



Cardiac patient education and its relationship to knowledge, anxiety, and health perception
by Florence Olga Kubinec

A thesis submitted in partial fulfillment of the requirements for the degree of MASTER OF NURSING
Montana State University

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Abstract:

The purpose of this study was to examine the effect of the Alberta Heart Foundation Rehabilitation Program on participants' level of knowledge, anxiety, and health perception. Twelve participants from the Lethbridge and Red Deer programs were in the experimental group; twelve subjects randomly selected from the medical records of the Lethbridge Municipal Hospital were included in the control group.

All subjects were pre-tested. The experimental group was post-tested at the completion of the program and the control group was post-tested six to seven weeks following the completion of the pretest. The Taylor Manifest Anxiety Scale, a knowledge questionnaire designed by D. Bille, and a health perception questionnaire based on Cantri's ladder were used to measure the effectiveness of the program.

The Mann Whitney U Statistical Test was used to determine the differences in knowledge, anxiety, and health perceptions between the two groups. No significant differences were found between the experimental and control groups on the post-test. The Fisher Exact Probability Test was used to determine the relationship between the dependent variables. In the experimental group, there was a significant association between perception of present health and perception of health in six months. Individuals who perceived their present health as good also perceived their future health as good.

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by

FLORENCE OLGA KUBINEC

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


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ABSTRACT

The purpose of this study was to examine the effect of the Alberta Heart Foundation Rehabilitation Program on participants' level of knowledge, anxiety, and health perception. Twelve participants from the Lethbridge and Red Deer programs were in the experimental group; twelve subjects randomly selected from the medical records of the Lethbridge Municipal Hospital were included in the control group.

All subjects were pre-tested. The experimental group was post-tested at the completion of the program and the control group was post-tested six to seven weeks following the completion of the pre-test. The Taylor Manifest Anxiety Scale, a knowledge questionnaire designed by D. Bille, and a health perception questionnaire based on Cantril's ladder were used to measure the effectiveness of the program.

The Mann-Whitney U Statistical Test was used to determine the differences in knowledge, anxiety, and health perceptions between the two groups. No significant differences were found between the experimental and control groups on the post-test. The Fisher Exact Probability Test was used to determine the relationship between the dependent variables. In the experimental group, there was a significant association between perception of present health and perception of health in six months. Individuals who perceived their present health as good also perceived their future health as good.

Chapter 1

INTRODUCTION

Patient education is an area of health teaching which is old but which is experiencing a rebirth. Previously, patient education was often viewed as a private matter between physician and patient. Wars and accidents and the resulting traumatic injuries have emphasized the need for teaching in rehabilitation. Shortened hospital stay with early ambulation required preparation for the convalescence of the patient at home. An increase in long term illnesses and disabilities due to the improvement in medical treatment and the increased longevity of individuals have also been an impetus to the growth of patient education.

Somers (1978) identified consumer health education as those activities that:

1. inform people about health, illness, disability, and ways in which they can improve and protect their own health, including the more efficient use of the delivery system;
2. motivate people to want to change to more healthful practices;
3. help them to learn the necessary skills to adopt and maintain healthful practices and lifestyles;
4. foster teaching and communication skills in all those engaged in educating consumers about health;
5. advocate changes in environment that will facilitate healthful conditions and healthful behavior; and

6. add to knowledge through research and evaluation the most effective ways of achieving those objectives.

A number of programs have been devised and implemented on educating the consumer, a potential patient, on how to stay healthy, when to seek timely medical advice, and when to look forward to being rehabilitated when ill. Working towards these goals, educational programs for post-myocardial infarction patients and their families have been developed and are an integral part of the rehabilitation program.

A number of articles are available describing a variety of cardiac rehabilitation programs (Kelsey and Beamer, 1973; Crawshaw, 1974; Rothman, 1974; Franklin, Besseghini and Golden, 1978; Baker and McCoy, 1979; Stevens, 1979). Although the literature may be useful in stimulating others to consider various ways to deliver cardiac patient education programs, they are deficient in hard evidence concerning outcome. Evaluation methodology, including potential benefits and designs is relatively undeveloped.

This researcher has been involved in a number of coronary rehabilitation programs sponsored by the Alberta Heart Foundation in Lethbridge, Alberta. Although participants were asked to comment on the pros and cons of the individual sessions and the program as a whole, there was little or no evaluation done using the content objectives of the individual sessions or program. Participants were

also asked to submit suggestions for improving the program but no mechanism was set up to evaluate or follow through on the suggestions.

Purpose of Study

The purpose of this study was to evaluate the immediate effectiveness of the Alberta Heart Foundation's Coronary Rehabilitation Program on the participant's level of knowledge of cardiovascular disease and its preventive aspects, feelings of anxiety, and health perceptions. The research questions to be asked were: As a result of program participation, did the participant's knowledge of cardiovascular disease and its preventive aspects increase; did the participant's feelings of anxiety decrease; and did the participant's perception of his health improve?

Definition of Terms

Anxiety - an individual's normal feeling state in a reaction to a real or perceived-to-be real threat and is accompanied by specific physiologic responses.

Knowledge - a cardiac individual's level of information concerning cardiovascular disease, diet, medications, physical activity, stressful situations, work, weight loss, smoking, and alcohol.

Health perception - a picture of his health expressed by the individual in his own terms.

Alberta Heart Foundation Coronary Rehabilitation Program - a program made available to cardiac patients and their families on a voluntary basis. The program is offered throughout Alberta, a minimum of twice annually, to cardiac patients following discharge from hospital and during their convalescence at home, and to cardiac patients and their families at any time during and after their rehabilitation. The six week program consists of weekly classes of approximately two and one half hours in duration. The program is coordinated by a nurse and is conducted by a local multidisciplinary team usually consisting of physicians, nurses, a dietitian, a pharmacist, a social worker or psychologist, and a vocational counselor. Content is provided through lecture, discussion, demonstration, and audio visual material. Topics discussed during the program include stress and relaxation, diet, medications, sexual activity, exercise, vocational counseling, psychological aspects of heart disease, and general medical information related to cardiovascular diseases (see Appendices A and B). Participants were requested to donate five dollars per family for the course, but the fee is not compulsory.

Chapter 2

CONCEPTUAL FRAMEWORK AND REVIEW OF THE LITERATURE

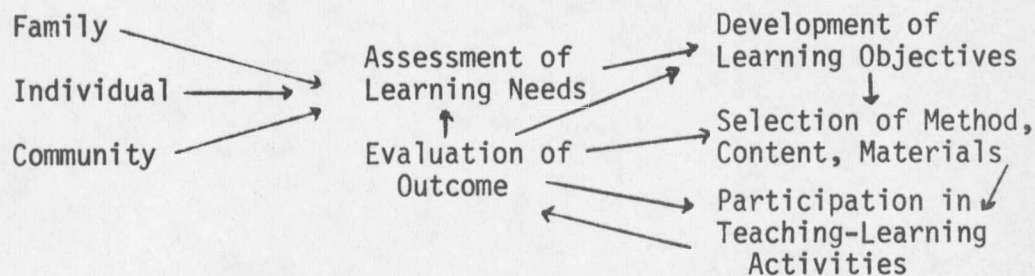
The conceptual framework for this study was the nursing process. "Process" is a method of doing something that generally involves a number of steps and is intended to bring about a particular result. In 1979, the Alberta Association of Registered Nurses defined nursing practice as the assisting of clients in a variety of practice settings with those activities which promote self-direction in the maintenance, restoration, and promotion of health. The nursing process (assessment planning, implementation, and evaluation) is the methodology used to carry out this function.

The steps in the nursing process follow each other logically. Before intervening, the nurse must initially assess the need for action. This assessment involves gathering data, analyzing, and synthesizing pertinent patient information. Problems or needs are then identified and prioritized. Based on the identified needs, goals or expected outcomes are established. These should be measurable, attainable, reasonable, and representative of the patient's aspirations. A plan of action is devised and implemented and the effectiveness of the actions are evaluated. The evaluation may result in information that leads to a modification of the problem list, the plan of action, or the expected outcomes. Thus, the process becomes

circular.

The nursing process can be applied to the teaching-learning process in adult education. There is an assessment of the learners' needs, the mutual development of goals and the planning, implementation, and evaluation of programs. A conscious effort is made in nursing and in adult education to involve the client in defining goals and planning the ways and means by which they can be met. The following illustrates the nursing process and its application to adult education:

Figure 1. The Nursing Process and Its Application to Adult Education



Because this study addresses itself to adults, the learning theory is one of adult learning or andragogy. Knowles' (1976) assumptions about adults as learners may be classified as self-concept, experience, readiness to learn, and orientation to learning. These assumptions are:

1. Adults view themselves as responsible, self-directing individuals.

2. Individuals accumulate a growing reservoir of experience which becomes an increasing resource for learning.
3. The primary determinant of readiness to learn in the adult is the developmental task of his social role.
4. Orientation toward learning shifts from one of subject centeredness to one of problem-centeredness.

The framework, in essence, states that:

1. a climate conducive to adult learning is to be established;
2. learners need to be involved in the planning;
3. learning activities are identified and objectives or goals are set;
4. learning activities are developed for the adult learner;
5. participants are involved in the learning activity; and
6. learning is evaluated by the teacher and the learner.

Literature Review

Survival from an acute myocardial infarction has become an increasingly probable reality for the majority of those stricken because of improved diagnostic and treatment measures (Fardy, 1980; Garrity, 1975). However, non-fatal myocardial infarctions and experiences associated with them are considered major life crises. The victims of a myocardial infarction can and usually do have grave physiological, psychological, sociological, and economic ramifications if the event is not dealt with in a propitious manner.

The literature concerning patients who have had a myocardial

infarction indicates that a substantial number experience difficulty in adapting to their change in health status. In the post hospital phase, feelings of anxiety and depression (Soloff, 1977-78; McEachern, 1977; Wrzesniewski, 1976; Wishnie, 1971; Wynn, 1967), poor health perceptions (Speegle, Bayer, and Greene, 1979; Garrity, 1973A), denial (Soloff, 1977-78), lack of knowledge and understanding regarding their condition (Borgman, 1975; Crawshaw, 1974) and concerns regarding vocational, social and family obligations (Wenger, 1976) have been elicited from patients who have had myocardial infarctions.

A study of Croog, Shapiro, and Levine (1971) indicated that 20 percent of the first infarction patients studied denied that they had a heart attack when asked and that this denial persisted for a one year follow-up period. This verbal denial of their cardiac event existed despite the time in a Coronary Care Unit and up to eighteen days of hospitalization. In addition, there was a tendency for deniers to resist medical advice. Denials, in this context, was defined as the conscious or unconscious repudiation of part or all of the total meaning of an event to allay fear, anxiety, or other unpleasant effects.

The concept of denial as an adaptive defense received some support in related research on the response to open heart surgery. Excessive anxiety and depression and the inability to use denial to combat the "awe" of open heart surgery have been associated with a

greater incidence of post-cardiotomy delirium (Blacher, 1972), morbidity and mortality (Kimball, 1972).

Tjoe and Lurie (1972) and Hackett and Cassem (1969) identified that patients experiencing chest pain often delayed twelve hours or more before seeking medical attention. Those who had had a myocardial infarction delayed just as long or longer than those who had never had a myocardial infarction. This denial during convalescence represents an insidious and chronic hazard and as such increases the coronary risk factor.

The maladaptive behaviors of myocardial infarction patients often interferes with their hospital management and recovery, as well as their reintegration into family and community. These studies suggest that these behaviors and other difficulties may arise because of lack of information regarding the disease and treatment, lack of psychosocial support, and inadequate planning for rehabilitation.

Tessler's and Mechanic's study (1978) indicated that psychological distress, defined as lack of happiness, nervousness, and negative affect (feeling of loneliness; depressed or blue; didn't have the energy you needed), affected how individuals perceived their health. Garrity (1973B) noted that self-perceived health status was associated with return to work after the heart attack. The better the individuals perceived their health to be, the more likely they were to return to work after discharge.

Return to work has been identified as perhaps the only firm index of recovery and successful rehabilitation as it enables patients to be economically independent and return to normal lifestyles and roles in society (Wenger, 1976). But what of those who because of age or other factors, do not return to work? According to Hackett and Cassem (1973) physical activity is necessary to enhance self-esteem and promote a sense of independence. As physical activity does much to promote healthy psychological behavior, it might be utilized as an index of recovery and successful rehabilitation.

Consumer demands, rising medical costs, legal pressures, and health agency accreditation have influenced the health care professionals' concern about patient education. A patient who has not been provided with adequate educational care can no longer be considered adequately treated or cared for. Somers (1976) asserted that "a few million dollars" spent to teach the consumer/patient to develop a lifestyle conducive to health and, when ill or disabled to understand and cope more effectively with one's own health problems, could be more cost effective than billions spent on the development of new medical technology and expensive in-patient programs.

A number of studies substantiate the value of patient education. Myers' (1964) experiment demonstrated that less stress and few misconceptions were created for patients who experienced an unfamiliar diagnostic procedure in which they were given information which they

could use to interpret the experience. Lindeman and Van Aernam (1971) demonstrated that structured preoperative teaching improved the patients' ability to deep breathe and cough, and reduced their length of hospital stay. Rosenberg's (1971) educational program for fifty patients with congestive heart failure demonstrated an increase in the patients' knowledge about their disease, medications, and diets as well as adherence to a prescribed regimen. Linde and Janz (1979) reported that cardiac patients' knowledge increased following a comprehensive teaching program and that patients taught by master's prepared nurses had significantly higher test scores at discharge than patients taught with less than master's preparation. In addition, Lindeman (1971) and Toth (1980) demonstrated that structured teaching (the use of specific guidelines for teaching content) is more effective than unstructured teaching.

The need for cardiac rehabilitation, which should be a systematic program whose goal is to return the cardiac patient to a health lifestyle, is essential for the long term care of the cardiac patient. Information, exercise testing, prescription, and training are all part of a rehabilitation program. According to Edgett and Porter (1980), a comprehensive approach to cardiac rehabilitation should include four program phases: acute, in-hospital phase, program following discharge which is usually hospital based and is of two - four months duration, long term supervised conditioning and maintenance program, and long

term ongoing program conducted at home.

Granger (1974) reported that a group therapy approach was being used in a cardiac rehabilitation program. In addition to cardiovascular stress testing, physical exercise, and weight loss regimens, the program was designed to mitigate emotional problems and maladaptive coping behavior patterns, teach methods of tension reduction, and intervene in the high risk environment to which the patient would return. Clinical impressions were the only evaluation tool used in this program.

Wrzesniewski (1976) found that men who had a myocardial infarction had a higher level of anxiety than did men free from coronary disease and rheumatic patients. Following a 28 day post hospitalization program, general and specific anxiety appeared to decrease. The Attitude Toward Illness Subscale and the Taylor Manifest Anxiety Scale were used to measure the anxiety. The study was conducted in Poland and there was no indication as to whether the tools were administered in English or if they had been translated. As there was no appropriate control group in the study, time may have been the factor which decreased the anxiety.

An education program conducted by Owen, McCann, and HuteImyer (1978) with a group of cardiac patients indicated that patients are capable of learning pathophysiology, appropriate adjustments in lifestyles, name, function and side effects of medications, risk

factors, signs and symptoms of complications, when to notify their physician, and rationale for medical follow-up; and they can learn this in a group setting. Although the authors stated that the group setting appeared to decrease the anxiety level of members, no tool was used to measure the anxiety level. They also noted that knowledge continued to increase after discharge from hospital. The provision of written material may have been a factor in the increased knowledge.

Programs will need to be adapted to suit particular area and individual needs, but the philosophy is the same: total patient care. Hellerstein (1972) stated that the goal of cardiac rehabilitation is restoration of an individual to his optimal status in physiological, psychological, and vocational terms, and to prevent the progression of the underlying disease process. Naughton (1977) stated that total cardiac rehabilitation is a process of longitudinal comprehensive care through which identified patients are restored to and maintained at their optimal medical, physical, social, vocational, and recreational status. These definitions demand development of programs that provide optimal total patient care and that are open-ended, that is, extend for the remainder of the patient's life.

Hypotheses

In light of the literature review and the research questions asked, the following hypotheses were tested:

Hypothesis I

As a result of program participation, there will be a greater increase in the participants' knowledge post test scores than in the knowledge post test scores of the non-participants.

Hypothesis II

As a result of program participation, there will be a greater decrease in the participants' anxiety post test scores than in the anxiety post test scores of the non-participants.

Hypothesis III

As a result of program participation there will be a greater increase in the participants' "perception of the present health" post test scores than in the "perception of present health" post test scores of the non-participants.

Hypothesis IV

As a result of program participation, there will be a greater increase in the participants' "perception of his health prior to his heart attack" post test scores than in the "perception of his health prior to his heart attack" post test scores of the non-participants.

Hypothesis V

As a result of program participation, there will be a greater

increase in the participants' "perception of his health in six months" post test scores than in the "perception of his health in six months" post test scores of the non-participants.

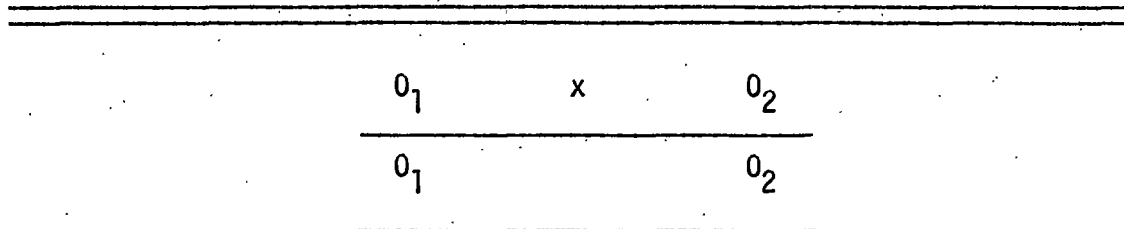
Hypothesis VI

As a result of program participation, there will be a greater increase in the participants' "perception of health of an average individual of the same age and sex" post test scores than in the "perception of the health of an average individual of the same age and sex" post test scores of the non-participants.

Chapter 3
METHODOLOGY

A quasi-experimental design was used for this study. Subjects were pre-tested to determine whether they were similar in terms of knowledge, anxiety, and health perceptions. If the control and experimental groups responded similarly on the pre-test questionnaires, then any post-test differences in knowledge, anxiety, and health perceptions could be attributed to the experimental treatment. Figure 2 depicts this study symbolically.

Figure 2. Symbolic Design



The top line in Figure 2 represents the experimental group which has had both a pre-treatment test (O_1) and a post-treatment test (O_2) and has been exposed to the experimental treatment of interest (x). The second row in the figure represents the control group, which differs from the experimental group only by the absence of exposure to the experimental treatment.

Sample

Subjects in the experimental group were individuals who had at least one myocardial infarction and who voluntarily attended the Spring 1981 six week Alberta Heart Foundation Coronary Rehabilitation Program in Lethbridge or Red Deer, Alberta. The programs are taught by different individuals and although the topic headings differ on the course outline, the content, which is prescribed by the Alberta Heart Foundation is the same (see Appendices A and B). Ten subjects attended the Lethbridge program and eleven the Red Deer program. The pre-test scores of both groups were analyzed for significant differences and as none were identified, the participants from both cities were placed in the one experimental group.

Subjects in the control group consisted of fifteen individuals who had at least one myocardial infarction within the previous three years and who had not attended a structured coronary rehabilitation program. Individuals over eighty years of age and individuals not living at home or in a Lodge (retirement home) in Southern Alberta were eliminated because of accessibility problems.

Since the follow-up questionnaire was used, it was necessary to keep a record of the names and addresses of the subjects. However, to ensure confidentiality, the identity of the subjects was separated from the data they provided by assigning each subject a number and using this number on all questionnaires.

Procedure

Permission was granted by the administration of a Lethbridge Hospital to utilize medical records to select and contact subjects for the control group (see Appendix C). A letter was also sent to the Chief of Medicine of the same hospital explaining the study and requesting his assistance in informing the internists and soliciting their cooperation (see Appendices D and E). For the experimental group, the coordinators of the programs were contacted by telephone and information was provided regarding the study and the time required for the pre-test in the first class.

The experimental group was given the pre-test in the first class of the Coronary Rehabilitation Program. A letter explaining the study was read to the Lethbridge and Red Deer participants by a registered nurse (see Appendix F). Pre-tests and covering letters were circulated to the participants (see Appendix G). Those willing to participate in the study were given one hour to complete the pre-test. The pre-tests were collected by the registered nurse and returned to the researcher. A post-test was given to participants upon completion of the final class (see Appendix H). Instructions were given to complete the questions independently at home and to return the test to the researcher within one week in the self-addressed stamped envelope.

The control group was given the pre-test (see Appendix G) within

seven to ten days of the experimental group's testing. The letter explaining the study, the cover letter, and the pre-tests were delivered to participants in Lethbridge by the researcher. Participants living outside of Lethbridge had their packet mailed to them. Participants were requested to complete the questions independently and return the tests to the researcher within one week in the self-addressed stamped envelope. The post-test (see Appendix H) was mailed to participants six to seven weeks following the completion of the pre-test. The date noted on the cover letter of the pre-test was used to calculate this time. Participants were instructed to complete the questions independently and to return the tests within one week to the researcher in the self-addressed stamped envelope.

Instruments

Pre-tests and post-tests (see Appendices G and H) were used to collect data for this study. The tests consisted of five sections. Section I included both open and close ended questions designed to collect the demographic data needed to describe the sample and to provide specific information requested by the Alberta Heart Foundation. Questions requested by the Alberta Heart Foundation were noted by an asterisk (*).

Section II (requested by the Alberta Heart Foundation) was designed to identify the medications (prescribed and over-the-counter

drugs) that participants were presently taking. It also had the participants identify which of the medications they were taking related to their heart problem. The knowledge they had regarding the dose, frequency and side effects of these heart medicines was also elicited. By identifying the knowledge level of participants regarding their medications, the pharmacist was better able to plan his content prior to the class. Section II was included on the post-test to evaluate the effectiveness of the class on Heart Medicines.

Section II was included in the pre-tests and post-tests of the control group in order to identify medications that myocardial infarction patients were taking and to assess their level of knowledge regarding them. The post-test results were also used to evaluate the class on Heart Medicines. The information obtained could be used to promote the increased need for pharmacists to educate consumers regarding prescription and non-prescription drugs.

Section III was designed to elicit the individual's perception of his present health status, his status prior to his heart attack, his status six months from the time of the pre-test, and the status of an average individual of the same age and sex. Cantril's ladder scale (Cantril, 1965) was used to determine the perception of health status. It allowed the individual to express a picture of his health in his own terms. Utilizing a non-verbal ladder device, which was symbolic

of the ladder of health, the individual was able to place himself on the appropriate rung. The top of the ladder was the best of health as he defined it and the bottom was the worst possible health as he defined it.

Section IV measured the individual's level of anxiety. To measure this, the Taylor Manifest Anxiety Scale (Taylor, 1953) was utilized. The reliability of the original sixty-five items was 0.92. The more common fifty item test, which was the one used, was made up of the most consistent items on the original, and although this correlation was not reported, it was probably quite high as well (Bavelas, 1978). There was a possibility that social desirability could enter into the way in which the individual answered the statements. It was hoped that because of anonymity, the individuals answered the statements candidly.

Section V measured the participant's level of knowledge of cardio-vascular disease and its preventive aspects. The Life After A Heart Attack questionnaire developed by D. Bille (1977) was utilized (see Appendices J and K). The test contained forty questions of multiple choice and yes-no types related to medications, diet, physical activity, work, stressful events, weight loss, smoking, and alcohol. D. Bille noted that the reliability was 0.6443. He also stated that the questionnaire was judged to have both content and face validity as long as the rehabilitation program had the same objectives

that he used. As the objectives were not identified in the article (Bille, 1977) this researcher could not compare them with those of the rehabilitation program. Instead, this researcher and two coronary care nurses from the local hospitals compared the content taught in the Alberta Heart Foundation Coronary Rehabilitation Program to the content identified by D. Bille in his article "The Role of Body Image in Patient Compliance and Education" (1977). The content was judged to be similar and the tool deemed to be acceptable.

Data Analysis

Non-parametric statistics were used to analyze the data as the following assumptions underlying the use of parametric statistics could not be met: random selection of subjects, subjects drawn from a normally distributed population, and variable measured on at least an interval scale. In addition, the small sample size dictated the use of non-parametric statistics.

Descriptive statistics, mean and standard deviation, were used to describe the sample. The Mann Whitney U was used to determine if there were any significant differences between the experimental and control groups ($p=.05$)

The Fisher Exact Probability test was used to determine if there was a relationship between knowledge and anxiety, knowledge and perception of present health status and perception of present health

status, and perception of health prior to myocardial infarction,
perception of health six months from now, and perception of the health
of an average individual of the same age and sex.

Chapter 4

RESULTS

A total of twenty-one individuals attended the Alberta Heart Foundation Coronary Rehabilitation Program. The experimental group consisted of twelve of these individuals who completed the program and the pre and post tests. Seven individuals did not complete the program, that is, they missed more than one class. The reasons that these individuals did not complete the course were not identified. Pre and post tests from two of the participants were incomplete and could not be used. Of the fifteen subjects in the control group, twelve completed the pre and post tests, one died during the time the study was conducted, and two subjects were hospitalized at the time of the post tests.

Of the twenty-four individuals who participated in the study, four were forty-nine years or younger, seven were fifty to fifty-nine years, and thirteen were over sixty years of age. Twenty-three of the participants were married and one was widowed. Nineteen of the participants were male and five were female. In relation to education, fifteen of the participants had high school education, or a few years of high school education; eight had community college or technical institute education; and only one had some university education. Fifty-eight percent of the participants had their heart

problem (as defined by the patient) for two years or less and twenty-nine percent had a heart problem for more than three years. Fifty percent of the participants were ex-smokers while 41 percent were non-smokers.

Fifty-eight percent of the participants drank varying amounts of spirits, wine and beer while 25 percent were non-drinkers. The drinkers in the experimental group drank two to fifteen glasses of spirits per week, with a mean of 6.4. Beer consumption was one to six bottles per week with a mean of 2.17. The control group drank one to six glasses of spirits per week with a mean of 2.8. Their consumption of wine was one to two glasses with a mean of 1.5 and beer consumption was two to eight bottles with a mean of five per week. The experimental group consumed higher quantities of spirits than the control group, however, the control group consumed higher quantities of beer and wine.

The demographic characteristics of the subjects in the experimental and control groups are provided in Table 1. The demographic characteristics of the groups were similarly distributed.

Stage One Analysis

In a quasi-experimental design, if the experimental and control groups respond similarly on pre-tests, then any post test differences could be attributed to the experimental treatment. The pre-test

