plaque back against the vessel wall. This widens or unblocks the artery to r the blood flow (Garrett, 2002).

Bypass surgery – a surgery to treat coronary artery disease. The surgeon takes a segment of a healthy blood vessel from another part of the body, and uses it to create a detour around the blocked portion of a blood vessel in the heart (Garrett, 2002).

Cardiac rehabilitation program – a supervised program designed for heart patients to improve their overall physical and mental functioning following a heart related surgery or a diagnosis of heart disease (Garrett, 2002).

Compliance – fulfillment by the patient of the caregiver's prescribed course of treatment (Mosby, 1992).

Congestive heart failure – another word for heart failure. A chronic condition in which at least one chamber of the heart is not pumping well enough to meet the body's needs. This leads to congestion in the lungs or pulmonary blood vessels and may cause fluid backup or swelling in the lungs, legs, and ankles (Garrett, 2002).

Coronary heart disease (CHD) – also called coronary artery disease. A chronic disease in which there is a hardening (atherosclerosis) of the coronary arteries. The main symptom of CHD is angina, a type of chest pain, pressure, or discomfort (Garrett, 2002).

Phase II cardiac rehabilitation - Phase II cardiac rehabilitation is a 12 week / 36 session program initiated immediately after discharge from the hospital. This outpatient program assists the patients and their families in adjusting to heart disease and modifying their lifestyle.

It includes telemetry monitored exercise, nutrition and stress management consultations, and smoking awareness classes. The participant must have a physician's order for admission. Treadmill tests are performed prior to admission and upon completion to assist in developing a comprehensive exercise prescription that is made individually for each participant (Garrett, 2002).

Risk Factor –an aspect of personal behavior or lifestyle, an environmental exposure, or inherited characteristic, which on the basis of epidemiological evidence is known to be associated with health-related condition or conditions considered to be important to prevent (ACSM, 2000).

CHAPTER II

REVIEW OF LITERATURE

Introduction

In 1964 the World Health Organization defined a cardiac rehabilitation program as "the sum of activity required to ensure cardiac patients 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 life" (Dafoe, et al., 1997). Presently cardiac rehabilitation services are comprehensive and long-term programs involving medical evaluation, prescribed exercise, cardiac risk factor modification, education, and counseling. These programs are designed to limit the physiologic and psychological effects of cardiac illness, control cardiac symptoms, reduce the risk for sudden death or re-infarction, stabilize or reverse the atherosclerotic process, and enhance the psychosocial and vocational status of patients with established coronary heart disease (Dafoe, et al., 1997).

The following positive risk factors (ACSM, 2000) raise the probability of developing coronary heart disease:

- *Family History:* Myocardial infarction, coronary revascularization, or sudden death before 55 years of age in father or other male first-degree relative (e.g., brother or son), or before 65 years of age in mother or other female first-degree relative (e.g., sister or daughter)

- *Cigarette Smoking:* Current cigarette smoker or those who quit within the previous six months
- *Hypertension:* Systolic blood pressure greater than or equal to 140 mm Hg or diastolic blood pressure greater or equal to 90 mm Hg, confirmed by measurements on at least two separate occasions, or if a person is on antihypertensive medication
- *Hypercholesterolemia:* Total serum cholesterol of greater than 200 mg/dL or high-density lipoprotein cholesterol less than 35 mg/dL, or if a person is on lipid-lowering medication. If low-density lipoprotein is available, use greater than 130 mg/dL rather than total cholesterol of greater than 200 mg/dL
- *Impaired Fasting Glucose:* Fasting blood glucose greater than or equal to 110 mg/dL confirmed by measurements on at least two separate occasions
- *Obesity:* Body max index greater than or equal to 30 kg/m2 or waist girth of over 100 cm
- *Sedentary Lifestyle/Physical Inactivity:* Persons not participating in a regular exercise program or meeting the minimal physical activity recommendations (accumulating 30 minutes or more of moderate physical activity on most days of the week) from the U.S. Surgeon General's report

Negative CHD risk factors (ACSM, 2000) are those factors that reduce the danger for developing coronary heart disease:

- *High Serum HDL Cholesterol:* Over 60 mg/dL

It is standard to sum the risk factors when creating medical judgments. While doing so, if the high serum HDL cholesterol is high (greater than 60 mg/dL) one risk factor is subtracted from the sum of positive risk factors. This is because elevated serum HDL cholesterol reduces the danger for developing coronary heart disease and, thus negates one positive risk factor (ACSM, 2000).

Phases and Components of CR Program

The treatment for CHD consists of revascularization, including the two most commonly used techniques to restore the blood supply to the heart; angioplasty (PTCA) and coronary artery by-pass (CABG) surgery. Both techniques can improve symptoms of angina and under certain circumstances can increase life expectancy. However, these benefits are likely to be short lived unless they are supplemented by changes in the patient's lifestyle and long-term devotion to medication by means of participating in a cardiac rehabilitation program. In general CR programs are divided into four phases. Phase I is a hospital inpatient care. Phase II, which may last up to 12 weeks and involves continuous EKG monitoring is the immediate outpatient period. Phase III is the intermediate outpatient phase. Phase III varies in length (up to four or six months) and engages intermittent or no EKG monitoring. Phase IV is the maintenance outpatient part of the CR program that involves long-term follow-up with no EKG monitoring. Typical CR programs are led by a multidisciplinary team of well-trained professionals and supervised by a cardiologist, who together assist the participants with setting personal goals for recovery. The multidisciplinary team offers patients a comprehensive educational program and exercise prescription, as well as additional services modified to

meet the patient's needs; including weight loss strategies, lipid management, smoking cessation techniques, blood pressure control, management of diabetes mellitus, vocational counseling, and measures to decrease stress and improve psychosocial well-being (see Figure 1) (Dafoe, & Huston, 1997).

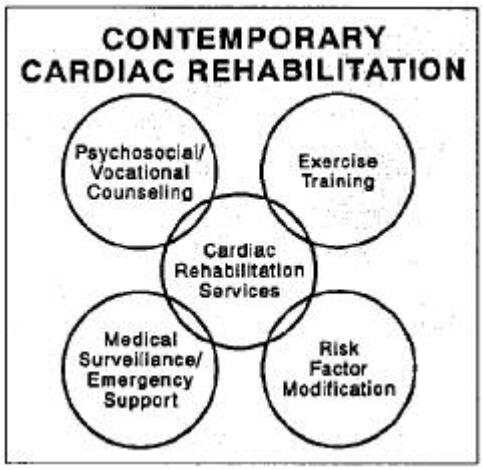


Figure 1. Core Components of a Contemporary Cardiac Rehabilitation Program (Franklin, et al., 1998)

Educational Programs for CR Patients

Education and counseling are essential components of CR programs. With the tendency toward early discharge, patients and their families need further explanations about how best to live with heart disease and how to develop lifestyle-change strategies. To put into practice such changes, information about the various risk factors and practical techniques to modify behaviors are provided. Such education can be provided during official and organized sessions with group support or on a one-on-one basis (Dafoe, et al., 1997). It is unrealistic to convey all of the educational information in a few sessions. The educational needs of each patient and his/her family are unique and depend on a number of factors including gender, age, level of education, and the readiness for change of any

of the risk factors. A considerable amount of unfiltered information about heart illness is available through the media, the Internet, well-meaning friends and family members. However, the cardiac rehabilitation personnel can help individuals distinguish the good information from the bad and become informed health care consumers (Dafoe, et al., 1997).

Exercise

Exercise training created the basis of CR programs in the 1950s for patients who had myocardial infarctions. Today, exercise remains a keystone of cardiac rehabilitation programs. To create a realistic exercise program, rehabilitation personnel conduct a detailed evaluation that includes documentation of pre- and post-event exercise habits and the patient's aerobic capacity as established by exercise testing. Patients with heart problems are naturally and unsurprisingly worried about the appropriate intensity of exercise as well as safe vocational and non-vocational activities (Dafoe, et al., 1997). Most individuals are not content with vague suggestions to "listen to your body" or "just try out any activity," they appreciate precise guidelines. It is, obviously, impossible to give an exact intensity of exercise that will be suitable in all situations. This is because the heart disease process is dynamic, the condition of the coronary arteries varies with circadian rhythms and the workload for tasks is affected by a variety of environmental factors (Dafoe, et al., 1997; Dafoe, 1992).

Patients with uncomplicated heart problems can be encouraged to reach a heart rate 70 to 85 percent of their maximum heart rate achieved during exercise testing or, in the presence of ischemia, a heart rate below the ischemic threshold. For patients who are out of shape or those with limiting medical conditions exercise training intensities in the

range of 50 to 70 percent of the peak heart rate are recommended (Cardiac Rehabilitation Guideline Panel, 1995; American College of Sport Medicine, 1995) This more moderate training intensity has been shown to stimulate a traiing response, improve functional capacity, and is likely to improve long-term devotion. The success of using exercise as a therapeutic tool requires a thorough knowledge of the effects of exercise on various medical conditions. The exercise therapist is expected to have considerable skill developing and modifying the exercise prescription according to the individual medical and psychological needs of each patient (Dafoe, et al., 1997).

How much exercise is required for a beneficial effect? "Exercise is similar to most biologic variables in that there appears to be a continuous gradient in its cardio protective effect" ("Physical activity," 1996). Thus, inactive patients should be encouraged to increase their activity to mild or moderate levels in order to expend 1000 to 1500 kcal per week. This can be achieved by daily walks, up to 17 km per week, and improved activity habits such as using the stairs instead of elevators. The best possible benefits accumulate from increasing the activity intensity to expend more than 1500 to 2000 kcal per week, which is usually achieved by exercising 4 or 5 times a week, with each session being 45 to 60 minutes long. A typical exercise program is designed to expend 200 to 300 kcal per session. The threshold for a positive effect from exercise varies for each of the risk factors, but, if the goal of expending 1500 to 2000 kcal per week can be achieved, then all of the end points should improve (Dafoe, et al., 1997).

A major modification regarding cardiac rehabilitation programs in the last decade has been the inclusion of strength training for properly screened patients. Weight training, according to specified guidelines, has been shown to be safe, to improve aerobic

tolerance, and to help with the physical demands of jobs and activities of daily living (Cardiac Rehabilitation Guideline Panel, 1995; American College of Sport Medicine, 1995).

Weight Loss Strategies

"Obesity, commonly defined as a body mass index over 27, is relatively common in adults and is well known to be associated with hypertension, non-insulin-dependent diabetes mellitus and coronary artery disease" (Dafoe, et al., 1997). A multidimensional intervention program is usually necessary to provoke significant weight loss. Dietary recommendations often involve lower dietary fat, moderate intake of concentrated sugars, and portion control. Patients who can do the above in combination with their exercise training are usually very successful in losing weight. Often, however, overweight or obese patients have a long history of inactivity and dislike formal and organized exercise programs. Thus, the cardiac rehabilitation personnel need to encourage the gradual resumption of physical activities and look for inventive alternatives to traditional exercise classes that are more appealing to overweight or obese patients (Dafoe et al., 1997). In addition the exercise intensity should be in the low- to moderate-intensity range in order to produce an energy expenditure of 300 kcal or more per each session and present minimal risk of orthopedic problems (American College of Sport Medicine, 1995).

Lipid Management

"It is well recognized that optimal management of lipid levels can mitigate symptoms as well as favorably slow the progression of heart disease" (Dafoe, et al., 1997). Traditionally, cardiac rehabilitation programs have involved education about the purpose of diet and cholesterol, dietary changes to decrease the intake of saturated fats,

exercise, and weight loss in order to encourage a more favorable lipid status (Dafoe, et al., 1997). According to recent guidelines, target lipid levels for patients with known cardiac illness "include a low-density lipoprotein (LDL) cholesterol level of less than 2.5 mmol/L, an HDL cholesterol level of more than 1.0 mmol/L and a triglyceride level of less than 1.8 mmol/L"(National Cholesterol Education Program, 1993).

Lipid levels may fall temporarily after myocardiac infarction (MI) or bypass grafting. Thus, a measurement of the patient's fasting lipid levels should be conducted 8 weeks after the cardiac event as an element of a complete risk-factor evaluation. If the lipid levels are higher than those listed above, then both lifestyle modifications, such as low-fat diet and exercise, and treatment with lipid-lowering medications are recommended (Dafoe, et al., 1997).

Educating patients about lipid-lowering diets can be complicated, "because of the differences between dietary and serum cholesterol as well as between saturated and unsaturated fats and the difficulty in learning how to determine the percentage of fat in the diet" (Dafoe et al., 1997). Dietary modifications require patients to understand food labels, prepare different foods, and convince their family members to join them in practicing their new diet. Most cardiac rehabilitation programs have a dietitian as a member of the multidisciplinary team and he or she can facilitate group or individual educational sessions that will help patients accomplish a more favorable lipid standing or lose weight (Dafoe et al., 1997).

Aggressive lifestyle changes, such as those involved in the very low-fat diets recommended by Ornish, Brown, Scherwitz, Billings, Armstrong, and Ports (1990) or Schuler, Hambrecht, Schlierf, Niebauer, Hauer, and Neumann (1992) can provoke

regression of atherosclerotic plaques comparable to that provoked by lipid-lowering agents. There are some cardiac rehabilitation programs that offer support groups for participants who are attempting such dietary interventions. However, because many people are not able to maintain these very low-fat diets, lipid-lowering agents may be required as well. "An encouraging trend in rehabilitation is the formal linkage of rehabilitation programs with lipid clinics for a combined medical and lifestyle treatment approach" (Dafoe, et al., 1997).

Smoking Cessation

According to Wilhelmsen (1988) smoking cessation after MI reduces the probable risk of death by 40 to 60 percent as well as decreases the risk of vein graft failure (Hermanson, Gersh, & Frye, 1988) and the occurrence of angina (Deanfield, Wright, & Krikler, 1984). A combined educational and behavioral intervention program can cause smoking termination among 17 to 26 percent of smoking patients (DeBusk, Miller, Superko, Dennis, Thomas, & Lew, 1994; Taylor, Huston-Miller, Killen, & DeBusk, 1990). Most CR programs offer education and other interventions, for example, stress management, which may help with termination of smoking. The researchers claim that individuals who are still smoking upon entry to cardiac rehabilitation programs are often the strongly addicted, headstrong smokers. In most cases, by the time these patients reach a cardiac rehabilitation program, they most likely have been lectured to stop smoking by health care workers, family members, and coworkers. However, despite their resistance, it is still advisable to have a thorough discussion with such participants, as they may not know the impact of termination of smoking on other factors such as low HDL cholesterol levels and the rate of recurrence of angina (Dafoe et al., 1997). It is also often the case

that such patients usually need to have success in another area of risk-factor modification, such as weight loss, before they can focus on smoking cessation. In such cases additional aids such as nicotine gum or the patch are often needed. However, it is important to remember that "patients who use the nicotine patch should remove it before exercise to avoid an increased absorption of nicotine through the vasodilated skin overlying exercising muscle" (Dafoe, et al., 1997).

Blood Pressure Control

Cardiac rehabilitation programs can offer frequent measurements of blood pressure (BP) and encourage appropriate lifestyle modifications that may lessen resting and exercise BP levels. Such lifestyle modifications include "weight reduction, increased physical activity, reduced dietary sodium levels, and moderate alcohol consumption" (National High Blood Pressure Education Program, National Heart, Lung, and Blood Institute of Health 1993). In the case of patients with abnormal BP the exercise program may need to be tailored so that aerobic exercise and resistance training are in the lower intensity range (American College of Sport Medicine, 1995). If drug treatment is necessary, then extra information should be provided concerning the purpose of suggested drugs, their potential side effects, and tactics to improve compliance.

Management of Diabetes Mellitus

"Patients with diabetes mellitus are at 2 to 5 times greater risk of coronary artery disease than those who are normoglycemic" (Dafoe, et al., 1997) and those diabetic individuals with heart illness should be given a high priority for cardiac rehabilitation programs. The complications of diabetes mellitus including neuropathy, retinopathy, and nephropathy all influence the exercise prescription for diabetics. The changed dietary and

exercise routines practiced while participating in a cardiac rehabilitation program influence glycemic control. Blood glucose levels must be monitored prior to and following exercise sessions at the beginning of the CR program and, if levels are stable, as indicated thereafter (Dafoe et al., 1997). Close communication is required between the treating physician and the cardiac rehabilitation staff in order to optimize medical supervision (American College of Sport Medicine, 1995). Graded exercise testing is suggested if any physical activity more strenuous than walking is performed. This recommendation is particularly important for individuals with diabetes mellitus because of their higher occurrence of silent ischemia (Dafoe, et al., 1997).

Maximizing Psychosocial Well-being

Depression and social isolation after MI are major risk factors for death (Cardiac Rehabilitation Guideline Panel, 1995; Frasure-Smith, Lesperance, & Talajic, 1995). Cardiac rehabilitation programs assist health care professionals in identifying individuals who are significantly depressed and assist in beginning a suitable treatment that acts in synergy with other elements of the cardiac rehabilitation program, such as physical activity (North, McCullagh, & Tran, 1990). Friendship and altruism often build up among participants in cardiac rehabilitation programs and these qualities are very helpful in nurturing an original social support system.

Since the family, as individual members and as a unit, is affected by a cardiovascular episode, cardiac rehabilitation programs include the spouse and concerned family members in many educational sessions (Dafoe et al., 1997). Literature that addresses the spouse's concerns is available (Levin, 1987) and support groups help spouses deal with role modifications.

It is a general perception among individuals with heart problems that stress is a key contributory factor to their illness. Thus, participation in the stress-management programs helps the patients obtain skills that may lessen their "need for maladaptive supports, whether these be nicotine, alcohol, overwork or food" (Dafoe, et al., 1997). The trauma caused by a cardiac episode typically aggravates any pre-existing stressors, whether they are marital, financial, or family-related. Dealing with these stressors may involve individual, couple, or family counseling by the patient's physician, an appropriate therapist to whom the patient is referred, or one of the trained cardiac rehabilitation team members (Dafoe, et al., 1997).

For many patients, return to work after experiencing a cardiac event is an important objective. The financial realities of the patient's life and the life of his or her family often depend on a profitable employment. The CR program can help ease the transition of returning to work by providing objective measurements of the patient's functional capabilities, improving the patient's fitness capacity, from both an aerobic and strength point of view, and by teaching needed skills, such as stress management, for better functioning in the work environment (Dafoe, et al., 1997).

Comprehensive CR programs incorporate exploring with the patients what their heart illness means to them. For some people the diagnosis of heart illness may have a minimal effect on them, but most individuals describe the diagnosis as a "wake-up call" that motivates an evaluation of all aspects of their lives (Dafoe, et al., 1997). The latter group of individuals often views the diagnosis as a time of change and new direction. There is a plethora of literature that is available for those going through this type of re-evaluation and reorientation (Hollis, 1993; Kushner, 1981).

Compliance After Graduation from the Phase II CR Program

Most Americans are aware of the fact that cardiovascular disease is the leading cause of the mortality in the United States and it accounts for almost 50 percent of deaths each year (Ayala, et al., 2003). It is difficult, if not impossible, to turn on the television or glance at a newspaper without seeing some sort of message about the growing number of deaths caused by heart illness. The mass media and the scientific evidence reinforce the idea that the major reversible causes of heart disease are smoking, raised cholesterol, uncontrolled hypertension, diabetes, poor diet, and lack of physical activity. Thus, according to the literature a major component of risk reduction strategies for individuals with these above risk factors is a CR program, which in most cases consists of nutritional counseling that includes the management of lipid levels, hypertension, weight, and diabetes; smoking cessation when necessary; psychosocial interventions; and physical activity counseling and exercise training (Balady, et al., 2000).

According to the research, cardiac rehabilitation programs have been associated with substantially increased life expectancy among its participants (Whellan, et al., 2001). However, at the same time research also shows that CR program graduates tend to weaken their compliance toward newly acquired diet and exercise related behaviors with time, following the discharge from the program. The following paragraph will focus on the literature that talks about the tendencies of the Phase II CR program graduates with regard to their continuation with the lifestyle changes developed during their participation in Phase II CR programs.

Continuation with the Lifestyle Changes

According to the literature CR programs have been connected with significantly improved survival rates among its patients. However, the question is whether these patients continue with their newly developed lifestyles after exiting a twelve-week Phase II CR program. This is because the effectiveness of risk factor reduction interventions is greatly dependent upon compliance. It is understandable that poor compliance to cardiac rehabilitation practices limits the effectiveness of the intervention. Unfortunately, the literature shows that despite the positive benefits that may be derived while in cardiac rehabilitation, long-term compliance to health promoting behaviors such as diet and exercise remains low among CR graduates. It is estimated that less than 20 percent of cardiac patients initiate comprehensive treatment, such as CR program, aimed at risk factor reduction and remain compliant for longer than 6 months following graduation from the program (Gordon, & Haskell, 1997). Dropout rates among CR participants are as high as 25 percent in the first three months following discharge from a CR program and up to 50 percent in just the first six months (Bock, et al., 1997). Results of a recent study conducted by Wilkinson (2003), with a sample size equal to 62 subjects, reported that one-third (37 percent) of Phase II CR program graduates continued their exercise programs for at least 3 months after completing the CR program. This, however, leaves a substantial (63 percent) number of individuals who dropped out from the training program in a three-month period after exiting the CR program.

One reason for this lack of compliance may be the failure to address participants' differences in health behavior motivation (Fleury, 1991). Various intervention methods may need to be used to assist in motivating CR patients who need to lower their risk

factors through lifestyle modification. And reducing risk factors is essential in reducing recurring heart attack.

Studies have shown that a multi-factorial approach (i.e.signing commitment, family involvement, recreational activities, educational component, etc.) significantly improves compliance rates among cardiac rehabilitation patients (Huerin, Rosario, Bergman, Belardi, Trivi, Guzman, & Rubinstein, 1998). CR participants with an improved understanding of heart disease demonstrate better compliance with their recommended treatment. Farther, compliance to cardiac rehabilitation practices influences the clinical outcomes that ultimately affect quality of life and reduces the risk of subsequent morbidity and mortality (Pashkow, Ades, Emery, Frid, Miller, Peske, Reardon, Schiffert, Southard, & ZuWallack, 1995).

Researchers have found that patients' compliance to exercise is strongly related to improvement in their exercise capacity. In addition, a sedentary lifestyle preceding the coronary event has been associated with a very poor compliance to the exercise program (Hershberger, Robertson, & Markert, 1999).

Gordon and Haskell (1997) recommend long-term follow up to enhance compliance and make revisions as needed, and long-term outcomes assessment for each patient.

Greater attention may need to be devoted to patients who score high in pessimism, as they were shown to have the least success in making positive health changes. Shepperd, Maroto, and Pbert (1996) recommend greater awareness of the patient's expectations regarding recovery by the health care staff, and thus facilitating better methods of intervention for those pessimistic individuals.

It may be the case that patients find it desirable to still give account for their physical activity after their graduation from Phase II cardiac rehabilitation program. Investigation has reported a substantially greater attendance and compliance rates for cardiac patients when they recorded their exercise sessions on a computer based feedback system that provided enhanced tracking, goal-setting, and feedback (Annesi, 1998). Thus, it has been suggested that periodic, long-term follow up should be included following Phase II CR to aid patients in maintaining their goals (Einerson, Vitcenda, Ward, & McBride, 1999).

Summary of Literature Review

The objectives of cardiac rehabilitation programs are to reduce participants' risk factors and to improve their overall quality of life. Participants of Phase II CR programs experience numerous health benefits while in the program, but the most important contribution of cardiac rehabilitation is the possibility of a lifelong adoption of health promoting behaviors. The lifelong aspect of CR, however, seems to be the most challenging, as the dropout numbers among Phase II CR graduates are significant. To maximize long-term compliance among Phase II CR graduates a comprehensive program with a multi-factorial approach is suggested. It is also crucial to address patients' individual differences regarding health behavior motivation. At last, follow up after release from Phase II CR program appears to be another significant variable in patients' compliance rates to newly acquired diet and exercise lifestyles.

CHAPTER III

METHODS AND PROCEDURES

Subjects

The subjects in this study included 39 males and females who had participated in and graduated from the Tulsa Saint Francis Phase II CR program in the fall 2005. Out of the 22 subjects that actively participated in this study only two were females. The average age of the participants was 68 years old with the youngest participant being 54 and the oldest participant being 81 years of age. The recruitment of subjects took place toward the end of the fall semester 2005 by contacting the administrative staff of the Saint Francis Phase II CR program. In order to qualify for the study the subjects must have been diagnosed with a cardiovascular disease and must have been referred by their doctors to the St. Francis cardiac rehabilitation program. All patients were asked to complete two surveys, "Lifestyle Questionnaire 1" and "Lifestyle Questionnaire 2" at three and six months, respectively, after graduation from the Phase II CR program.

Instruments

The instruments used in this study were two subjective surveys called "Lifestyle Questionnaire 1" and "Lifestyle Questionnaire 2." The questionnaires used in this study were developed by the researcher, who based them in part on the questions from the survey used by the St. Francis CR program for the yearly follow-ups and in part on questions that would be relevant for the purposes of the study. The "Lifestyle

Questionnaire 1" (See Appendix C) was administered to the subjects at three months following their graduation from Phase II CR program and consisted of total of 21 questions, including three sub questions. The questions in this survey asked about general information of the participant (i.e. gender and age), their participation in Phase II CR program, the status of the risk factors (i.e. smoking, weight, cholesterol intake, stress), and their exercise and diet behaviors. Most of the questions required from the participants simple circle or check mark and only one question asked the subjects to fill in his/her age. At the end of the questionnaire there was also space with an opportunity for the participants to express any comments or suggestions regarding the Phase II CR program in which they participated. The "Lifestyle Questionnaire 2" (See Appendix D) was administered to the subjects at six months following their discharge from Phase II CR program and three months after the first survey was sent out. It represented a shorter version of the "Lifestyle Questionnaire 1." The "lifestyle Questionnaire 2" consisted of total of 13 questions all of which appeared in the longer version of "Lifestyle Questionnaire 1." The questions that were not included in the "Lifestyle Questionnaire 2" were asking for general information about the subjects (i.e. age, gender, etc.) and they did not need to be repeated. Only the questions that provided information that were compared between the two surveys were included in the "Lifestyle Questionnaire 2."

Procedures

Once the Institutional Review Board (IRB) at Oklahoma State University (OSU) and the IREB at the St. Francis Hospital approved the proposal for conducting this experiment (See Appendix A and B) the researcher contacted the coordinator of the St.

Francis Phase II CR program. The researcher was provided all the contact information, including addresses and telephone numbers, of the patients who have been out of the Phase II CR program for three months. The subjects who were included in the study group were chosen based on the date when the researcher planned to send the first letters out. Cardiac rehabilitation patients' telephone numbers and addresses were obtained from the Saint Francis Phase II CR program records. Permission to obtain this information was granted by the coordinator of the Saint Francis Phase II CR program.

The first letter sent to the patients who met the criteria for participation in the study included "Lifestyle Questionnaire 1," the informed consent form (See Appendix E), the explanatory letter number 1 (See Appendix F)), and a self-addressed and stamped envelope. The explanatory letter number 1 was the first document the subjects saw after opening the envelope. It explained to them the purpose and the details of the study. The participants were instructed in the explanatory letter to read and sign the consent form and send it together with the completed survey in the self-addressed and stamped envelope within two weeks of receiving it. Three months after administering the "Lifestyle Questionnaire 1" the second survey called "Lifestyle Questionnaire 2" was sent out to the group of individuals who responded in the first part of the study. The "Lifestyle Questionnaire 2" was sent out together with the explanatory letter number 2 (See Appendix G), and a self-addressed and stamped envelope. The explanatory explained to the subjects the purpose and the steps to follow in the study. The participants were instructed in the explanatory letter to fill out the survey and then return the completed survey in the self-addressed and stamped envelope that was provided for them. Subjects were asked to return survey approximately two weeks after the surveys reached

them by mail. Telephone calls were made to the subjects whose responses weren't received within two weeks from the send-out date in order to encourage them to complete and return the surveys. Subjects' answers were kept strictly confidential, as only a code number was used to identify the subject. It was necessary to identify the patient in order to send the second survey to a correct address. Only the investigator had access to the list with names and corresponding code numbers. The list of the subjects and the returned Informed Consent forms were stored in a locked filing cabinet in the Outpatient Cardiac Rehabilitation break-room at St. Francis Hospital. The returned coded surveys were kept in the researcher's private residence in a locked cabinet in the office until all statistical analyses were completed. Upon conclusion of the research, the researcher destroyed the list that identified individuals and their code numbers.

Statistical Analyses of Data

Descriptive statistics were used to summarize a collection of data in a clear and understandable way in order to provide picture of what happened in the study. Inferential statistics was used to test the hypotheses. All hypotheses were tested at a .05 level of significance.

CHAPTER IV

RESULTS AND DISCUSSION

Results

The purpose of this study was to compare the responses of the Lifestyle Questionnaire 1 and 2 administered at three and six months after graduation from the Phase II CR program in order to determine the long-term compliance to an exercise program developed while participating in the cardiac rehab among former Phase II patients. The questions in the survey asked about general information of the participant (i.e. gender and age), their participation in the Phase II CR program, the status of the risk factors (i.e. smoking, weight, cholesterol intake, stress), and their exercise and diet behaviors.

Demographics

The first survey was sent to a total of 39 subjects. 22 subjects responded, concluding with a response rate greater than 50 percent. The second questionnaire was sent to the 22 subjects who responded to the first survey and 20 individuals replied, resulting in a 91 percent response rate. Out of the 22 subjects that actively participated in this study only two were females. The average age of the participants was 68 years old with the youngest participant being 54 and the oldest participant being 81 years of age.

Education Classes

One of the questions on the Lifestyle Questionnaire asked about the percentage of the education classes that the subjects participated in while attending the Phase II CR

program. As can be seen in Table I half of the subjects reported that they attended 100 percent of the education classes and only three individuals reported attending less than 50 percent of the offered education classes.

Table I. **Education Classes**

PERCENTAGE OF CLASSES ATTENDED	FREQUENCY	PERCENT
25	2	9.5
30	1	4.8
50	1	4.8
75	2	9.5
80	1	4.8
85	1	4.8
90	1	4.8
95	1	4.8
100	11	52.4

Heart Attack, Procedures, and Symptoms Occurrence

No patients had experienced a subsequent heart attack during the six months following release from the Phase II CR program, and relatively few (only 9% and 5% of those patients surveyed) had undergone coronary artery bypass graft surgery and angioplasty, respectively. One patient reported having chest pain (angina); 10 patients reported experiencing shortness of breath; and 10 patients reported that they had had no

heart attack, neither bypass nor angioplasty done, and no symptoms of angina or shortness of breath.

Diet

As can be observed in Table II more than half (61.9%) of the subjects reported that their diet was high in fat before attending the Phase II CR program. At three months following graduation from the Cardiac Rehabilitation program only 11.1% of participants still ate a diet high in fat. Three months later (six months following release from cardiac rehab) this number grew to 30%, but still remained significantly smaller (by half), compared to the 61.9% from before participating in the Phase II CR program.

Table II. **DIET**

	PREVIOUS DIET	DIET AT 3 MONTHS	DIET AT 6 MONTHS
High Fat	13(61.9%)	2(11.1%)	6(30.0%)
Low Fat	8(38.1%)	16(88.9%)	14(70.0%)

Weight

More than half (59.1%) patients were overweight before entering the Phase II CR program. Three months after graduation from cardiac rehab three (13.6%) individuals admitted to gaining some weight and six (27.3%) individuals reported losing weight. The rest of the subjects remained at their original weight. Six months following release from the CR program 16 (80.0%) patients reported that their weight was either the same as before or less than before their participation in the Phase II CR program. Four patients admitted to gaining some weight and three out of these four were previously overweight individuals.

Smoking

Only five out of 22 participants were smoking prior to beginning the Phase II CR program. Four out of the five smoking individuals were able to quit and remain nonsmoking during the three months following CR program. The fifth individual was unable to quit but he managed to cut down on the daily quantity. The picture was the same three months later. All the participants were able to remain nonsmoking for half a year following release from cardiac rehab, except the one individual, who was only able to reduce the amount of smoked cigarettes.

Previous Exercise Behaviors

Half (52.45) of the subjects stated that before attending the Phase II CR program their lifestyle was sedentary, that is, they did not exercise at least three times per week. The remaining 47.6% of the patients lived an active lifestyle and exercised at least three times per week prior to starting the Phase II CR program.

Exercise Sessions

The results of the analyses of the questions related to exercise sessions are presented in Table III. At three months after exiting the Phase II CR program a little more than half (54.5%) of the participants reported exercising at least three times or more per week on a regular basis. Close to 1/3 (27.3%) of the patients admitted to not exercising at all. Out of the 11 subjects who lived sedentary lifestyles prior to starting the cardiac rehab only three began exercising at least three times per week and eight remained sedentary with no or only one exercise session per week. Three months after administering the first questionnaire the number of subjects who exercised at least three times per week dropped slightly to 50%. At six months after exiting cardiac rehab only one more out of the 11

sedentary patients began exercising on a regular basis, with seven patients remaining inactive.

Table III. **EXERCISE SESSIONS**

NUMBER OF EXERCISE SESSIONS PER WEEK	EXERCISE SESSIONS AT 3 MONTHS	EXERCISE SESSIONS AT 6 MONTHS
0	6(27.3%)	5(25.0%)
1	2(9.1%)	2(10.0%)
2	2(9.1%)	3(15.0%)
3	6(27.3%)	3(15.0%)
4	1(4.5%)	2(10.0%)
5	2(9.1%)	2(10.0%)
6	2(9.1%)	3(15.0%)
7	1(4.5%)	0(0.0%)

Length of the Exercise Sessions

The mean score for the number of minutes at each exercise session was 29.25 and 32.00 minutes for the three- and six-month sessions, respectively. The means for the number of minutes at each exercise session did not differ significantly between the three- and six-month follow-ups. All of the individuals who were exercising at least three times per week or more exercised for minimum of 30 minutes or longer during each of the weekly sessions, both at the three- and six-month time periods.

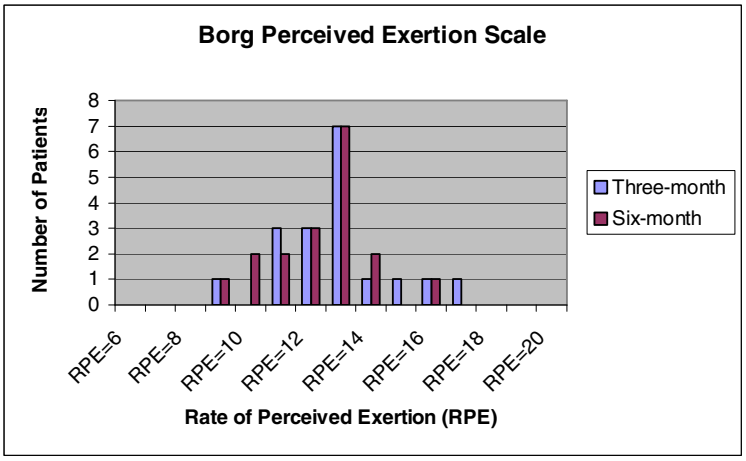
Weekly activities

At the three-month period seven patients reported riding a bicycle; ten reported walking slower than 3.5 mph; while five subjects reported walking at 3.5 mph or faster. Four subjects said that they still participated in weight training. Other current activities listed by patients include golf, stairs, work outside, yard work, and outdoor activities. During the six-month follow-up the results related to the type of activities that the patients engaged in were almost identical to the three-month follow-up results, except for the number of individuals who engaged in no activities dropped from five to only two subjects at the six-month follow-up.

Borg Perceived Exertion Scale

As it can be seen on Figure 2, at the three-month follow-up one patient reported exercising at a rate of perceived exertion (RPE) of 9; three at an RPE of 11; another three at an RPE of 12; seven patients reported an RPE of 13; and one at levels of 14, 15, 16, and 17. Similar results were observed at the six-month follow-up. Overall the mean score for the Borg Perceived Exertion Scale question was 10.35 and 11.10 for the three- and six-month time periods, respectively and the mean did not differ significantly.

Figure 2.



Stress

According to the data 1/3 (31.8%) of the participants admitted that they felt that stress played a role in their heart disease. At three months following graduation from the phase II CR program five out of the seven subjects who recognized stress as being part of their heart problems reported that they handled stress better since attending cardiac rehab. However, during the six-month follow-up the number of individuals who said that they struggled with handling stress increased from 2 (9.1%) to 8 (40.0%) people.

Emotional State

The results of the analyses of the question related to the emotional state are presented in Table IV. The mean score for the emotional state of the participants at the three-month follow-up was 4.25, with 1 meaning, “disagree with the statement”: “I am feeling very well emotionally” and 5 meaning, “agree with the statement.” The standard deviation for the first follow-up was 1.293. Similarly, the mean score for the six-month follow-up was 4.20, with a standard deviation of 1.322. At both follow-ups close to 70% of the patients reported feeling very well emotionally and approximately 15% declared that they are not feeling emotionally stable.

Table IV. **EMOTIONAL STATE**

	THREE-MONTH	SIX-MONTH
Disagre	2(9.1%)	1(5.0%)
Tend to Disagree	0(0%)	2(10.0%)
Undecided	2(9.1%)	3(15.0%)
Tend to Agree	3(13.6%)	0((%)
Agree	15(68.2%)	14(70.0%)

Home and Supervised Exercise

Three months after the release from cardiac rehab nearly all, but one (95%) patient stated that they plan to exercise at home, and this number stayed almost the same at 85% three months later (at the half year follow-up). At both three- and six-month time periods five subjects declared that they are going to continue to exercise under supervision.

Hypothesis

The results of the paired t-test for the exercise related variables are in Table V.

Research Hypothesis. There will be no difference between the responses at the three- and six-month time periods to the exercise related questions on the Lifestyle Questionnaires.

This null hypothesis was tested at the .05 level of significance using a paired t-test. This hypothesis was accepted, as there were no significant differences between the three- and six-month means for the exercise variables.

Table V. **PAIRED T-TEST STATISTICS**

		MEAN	STANDARD DEVIATION	t-VALUE
Pair 1	Number of Exercise Sessions at 3 months	2.50	2.306	-.513
	Number of Exercise Sessions at 6 months	2.65	2.183	
Pair 2	Minutes per Exercise Session at 3 months	29.25	23.299	-.577
	Minutes per Exercise Session at 6 months	32.00	23.136	
Pair 3	Borg Perceived Exertion at 3 months	10.35	5.585	-.965
	Borg Perceived Exertion at 6 months	11.10	4.115	

Discussion

Increasing patient awareness of risk factors has been reported to result in remarkable, beneficial lifestyle changes and improve quality of life (Shepperd, Maroto, & Pbert, 1996). Cardiac rehabilitation programs have been a key factor in assisting patients in making the health-related lifestyle changes including exercise behaviors. The problem of this study was to investigate long-term compliance to an exercise program among the graduates of a Phase II CR program at three and six months following their graduation from the program.

Based on the Lifestyle Questionnaire data presented, very little difference was found between the three- and six-month follow-up results related to exercise behaviors. The mean scores of the number of weekly exercise sessions measured at the two time periods were not significantly different, and neither were the mean scores of the length of

each exercise session. Thus, it appears that the compliance to the exercise regimen among the former cardiac patients remained similar at three- and six-months after graduation.

The data derived from this study also showed that one third of individuals who lived a sedentary lifestyle prior to attending the Phase II CR program were converted into active life participants as a result of participation in the comprehensive cardiac rehabilitation program. The analyses of the questions related to diet also revealed improvements in the area of nutritional behaviors among former cardiac rehab patients. Even at six months after completion of the Phase II CR program the number of individuals, who implemented a diet low in fat, still remained significantly higher compared to prior to the cardiac rehab. In addition, all five smokers who participated in this study altered their smoking behavior upon graduation from the program.

These results would suggest that cardiac patients who successfully completed at least one third of the number of the recommended sessions did benefit from the program and are continuing to follow acquired exercise, dietary, and smoking regimens. One would like to think that this could be, at least in part, attributed to the education they received in the Phase II CR program regarding the importance of an exercise program and the satisfaction they received from the physical activity. Patients who participated in this research generally attended Phase II rehab for 12 weeks or less. During this short time, improvement can be seen fairly quickly in exercise tolerance, body weight, and general feelings of well-being. Often at this time, patients are regaining self-confidence in their ability to physically perform activities. Once this is established, it is likely that patients do not want to risk “losing ground” by ceasing to exercise and becoming deconditioned again. Patients may; in fact, credit the physical activity to an improved or

at least maintainable quality of life and this situation may facilitate other major health-related lifestyle changes, like low fat diet or quitting cigarettes.

A new appreciation of life after a near-death experience, such as a heart attack, may also be responsible for the changes in one's lifestyle. A major health-related event in life may often make one re-evaluate his or her lifestyle. Patients may then want to get more out of life and their bodies and thus make exercise a higher priority, when they have seen the benefits firsthand.

However, the use of a self-reporting instrument, such as the Lifestyle Questionnaire used in this study, may not be the most accurate method of getting honest answers. This is because the patient may imagine which response is most desirable and give that answer instead of the most truthful one, thus skewing the accuracy of the data. This is, however, a common problem with self-report surveys.

According to the results of this study only half of the graduates from the Phase II CR program continued to exercise on a regular basis for at least six months after completing the program. This may not look like a satisfactory number, however, the remarks that were made by the subjects in the space provided on the survey for comments and suggestions or during the phone conversations indicate that the reason for this outcome is not the poor quality of the cardiac rehab program or absence of strong will among the patients. The main reason why many of the former cardiac rehab participants do not comply with the minimum three-time a week exercise regimen is their long hours of work every day. Some of the participants reported working about 12 hours a day, which does not leave much time for anything but eating and sleep.

In addition, many of the cardiac patients may be living on a fixed income (e.g. Social Security Disability) that restricts their ability to buy the right food to maintain low fat diet. One of the subjects indicated that after paying all the bills all he had left for groceries each month is about $75, which is hardly enough to buy a months worth of food and especially not enough to by a healthy months worth of food. The same individual admits that he mainly eats macaroni and cheese and other foods that he knows he shouldn't be eating. However, the finances do not allow him to eat a healthy diet with more fruit and vegetables.

Based on the fact that someone works 12 hours a day or has only $75 a month for food, one could also infer that such a person would not be able to successfully adhere to both exercise and diet programs, and would not be able to afford or would have no time for sufficient medical supervision with frequent follow-up visits at the specialist' office.

CHAPTER V

SUMMARY, FINDINGS, CONCLUSIONS, & RECOMMENDATIONS

Summary

The purpose of this research was to compare responses to exercise related questions in the Lifestyle Questionnaire administered at two different points during cardiac patients' maintenance program in order to determine the percentage of the Phase II graduates who continued exercising at least three or more times per week on a regular basis. The questions in the survey asked about general information of the participant (i.e. gender and age), their participation in the Phase II CR program, the status of the risk factors (i.e. smoking, weight, cholesterol intake, stress), and their exercise and diet behaviors.

Findings

One hypothesis was tested and it was accepted:

Research Hypothesis. There will be no difference between the responses at the three- and six-month time periods to the exercise related questions on the Lifestyle Questionnaires.

There were no significant differences between the three- and six-month responses to the questions related to exercise. This indicates that the compliance to the exercise program adopted during the Phase II CR program by the patients remained comparable at the two time periods. The results obtained through this study showed that 1/3 of

individuals who lived an inactive lifestyle before attending the Phase II CR program became active on a regular basis and were able to maintain their vigorous lifestyles for at least six months following participation in a cardiac rehab program.

Conclusions

The self-reported compliance rates to an exercise prescription did not differ greatly between the three- and six-month periods. Furthermore, the subjective answers to the two Lifestyle Questionnaires administered at three- and six-months following the Phase II CR program showed that the patients tended to move away from a low fat diet with time. In addition, the second follow-up also indicated that patients lose their ability to handle stress as time passes by.

Cardiac rehabilitation programs are designed to improve the quality of life by decreasing feelings of anxiety and disability, and increasing diet awareness and vitality (Hujibrechts, 1997). Research has shown that cardiac rehab participants had an improved understanding of heart disease and better complied with their exercise and diet programs (Pollock, Schmidt, 1995). Based upon the results of this research, the conclusion has been submitted that cardiac rehabilitation had an overall positive effect on its participants in the areas of exercise, diet, and handling stress. However, the data also shows that regarding diet and stress handling the positive effects were short lived, as the number of subjects who continued with a low-fat diet and handled stress well decreased with time following graduation from the Phase II CR program. Thus, it signifies the importance of continuous or at least periodic diet and stress educational intervention for former cardiac

patients at least as far as six months following completion of the Phase II CR program, but preferably forever.

Recommendations for Future Studies

Recommendations for future studies would include using the Lifestyle Questionnaire again after the three- and six-month follow-up points. This may show how the compliance to the exercise and diet programs changes among former cardiac patients.

A more detailed account of patient exercise habits might be more useful. For example, asking the patients if they generally exercise in the morning, afternoon, or evening and give the subjects an opportunity to list other types of activities that they might be engaged in and which did not appear on the list provided by the researcher in this study. This may make patients more conscientious about their current habits and answer more honestly, instead of giving the answers they believe are desirable.

A larger sample would be preferred. Perhaps the research might include patients from several different facilities with Phase II CR programs to attain this larger group. Further breakdown of data to analyze subjects' demographic data (e.g. gender, age, employment status) might also be of use. Continued research to investigate predictors of exercise continuation and relapse regarding demographic data, such as gender, are needed to provide the foundation for developing theoretically based gender-specific interventions in order to reduce the relapse rates in exercise and diet regimens in both male and female individuals with cardiovascular disease.

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APPENDIX A

IRB APPROVAL

Oklahoma State University Institutional Review Board

Date:	Monday, December 05, 2005
IRB Application No	ED0656
Proposal Title:	The Effects of Phase II Cardiac Rehabilitation Program on Future Lifestyle of Its Graduates
Reviewed and Processed as:	Expedited

Status Recommended by Reviewer(s): Approved Protocol Expires: 12/4/2006

Principal Investigator(s)

Dominika A Olszewska
624 Wedgewood Dr.
Stillwater, OK 74075

Steven Edwards
432 Willard
Stillwater, OK 74078

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

☑ The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval.
2. Submit a request for continuation if the study extends beyond the approval period of one calendar year. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of this research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Beth McTernan in 415 Whitehurst (phone: 405-744-5700, beth.mcternan@okstate.edu).

Sincerely,

Sue C Jacobs

Sue C. Jacobs, Chair
Institutional Review Board

APPENDIX B

IREB APPROVAL

Saint Francis Hospital

6161 South Yale Avenue
Tulsa, OK 74136
918.494.2200

www.saintfrancis.com

Saint Francis Health System
Founded by The William K. Warren Foundation

Institutional Research Ethics Board
A Commitment to Ethical Research and the Protection of Human Subjects
(918)494-2495 / fax (918)494-2481

November 21, 2005

Dominika Olszewska
624 Wedgewood Dr.
Stillwater, OK 74075

Dear Ms. Olszewska:

The study #1793-05 The Effects of Phase II Cardiac Rehabilitation Program on Future Lifestyle of Its Graduates has been reviewed and granted **Exemption from review** by a qualified member of the Institutional Research Ethics Board.

Qualifying Exempt Criteria:
#2 Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless:

(i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and

(ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil, liability or be damaging to the subjects' financial standing, employability, or reputation. Research on children involving surveys or interviews procedures or observations of public behavior does not apply and may not be exempted from review except for research involving observation of public behavior when the investigator(s) do not participate in the activities being observed.

It has been determined that this project uses survey procedures and while the information obtained is recorded in such a manner that human subjects can be identified through identifiers linked to the subjects, disclosure of the subjects' responses outside the research would not reasonably place the subject at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

If any changes are made in this study that may affect the IREB exemption status you are required to submit these for additional review.

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Sincerely,

G. Kevin Donovan, MD, General Studies Chairman
Institutional Research Ethics Board

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Saint Francis Health System
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Institutional Research Ethics Board

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(918)494-2495 / fax (918)494-2481

January 4, 2006

Dominika Olszewska
624 Wedgewood Dr.
Stillwater, OK 74075

Dear Ms. Olszewska,

I reviewed your December 1st memo that identified the changes to study #1793-05 The Effects of Phase II Cardiac Rehabilitation Program on Future Lifestyle of Its Graduates. I do not feel that the modifications to the project affect its exempt status.

This IREB exemption was granted because the project meets the following criteria:

- Minimal risk. The probability and magnitude of harm anticipated is not greater than that encountered ordinarily in daily life or during the performance of routine physical or psychological examinations or tests.
- Exemption Category #2. Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless:
    - (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and
    - (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil, liability or be damaging to the subjects' financial standing, employability, or reputation. Research on children involving surveys or interviews procedures or observations of public behavior does not apply and may not be exempted from review except for research involving observation of public behavior when the investigator(s) do not participate in the activities being observed.
- It has been determined that this project uses survey procedures and while the information obtained is recorded in such a manner that human subjects can be identified through identifiers linked to the subjects, disclosure of the subjects' responses outside the research would not reasonably place the subject at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

If any revisions are made that may affect the IREB exemption status you are required to submit these for additional review prior to implementation. Please contact Amber Selvidge at 494-2495 if you have any additional questions.

Sincerely,

G. Kevin Donovan, MD, Chairman
General Studies Institutional Research Ethics Board

CC: Susan Bonner, Clinical Manager Outpatient Cardiac Rehab

APPENDIX C

LIFESTYLE QUESTIONNAIRE 1

LIFESTYLE QUESTIONNAIRE 1

Please answer the following questions as indicated.

1. Sex: (Circle one) Male Female

2. Write in your age: _____ years

3. Circle the approximate percentage of the education classes that you attended at Phase II CR program:

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

4. Was your diet high in fat before attending the Phase II CR program?
(Circle One) Yes No

5. Do you now eat a diet low in fat and cholesterol? (Circle One) Yes No

6. Did you smoke cigarettes or use tobacco before attending the Phase II CR program?

Circle One: No (Go on to question #7.)

Yes (Go on to question #6a.)

6a. Place a checkmark (✓) next to the phrase which best describes your smoking habits today:

_____ I have quit using tobacco. (Go on to question #7.)

_____ I still use tobacco sometimes. (Go on to question #7.)

_____ I still use tobacco as much as I did before. (Go on to question #7.)

7. Were you overweight before starting Phase II CR program?

Circle One: No (Go on to question #8.)

Yes (Go on to question #7a.)

7a. Place a checkmark (✓) next to the phrase which best describes your weight today:

_____ My weight is about the same as before. (Go on to question #8.)

_____ I have lost some weight. (Go on to question #8.)

_____ I have gained some weight. (Go on to question #8.)

8. Place a checkmark (✓) next to any of the events listed below which have occurred since completing the Phase II CR program:

_____ Heart attack
_____ Bypass surgery
_____ Angioplasty
_____ Angina
_____ Shortness of breath

9. Did you have a sedentary lifestyle (not exercising at least 3 times per week) before starting Phase II CR program? (Circle One) Yes No

10. Circle the number of times per week that you now exercise routinely?

None (Go on to question #12) 1 2 3 4 5 6 7

11. Circle the approximate number of minutes that you exercise at each exercise session?

10 15 20 25 30 35 40 45 50 55 60 more than 60

12. Place a checkmark (✓) next to the type(s) of activity which you now perform in a typical week:

_____ Riding bicycle
_____ Walking slower than 3.5 mph
_____ Walking at 3.5 mph or faster
_____ Weight training
_____ Calisthenics
_____ Golf
_____ Tennis
_____ Stairs
_____ Working outside
_____ Yard work
_____ Outdoor activities
_____ None of these (Go on to question #14)

13. Given the activities which you indicated above, circle the number that corresponds to your usual activity intensity level:

Borg Perceived Exertion Scale:

6
7 very, very light
8
9 very light
10
11 fairly light
12
13 somewhat hard
14
15 hard
16
17 very hard
18
19 very, very hard
20

14. Do you maintain at least the same or higher physical activity level during a typical week as you did while participating in Phase II CR program? (Circle One) Yes No

15. At the time that you entered the Phase II CR program, did you feel that stress played a role in your heart disease?

Circle One: No (Go on to question #16.)

Yes (Go on to question #15a.)

15a. Do you handle stress better since attending Phase II CR program?
(Circle One) Yes No

16. Read the statement below and place a checkmark (✓) next to the word/phrase which best indicates your agreement with the statement.

I am feeling very well emotionally.
_____ Agree
_____ Tend to agree
_____ Undecided
_____ Tend to disagree
_____ Disagree

17. Do you plan to home exercise? (Circle One) Yes No

18. Do you plan to continue to exercise under supervision? (Circle One) Yes No

Are there any comments or suggestions you would like to add about the Phase II CR program in which you
participated?

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Please check to be sure that you answered all of the questions.

Thank You again for taking time to complete and return this questionnaire.

APPENDIX D

LIFESTYLE QUESTIONNAIRE 2

LIFESTYLE QUESTIONNAIRE 2

Please answer the following questions as indicated.

1. Do you now eat a diet low in fat and cholesterol? (Circle One) Yes No

2. Place a checkmark (✓) next to the phrase which best describes your smoking habits today:

   _____ I have quit using tobacco.

   _____ I still use tobacco sometimes.

   _____ I still use tobacco as much as I did before.

3. Place a checkmark (✓) next to the phrase which best describes your weight today:

   _____ My weight is about the same as before.

   _____ I have lost some weight.

   _____ I have gained some weight.

4. Place a checkmark (✓) next to any of the events listed below which have occurred since completing the Phase II CR program:

   _____ Heart attack
   _____ Bypass surgery
   _____ Angioplasty
   _____ Angina
   _____ Shortness of breath

5. Circle the number of times per week that you now exercise routinely?

   None (Go on to question #7) 1 2 3 4 5 6 7

6. Circle the approximate number of minutes that you exercise at each exercise session?

   10 15 20 25 30 35 40 45 50 55 60 more than 60

7. Place a checkmark (✓) next to the type(s) of activity which you now perform in a typical week:

   _____ Riding bicycle
   _____ Walking slower than 3.5 mph
   _____ Walking at 3.5 mph or faster
   _____ Weight training
   _____ Calisthenics
   _____ Golf
   _____ Tennis
   _____ Stairs
   _____ Working outside
   _____ Yard work
   _____ Outdoor activities
   _____ None of these(Go to question #9)

8. Given the activities which you indicated above, circle the number that corresponds to your usual activity intensity level:

Borg Perceived Exertion Scale:

6	
7	very, very light
8	
9	very light
10	
11	fairly light
12	
13	somewhat hard
14	
15	Hard
16	
17	very hard
18	
19	very, very hard
20	

9. Do you maintain at least the same or higher physical activity level during a typical week as you did while participating in Phase II CR program? (Circle One) Yes No

10. Do you handle stress better since attending Phase II CR program? (Circle One) Yes No

11. Read the statement below and place a checkmark (✓) next to the word/phrase which best indicates your agreement with the statement.

I am feeling very well emotionally.
_____ Agree
_____ Tend to agree
_____ Undecided
_____ Tend to disagree
_____ Disagree

12. Do you plan to home exercise? (Circle One) Yes No

13. Do you plan to continue to exercise under supervision? (Circle One) Yes No

Please check to be sure that you answered all of the questions.

Thank You again for taking time to complete and return this questionnaire.

APPENDIX E

INFORMED CONSENT

INFORMED CONSENT

As a graduate of the Saint Francis Phase II Cardiac Rehabilitation Program you are invited to participate in a study entitled "The Effects of Phase II Cardiac Rehabilitation Program on Future Lifestyle of Its Graduates." This study involves research and is being conducted by a Graduate Student at Oklahoma State University (OSU).

There are no experimental procedures, only two brief subjective surveys to complete. There are no right or wrong answers so please just answer honestly. Your name will not be used in the research project and all answers will be confidential. If you agree to participate in this study a similar questionnaire will be sent to you again in three months. The surveys will be coded so that the first and second follow-up surveys may be compared. Only the researcher herself will have access to the identification codes and they will be kept in a filing cabinet in the Outpatient Cardiac Rehabilitation break-room at St. Francis Hospital. These records will be destroyed upon completion of the study.

After the surveys are returned, the first and second follow-up surveys will be compared. The data then will be analyzed statistically in order to evaluate the long-term benefits of Phase II CR program. The information derived from this study may be found useful for the Saint Francis Hospital, as well as other CR program developers, in creating, modifying, or improving existing Phase II CR programs so they result in greater adherence to newly acquired exercise and diet behaviors over a longer period of time among its graduates of both genders. There are no foreseeable risks to you for participation in this research.

If you have any questions or would like further information, feel free to contact me, Dominika Olszewska, at (405) 880-5382, or Dr. Edwards at the Oklahoma State University at (405) 744-7476. You may also contact Dr. Sue Jacobs, OSU's IRB Chair, 415 Whitehurst at (405) 744-1676, or Dawn Bradley, Coordinator of the St. Francis Outpatient Cardiac Rehab at (918) 494-6470.

Participation is voluntary and you will in no way be penalized if you choose not to participate. You are free to withdraw your consent and end your participation at any time without penalty after notifying the researcher.

I have read and understand the foregoing. Any questions I had have been answered to my satisfaction. I sign it freely and voluntarily.

NAME _____ **DATE** _____

Please Print

SIGNATURE OF PARTICIPANT_____

SIGNATURE OF RESEARCHER_____ **DATE**_____

APPENDIX F

EXPLANATORY LETTER 1

EXPLANATORY LETTER 1

December 5, 2005

Dear Former Cardiac Rehabilitation Participant,

It has been three months since you graduated from the Saint Francis Cardiac Rehabilitation Program. I invite you to participate in a study entitled "The Effects of Phase II Cardiac Rehabilitation Program on Future Lifestyle of Its Graduates." Dominika Olszewska, who worked with cardiac patients at the Stillwater Seretean Wellness Center for past two semesters and is now a candidate for the Master of Science degree at Oklahoma State University (OSU), is conducting this study. Dominika Olszewska is currently completing an internship at St. Francis Hospital in the Cardiac Rehabilitation Department.

All that is required of you is:

1. Read and sign the enclosed consent form
2. Complete the short questionnaire that is enclosed
3. Return the completed questionnaire ***and*** signed consent form in the self-addressed and stamped envelope ***no later than December 22, 2005***

This is simply a follow-up study that asks you to complete a brief survey. It will only take a few minutes out of your day and your honesty is appreciated as your name will not be used in the research project and all answers will be confidential. The purpose of this study is to evaluate the long-term benefits of CR program. If you agree to take part in this research, in three months you will receive similar survey for the second and final time.

If you have any questions, feel free to call me, Dominika Olszewska, at (405) 880-5382 or Dawn Bradley, Coordinator of the St. Francis Outpatient Cardiac Rehab at (918) 494-6470.

Thank you in advance for your cooperation and participation. Thanks to your involvement in my study I will be one step closer to graduating from the Masters Program at OSU. I hope you are doing well and I hope to hear from you soon!

With Sincere Appreciation,

Dominika A. Olszewska
OSU Masters Candidate
OSU Women's Tennis Team Assistant Coach
Current St. Francis Intern
Former Stillwater Seretean Wellness Center Intern

APPENDIX G

EXPLANATORY LETTER 2

EXPLANATORY LETTER 2

February 28, 2006

Dear Former Cardiac Rehabilitation Participant,

It has been six months since you graduated from the Saint Francis Cardiac Rehabilitation Program and three months since you received the first questionnaire. Thank you very much for responding to the first survey. I invite you to participate in the second part of the study entitled "The Effects of Phase II Cardiac Rehabilitation Program on Future Lifestyle of Its Graduates." Dominika Olszewska, who worked with cardiac patients at the Wellness Center for past two semesters and is now a candidate for the Master of Science degree at Oklahoma State University (OSU), is conducting this study. Dominika Olszewska is currently completing an internship at St. Francis Hospital in the Cardiac Rehabilitation Department.

All that is required of you is:

4. Complete the short questionnaire that is enclosed
5. Return the completed questionnaire in the self-addressed and stamped envelope ***no later than March 14, 2006***

This is simply a follow-up study that asks you to complete a brief survey. It will only take a few minutes out of your day and your honesty is appreciated as your name will not be used in the research project and all answers will be confidential. The purpose of this study is to evaluate the long-term benefits of CR program. This is the last survey that you will receive regarding this study.

If you have any questions, feel free to call me, Dominika Olszewska, at (405) 880-5382 or Dawn Bradley, Coordinator of the St. Francis Outpatient Cardiac Rehab at (918) 494-6470.

Thank you in advance for your cooperation and participation. Thanks to your involvement in my study I will be one step closer to graduating from the Masters Program at OSU. I hope you are doing well and I hope to hear from you soon!

With Sincere Appreciation,

Dominika A. Olszewska
OSU Masters Candidate
OSU Women's Tennis Team Assistant Coach
Current St. Francis Intern
Former Stillwater Seretean Wellness Center Intern

VITA

Dominika Anna Olszewska

Candidate for the Degree of

Master of Science

Thesis: A COMPARISON OF THE THREE-MONTH AND SIX-MONTH POST PHASE II CARDIAC REHABILITATION PROGRAM EXERCISE VARIABLES

Major Field: Health and Human Performance

Biographical:

Personal Data: Born in Pabianice, Poland, On September 29, 1978, the daughter of Ewa and Grzegorz Olszewscy

Education: Graduated from Queen Jadwiga's High School, Pabianice, Poland, 1997; received Bachelor of Science degree in Physical Education and minor in Spanish, May 2003. Completed the requirements for the Master of Science degree with a major in Applied Exercise Science at Oklahoma State University in May 2006.

Experience: Played tennis since seven years old; employed as a tennis pro, tennis school in Poland, 1998-1999; student physical education teacher at Sanger Ridge Elementary School and Middle School in Stillwater, spring semester 2003; Cardiac Rehabilitation observation and hands-on experience, Seretean Wellness Center, fall 2004 and spring 2005; graduate coach assistant, Oklahoma State University Women's Tennis Team, 2003 to present; internship at the Cardiac Rehabilitation Program, St. Francis Hospital, Tulsa, Oklahoma, spring 2006.

Name: Dominika Anna Olszewska Date of Degree: May, 2006

Institution: Oklahoma State University Location: Stillwater, Oklahoma

Title of Study: A COMPARISON OF THE THREE-MONTH AND SIX-MONTH POST PHASE II CARDIAC REHABILITATION PROGRAM EXERCISE VARIABLES

Pages in Study: 66 Candidate for the Degree of Master of Science

Major Field: Health and Human Performance

Scope and Method of Study: The purpose of this study was to investigate long-term compliance to an exercise program among the graduates of Phase II CR program at three and six months following the discharge. 22 former cardiac patients participated in the study and each completed two questionnaires, one at three and one at six months after the discharge. Responses to the exercise related questions were used to test the hypothesis. Additionally, the risk factors and diet questions were discussed.

Findings and Conclusions: There were no significant differences between the three- and six-month responses to the exercise related questions. This indicates that the compliance to the exercise program remained comparable at the two time periods. Positive effects regarding diet and stress handling were short lived, as the number of subjects who continued with a low-fat diet and handled stress well decreased with time following graduation from the CR program.

ADVISER'S APPROVAL: Dr. Steven Edwards