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Use of the Relaxation Response in Cardiac Rehabilitation of Post-Acute Myocardial Infarction Patients

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USE OF THE RELAXATION RESPONSE IN CARDIAC REHABILITATION OF POST-ACUTE MYOCARDIAL INFARCTION PATIENTS

by

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Through reeducation and secondary prevention, cardiac rehabilitation programs offer post-acute myocardial infarction (MI) patients tools to modify and control certain risk factors for cardiovascular disease such as a prolonged response to stress. In this study, the use of relaxation as a stress reduction technique for use in Phase I of cardiac rehabilitation was examined as a tertiary prevention strategy within the Neuman Health Care Systems Model (1982).

A quasi-experimental pretest-posttest control group design was used to examine the use of the relaxation response technique developed by Dr. Herbert Benson (1975) within a group of 15 medically-managed post-MI patients at a midwestern community teaching hospital. The psychological variable of state anxiety, as measured by the Anxiety State Scale of the State-Trait Anxiety Inventory (Form Y) (Spielberger et al., 1983), and the physiological variables of heart rate, respiratory rate, and blood pressure were used to compare experimental group subjects (n = 9), who were individually taught Benson's relaxation response technique, and control group subjects (n = 6), who were not taught the technique.

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support, encouragement and unconditional love throughout the duration of this project.

VITA

The author, Ruth Elizabeth Higgins Schleyer, was born June 4, 1956 in Dover, Ohio. She is the daughter of Clarence and Janice Higgins.

Her elementary education was completed in public schools in Ohio. Her secondary education was completed in 1974 at DeKalb High School, DeKalb, Illinois.

In August 1974, Ms. Schleyer entered Northern Illinois University, DeKalb, Illinois. While attending the School of Nursing there, she held several offices in the Student Nurses' Organization, including the presidency from 1977 to 1978. As an undergraduate student, Ms. Schleyer was selected for membership in Phi Kappa Phi, a national scholastic honor society, and membership in Sigma Theta Tau, the national honor society of nursing. She graduated magna cum laude from Northern Illinois University, receiving the degree of Bachelor of Science in Nursing in 1978.

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CHAPTER I

STATEMENT OF THE PROBLEM

Despite a recent reversal of the trend of rising age-specific coronary mortality rates (Oberman, 1980), cardiovascular disease remains the leading cause of death in the United States. In 1985 the American Heart Association projected the total health care cost of cardiovascular disease in this country to be 72.1 billion dollars. This high cost to society, in terms of economic and human resources, illustrates the magnitude of the problem.

Excessive long-term mortality and morbidity are particularly common among those heart disease patients with myocardial infarction (Croog & Levine, 1977). The American Heart Association (1985) reported a fatal outcome for over one-third of the estimated 1,500,000 Americans who, in 1982, experienced myocardial infarctions. For those surviving the myocardial infarction there remained an increased risk of reinfarction and other cardiovascular disease.

An active attempt to decrease these risks through reeducation and implementation of secondary prevention is found in cardiac rehabilitation programs for patients who have experienced myocardial infarctions (Comoss, Burke & Swails, 1979; Garcia, 1979; Hojnacki & Halfman-Franey, 1985;

Spicer, 1983; Wenger & Hellerstein, 1984). An important component of cardiac rehabilitation is increased participant awareness of the multiple risk factors for heart disease (American Heart Association, 1980, 1985; Sanderson & Kurth, 1983).

Risk factors for cardiovascular disease have been subdivided into unalterable, major alterable, and minor alterable or contributing factors (American Heart Association, 1985; Hojnacki & Halfman-Franey, 1985; Sadler, 1984). The risk factors that cannot be changed include being male, increasing age, and a family history of cardiovascular disease (heredity). Major alterable risk factors include hypertension, hyperlipidemia, cigarette smoking, and diabetes mellitus. Obesity, lack of exercise, and stress are viewed as contributing or minor alterable risk factors (American Heart Association, 1985). Cardiac rehabilitation programs provide information that enables participants to alter the cardiovascular risk factors within their control. Participants are assisted with identifying their negative health oriented behaviors that have contributed to a dysfunctional lifestyle, which the literature has defined as "that which contributes to the risk of developing cardiovascular disease" (Sadler, 1984, p. 2). Awareness of the consequences of a dysfunctional lifestyle may help the participants in cardiac rehabilitation choose to engage in activities that promote cardiovascular health.

Identified as one of the alterable risk factors for cardiovascular disease, a person's stress level is quite difficult to define and evaluate (American Heart Association, 1985; Hojnacki & Halfman-Franey, 1985). Hans Selye, the father of stress research, defined stress from a primarily physiological viewpoint as "the nonspecific response of the body to any demand" (1976, p. 15). Selye outlined the body's nonspecifically induced response in terms of the general adaptation syndrome (GAS). The GAS occurs in three successive stages: (a) the alarm reaction, (b) the stage of resistance, and (c) the stage of exhaustion. These stages correspond to an initial general mobilization of body defenses, followed by internal responses that stimulate tissue defenses and achieve maximal possible adaptation. Finally, collapse of adaptive mechanisms results if the stressor persists or the defenses are inadequate (Selye, 1976).

Selye's biological conceptualization of stress has been expanded by other researchers (e.g., Lazarus, 1966) to include a psychosocial component with emphasis on cognitive and perceptual processes (Jacobson & McGrath, 1983). Scott, Oberst, and Dropkin (1981) saw stress as arising from a transaction between an individual and his environment when the individual percieved the environmental demand (sociocultural, psychological, or physiological) as greater than his resources to deal with it. Claus and Bailey (1980) also

found perception to be a key element in the stress response. Two people may perceive the same demand quite differently--one sees it as a stressor and the other does not. However, perceptions and responses to stressors can be altered.

Whatever the origin of the stressor, once it is perceived a common physiologic response occurs. Identified as a complex cortico-hypothalamic mediated neuroendocrine response, it includes mass discharge of the sympathetic nervous system and increased pituitary secretion of adrenocorticotropic hormone (ACTH) which increases adrenal cortical secretion of corticosteroids (Guyton, 1981). Chronic stimulation of this stress response can be destructive--the body becomes worn out (Nuernberger, 1981) and an increased risk of illnesses such as cardiovascular desease results (Bieliauskas, 1982).

Continued frequent elicitation of the stress response by a person who already has cardiovascular disease may lead to further vessel injury and increased coronary atherosclerosis (Bramoweth, 1983; Eliot, 1974; Nuernberger, 1981). The key to prevention of chronic stimulation of the stress response lies in the cognitive perceptual component of the response. It is possible to learn to control the stress response thus diminishing its potentially harmful effects (Nuernberger, 1981; Scott, Oberst, & Dropkin, 1981). As such, stress reduction techniques including relaxation are recommended for inclusion in the core curriculum of cardiac

rehabilitation programs (Comoss et al., 1979; Hackett & Cassem, 1975; Hojnacki & Halfman-Franey, 1985; Segev & Schlesinger, 1981).

Anxiety after a myocardial infarction is a prevelant emotional reaction that often elicits the stress response and can tend to impair rehabilitation (Gruen, 1975; Hackett & Cassem, 1982). Techniques that help post-myocardial infarction patients decrease their anxiety may also help them modify their responses to other stressors and thus facilitate development of a functional lifestyle. To explore the use of a stress-modification technique with post-myocardial infarction patients, this study asked the following question:

> What is the relationship between use of the Benson relaxation response technique and anxiety among post-myocardial infarction patients in the first phase of cardiac rehabilitation?

CHAPTER II

CONCEPTUAL FRAMEWORK

The Neuman Health Care Systems Model, an approach to total client care developed by Betty Neuman (1982), provides the conceptual framework for the use of relaxation as a nursing intervention in this study. Neuman's model is a process model founded in General Systems Theory and based on the concepts of stress and homeostasis. The model focuses primarily on an individual's relationship to stress and the nurse-client relationship in terms of the client's response or potential response to stressors (Neuman, 1982).

Neuman sees man as a dynamic, interrelated composite of four variables--physiologic, psychologic, sociocultural, and developmental--interacting as an open system with the environment. The "environment consists of the internal or external forces surrounding man at any point in time" (Neuman, 1982, p. 9). Man is seen as maintaining varying degrees of harmony between the internal and external environment.

The homeostasis of the system may be disrupted by forces called stressors. According to Neuman, man (the patient/client) is continually bombarded by stressors throughout his interaction with the environment. Stressors may be withstood if the variables composing the patient/client system

are in place as follows: (a) the basic structure, a core of energy resources common to all members of the species; and (b) the lines of resistance, a flexible, internal set of resistance factors, are intact; (c) the normal line of defense, a set of stability factors developed over time, is in optimum working order; and (d) the flexible line of defense, a dynamic, accordionlike protective cushion against stressors, is in a working state. If one or more of these variables is weakened or if the amount of stress or stressors is increased significantly, homeostasis is disrupted and disequilibrium results (Neuman, 1982).

The steady state of equilibrium and harmony of all variables (homeostasis) comprises health. Neuman views health as reflected in the level of wellness; optimal wellness indicates that man's total needs are met. Health may thus be represented by a wellness-illness continuum that is segmented into three phases. These phases provide a framework for the role of nursing which is to work with the patient/client to move the patient/client along the continuum. The goal is to attain and maintain a maximal level of total wellness through purposeful interventions directed toward reduction of stressors.

The three phases of the wellness-illness continuum correspond to the three levels of prevention Neuman has identified in her model. Prevention is seen as intervention and as such "can begin at any point at which a stressor is

either suspected or identified" (Neuman, 1982, p. 15). The first phase (primary prevention) involves the assessment of potential or actual stressors which have not yet broken the flexible line of defense in an attempt to prevent invasion by those stressors and to retain patient/client stability. In primary prevention, risk factors are identified and modified to reduce the likelihood of problem development and the client's own defenses are strengthened (Sadler, 1984).

Secondary prevention, the second phase, begins after a reaction to a stressor has occurred. It relates to symptomatology, appropriate ranking of intervention priorities, and treatment to reduce the degree of reaction. The goal of secondary prevention is to attain patient/client stability by protecting the basic structure and facilitating wellness through reconstitution, movement toward desired wellness.

The third and final phase, tertiary prevention, seeks to maintain a maximal level of wellness once attained. The adaptive process of reconstitution is assessed and internal and external resources are integrated to prevent future occurrence of reaction to stressors.

Neuman's model is concerned with retaining, attaining, and maintaining integrated patient/client stability in the face of stressors. Relaxation is considered a stress-modification technique which can provide stability. Therefore, the model and the concept of relaxation merge easily.

Relaxation has been described as a self-regulatory

approach to stress management (Lachman, 1983; Pelletier, 1979; Warshaw, 1979). Relaxation is one way to give the body systems a rest period from accelerated responses. Use of a relaxation technique may train the body to recognize and voluntarily counteract stress symptoms (Comoss, Burke, & Swails, 1979). Relaxation is an active process and one that must be chosen by the participant in order to be effective. Relaxation and Neuman's model also fit well since Neuman's emphasis on patient/client participation in the health-wellness practice clearly provides for the client choice and active participation needed for successful relaxation training.

The use of relaxation as a nursing intervention is consistent with the three prevention modes discussed. As a primary prevention, the use of relaxation techniques mirrors several of the nursing actions suggested by Neuman (1982). Client and nurse work together to identify actual and potential stressors and to identify the need to learn relaxation as a coping technique. The nurse then has the responsibility to provide the client information about relaxation and to teach relaxation techniques.

Relaxation in the secondary prevention phase mobilizes internal resources that assist the stabilization of man's basic structure after stressor invasion. Relaxation is inherently energy-conserving, and may facilitate purposeful manipulations of one's reactions to stressors. Nursing actions

in secondary prevention also include teaching relaxation techniques to treat symptomatology identified through early case-finding.

Nursing actions in tertiary prevention are focused more on the reconstitution process. Clients are assisted to maintain their maximal levels of wellness and stability. In this phase relaxation provides an educational tool for wellness maintenance. The nurse acts as an active supporter of the client's decision to use relaxation as a health-directed behavior. In tertiary prevention nursing actions may also include coordinating and integrating health services including relaxation classes.

The use of relaxation in Phase I of cardiac rehabilitation of post-acute myocardial infarction patients is a tertiary prevention strategy viewed within Neuman's model. Stressor invasion has occurred and the initial symptomatology has culminated in an acute health problem, the myocardial infarction. Nurse and patient/client work together to identify risk factors that contributed to the acute myocardial infarction and to develop a plan to modify those risks. The nurse's teaching encompasses information necessary to enhance personal health behavior, including a functional lifestyle. At this point, relaxation is introduced as a self-regulated technique to help the patient/client modify the risk factor of a stressful lifestyle. Nurse and patient/client share the goal of attainment and maintenance of the highest level of

wellness possible for that client. Relaxation techniques may be instrumental in achieving that goal.

CHAPTER III

REVIEW OF RELATED LITERATURE

The Relaxation Response

Stressful situations requiring behavioral adjustment often elicit an integrated cortico-hypothalamic mediated neuroendocrine response. This response includes mass discharge of the sympathetic nervous system and increased pituitary secretion of adrenocorticotropic hormone (ACTH) which increases adrenal cortical secretion of corticosteroids (primarily cortisol and aldosterone) (Guyton, 1981). Popularly known as the alarm reaction or the fight-or-flight response, this stress response is characterized by increased production of catecholamines (epinephrine and norepinephrine) with associated increases in blood pressure, heart rate, and respiratory rate. The net effects of the response include shunting of blood flow from the skin and viscera to the skeletal muscles, increased motor and emotional activity, and increased rates of cellular metabolism. Blood glucose concentration rises, as do water retention, blood volume, and rate of blood coagulation. Desynchrony of the electroencephalogram also occurs (Guyton, 1981; Nuernberger, 1981). Chronic stimulation of the stress response may lead to an increased risk of illness (Bielia-

uskas, 1982).

The stress response is, however, physiologically balanced by another integrated hypothalamic response known as the relaxation response. This wakeful hypometabolic state is characterized by changes consistent with decreased sympathetic nervous system activity including decreased arousal, decreased oxygen consumption, decreased carbon dioxide elimination, stabilization of muscle blood flow, decrease in blood pressure when elevated, decrease in heart rate, and decrease in lactate production (Beary, Benson, & Klemchuk, 1974; Benson, 1975; Christoph, Luborsky, Kron, & Fishman, 1978).

The relaxation response may be elicited by many techniques among which are included autogenic training, hypnosis, and progressive muscle relaxation as well as meditative prayer, transcendental meditation, and yoga (Benson, Beary, & Carol, 1974; Benson, Marzetta, & Rosner, 1974; French & Tupin, 1974). Four key elements integral to these diverse techniques and needed to elicit the relaxation response are (a) a quiet environment, (b) decreased muscle tonus, (c) a mental device, and (d) a passive attitude.

In an own-control comparison of 17 healthy subjects taught the relaxation response eliciting technique one hour before being studied, Beary et al. (1974) reported that during relaxation oxygen consumption decreased 13%, carbon dioxide production decreased 12%, and respiratory rate

decreased 4-6 breaths per minute below control values obtained while sitting quietly reading. Sitting quietly only with eyes closed failed to produce a statistically significant change from control. A partial replication of this study by Christoph et al. (1978) using 18 hypertensive subjects found a similar and highly significant decrease in respiratory rate as well as decrease in heart rate with relaxation. However, no significant response was found in systolic or diastolic blood pressure, suggesting some individual variation in relaxation response patterns.

Benson, Marzetta, and Rosner (1974) in a study of the effect of the relaxation response on 30 hypertensive patients found a mean reduction in systolic blood pressure of 15 mmHg when regularly eliciting the response for 7-11 weeks. The average diastolic blood pressure of all the subjects did not change significantly from control; however, the ten subjects with the highest systolic and diastolic blood pressure pre-relaxation had the largest reductions.

A study by Taylor, Farquhar, Nelson, and Agras (1977) of 31 medically treated hypertensive patients also showed a trend favoring relaxation therapy. Patients were assigned to medical treatment only, non-specific treatment, or relaxation treatment groups. At the end of treatment, differences in blood pressure between the relaxation group and the medical treatment only group, as well as between the relaxation group and the non-specific therapy group, were significant.

However, due to attrition, there was no final statistical difference in blood pressure at six month follow-up.

Reduction of blood pressure in hypertensive subjects using relaxation techniques is further supported in a recent study by Pender (1984) whose experimental group of 22 clients were given group relaxation training followed by individual sessions over a six week period. The 22 person control group received no relaxation training. At four month follow-up, the trained group demonstrated a significant decrease in average systolic blood pressure of 8 mmHg ($p < .01$). There was found to be a significant inverse correlation coefficient of -.55, $p < .01$ between systolic pressure and frequency of practice, indicating the importance of continued elicitation of the relaxation response to obtain benefit.

Further support of a relaxation response induced decrease in sympathetic nervous system activity is found in increased galvanic skin resistance with relaxation reported by French, Tupin, Wright, and Drummer (1981) and reduction of premature ventricular contractions in patients with ischemic heart disease with relaxation reported by Benson, Alexander, and Feldman (1975). Davidson, Winchester, Taylor, Alderman, and Ingels (1979) reported a significant relaxation-induced decrease in plasma norepinephrine levels compatible with decreased sympathetic nervous system activity in a study of six patients with organic heart disease who had surgically implanted metallic myocardial markers. When compared to a

control state "this presumed change in sympathetic tone was further reflected in decreased myocardial circumferential shortening velocity, stroke volume, and ejection fraction and an increased end systolic cardiac volume (Davidson et al., 1979, p. 307). Indices of myocardial function were calculated from analysis of movement of the myocardial markers recorded fluoroscopically on video disks. Heart rate changes during relaxation were also directly correlated with plasma norepinephrine levels.

In addition to the physiological effects, the psychological effects of relaxation have been studied using various methods and samples. Flaherty and Fitzpatrick (1978) and Wells (1982) both reported significant differences in self-reported distress experienced postoperatively by surgical patients taught relaxation methods and those not taught relaxation. Relaxation as an active coping skill was found to significantly reduce anxiety in a study by Goldfried and Trier (1974) that used public speaking anxiety as a target behavior and relaxation as a self-control condition.

Anxiety was also the focus of a prospective study by Benson, Frankel, Apfel, Daniels, Schniewind, Nemiah, Sifneos, Crassweller, Greenwood, Kotch, Arns, and Rosner (1978) who investigated the efficacy of two relaxation techniques in the treatment of 32 patients with anxiety neurosis. Psychiatric assessment based on the Hamilton Scale for the Assessment of Anxiety States was made by an independent psychiatrist;

physiologic assessment included measurement of oxygen consumption, carbon dioxide elimination, heart rate, and blood pressure; self-assessment was based on completion of a self-rating anxiety questionnaire. According to these evaluations, no difference in therapeutic efficacy was found between the two techniques. Overall improvement of anxiety in 34% of the population was revealed by psychiatric assessment and self-rating assessment indicated improvement in 63% of the patients.

The nonpharmacologic approach to the therapy of anxiety provided by elicitation of the relaxation response has far-reaching implications. Anxiety is a prevalent problem, linked to many illnesses, including myocardial infarction, and the treatment of anxiety is an important factor in recovery.

Anxiety Following Myocardial Infarction

Hackett and Cassem (1982) have identified anxiety and depression as the focal points of psychological problems found in individuals recovering from a myocardial infarction. They feel that anxiety stems from the threat of sudden death and the concomitant sense of partial loss of self which is intensified by the individual's sense of weakness and easy fatigue.

Studies of 203 men admitted to the Coronary Care Unit, Royal Infirmary of Edinburgh (Cay, Vetter, Philip, & Dugard, 1972; Dellipiani, Cay, Philip, Vetter, Colling, Donaldson, & McCormack, 1976) also identified anxiety as a common and

immediate response to a myocardial infarction. Anxiety, measured by the Cattell 8-Parallel-Form Anxiety Battery, was initially high upon transfer from the coronary care unit, decreased during the following week, and then rose as discharge neared. The level of anxiety was not found to correlate significantly with the actual physical severity of myocardial infarction. At four month follow-up, those patients with initially high anxiety were less likely to be working or if working, to be back to their previous level of activity.

Billing, Lindell, Sederholm and Theorell (1980) in a study of denial, anxiety, and depression in 93 Swedish patients who had suffered a myocardial infarction also discovered that there was no correlation between the severity of the infarct and scores of observed anxiety or depression. In addition, there was no correlation between the degree of reported pain and observed anxiety. The influence of an anxiety factor as a possible hinderance to successful rehabilitation is reflected by these studies since more anxious patients had not necessarily had more severe myocardial infarctions.

Rehabilitation outcomes following acute myocardial infarction were studied by Stern, Pascale, and McLoone (1976) who identified two groups of patients whom they classified at opposite ends of a rehabilitation continuum ranging from poor response to good response to rehabilitation. The study lasted one year. Thirteen percent of the sample of 63 survivors were classified into the poor rehabilitation group.

These patients were depressed at each follow-up session, reported significant anxiety, and had much lower rate of return to work and sexual functioning than those classified into the good response group.

Garrity and Klein (1975) found that six month mortality for survivors of myocardial infarction was higher among patients who showed greater unresolved emotional distress during hospitalization. Their study of 48 patients reported 12 deaths at six month follow-up--10 (41%) from the non-adjustment group and 2 (8%) from the adjustment group. Adjustment and nonadjustment were determined by a behavioral checklist used for the first five days after hospitalization.

Interestingly, an eight month prospective study of 120 survivors of myocardial infarction (93 men and 27 women) by Byrne, Whyte, and Butler (1981) relating illness behavior and survivor outcome found no strong influence of anxiety following myocardial infarction on unsatisfactory rehabilitation. However, the recognition of life stress reported post-myocardial infarction was statistically associated with subsequent mortality and morbidity. A later study of that same sample (Byrne & Whyte, 1983) examining anxiety as a correlate of illness behavior in survivors of myocardial infarction, showed that six of eight clinically meaningful dimensions of illness behavior were influenced by either trait anxiety or state anxiety or both. The researchers suggested that knowledge of the anxiety engendered by the illness would

assist persons caring for survivors of myocardial infarctions in meeting the psychological needs of their patients.

Relaxation in Cardiac Rehabilitation

Persistent anxiety and depression tend to impair rehabilitation and recuperation after a myocardial infarction and trigger a cycle leading to cardiac invalidism which generates more anxiety and depression and predisposes to recurrent illness. Comprehensive cardiac rehabilitation programs to address these psychosocial problems have recently begun to include relaxation techniques in addition to more traditional exercise, education, and short-term psychotherapeutic techniques (Gruen, 1975).

In 1979 Morris reported a case study using progressive relaxation and diet modification in the health regimen of a 50 year old man who had suffered a myocardial infarction. The patient used the relaxation exercise a minimum of twice daily and reported a decrease in angina as well as a subjective feeling that it "worked". Physiological parameters showed a drop in blood pressure from 190/100 to 154/80 mmHg, a drop in cholesterol level from 344 mg percent to 249 mg percent, triglyceride level from 302 to 118 mg percent, and uric acid level from 10 to 8.14 mg percent.

Use of relaxation as a behavioral technique in cardiac rehabilitation was expanded to a larger group in a pilot study described by Brown and Munford (1984). A pre-experimental pretest-posttest design was used in this study which

explored treatment of depression and psychological invalidism post-myocardial infarction. Nine medically-cleared outpatients (eight men and one woman) who had suffered a myocardial infarction within two years previously, who exhibited a dysphoric mood but had no previously diagnosed mental illness, whose evidence of work or social dysfunction was corroborated by a significant other, and whose significant other agreed to participate comprised the sample. Subjects were taught a combination of deep muscle relaxation, imagery-based desensitization (both relaxation response eliciting techniques), stress and anger management, activity scheduling, and cognitive restructuring with their significant other as a trained facilitator. Pre-post treatment comparisons of the Zung Depression Scale, the Hamilton Rating Scale for Depression, and the PARS IV Community Adjustment Scale indicated the patients' relaxation increased and depression decreased with improvements maintained at one year follow-up. The study indicated the value of a behaviorally based, individualized cardiac rehabilitation program.

Bohachick (1984) also addressed the effect of relaxation training in cardiac rehabilitation on psychological variables. Pretest-posttest stress levels as measured by the Anxiety State Scale of the State-Trait Anxiety Inventory and by selected dimensions of the Symptom Checklist-90-Revised indicated significant decreases in scores of the 18 member treatment group as compared with the 19 member control

group. Subjects were volunteers recruited from a cardiac rehabilitation program that used exercise as its primary treatment modality. The investigation demonstrated the feasibility of incorporating relaxation training into a cardiac exercise program and indicated that cardiac patients may derive significant benefit from learning such techniques.

A relaxation technique as a mode of therapeutic intervention was studied in a cardiac rehabilitation program in The Netherlands by vanDixhoorn, deLoos, and Duivenvoorden (1983). Sixty-nine post-myocardial infarction patients (64 men and 5 women) physician-referred to the program three weeks after discharge from the hospital were randomly assigned to the relaxation condition (exercise plus relaxation training) or the control condition (exercise training only). Patients participating in relaxation showed positive changes on all outcome variables measured by the Medical Psychological Questionnaire Cardiac Patients (MPVH) and the State-Trait Anxiety Inventory, with significant positive effects on the MPVH scales of well-being and feelings of invalidity. Psychological improvement as a result of exercise alone was not found. This study also found that the benefits of relaxation techniques were more likely to occur in patients exhibiting Type A behavior patterns, indicating that relaxation is an appropriate intervention for the coronary personality, providing a feedback system for self-awareness and self-control.

Use of relaxation training in the immediate post-acute myocardial infarction phase of cardiac rehabilitation was reported by Wallace, Bratt-Wyton, Jones, and Wingett (1982). In this British study, hospitalized patients participated in a unit-based group relaxation training session. A 20 minute tape of cue-controlled breathing, positive mental imagery, and muscle tension and relaxation was utilized. No measurements of psychological or physiological effects related to the relaxation training were reported. However, according to a patient questionnaire, 90% of the 54 participants were highly satisfied with the program. Post-discharge follow-up of 14 participants revealed that all 14 perceived the relaxation training as a useful stress-modification strategy and continued to practice it at home (Wallace et al., 1982). This study demonstrated both the usefulness of relaxation training in the first phase of cardiac rehabilitation and the perceived effectiveness of continued elicitation of the relaxation response.

CHAPTER IV

HYPOTHESES

Based upon the survey of the literature and the conceptual framework, the following hypotheses for this study were generated:

I. At the end of cardiac rehabilitation Phase I, status post-acute myocardial infarction patients taught Benson's relaxation response technique will demonstrate less anxiety than those patients not taught the technique.

II. At the end of cardiac rehabilitation Phase I, status post-acute myocardial infarction patients taught Benson's relaxation response technique will demonstrate lower average heart rate, respiratory rate, and blood pressure than those patients not taught the technique.

CHAPTER V

DEFINITION OF TERMS

The following definitions of terms were used in this study.

Acute Myocardial Infarction Patient

A person hospitalized with the medical diagnosis of recent myocardial necrosis is an acute myocardial infarction patient. The medical diagnosis is based upon clinical signs and symptoms, changes in the patient's electrocardiogram, and serial laboratory tests of cardiac enzyme elevations (proteins released from necrotic myocardial cells) (Guyton, 1981).

Cardiac Rehabilitation Phase I

Cardiac rehabilitation Phase I at the institution used for this study is an inpatient hospital program designed for a physician-referred population of cardiac patients, including primarily post-myocardial infarction and post-cardiac surgery patients. Components of this phase include supervised physical activity, patient education, and psychological support of the patient and family. Program length varies with length of hospitalization averaging five to six days. Staff/patient ratio is 1:1. Program modes include active range of motion exercises, progressive ambulation, and stair climbing, and monitored ECG, blood pressure, and heart rate.

Patients are seen daily for progressive ambulation. The educational component includes information about coronary anatomy and physiology, diet, medications, and reduction of risk factors. Teaching techniques include written materials, slide programs, individual teaching, and group classes.

Technique for Eliciting the Relaxation Response

The relaxation response, characterized by decreased sympathetic nervous system activity, can be elicited using the following steps outlined by Benson (1975, pp. 162-163):

(1) Sit quietly in a comfortable position.

(2) Close your eyes.

(3) Deeply relax all your muscles, beginning at your feet and progressing up to your face. Keep them relaxed.

(4) Breathe through your nose. Become aware of your breathing. As you breathe out, say the word, "ONE", silently to yourself. For example, breathe IN . . . OUT, "ONE"; IN . . . OUT, "ONE"; etc. Breathe easily and naturally.

(5) Continue for 10 to 20 minutes. You may open your eyes to check the time, but do not use an alarm. When you finish, sit quietly for several minutes, at first with your eyes closed and later with your eyes opened. Do not stand up for a few minutes.

(6) Do not worry about whether you are sucessful in achieving a deep level of relaxation. Maintain a

passive attitude and permit relaxation to occur at its own pace. When distracting thoughts occur, try to ignore them by not dwelling upon them and return to repeating "ONE". With practice, the response should come with little effort. Practice the technique once or twice daily, but not within two hours after any meal, since the digestive processes seem to interfere with the elicitation of the Relaxation Response.

Decreases in the physiological parameters of heart rate, respiratory rate, and blood pressure and the psychological parameter of anxiety have been shown to be associated with elicitation of the relaxation response (Beary et al., 1974; Benson, 1975; Benson et al., 1978; Christoph et al., 1978; Goldfried & Trier, 1974). Benson's technique for eliciting the response includes the four integral elements described earlier and avoids the extensive use of isometric exercise (static increase in muscle tension without change in muscle length) which tends to increase myocardial oxygen demand and impose a pressure load on the left ventricle of the heart. This strain could overload a newly injured heart in the early stages of healing, e.g., patients in the first phase of cardiac rehabilitation (Spicer, 1983). For this reason, Benson's technique has been chosen over other relaxation techniques. Progressive relaxation, which includes isometric exercise may be more useful in a later phase of

of cardiac rehabilitation.

Anxiety

Frazier, Campbell, Marshall, and Werner have defined anxiety as "apprehension, tension, or uneasiness that stems from the anticipation of danger, the source of which is largely unknown or unrecognized" (1975, p. 16). Anxiety is more than an unpleasant emotional state. According to Spielberger, Gorsuch, Lushene, Vagg, and Jacobs (1983), the term can also be "used to describe relatively stable individual differences in anxiety-proneness as a personality trait" (p. 1). For purposes of this study, the distinction between state and trait anxiety is quite important. State anxiety refers to an emotional state at a particular level of intensity existing at a given moment in time. "Anxiety states are characterized by subjective feelings of tension, apprehension, nervousness, and worry, and by activation or arousal of the autonomic nervous system" (Spielberger et al., 1983, p. 1). Trait anxiety, on the other hand, refers to individual tendencies toward anxiety-proneness (i.e., toward state anxiety) that are relatively stable and enduring over time. Both types of anxiety are influenced by a person's experience base and perceptions of a situation as potentially threatening or dangerous. Because trait anxiety is a relatively stable personal psychological characteristic and therefore not amenable to short-term interventions toward reduction, this study focuses on alteration of state anxiety.

CHAPTER VI

METHODOLOGY

The methodology as discussed in this chapter was developed to address the following two hypotheses.

I. At the end of cardiac rehabilitation Phase I, status post-acute myocardial infarction patients taught Benson's relaxation response technique will demonstrate less anxiety than those patients not taught the technique.

II. At the end of cardiac rehabilitation Phase I, status post-acute myocardial infarction patients taught Benson's relaxation response technique will demonstrate lower average heart rate, respiratory rate, and blood pressure than those patients not taught the technique.

Design

A quasi-experimental pretest-posttest control group design was used. The independent variable was the relaxation response technique by Benson outlined previously (see DEFINITION OF TERMS). The dependent variables included state anxiety, heart rate, respiratory rate, and blood pressure. Specific intervening variables included the subject's age, sex, race, reported occupation, employment status, type of myocardial infarction, presence of other medical problems as per history, medications, total length of hospitalization

(number of days), and length of participation in Phase I of cardiac rehabilitation (number of days).

The proposed sample size for this project was to be 30 subjects, randomly assigned. Based on previous rates of patient referral to Phase I of cardiac rehabilitation an N of 30 subjects was considered realistic. Data collection was projected to be completed within a six months period.

Target Population

The target population for this study included post-acute myocardial infarction patients. These patients included men and women between 30-80 years of age, enrolled in the initial in-hospital phase of cardiac rehabilitation at the study site, and who were on a prescribed medical regimen only.

Setting

A suburban community teaching hospital provided the site for data collection for this study. The agency used has a 469 bed operating capacity and in 1985 reported a 70% occupancy rate. The hospital's cardiac rehabilitation program was established in 1978 and in 1985 saw an average of 25 patients per day with various cardiac diagnoses in Phase I.

Criteria for Inclusion

The following criteria were used to select the patients for this project: (a) an established diagnosis of acute myocardial infarction, (b) age of 30-80 years, (c) enrollment in Phase I of cardiac rehabilitation for at least three days,

(d) no prior history of percutaneous transluminal coronary angioplasty (PTCA) or cardiovascular surgery, and (e) ability to speak and read English. Participation in Phase I for at least three days was necessary to allow time for implementation of the study protocol. Patients who had undergone PTCA or cardiovascular surgery prior to or during their current hospitalization were not included in the project. Elimination of patients who had undergone PTCA or cardiovascular surgery was based upon the thinking that an invasive procedure, e.g., angioplasty or surgery, in and of itself might produce anxiety.

Originally, the criteria included an age restriction of 30-70 years and also eliminated persons who had a previous history of myocardial infarction. Over the first three months of data collection these two criteria eliminated ten subjects between the ages of 70 and 80 and an additional three subjects under age 70 who had previous histories of acute myocardial infarctions. Finding that a large number of otherwise appropriate candidates were being eliminated, the criteria for inclusion were revised.

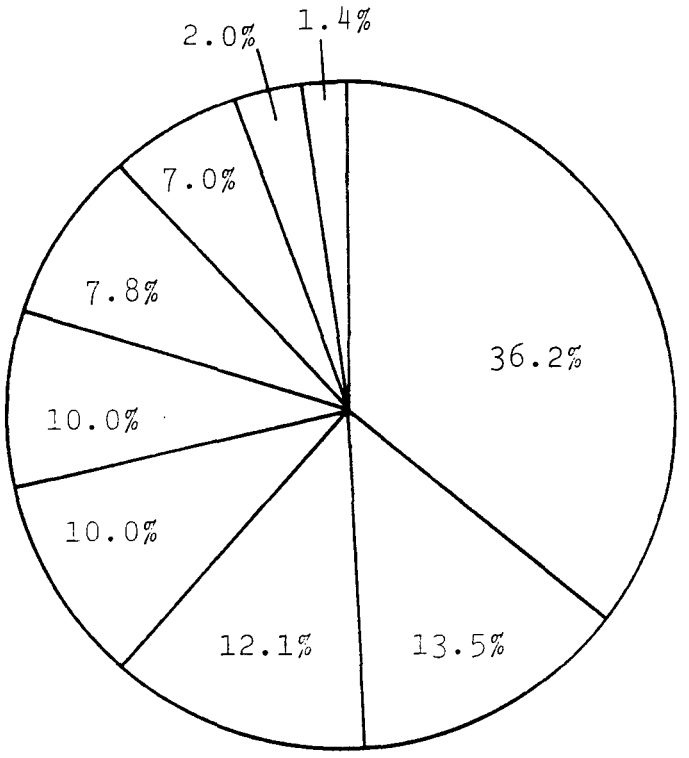
The actual pool of subjects was also affected by a change in the protocol for management of acute myocardial infarction patients which occurred during the course of the study. Rather than treating those patients with medications only, many underwent percutaneous transluminal coronary angioplasties in the acute phase of their myocardial infarctions.

This procedure resulted in the elimination of 51 subjects from the study.

Over the entire six months data collection period additional rejections from the pool of potential subjects referred to Phase I included the following: (a) 2 mentally retarded patients, (b) 11 patients unable to speak and read English, (c) 14 patients who were introduced to the cardiac rehabilitation program and discharged from the hospital on the same day, (d) 14 patients over age 80, (e) 17 medical patients referred to Phase I who had no acute myocardial infarction, and (f) 19 patients with a history of previous cardiovascular surgery. Figure 1 represents the proportions of the pool of subjects rejected who did not meet the study criteria.

A total of 24 patients referred to Phase I during the data collection period met the criteria for inclusion. Of those, three persons made the elective decision to not participate in the study. The remaining 21 patients gave their informed consent for participation, however six of them were unable to complete the study for one of the following reasons: (a) a change in physical condition resulting in transfer back to a critical care unit with concomitant suspension of cardiac rehabilitation, emergency PTCA and/or coronary artery bypass graft surgery; or (b) early discharge. In toto, 165 medical patients were referred to Phase I of the cardiac rehabilitation program at this community hospital during the

Figure 1



Proportions of the pool of subjects rejected from inclusion in the study:

36.2%	(n = 51)	PTCA
13.5%	(n = 19)	Cardiovascular surgery
12.1%	(n = 17)	No myocardial infarction
10.0%	(n = 14)	Same day introduction to Phase I and discharge
10.0%	(n = 14)	> 80 years of age
7.8%	(n = 11)	Unable to speak or read Englich
7.0%	(n = 10)	70-80 years of age
2.0%	(n = 3)	Old myocardial infarction
1.4%	(n = 2)	Retarded

six months of data collection. The achieved sample for this study was 15 subjects.

Sample Selection

A nonprobability sampling method was used. Potential subjects were all volunteers who agreed to participate. Knapp (1985) cites lower costs and convenience as two of the major reasons for the use of nonprobability sampling. Although the primary limitation of nonprobability sampling is "that generalization from a nonrandom sample to the population of interest is statistically not justifiable" (Knapp, 1985, p. 293), this limitation is minimized when the phenomena under investigation are fairly homogeneous within the population (Polit & Hungler, 1983) and when random assignment of subjects to experimental and control groups is used (Knapp, 1985). In this study, the patient population was considered homogeneous for sample selection because all patients had the diagnosis of acute myocardial infarction, were all medically-managed, and were all enrolled in Phase I of cardiac rehabilitation. Convenience sampling allowed use of all consenting patients who met the criteria for inclusion in the sample set. A table of random numbers was used to assign subjects to the treatment groups (i.e., experimental or control). Random assignment "eliminates the chances of investigator-instilled biases and personal judgment in the allocation of patients to treatment groups" (Knapp, 1985, p. 286) and allows the use of tests of significance even

though the groups do not constitute true random samples.

Instrumentation

Anxiety

Anxiety was measured by the Anxiety State Scale of the State-Trait Anxiety Inventory (Form Y) (STAI S-Anxiety scale) (Spielberger et al., 1983) (Appendix A). The scale was designed to measure the respondent's anxiety as perceived at the moment of response and has been found to be a sensitive indicator of changes in transitory anxiety. Qualities evaluated by this scale include feelings of tension, worry, apprehension, and nervousness.

The STAI S-Anxiety scale consists of 20 statements which require respondents to select the choice that best describes the intensity of their feelings. Each choice is based on a unipolar four point rating scale including: (a) not at all, (b) somewhat, (c) moderately so, and (d) almost always. Each item is given a weighted score of one to four. High anxiety is indicated by a rating of four and low anxiety by a rating of one. The total score is the weighted sum of all 20 responses, ranging from a minimum of 20 (low anxiety) to a maximum of 80 (high anxiety). Instructions for the STAI S-Anxiety scale are printed on the test form and are verbally reinforced by the examiner. Respondents are also reminded to complete all test items.

Given the transitory nature of anxiety states, measures of internal consistency provide the most meaningful reliabil-

ity indices for this scale. According to the Manual for the State-Trait Anxiety Inventory (Spielberger et al., 1983) the scale has been used in over 2000 studies. Alpha reliability coefficients for the STAI S-Anxiety scale (Form Y) are quite high, ranging from .86 to .95. The overall median alpha coefficient in the normative sample was .92. These high values indicate that items of the STAI S-Anxiety scale are consistently measuring the attribute of state anxiety. Internal consistency is further evidenced by item-remainder correlations computed for the normative samples. Item-remainder correlations reveal the ability of test items to discriminate between conditions of testing, e.g., more stressful or more relaxed conditions. The median S-Anxiety item-remainder correlations among the normative groups ranged from .55 to .63. The highest such correlations for individual items occurred when the S-Anxiety scale was administered under stressful conditions. Given the broad spectrum of subjects to whom the scale has been administered, the assumption was made that the STAI S-Anxiety scale would be a reliable tool for this study.

Validity of the STAI scales has been demonstrated by administration of the questionnaires under stressful and nonstressful conditions in a wide variety of studies, including studies of hospitalized medical-surgical patients. Spielberger et al. (1983) reported evidence of the concurrent, convergent, divergent, and construct validity of the scales

supported by research findings in six main areas: (a) contrasted groups, (b) correlations between the S-Anxiety and T-Anxiety scales, (c) correlations of the STAI with other personality tests, (d) correlations of the T-Anxiety scale with other trait anxiety measures, (e) correlations of the STAI with academic aptitude and achievement, and (f) effects of stress on state anxiety. Of particular interest to this study are the findings that the STAI S-Anxiety scale was found to be a valid measure of transitory levels of state anxiety when administered to the same samples of subjects under a range of different experimental conditions including highly stressful and relaxing circumstances.

Heart Rate

For this study, heart rate was measured by continuous electrocardiogram monitoring of patients by General Electric or Marquette monitors. According to the Biomedical Engineering Department of the participating agency, the monitors are calibrated every six months in accordance with the manufacturers' specifications. Heart rates were recorded at 0800 and 1600 hours.

Respiratory Rate

Each subject's respiratory rate was counted for 60 seconds using a watch with a sweep second hand. Respiratory rate measurements used for this study were those recorded by the subject's caregiver at 0800 and 1600 hours.

Blood Pressure

Arterial blood pressure was measured by the registered nurse caring for the subject, using the wall-mounted mercury sphygmomanometer at the subject's bedside. Blood pressure readings used for this study were those recorded as routine vital sign measurements at 0800 and 1600 hours. Registered nurses caring for subjects had been trained in their basic nursing programs to measure arterial blood pressure using functional stethoscopes.

Data Collection

This study was carried out in accordance with ethical standards and institutional requirements to protect the rights of the subjects involved. First, approval to conduct the study was obtained from the Institutional Review Board of Loyola University of Chicago. Following receipt of university approval, the proposal was personally presented by the researcher to a series of committees at the agency selected as the data collection site. The hospital's Nursing Research Committee, Cardiology Committee, and Institutional Review Committee all approved the project. Following institutional approvals, the research proposal was accepted by and filed with the Graduate School of Loyola University of Chicago in the form of a thesis outline. Informal approval and input were also obtained from the Patient Care Director of the nursing unit where data collection would occur, as well as from the cardiac rehabilitation nurses working with that unit.

Prior to implementation of the project, staff working on the nursing unit selected for data collection attended an information session about the study. Session content included information about the purpose of the study, a summary description of the study, and the supportive role staff members would play during the data collection period. Staff members were informed that colorful heart-shaped stickers would be placed on the chart covers and kardexes of patients participating in the study. To avoid assigning experimental and control subjects to the same room, a black dot was drawn in the center of the chart and kardex stickers for the control group members. However, staff members were not informed which group was indicated by stickers with dots, only that patients with plain and dotted stickers should be assigned separate rooms. Staff members were asked to not assist subjects to practice the relaxation response technique and to refer all patient questions about the technique to the researcher. A total of 25 staff members employed on the Coronary Surveillance Unit and the two cardiac rehabilitation nurses assigned there attended one of the four sessions presented. A summary description of the study was also posted on the unit and staff were encouraged to read it and to refer any questions or concerns to the researcher.

Nursing staff and physicians (both attending cardiologists and housestaff) were quite cooperative, expressed interest in the study, and helped keep the researcher abreast

of potential subjects. The most influential and consistent resource person, however, was the cardiac rehabilitation nurse who screened all the medical referrals of patients to Phase I. The researcher would telephone the cardiac rehabilitation nurse on an almost daily basis to check if any patients referred to Phase I that day fit the criteria for inclusion in the study. No potential patient-subject was approached by the researcher before that person had been introduced to the cardiac rehabilitation program. Patient contact by the cardiac rehabilitation nurse prior to contact by the researcher was arranged for two main reasons. First, a preliminary screening of candidates could occur. Second, the introduction to cardiac rehabilitation included a slide-tape program on the risk factors for heart disease that mentioned the concept of stress as a risk factor. This key point was further emphasized by the researcher in the explanation of the relaxation study.

Patient records were used to validate the diagnosis of acute myocardial infarction. Physician progress notes, nursing notes, and the patient's history and physical were carefully read to verify the patient's age and previous history.

Patients meeting the criteria for inclusion were asked for informed consent to participate in the study within 36 hours after referral to cardiac rehabilitation. Explanation of the study included the potential benefit of learning a stress-modification technique such as relaxation as a self-

controlled method of reducing one of the risk factors for heart disease. Participation in the project was presented as an adjunct to the cardiac rehabilitation protocol already in place, not as a replacement for it. Patients were assured that they were being denied none of the usual cardiac rehabilitation curriculum and that they were free to withdraw from the relaxation project at any time if they so desired without jeopardizing their treatment. Patients were also informed that they would be asked to complete a brief self-evaluation questionnaire at the beginning of the project and again the day before discharge from the hospital.

Informed consent forms (Appendix B) were completed in duplicate. One copy was given to the patient and one copy was retained by the researcher. Individual physician approval to approach a patient was deemed unnecessary by the members of the Cardiology Committee and Institutional Review Committee at the time of proposal approval.

A table of random numbers (Polit & Hungler, 1983) was used to assign the volunteers to the experimental and control groups. Random assignment thus resulted in a final sample size of 15; 6 in the control group and 9 in the experimental group.

Participants in both groups were next administered the STAI S-Anxiety scale as a pretest to measure their anxiety at that point in time. If the subject was in the control group, at the conclusion of the pretest, the researcher gave

the subject four heart-shaped stickers and said the following:

> Relaxation is an important method of helping you to deal with stress. Your heart muscle works less hard when you are rested and relaxed. Here are four heart-shaped stickers to serve as relaxation reminders. I'd like you to stick these hearts on four objects that you frequently see or use--for example, on your telephone receiver, your bedside table, or your bathroom mirror. Whenever you see a heart, I'd like you to take a moment to tell yourself: "Relax, do it for your heart". I'll be stopping in periodically to say "hello" and to ask how you're doing. The day before you go home, I'll be giving you another questionnaire. Thank you very much.

Use of the stickers with the control group provided an avenue for the researcher to maintain contact with the subjects, thus minimizing the risk of subjects leaving the hospital without completing the study. The heart-shaped stickers also served as a visual reminder cue for relaxation (Smythe, 1984).

At the conclusion of the pretest questionnaire, subjects in the experimental group were given a folder containing an information sheet about relaxation (Appendix C), the steps of the relaxation response technique as outlined by Benson (Appendix D), a practice record upon which to record practice times and comments (Appendix E), and four heart-shaped stickers identical to those used by the control group.

Instructions for use of the relaxation reminder stickers were identical to those given to subjects in the control group. Additionally, subjects in the experimental group were asked to read the information in the folder and an appointment was made for the researcher to return within 24 hours to teach the subject the relaxation response technique. Subjects were also informed that they should expect to practice the technique twice daily throughout their hospital stay in order to derive maximal benefit from its effects.

Most initial teaching session appointments with experimental subjects were scheduled for late afternoon or early evening to avoid conflicts with mealtimes, physician and nursing rounds, and scheduled tests. Teaching sessions often coincided with visiting hours, however, and the subjects were extremely cooperative about requesting visitors to wait until after the session was completed. On several occasions family members expressed strong personal interest in the project and in three individual cases asked to be taught the technique themselves while it was being taught to the subject. With the subject's permission, those interested family members were included in the teaching session. Teaching sessions took place in the subject's hospital room with the subject seated in a comfortable armchair. A quiet environment was structured as much as possible by closing the door of the room and attempting to control noise within the room (e.g., turning off the television). Subjects' roommates and

their roommates' visitors were also extremely helpful and cooperated in creating as quiet an environment as possible. In fact, several roommates who were not in the study asked permission to "listen in" during the teaching session. A sign which stated "Quiet please. Relaxation session in progress." was posted on the door of the room to help minimize noise and interruptions during the teaching session.

The relaxation technique was taught using the steps outlined earlier under Technique for Eliciting the Relaxation Response. Because live instruction sessions for relaxation training have been reported to be more effective than taped sessions (Hillenberg & Collins, 1981; Tamez, Moore, & Brown, 1978), live instruction and follow-up were chosen for this study.

First, the researcher reviewed the general information about relaxation that the subject had previously been asked to read. The subject and researcher next reviewed the actual steps of the technique, using the written outline provided. Finally, the subject practiced the technique while guided through the steps by the researcher. Upon completion of the initial session, the participant was asked for subjective feedback about the experience. He/she was encouraged to practice the technique twice daily for approximately 10-20 minutes, not within two hours after meals. Dates and times of the practice sessions were to be recorded on the practice record along with any comments or suggestions as feedback

for the researcher. The researcher also suggested that the relaxation reminder stickers could be used to help the subject remember to practice the technique. Each subject was aware that the researcher would collect the practice record at the time the second self-evaluation questionnaire was completed. Completed practice records helped document actual use of the technique. Additionally, practice sessions are an integral component of learning relaxation and should be recorded even if the recording is a subjective rather than an objective measurement (Hillenberg & Collins, 1981; Snyder, 1984).

Within 24 hours after initially teaching the technique, the researcher returned to provide the subject a follow-up review and practice session and to address any questions or concerns that might have arisen. In all cases but two, the subjects denied the need for an additional practice session. Basic elements of the relaxation technique were reviewed and use of the practice record was emphasized.

Daily contact was made by the researcher with subjects in both the experimental and control groups and careful anecdotal notes of the interactions, including the subjects' reported perceptions and concerns, were recorded. Heart-shaped stickers were observed placed as instructed in the subjects' hospital rooms and on some of their belongings. Most common locations chosen included telephones, bedside tables, water pitchers, tissue boxes, and overhead televisions.

Frequent contact also facilitated researcher awareness of projected date of discharge for the study participants. The day prior to discharge each subject was administered the STAI S-Anxiety scale as a posttest questionnaire and practice records were collected from subjects in the experimental group.

Throughout their participation in the study physiological data were collected from the subjects' charts. Physiological data collection for each subject was inclusive from the day of pretest administration through the day of posttest administration. Vital sign measurement is routinely conducted at 0800 hours and 1600 hours according to institutional policy (Appendix F) and reflects the usual circadian pattern of vital signs. Temperature, heart rate, and blood pressure follow the same basic curve; lowest in the early morning and gradually rising to a peak in the late afternoon (Lanuza, 1976; Tom, 1976). Heart rate, respiratory rate, and blood pressure measurements recorded at 0800 and 1600 hours were obtained from the graphic sheets of the inpatient medical records.

Demographic data including sex, age, race, employment status, reported occupation, and type of myocardial infarction were obtained from the participants' inpatient medical records. Lists of current medications and of any additional medical problems per history were also derived from chart review.

Participant confidentiality was strictly maintained throughout the data collection period. No personal names and/or other identifying information were at any time indicated on the data collection sheet. Information was collected by code numbers only to allow for comparison of individual pretest and posttest scores. The entire data collection phase lasted a total of six months.

CHAPTER VII

RESULTS

An examination of the demographic characteristics and categorical indices of health for the achieved sample of 15 subjects was performed. The sample was composed of 4 female subjects (26.7%) and 11 male subjects (73.3%), ranging in age from 39 to 76 years with the mean age being 57.8 years. Subjects were hospitalized for 9 to 16 days (mean of 13) and spent between 4 and 10 (mean of 6) of those days enrolled in the first phase of cardiac rehabilitation. An overview of the data revealed several trends for the entire sample reflected within both the control and the experimental groups. Men outnumbered women, Caucasians outnumbered Blacks, and employed subjects outnumbered those unemployed by a ratio of 2:1 or more (see Table 1). Several subjects were unwilling to reveal information regarding their level of education. The proxy measure of occupation was therefore used to compare the groups according to the U.S. Department of Labor classification of occupations (U.S. Department of Labor, 1986). Subjects' occupations were categorized similarly within both groups (see Table 1).

The most commonly reported single site of myocardial infarction was an infarction of the inferior wall (n = 8),

Table 1

Distribution of Demographic Characteristics

Variable	Control (n = 6) Frequency	%	Experimental (n = 9) Frequency	%	Total (N = 15) Frequency	%
Race						
Caucasian	5	(83.3)	9	(100.0)	14	(93.3)
Black	1	(16.7)	0	(0.0)	1	(6.7)
Sex						
Men	5	(83.3)	6	(66.7)	11	(73.3)
Women	1	(16.7)	3	(33.3)	4	(26.7)
Age						
30-39	1	(16.7)	0	(0.0)	1	(6.7)
40-49	0	(0.0)	2	(22.2)	2	(13.3)
50-59	3	(50.0)	3	(33.3)	6	(40.0)
60-69	2	(33.3)	3	(33.3)	5	(33.3)
70-79	0	(0.0)	1	(11.1)	1	(6.7)
Employment Status						
Unemployed	2	(33.3)	2	(22.2)	4	(26.7)
Employed	4	(66.7)	7	(77.8)	11	(73.3)

Table 1 (continued)

Distribution of Demographic Characteristics

Variable	Control (n = 6) Frequency	%	Experimental (n = 9) Frequency	%	Total (N = 15) Frequency	%
Occupation						
Executive/ Managerial	2	(33.3)	1	(11.1)	3	(20.0)
Engineer	0	(0.0)	2	(22.2)	2	(13.3)
Marketing/ Sales	1	(16.7)	1	(11.1)	2	(13.3)
Service	2	(33.3)	2	(22.2)	4	(26.7)
Production	1	(16.7)	0	(0.0)	1	(6.7)
Transportation	0	(0.0)	3	(33.3)	3	(20.0)

followed by infarction of the true posterior wall (n = 2), and anteroseptal infarction (n = 1). The remainder of subjects had experienced myocardial infarctions of multiple walls as follows: (a) inferior plus anteroseptal (n = 1), (b) inferior plus anterolateral (n = 1), (c) inferior plus right ventricular (n = 1), and (d) inferior plus posterior (n = 1).

Examination of concomitant medical diagnoses per history as recorded in the subjects' inpatient hospital records revealed that most had medical problems in addition to the diagnosis of acute myocardial infarction. Two-thirds (n = 10) of the subjects were also hypertensive and one-third (n = 5) had diabetes mellitus. Four of the 15 subjects had both hypertension and diabetes mellitus. Less commonly identified medical diagnoses included a history of transient ischemic attacks (n = 2), gout (n = 2), bronchitis (n = 2), arthritis (n = 2), hiatal hernia (n = 2), colitis (n = 1), renal failure (n = 1), pulmonary edema (n = 1), and previous myocardial infarction (n = 1). The medical diagnoses identified among the study participants were reflected in the composite list of their current medications. Listed in order of frequency prescribed for sample members, those medications were categorized as follows: (a) nitrates (n = 13); (b) calcium channel blockers (n = 11); (c) stool softeners (n = 10); (d) antacids (n = 5); (e) anticoagulants (n = 4); (f) antibiotics, (g) antiarrhythmics, and (h) sulfonylureas

(n = 3); (i) beta blockers, (j) nonsteroidal anti-inflammatory agents, and (k) cardiac glycosides (n = 2); and (l) glucocorticoids, (m) diuretics, (n) insulin, (o) potassium supplements, (p) tricyclic antidepressants, (q) captopril, and (r) bronchodilators (n = 1). It is apparent therefore that study subjects had multiple diagnoses and multiple medications.

Based upon the information obtained by examination of the demographic and health indices data, a profile of the typical study participant could be described. The typical study participant was (a) employed, (b) Caucasian, (c) male, (d) between the ages of 50-70, (e) hypertensive, (f) enrolled in Phase I of cardiac rehabilitation, (g) an acute inferior wall myocardial infarction patient, and (h) receiving medications that included a nitrate, a calcium channel blocker, and a stool softener.

In addition to the characteristics listed, various descriptive statistics offered information about the sample. Study participants assigned to the control group had a mean age of 55.7 years; those assigned to the experimental group had a mean age of 59.2 years. Control group subjects were hospitalized for a mean of 11.8 days with a mean enrollment in Phase I of 5 days. Experimental group subjects were hospitalized for a mean of 13.9 days and spent a mean of 6.8 days enrolled in Phase I (see Tables 2 and 3).

In order to test the study hypotheses, it was necessary

Table 2

Selected Descriptive Summary Statistics for Control Group (n = 6)

Label	Mean	Standard Deviation	Minimum Value	Maximum Value	Variance
Age	55.667	9.201	39.0	66.0	84.667
Number of Days Hospitalized	11.833	1.941	9.0	14.0	3.767
Number of Days in Phase I	5.0	0.894	4.0	6.0	0.800

Table 3

Selected Descriptive Summary Statistics for Experimental Group (n = 9)

Label	Mean	Standard Deviation	Minimum Value	Maximum Value	Variance
Age	59.222	8.913	47.0	76.0	79.444
Number of Days Hospitalized	13.889	2.028	11.0	16.0	4.111
Number of Days in Phase I	6.778	1.787	5.0	10.0	3.194

to first demonstrate that the control group and the experimental group were comparable on important demographic variables and health indices at the beginning of the study. It was also important to verify that length of hospital stay and length of enrollment in Phase I of cardiac rehabilitation were similar for both groups. To accomplish this, two statistical tests were performed, the chi-square test and the t-test for independent samples.

The chi-square statistical test with a Yates Correction for continuity was used to test the differences in proportions of various characteristics in the two groups (Kviz & Knafl, 1980; Polit & Hungler, 1983). Although use of the chi-square statistic is usually limited when more than 20% of the expected frequencies are less than 5, according to Minium and Clarke (1982) such a limitation may be more conservative than necessary. They report that "chi-square will give reasonable results for contingency tables even when the average expected frequency is lower" (Minium & Clarke, 1982, p. 382). In this study, application of the chi-square test to the nominal level demographic variables of sex, race, and employment status revealed no statistically significant differences in the proportions of these variables between the two groups (see Tables 4, 5, and 6).

The t-test for independent samples was used to test for the difference between the means of the control group and the experimental group for the interval level demographic

Table 4

Comparison of Control and Experimental Groups by Sex Using Chi-square Statistic

Group	Men	Women	Total
Control	5	1	6
	(45.5%)	(25.0%)	
Experimental	6	3	9
	(54.5%)	(75.0%)	
Entire Sample	11	4	15
	(100.0%)	(100.0%)	

Note. Chi-square = 0.37, *df* = 1

p = .546

Table 5

Comparison of Control and Experimental Groups by Race Using Chi-square Statistic

Group	Caucasian	Black	Total
Control	5	1	6
	(35.7%)	(100.0%)	
Experimental	9	0	9
	(64.3%)	(0.0%)	
Entire Sample	14	1	15
	(100.0%)	(100.0%)	

Note. Chi-square = 1.07, df = 1

p = .301

Table 6

Comparison of Control and Experimental Groups by Employment Status Using Chi-square Statistic

Group	Employed	Unemployed	Total
Control	4	2	6
	(36.4%)	(50.0%)	
Experimental	7	2	9
	(63.6%)	(50.0%)	
Entire Sample	11	4	15
	(100.0%)	(100.0%)	

Note. Chi-square = 0.23, df = 1

p = .635

variable of age. Use of the t-test is appropriate for data that "consist of two sets of sample measurements that possess at least interval scale and are continuous in nature" (Knapp, 1985, p. 167), as is the case with the variable of age. Because t-tests assume that the data are random samples drawn from normally distributed populations, use of the t-test with small sample sizes should be viewed with caution. Results of the t-tests presented in this study should therefore be examined in light of this limitation. Analysis of the difference between the means of the subjects' age in years revealed no statistically significant differences for mean age (see Table 7).

Statistical comparisons of the categorical indices of health, including type of myocardial infarction, concomitant medical diagnoses, and medication regimen, were not performed because the number of variables exceeded the number of subjects. However, based upon the researcher's clinical judgment, the control and experimental groups did not appear to differ in regard to these health indices.

The control and experimental groups were compared on the variables of total number of days hospitalized and number of days in Phase I using the t-test for independent samples. No statistically significant difference was found for mean number of days hospitalized. For the variable of mean number of days in Phase I, the data yielded a t value of 2.237 which was significant at the probability level of .043 when a two-

Table 7

T-test Statistics for Independent Samples Used to Compare the Control and Experimental Groups for Age and Hospitalized Days ($n_C = 6$: $n_E = 9$)

Variable	Overall Mean	*SD*	*t*	*df*	Prob > |*t*|
Age	57.800	8.882	.747	13	.468
Number of Days Hospitalized	13.067	2.187	1.955	13	.072
Number of Days in Phase I	6.067	1.710	2.237	13	.043

Note. \|*t*\| = Absolute value of *t*, indicating probability is based on a two-tailed *t*-test.

tailed t-test was used. These data indicated that the control and experimental groups were different in respect to length of time group members participated in the first phase of cardiac rehabilitation (see Table 7). Members of the experimental group were in Phase I 1.7 days longer than were control group members.

In summary, similarity of the control group and the experimental group was established. No differences between groups was found for the variables of sex, race, employment status, age, or length of hospital stay. Length of participation in Phase I was found to be longer for experimental group members than for control group members.

Hypothesis I

Hypothesis I asserts that "at the end of cardiac rehabilitation Phase I, status post-acute myocardial infarction patients taught Benson's relaxation response technique will demonstrate less anxiety than those patients not taught the technique". Subjects' state anxiety was measured using the STAI S-Anxiety scale as a pretest and posttest tool. Pretest and posttest scores were subjected to several statistical analyses to test the first hypothesis.

First, the t-test for independent samples was applied to the mean pretest scores for the control group and for the experimental group to determine if prerelaxation instruction anxiety levels were similar or different for the two groups. The data yielded a t value of 0.771, which was significant

at the probability level of .454 (see Table 8). Since the predetermined significance criteria of .05 was not met, the groups were comparable prior to the relaxation instruction.

Mean posttest state anxiety scores were then subjected to the t-test for independent samples. This comparison was performed to reveal any differences in state anxiety levels at the end of Phase I between subjects taught a relaxation technique and those receiving no structured relaxation teaching. A t value of 0.120 which was significant at the level of .906 was obtained (see Table 8). No statistically significant difference was indicated between the mean posttest scores for the control and the experimental groups. Based upon this finding, the first hypothesis was rejected.

To explore further if there were significant changes in state anxiety within each group, the paired t-test was performed on mean pretest and mean posttest scores within each group. Control group data yielded an F value of 0.001 at the significance level of .975. Therefore, no significant change in anxiety scores was found within the control group. Experimental group anxiety scores were also tested for changes in state anxiety. The paired t-test performed on mean pretest and posttest anxiety scores within the experimental group yielded an F value of 2.492 at the .153 level of significance. Therefore neither group showed significant changes in state anxiety as measured by the STAI S-Anxiety scale.

Table 8

T-test Statistics for Independent Samples Used to Compare the Control and Experimental Groups for Pretest and Posttest Scores ($n_C = 6$; $n_E = 9$)

Variable	Overall Mean	*SD*	*t*	*df*	Prob>|*t*|
Pretest Score	40.867	12.660	0.771	13	.454
Posttest Score	44.400	14.347	0.120	13	.906

Note. \|*t*\| = Absolute value of *t*, indicating probability is based on a two-tailed *t*-test.

Although scatter plots of the total sample pretest and posttest scores approached normal distribution, the small size of both groups warranted the use of nonparametric procedures to test for the differences between individually paired pretest and posttest scores (Polit & Hungler, 1983). The sign test and the Wilcoxin signed rank test are nonparametric tests analogous to the paired *t*-test in that both test whether a statistically significant difference "exists between two populations of measurements that have been paired on the basis of some extraneous factor(s)" (Knapp, 1985, p. 268).

Sign test and Wilcoxin signed rank test results for the entire sample ($N = 14$ because one pair of differences equalled zero) indicated that significant differences between the pretest and posttest scores did exist at the .05 level of significance. The sign test revealed that two differences occurred in the minority direction and for $N = 14$, that number of differences is the maximum which may occur at the significance level of .05 and still permit rejection of the hypothesis of no differences (Knapp, 1985). The Wilcoxin signed rank test, a more powerful test because it takes into consideration both direction and magnitude of differences, also revealed significance. The smaller of the sums of the signed ranks (in this case, the negative signed ranks) was 19.5. For $N = 14$ and $p = .05$ for a two-tailed test, the critical value below which significant difference may be said to exist is 21 (Knapp, 1985). Therefore, for the entire sample, a significant difference

existed between the pretest and posttest anxiety scores. Since the minority direction of difference was negative, it may be concluded that for the entire sample, posttest scores were generally higher than pretest scores. This indicated a relative increase in measured state anxiety over the time of study participation. Significant differences between the paired pretest and posttest scores failed to be revealed when the sign test and Wilcoxin signed rank test were applied to the control group and the experimental group separately.

The relationship between the number of days in Phase I of cardiac rehabilitation and the mean posttest score obtained by subjects for each length of time in Phase I was explored (see Table 9). The Pearson's Product Moment Correlation Coefficient measuring the linear relationship between these two variables was .673, indicating a moderately strong positive association. As the number of days in Phase I increased, so did the level of state anxiety as measured by the STAI S-Anxiety scale. The squared correlation ($.673^2$ = .45) indicated that 45% of the variation in one variable was explained by variation in the other. This is a fairly strong relationship.

In summary, statistical analyses of the data indicated that state anxiety levels in general for the entire sample increased over time. Additionally, there were no significant differences noted between pretest and posttest scores within groups as measured by the paired *t*-test, sign test, and

Table 9

Summary Statistics Related to Number of Days in Phase I (N = 15)

Days in Phase I	n	M Posttest Score	SD	Variance
4	2	30.5	14.85	220.5
5	5	48.0	10.22	104.5
6	4	47.5	17.46	305.0
8	3	39.0	16.82	283.0
10	1	58.0	NA	NA

Wilcoxin signed rank test; or between groups, as measured by the t-test for independent samples.

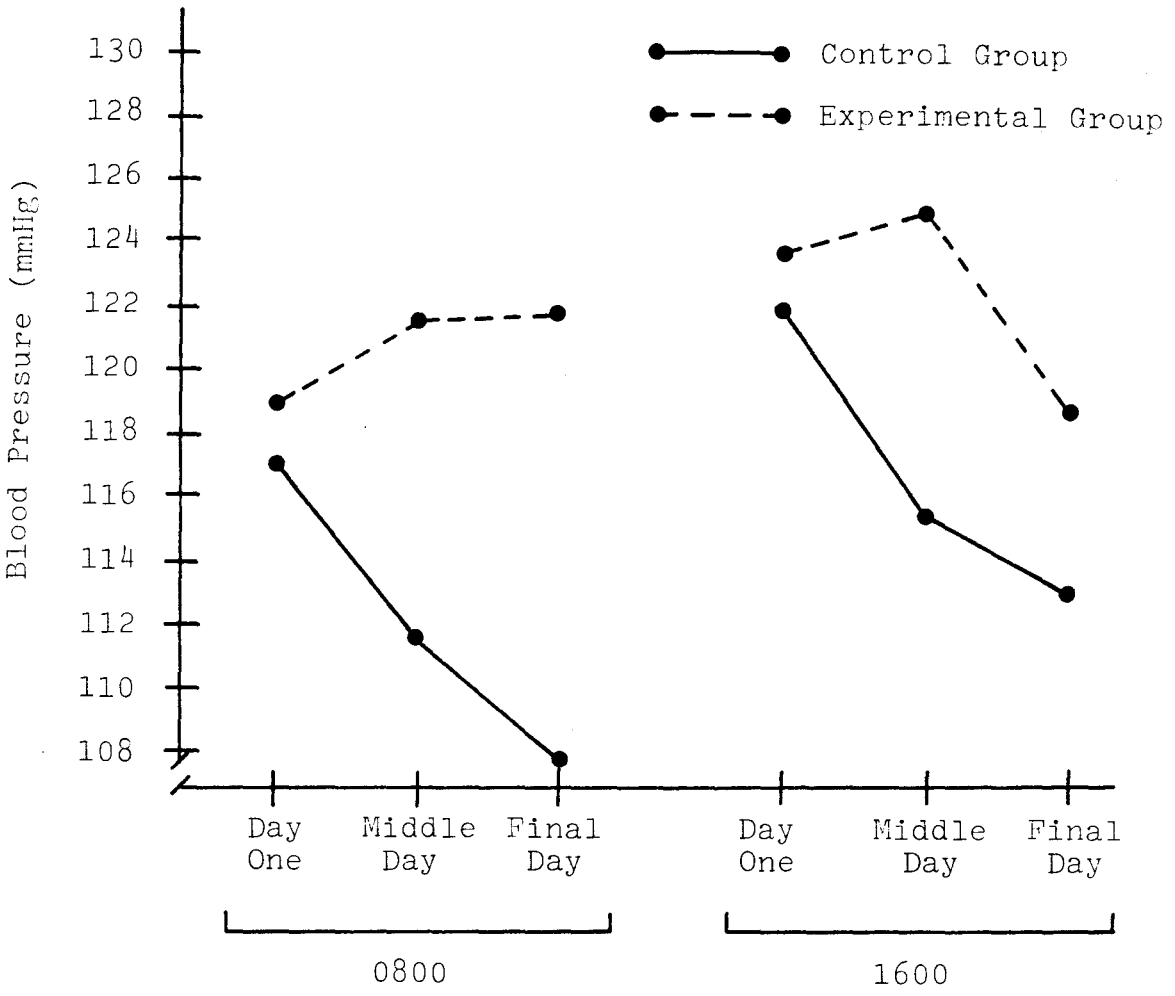
Hypothesis II

The second hypothesis for this study proposed that "at the end of cardiac rehabilitation Phase I, status post-acute myocardial infarction patients taught Benson's relaxation response technique will demonstrate lower average heart rate, respiratory rate, and blood pressure than those patients not taught the technique". Vital sign measurements for each subject were recorded at 0800 and 1600 hours for the duration of the subject's participation in the study, from the day of pretest administration through the day of posttest administration. Because subjects were enrolled in Phase I for varying lengths of time, ranging from 4-10 days, the number of vital sign measurements recorded also varied between subjects. To handle this variation, mean values of heart rate, systolic blood pressure, and diastolic blood pressure at 0800 and 1600 hours were calculated for each group on the first day, the middle day, and the final day of data collection. The values thus obtained were then plotted in order to determine their empirical relationships, particularly any trends noted over time (Egger & Miller, 1984) (see Figures 2, 3, and 4). Since mean respiratory rates of both groups remained virtually constant at both 0800 and 1600 hours, 18 $\pm$ 2 breaths per minute, these data were not plotted or statistically analyzed.

Figure 2

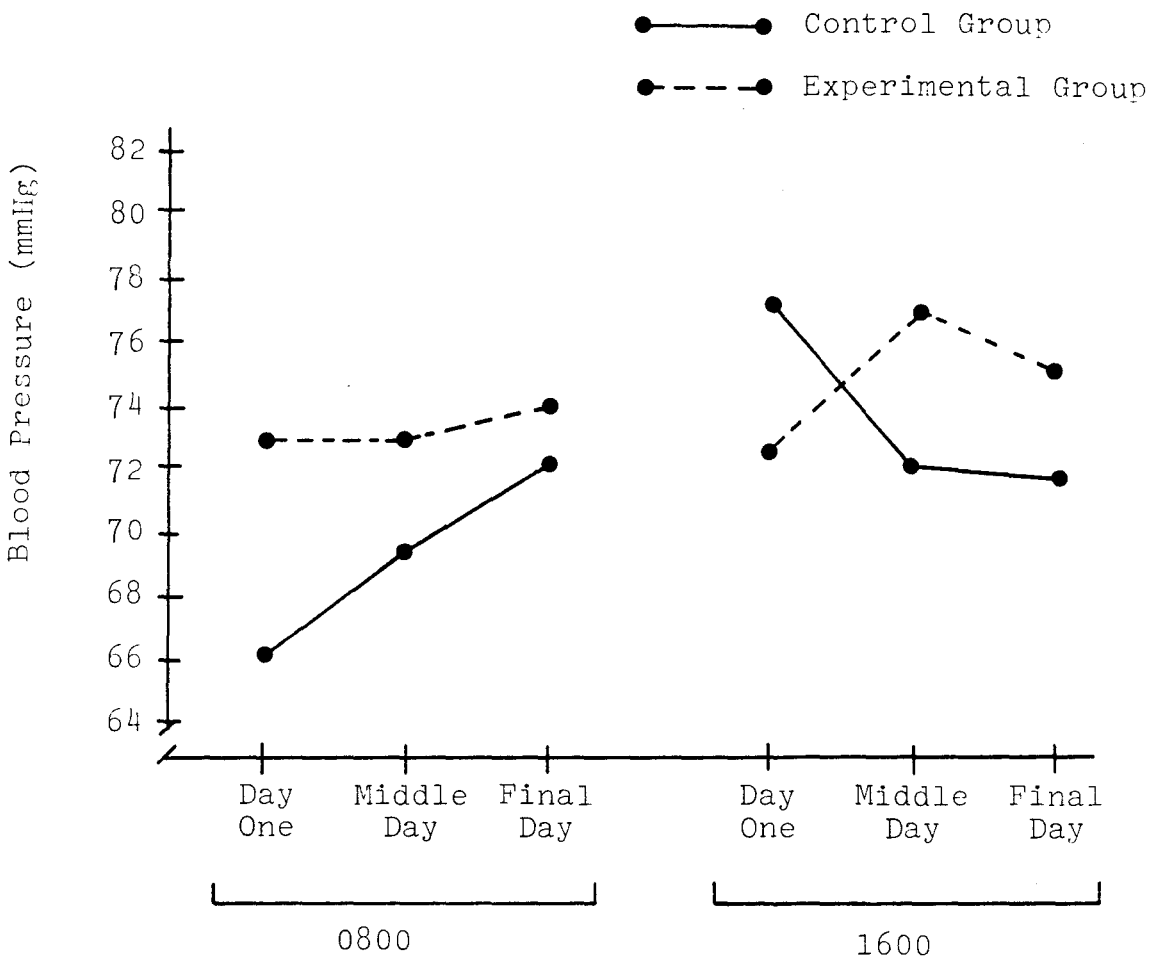
Mean 0800 and 1600 heart rates for control (n = 6) and experimental (n = 9) groups on Day One, Middle Day, and Final Day of data collection. See Tables 10 and 11 for summary statistics.

Figure 3



Mean 0800 and 1600 systolic blood pressures for control ($\underline{n}$ = 6) and experimental ($\underline{n}$ = 9) groups on Day One, Middle Day, and Final Day of data collection. See Tables 12 and 13 for summary statistics.

Figure 4



Mean 0800 and 1600 diastolic blood pressures for control ($\underline{n}$ = 6) and experimental ($\underline{n}$ = 9) groups on Day One, Middle Day, and Final Day of data collection. See Tables 14 and 15 for summary statistics.

Visual examination of the plotted values revealed the following trends: (a) mean heart rates at 0800 hours showed a net decrease over time for both groups, (b) mean heart rates at 1600 hours showed a net decrease over time for the control group but were virtually unchanged over time for the experimental group, (c) mean systolic blood pressure at 0800 hours progressively decreased for the control group and progressively increased for the experimental group, (d) mean systolic blood pressure at 1600 hours showed a net decrease over time for both groups, (e) mean diastolic blood pressure at 0800 hours showed a net increase for both groups, and (f) mean diastolic blood pressure at 1600 hours progressively decreased for the control group and showed a net increase for the experimental group. For all vital sign measurements except mean diastolic blood pressure at 1600 hours at baseline, the raw scores of the experimental group were higher than those of the control group. Standard deviation and variance for each vital sign mean were also calculated (see Tables 10, 11, 12, 13, 14, and 15).

Day one mean vital sign measurements of both groups at 0800 and 1600 hours were analyzed using the *t*-test for independent samples to determine if the groups were comparable at baseline. For all parameters except heart rate at 0800, there was no significant difference between groups, thus establishing their comparability. For the variable of heart rate at 0800 hours, the data yielded a *t* value of -2.90

Table 10

Summary Statistics of 0800 Heart Rate for Control and Experimental Groups ($n_C = 6$; $n_E = 9$)

Group	Day	Mean	Standard Deviation	Variance
Control	One	69.00	11.44	130.80
Experimental	One	86.00	10.91	119.00
Control	Middle	74.33	5.88	34.60
Experimental	Middle	78.89	10.82	117.11
Control	Final	66.33	9.83	96.60
Experimental	Final	79.56	8.29	68.78

Table 11

Summary Statistics of 1600 Heart Rate for Control and Experimental Groups ($n_C = 6$; $n_E = 9$)

Group	Day	Mean	Standard Deviation	Variance
Control	One	72.00	6.20	38.40
Experimental	One	80.22	12.14	147.45
Control	Middle	76.83	7.86	61.77
Experimental	Middle	81.89	13.71	187.86
Control	Final	70.33	7.53	56.67
Experimental	Final	79.89	9.55	91.11

Table 12

Summary Statistics of 0800 Systolic Blood Pressure for Control and Experimental Groups ($n_C = 6$; $n_E = 9$)

Group	Day	Mean	Standard Deviation	Variance
Control	One	117.00	19.45	378.80
Experimental	One	119.33	19.08	364.00
Control	Middle	111.50	6.38	40.70
Experimental	Middle	120.78	21.43	459.45
Control	Final	108.00	12.65	160.00
Experimental	Final	121.78	19.92	369.75

Table 13

Summary Statistics of 1600 Systolic Blood Pressure for Control and Experimental Groups ($n_C = 6$; $n_E = 9$)

Group	Day	Mean	Standard Deviation	Variance
Control	One	122.00	12.13	147.200
Experimental	One	123.78	15.44	238.445
Control	Middle	115.50	14.45	208.700
Experimental	Middle	124.44	17.34	300.780
Control	Final	112.67	14.73	217.070
Experimental	Final	118.89	15.80	250.110

Table 14

Summary Statistics of 0800 Diastolic Blood Pressure

For Control and Experimental Groups ($n_C = 6$; $n_E = 9$)

Group	Day	Mean	Standard Deviation	Variance
Control	One	66.33	8.24	67.87
Experimental	One	72.44	7.86	61.78
Control	Middle	69.33	7.63	58.27
Experimental	Middle	72.33	8.79	77.25
Control	Final	72.00	7.48	56.00
Experimental	Final	74.00	10.82	117.00

Table 15

Summary Statistics of 1600 Diastolic Blood Pressure for Control and Experimental Groups ($n_C = 6$; $n_E = 9$)

Group	Day	Mean	Standard Deviation	Variance
Control	One	77.00	10.49	110.00
Experimental	One	72.22	7.24	52.45
Control	Middle	72.00	14.14	200.00
Experimental	Middle	76.78	10.84	117.45
Control	Final	71.67	7.53	56.67
Experimental	Final	74.89	11.09	123.11

which fell into the region of rejection for $p < .05$ when a two-tailed t-test was used (see Table 16).

The t-test for independent samples was then applied to the final day mean vital sign measurements to determine if there were any significant differences between group means at the end of Phase I. No significant differences between group mean vital sign measurements at 0800 and 1600 hours on the final day of data collection were revealed except for heart rate at 0800 hours. As at baseline, a significant difference for heart rate at 0800 hours was yielded, $t(13) = -2.82$, $p < .05$ (see Table 16). Based upon these findings, the second hypothesis failed to be supported.

It should be noted that one set of vital sign measurements at 0800 hours and one set at 1600 hours could not take into consideration all physiologic trends. Average heart rate, respiratory rate, and blood pressure could not be inferred based upon only two measurements per 24 hour period. Analyses of final day mean vital sign measurements were performed to demonstrate any difference between the two groups at the conclusion of the relaxation study at 0800 and 1600 hours, not to demonstrate trends throughout the duration of the study.

To explore if there were significant changes in heart rate, systolic blood pressure, or diastolic blood pressure within each group, the paired t-test was performed on mean baseline (day one) and mean final day vital sign measurements within each group. At a significance level of .05, no sig-

Table 16

T-test Statistics for Independent Samples Used to Compare the Control and Experimental Groups for Vital Sign Measurements on Day One and Final Day (N = 15)

Variable	Overall Mean	SD	t Between Groups	df
		Day One		
HR 0800	79.20	13.75	-2.900*	13
HR 1600	76.93	10.74	-1.519	13
SBP 0800	118.40	18.57	- .230	13
SBP 1600	123.07	13.78	- .237	13
DBP 0800	70.00	8.32	-1.448	13
DBP 1600	74.13	8.67	1.051	13
		Final Day		
HR 0800	74.27	10.90	-2.820*	13
HR 1600	76.07	9.52	-2.056	13
SBP 0800	116.27	18.24	-1.496	13
SBP 1600	116.40	15.18	- .767	13
DBP 0800	73.20	9.37	- .393	13
DBP 1600	73.60	9.66	- .619	13

* $p < .05$, two-tailed

nificant differences were found within the experimental group for vital sign measurements at 0800 or at 1600 hours. Control group data yielded a significant difference for diastolic blood pressure at 0800 hours, $t(5) = -3.0$, $p < .01$, in the direction of increased blood pressure at the end of the study. All other comparisons of vital sign measurements within the control group were nonsignificant at the predetermined significance criteria of .05.

Because the sizes of both the control and the experimental groups in this study were small, the within-groups vital signs data were also examined using the sign test and the Wilcoxin signed rank test. Again, no significant differences were found within the experimental group. The sign test and the Wilcoxin signed rank test also failed to reveal significant differences within the control group for vital sign data. The significant difference within the control group for diastolic blood pressure at 0800 yielded by the paired t-test was not supported by the use of nonparametric tests.

Finally, the sign test and the Wilcoxin signed rank test were applied to day one and final day mean vital sign data for the entire sample ($N = 15$). No significant differences between day one and final day heart rates, systolic blood pressures, and diastolic blood pressures were revealed when the sample was examined as a whole.

In summary, statistical analyses of the data indicated

no significant differences between control and experimental group mean vital sign measurements at 0800 and 1600 hours at baseline or at the end of Phase I of cardiac rehabilitation except for heart rate at 0800 hours. These findings failed to support the second hypothesis.

CHAPTER VIII

DISCUSSION OF THE FINDINGS

Use of the relaxation response in the first phase of cardiac rehabilitation of post-acute myocardial infarction patients was examined in this study. The first hypothesis proposed that, at the end of Phase I of cardiac rehabilitation, subjects taught Benson's relaxation response technique would demonstrate less anxiety than subjects not taught the technique. No significant difference in state anxiety as measured by the STAI S-Anxiety scale was found between the two groups of subjects at the end of Phase I. Of interest however, is the finding that at the end of Phase I, state anxiety levels of the entire sample ($\underline{N}$ = 15) were significantly increased over the state anxiety levels measured at the beginning of Phase I.

The second study hypothesis proposed that subjects taught Benson's relaxation response technique would have lower average heart rate, respiratory rate, and blood pressure than subjects not taught the technique. The second hypothesis also failed to be supported. No significant difference between groups was found for any of the selected vital sign measurements, except for mean heart rate at 0800 hours.

Results of this study suggest that post-acute myocardial

infarction patients can use the relaxation response technique during Phase I of cardiac rehabilitation. However, this study was unable to demonstrate an effect on state anxiety level, heart rate, respiratory rate, or blood pressure of persons using it during Phase I.

Findings of this study are inconsistent with those of vanDixhoorn et al. (1983) and Bohachik (1984) who reported decreases in anxiety among post-myocardial infarction patients practicing relaxation. However, both of those studies used relaxation therapy as part of outpatient cardiac rehabilitation programs, not inpatient programs such as Phase I. The inpatient setting is one often oriented toward surviving illness; the outpatient setting is oriented toward improving health, a less anxiety-producing situation for most persons. Learning is often easier in a less stressful setting, and learning effective relaxation might have been enhanced in the outpatient program. Additionally, ability to perform progressive activity without symptoms might also have contributed to anxiety reduction among outpatients.

The relaxation training procedures used in the vanDixhoorn et al. study (1983) and the Bohachik study (1984) also varied from the one used in this study. Neither used Benson's relaxation response technique. In the study by Bohachik (1984), three weeks of progressive relaxation training was used. Biofeedback with diaphragmatic breathing practiced during six weekly, individual one-hour sessions was used in

the study by vanDixhoorn et al. (1983). Although all relaxation techniques are designed to elicit the same response, not all are equally effective for every person. According to Snyder (1984), various procedural variables including the technique used, the number of training sessions, the environment, and the mode of instruction may affect the degree of success achieved.

Subjects in the experimental group may have experienced difficulty learning the technique chosen for this study, although they reported the ability to practice the technique independently. Principles of adult learning theory suggest that learning in the acute care setting may be less than optimal because adults learn best when they view themselves as self-directed and free from threats to their independence (Knowles, 1970; Rankin & Duffy, 1983). For some patients, retention of information provided during the acute phase of illness has been found to be limited (Scalzi, Burke, & Greenland, 1980). However, in a study by Budan (1983), adult cardiac patients demonstrated significant increases in knowledge after an in-hospital cardiovascular teaching program. Perhaps the adult learning principles of a problem-centered orientation to learning and immediate application of information learned (Knowles, 1970) can outweigh the need for independent self-direction among adult learners. In this study, if learning the relaxation technique was not viewed by adult participants as an immediate approach to resolution

of a problem or if it was seen as an other-imposed intervention, learning and use of the technique may have been thwarted.

Anxiety levels of the participants may have also interfered with the learning process. The suggested relationship between anxiety and learning is complex. Under normal circumstances, mild anxiety levels facilitate learning, while increasingly severe levels of anxiety limit perception and ability to learn (Mouly, 1973; Guzzetta, 1979; Redman, 1976). Application of this relationship to learning abilities of the adult cardiac patient is unclear. Even mild to moderate anxiety may limit learning in the acute care setting of the hospital (Burke, 1981). Pretest state anxiety scores for the experimental group in this study ranged from 20 to 52, with a mean score of 39, indicating a moderate level of state anxiety according to Spielberger et al. (1983). Perhaps this moderate level of anxiety interfered with learning of the relaxation response technique, thus precluding its use as an anxiety-reducing technique.

Posttest state anxiety scores ($\underline{M} = 45$) for the experimental group were slightly higher than pretest scores ($\underline{M} = 39$), although the difference was not statistically significant. These posttest scores may reflect ineffectiveness of the relaxation response technique to reduce anxiety. They may also reflect an independent increase in patient state anxiety related to pending discharge from the hospital since

differences among individuals. Because each person brings to the relaxation process a unique perceptual and experiential background, not all relaxation techniques work equally well for all persons in all settings (Smythe, 1984; Snyder, 1984). It is interesting to note the perceived effectiveness of both the relaxation response technique and the use of relaxation reminder stickers by subjects in this study. Perhaps the Hawthorne effect influenced the study because the investigator had daily contact with study participants. Perhaps it was the personal attention and interest that prompted positive responses. However, actual practice sessions and sticker use did not include the investigator; subjects acted and recorded comments independently. It may be that no significant differences were found between the control and the experimental groups because the techniques were equally effective in promoting relaxation and perceived stressor reduction. Although anxiety scores among the entire sample rose prior to discharge, that rise may have been related to the discharge event itself, as discussed earlier. In fact, the rise might have been even more pronounced had the participants not been practicing some type of relaxation exercise.

The favorable responses reported by participants in this study paralled the positive responses described by Wallace et al. (1982) among a group of hospitalized post-myocardial infarction patients in Great Britain. Wallace

posttest scores were obtained the day prior to discharge. This finding is consistent with the study by Dellipiani et al. (1976) in which an increase in anxiety prior to discharge from the hospital in 203 cardiac patients was reported. Anticipation of discharge and the concomitant implications related to cessation of close monitoring in a safe structured environment may be extremely anxiety-producing. The mean posttest state anxiety score ($\underline{M}$ = 44) of the control group in this study was unchanged from the mean pretest score ($\underline{M}$ = 44). When the achieved sample was viewed in its entirety, the mean posttest score of the entire sample ($\underline{M}$ = 44.4) was slightly higher than the mean pretest score ($\underline{M}$ = 41). This difference was significant using a nonparametric measure. The findings in this study are consistent with those of Dellipiani et al. (1976) in that anxiety scores appear to rise prior to discharge from the hospital.

Factors other than impending discharge may have raised anxiety scores. The increase in anxiety scores may have reflected a perception of the participants about the information taught. In addition to information about relaxation, content including diet, exercise, and medication information was taught as part of the Phase I curriculum. Perhaps the amount of information presented, the changes in lifestyle proposed by that information, and/or the teaching-learning process were perceived as stressors, in and of themselves. This additional stress may have contributed to an elevation

in state anxiety. This suggestion has interesting implications for patient education in the acute care setting. Despite nursing's emphasis on patient teaching (Bille, 1981), might not the teaching-learning process itself be an additional stressor? Are nurses trying to teach patients too much, too fast, in the wrong setting?

An interesting finding of this study was that mean state anxiety scores tended to increase as the number of days in Phase I increased. This increase may have been related to the acuity of the patients' illnesses. Patients who were sicker may have been hospitalized and enrolled in Phase I longer. Despite apparently having more time to practice relaxation, they may have been too ill to do so effectively. They may also have been more anxious because of the perceived severity of their illness. Even if longer length of stay was related to physician preference rather than actual patient acuity, patients may have perceived their condition as "too sick to be discharged" and may have experienced a related increase in state anxiety. This suggestion is supported by the work of Dellipiani et al. (1976) and Billing et al. (1980) who found that level of anxiety post-myocardial infarction was unrelated to actual extent of physical severity of the infarct and had long-term implications for possible hinderance of successful rehabilitation.

Despite a slight increase in measured state anxiety at posttest, study participants perceived the use of relaxation

to be an important component of the Phase I curriculum. Subjects in both groups actively participated and freely offered their comments and suggestions to the investigator. This enthusiastic cooperation was somewhat unexpected on the part of the investigator, but was better understood when participants expressed their concerns about "needing a way to handle the stresses of life". One subject commented, "already people have been telling me to relax and I don't know how"; another identified "a real need to learn to relax". Almost all participants contributed the occurrence of their myocardial infarctions, at least partially, to stress of some kind. Comments such as "maybe I could have prevented it if I wasn't so stressed" and "stress is definitely what put me here" often prefaced explanations about stressors the participants perceived in their lives. Although not asked to define stress conceptually, subjects often identified as stressors demands they perceived as exceeding their available resources. Such stressors included job and family-related problems, health concerns, financial worries, and anticipated changes in lifestyle. Relaxation information presented as part of the study helped meet an identified need. Stressors were recognized and accepted and relaxation was introduced as a stress-modification strategy.

The relaxation reminder stickers were given to the control group primarily to control for personalized attention given the experimental group during relaxation training and

monitoring and as a follow-up device for the investigator. It is very interesting to note the overwhelmingly positive responses of the control group subjects regarding use of the stickers. Comments such as "self-suggestion using the stickers helps me relax", "it really does help to remind myself to relax", and "the sticker on the table is a Godsend, especially when I have to talk with the dietician" indicated that subjects were actively using the stickers as relaxation reminders. Five of the six control group subjects asked for stickers to use at home and at work. In fact, one person stated, "I already have the spots picked out for them".

In contrast, the experimental group subjects who were taught Benson's relaxation response technique in addition to using the relaxation reminder stickers, generally found the technique to be more beneficial than the stickers. Recorded comments included the following: (a) "The technique is helpful and easy to do; I used it alot"; (b) "I felt surprisingly relaxed after the sessions, but the stickers were not that helpful"; (c) "It really feels good to relax; the technique is easier to use than I expected"; and (d) "Even doing this only a few days, I really feel the difference". Two patients combined use of the stickers and Benson's technique to help them relax during diagnostic testing. One recorded, "I wore the sticker on my hand and practiced the technique while waiting for my stress test; I really felt relaxed". One subject in the experimental group found the stickers more help-

ful than Benson's technique when used in a hospital setting. She commented that "the technique was a good idea, but hard to do in such a contrived setting; it will be much more useful at home".

Participants often indicated surprise that a mental exercise could have physical effects. Recorded comments indicated that some participants clearly noticed physical sensations related to practicing the technique. Such comments included: (a) "My breathing felt better, easier"; (b) "My feet were cold when I started the technique, and now they really do feel warm and heavy"; (c) "I get a warm, heavy feeling in the back of the neck after practicing the technique"; and (d) "I felt as though I couldn't stand up if I wanted to". Such control over bodily responses was perceived as a positive result and precipitated comments about usefulness of the technique at work and at home.

Despite the noise and interruptions inherent in the hospital setting, most experimental group members recorded successful practice sessions. One commented, "I'm able to block out noise while practicing the technique"; while another recorded, "It is hard to find a quiet time to practice the technique here, but the idea is a good one and fills a need". Two other participants suggested use of a tape-recorded version of the technique for practice sessions in an attempt to minimize disruptions.

Such variations and suggestions reflect inherent

et al. (1982) used a unit-based group relaxation training session based on a 20 minute tape using cue-controlled breathing, imagery, and muscle tension and relaxation. According to a patient questionnaire, 90% of the 54 participants in the program were highly satisfied with the relaxation training. No measurements of psychological or physiological parameters related to relaxation effects were reported. Nonetheless, post-discharge follow-up of 14 patients revealed that all 14 continued to practice relaxation at home (Wallace et al., 1982). Despite the lack of measured effectiveness, participants perceived relaxation as a useful stress-management tool.

When viewed in light of the limited sample size and numerous intervening variables, lack of significant differences among group vital sign measurements was not an unexpected finding. Study participants had multiple medical diagnoses and were receiving multiple medications. In fact, there were a total of 29 variables in these two categories alone. Because the number of variables so greatly exceeded the number of subjects, statistical analyses to demonstrate any variance within or between the two groups related to those variables could not be accurately performed. However, based upon the researcher's clinical judgment, it is very likely that the medications the subjects received and their medical diagnoses probably had some degree of influence on their vital signs.

Vital sign measurements were recorded from the subjects' inpatient chart graphic records at 0800 and 1600 hours, the usual times for such measurements according to the policy at the data collection site. Data were not recorded immediately before and after relaxation was practiced for several reasons.

First, subjects in both groups had no scheduled times or suggested limit for the number of times they viewed the relaxation reminder stickers. In fact, they were encouraged to use the reminders whenever needed and/or whenever the stickers were viewed. It would have been impossible for the investigator to be present with each subject each time this technique was used in order to record vital signs. Use of the stickers with both groups was intended to control for any effect relaxation reminders may have had on vital sign measurements.

Second, subjects in the experimental group had the freedom to choose times to independently practice the relaxation response technique. Although it was suggested that they practice twice per day, individual circumstances dictated when practice sessions occurred. Since the technique was designed as a self-controlled stress reduction strategy, a structured practice schedule would have eliminated the subjects' freedom to self-determine the most appropriate practice times.

Third, even if vital signs had been recorded for the

experimental group immediately before and after practicing the technique, it would have been difficult to determine a comparable time for which to record vital signs of the control group. Using vital sign measurements recorded at 0800 hours and 1600 hours provided consistency for both groups and reflected normal circadian rhythms (Lanuza, 1976; Tom, 1976).

Finally, recording vital signs from the graphic records was intended to reflect any long-term effects of use of the relaxation response technique. According to Snyder (1984), "one criticism of relaxation is that (vital sign) measurements are usually taken immediately following the training session" (p. 56). Snyder suggested that multiple measurements over time may reveal persistent effects of relaxation training. This study attempted to measure any long-term effects. However, analysis of multiple measurements in this study was complicated by the fact that length of subjects' enrollment in Phase I of cardiac rehabilitation was not controlled. This study was conducted in a clinical setting in which many factors influenced length of hospital stay. It is unknown if the length of participation in Phase I by patients in this study was compatible with detecting long-term effects of relaxation as suggested by Snyder.

Analysis of both anxiety scores and vital sign measurements in this study was ultimately limited by the small size of the achieved sample. For a variety of reasons, including

a change in the protocol for treatment of acute myocardial infarction patients, the control group included six subjects and the experimental group included nine subjects. The relaxation response technique as an intervention to decrease state anxiety or to alter vital signs may not have been of sufficient strength to produce significant changes when used within small groups.

CHAPTER IX

CONCLUSIONS AND RECOMMENDATIONS

Cardiovascular disease remains the leading cause of death in the United States (American Heart Association, 1985) and programs that modify its risk factors represent an active attempt to improve that statistic. Included among such programs is cardiac rehabilitation for persons who have experienced acute myocardial infarctions. This study examined the use of relaxation training as a nursing intervention for post-acute myocardial infarction patients in Phase I of cardiac rehabilitation. Relaxation was introduced as a self-regulated technique to help patients modify the risk of stress as represented by their state anxiety levels, heart rates, respiratory rates, and blood pressures.

Despite the lack of statistically significant findings, this study has implications for nursing practice. The subjective data collected from study participants supported use of relaxation training as a nursing intervention among hospitalized myocardial infarction patients. Participants in both the control and the experimental groups identified various stressors in their lives, contributed some degree of blame for their conditions to those stressors, and identified the need to modify their responses to stressors in order to attain and maintain maximal wellness. Nurses have the

responsibility to assist their patients/clients toward achievement of maximal wellness and teaching a relaxation technique is one method to achieve this goal.

Because nurses view persons as interrelated composites of physiologic, psychologic, sociocultural, and developmental variables (Neuman, 1982), nurses have a unique opportunity and responsibility to treat the whole, integrated person. Stressors may affect any or all of a person's composite parts, and relaxation techniques are one method that may help modify a person's response to those stressors. For this reason it is recommended that basic nursing students be taught the importance of relaxation as an intervention modality and actually be taught a relaxation technique. Personal experience will facilitate use of relaxation with their patients/clients and will illustrate the applicability of the intervention in a variety of situations. This researcher used a combination of visual reminder cues and deep breathing with undergraduate nursing students who were beginning their first hospital clinical experience. Students reported a subjective decrease in anxiety and the experience provided the opportunity to discuss the implications of controlling one's responses to stressors. Staff nurses also may be taught about relaxation and its uses with patients/clients, and may be given the opportunity to learn a relaxation technique themselves. Staff nurses on the unit where this study was conducted have become quite interested in

learning about relaxation and its role in reduction of responses to stressors, both for themselves and for their patients. Information and practice sessions will provide them the opportunity to pursue that interest.

In this study, participants highly valued the use of relaxation as a stress-modification technique. They perceived relaxation as a useful tool that they would continue to utilize after discharge from the hospital. Based upon these perceptions of the value of relaxation, this researcher feels that further investigation of the subject is warranted.

Several recommendations for future study may be made. First, a much larger sample size needs to be obtained. Expanding the potential pool of subjects to include patients from multiple institutions would be one way to increase the sample size. An important point to consider when selecting a data collection site is the institution's protocol for management of acute myocardial infarction patients. Institutions with facilities for emergency coronary angioplasty of acute myocardial infarction patients will yield few patients who are medically-managed only.

Second, the study could be expanded to include patients who have previously undergone invasive procedures such as percutaneous transluminal coronary angioplasty or cardiovascular surgery. Obtaining a larger sample size would be facilitated by expansion of the criteria for inclusion. It would also be interesting to compare the findings of those

patients who have experienced previous invasive procedures and those who have not.

Third, a change in the relaxation training procedure could be made. Given increased patient acuity, staffing shortages, decreased length of stay, and the amount of time involved to individually teach and practice the relaxation response technique, time would need to be allotted for one-to-one teaching. Group classes and/or the use of tape-recorded instructions might be time and cost-saving alternatives. Cardiac rehabilitation nurses at the institution where this study was conducted now include as part of the Phase I curriculum, the written information about relaxation that was given to experimental subjects. They report that patients are able to practice the technique simply by following the written instructions and that those who use it find it quite effective.

Fourth, use of different relaxation techniques could be explored. In this study control group subjects used only self-suggestion to relax, cued by reminder stickers. Yet, they reported feeling relaxed and able to better control their response to stressors. Perhaps less complicated techniques such as this have a place in the already complex hospital environment. Though simple, they may be equally effective and certainly would reduce teaching time. Other possible techniques, ranging from simple to increasingly complex, might include positive imagery, focused breathing,

progressive muscle relaxation, and biofeedback.

Finally, expansion of the study could include teaching relaxation to patients' spouses or significant others. It would be interesting to study the effect of inclusion of significant others, both on the patients and on the "others". When a person experiences an acute myocardial infarction, the event impacts on many people beyond the patient. Unfortunately, those significant others are often neglected in the rush to care for the patient and experience the stress of the situation without adequate support. Relaxation training may help them cope more effectively with the stressors they encounter. It may also help provide a shared rehabilitation activity that eases the transition to post-myocardial infarction living. In this study and in the study reported by Wallace et al. (1982), spouses and other family members were quite interested in the relaxation techniques presented and several actively participated. Other studies have reported improved rehabilitation outcomes when significant others were included in various program components (Brown & Munford, 1984; Segev & Schlesinger, 1981).

Attainment and maintenance of maximal wellness are mutual goals of health care providers and health care consumers. Relaxation provides one route to help reach those goals. As an active, self-regulated stress-modification process, relaxation has a unique place in nursing. It may be utilized through nursing actions based on the Neuman

Health Care Systems Model as demonstrated by the tertiary prevention approach used in this study. Those who have made the decision to modify their responses to the stressors in their lives may benefit from relaxation. Nurses, as promoters of wellness, have an integral role to play in facilitating that decision.

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APPENDIX A

SELF-EVALUATION QUESTIONNAIRE

Developed by Charles D. Spielberger
in collaboration with
R. L. Gorsuch, R. Lushene, P. R. Vagg, and G. A. Jacobs

STAI Form Y-1

Name _____ Date _____ S ___

Age _____ Sex: M ___ F ___ T ___

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you feel *right* now, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	NOT AT ALL	SOMEWHAT	MODERATELY SO	VERY MUCH SO
1. I feel calm	①	②	③	④
2. I feel secure	①	②	③	④
3. I am tense	①	②	③	④
4. I feel strained	①	②	③	④
5. I feel at ease	①	②	③	④
6. I feel upset	①	②	③	④
7. I am presently worrying over possible misfortunes	①	②	③	④
8. I feel satisfied	①	②	③	④
9. I feel frightened	①	②	③	④
10. I feel comfortable	①	②	③	④
11. I feel self-confident	①	②	③	④
12. I feel nervous	①	②	③	④
13. I am jittery	①	②	③	④
14. I feel indecisive	①	②	③	④
15. I am relaxed	①	②	③	④
16. I feel content	①	②	③	④
17. I am worried	①	②	③	④
18. I feel confused	①	②	③	④
19. I feel steady	①	②	③	④
20. I feel pleasant	①	②	③	④

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APPENDIX B

CONSENT FORM

Project Title: Use of the Relaxation Response in Cardiac Rehabilitation of Post-Acute Myocardial Infarction Patients

Based upon your medical diagnosis of acute myocardial infarction (i.e., MI, heart attack), and your physician referral to Phase I of Cardiac Rehabilitation, you have been asked to participate in a study of the effects of relaxation on persons who have suffered a heart attack. As a participant in this study you may be taught a relaxation technique which you will be asked to practice twice daily for two weeks or until you are discharged from the hospital, whichever is longer.

Relaxation techniques have been shown to provide a self-controlled method of stress reduction when used with a wide variety of individuals. It is the intention of this study to extend evidence of that benefit to persons who have had a heart attack. Other stress reduction techniques may also be available through the Cardiac Rehabilitation Department.

The foreseeable risks or discomforts associated with practicing the relaxation technique are negligible. Since the technique intends to help you control stress, you may experience an increased awareness of sensations in your body and your environment as you learn to control your reactions to them. In no way is this study construed to harm you or any other participant; there is no financial risk to you. Participant confidentiality will be strictly maintained. All information will be collected by code numbers. No use of personal names and/or other identifying information will be used in the writing of the research report.

I have fully explained to _____ the nature and purpose of the above-described procedure and the risks that are involved in its performance. I have answered and will answer all questions to the best of my ability.

_____

Signature of Investigator

I have been fully informed of the above-described procedure with its possible benefits and risks. I give permission for my participation in this study. I know that Ruth H. Schleyer, RN, BSN and endorsing physician, Dr. K. Nititham, or his associates will be available to answer any questions I may have. I understand that I am free to withdraw this consent and discontinue participation in this project at any time without prejudice to my medical care. I have received a copy of this informed consent document.

Signature of Investigator	Signature of Patient
Date	Date

APPENDIX C

RELAXATION INFORMATION SHEET

This information sheet has been developed to give you some basic information about relaxation and to provide a practice guide for a simple technique to help you relax.

- Stress is the body's response to change. Small amounts of stress can be helpful, but large amounts over long periods of time can wear the body out. Can you think of some examples of stressful situations in your life?

- Relaxation is a learned response that can produce changes in the body which are opposite of the stress response. Can you think of some uses of relaxation?

- Relaxation IS:
  - innate in everyone (but often not used)
  - a wakeful state of restfulness
  - a method to control the stress response
  - able to be learned by everyone

- Relaxation is NOT:
  - a loss of control
  - a loss of consciousness
  - a state of sleep
  - a state of drowsiness

- Four key elements are needed in a relaxation technique:

  (1) A quiet environment. Should be free of noise, distractions and interruptions (as much as possible).

  (2) Decreased muscle tone. Since it is not possible to be relaxed and tense at the same time, muscle relaxation makes general relaxation easier. Choose a comfortable posture that avoids undue muscle tension.

  (3) A mental device. A sound, word, or phrase repeated silently or aloud helps break the train of distracting thoughts. It helps in recalling relaxing images and encourages mental relaxation.

  (4) Passive attitude. Let thoughts pass in and out of your mind freely. DO NOT WORRY ABOUT HOW WELL YOU ARE RELAXING. Distracting thoughts will occur. DON'T WORRY. When you become aware of distracting thoughts, simply return to repetition of the mental device.

APPENDIX D

INSTRUCTIONS FOR ELICITING THE RELAXATION RESPONSE*

(1) Sit quietly in a comfortable position.

(2) Close your eyes.

(3) Deeply relax all your muscles, beginning at your feet and progressing up to your face. Keep them relaxed.

(4) Breathe through your nose. Become aware of your breathing. As you breathe out, say the word, "ONE", silently to yourself. For example, breathe IN . . . OUT, "ONE"; IN . . . OUT, "ONE"; etc. Breathe easily and naturally.

(5) Continue for 10 to 20 minutes. You may open your eyes to check the time, but do not use an alarm. When you finish, sit quietly for several minutes, at first with your eyes closed and later with your eyes opened. Do not stand up for a few minutes.

(6) Do not worry about whether you are successful in achieving a deep level of relaxation. Maintain a passive attitude and permit relaxation to occur at its own pace. When distracting thoughts occur, try to ignore them by not dwelling on them and return to repeating "ONE". With practice, the response should come with little effort. Practice the technique once or twice daily, but not within two hours after any meal, since the digestive processes seem to interfere with the elicitation of the Relaxation Response.

* From Benson, H. (1975). The relaxation response (pp. 162-163). New York: William Morrow and Company, Inc.

APPENDIX E

PRACTICE RECORD No. _____

Please record the date and time of practice sessions in the spaces provided. Also note any thoughts or feelings you had related to the relaxation experience. Please plan to practice the technique twice daily for about 20 minutes. Avoid practicing within two hours after eating a meal because the digestive processes have been shown to interfere with relaxation. Relax and enjoy!

Date	Times		Comments

APPENDIX F

TEMPERATURE, PULSE, RESPIRATION POLICY

TITLE: TEMPERATURE, PULSE, RESPIRATION

POLICY:

1. Temperature, pulse and respiration are taken on all patients each day at 8:00 A.M. and 4:00 P.M.

2. Temperature, pulse and respiration may be taken at any time as a result of physician order or nurse's clinical judgement.

3. Indicators for rectal/axillary temperature include:

   a. Seizure
   b. Altered status of consciousness/orientation
   c. Children under 5 years of age
   d. Oxygen administration
   e. Mechanical interference with breathing

4. Contraindications for rectal temperature include:

   a. Rectal surgery
   b. Ostomy patients
   c. Immunosuppressed patients

5. Pulse rate is to be taken for one full minute on admission, for children and geriatric patients or if irregular.

PROCEDURE	RATIONALE
1. Take individual patient's temperature, pulse and respiration.	
2. Report abnormal findings to R.N. responsible for patient.	2. For further assessment
3. Record findings on T.P.R. data sheet.	3. For transcription to individual patient's clinical record by nursing personnel or by the Unit Secretary

APPROVAL SHEET

The thesis submitted by Ruth Higgins Schleyer has been read and approved by the following committee:

Dr. Nancy M. Sargis, Co-Director
Professor of Medical/Surgical Nursing
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The final copies have been examined by the directors of the thesis and the signatures which appear below verify the fact that any necessary changes have been incorporated and that the thesis is now given final approval by the committee with reference to content and form.

The thesis is therefore accepted in partial fulfillment of the requirements for the degree of Master of Science in Nursing.

November 10, 1986
Date

Nancy M. Sargis
Co-Director's Signature

Nov 1, 1986
Date

Diana P. Hackbarth
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