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Nicholson, Suzanne Maria, M.S.

The University of Arizona, 1987
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UNCERTAINTY IN CARDIAC TRANSPLANT
RECIPIENTS PRIOR TO AND AFTER
CARDIAC CATHETERIZATION

by
Suzanne Maria Nicholson

A Thesis Submitted to the Faculty of the
COLLEGE OF NURSING
In Partial Fulfillment of the Requirements
For the Degree of
MASTER OF SCIENCE
In the Graduate College
THE UNIVERSITY OF ARIZONA
1987
STATEMENT BY AUTHOR

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This thesis has been approved on the date shown below:

JOYCE A. VERRAN  
Associate Professor of Nursing

Date
DEDICATION

I would like to dedicate this thesis and express my appreciation to the transplant recipients that participated in this study. Their courage and spirit is inspiring and foundational to the advancement of cardiac transplantation.
ACKNOWLEDGEMENTS

I would like to thank my committee members, Dr. Carolyn Murdaugh and Dr. Merle Mishel for their expertise with transplant recipients, making this thesis experience more valuable. A special note of thanks to my chairperson, Dr. Joyce Verran for her consistent support and practical guidance.

I also wish to thank Mary Dong for her invaluable assistance in the practical completion of this thesis. Finally, for her camaraderie and encouragement throughout graduate school, I would like to thank Jan Dodge.
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The purpose of this study was to describe the presence of uncertainty experienced by heart transplant recipients at one and two year diagnostic follow-up evaluations. Twelve one year and eleven two year transplant recipients completed the Mishel Uncertainty in Illness Scale (MUIS), prior to and after cardiac catheterization.

There was a decrease in uncertainty levels from pre to post-catheterization, for both one and two year recipients, however findings were not significant. Recipients prior experience with catheterization and the interaction effects of the complete evaluation process or future health status may have affected the subject's uncertainty response.

Two year transplant recipients demonstrated significantly higher uncertainty levels, before and after cardiac catheterization, when compared to one year recipients. These findings lend initial and tentative support to the proposal that uncertainty increases with time post-transplant. The yearly follow-up evaluation may represent an episodic focusing for the transplant recipient on health status.
CHAPTER 1

INTRODUCTION

Cardiac transplantation, no longer considered an experimental procedure, offers patients with fatal heart disease the alternative of survival and enhanced quality of life. Heart transplantation was first performed by Barnard in South Africa in 1968 (Funk, 1986). Early enthusiasm for the procedure was dampened by poor survival rates. Since the mid 1970's, however, there has been a renewal of interest, primarily related to continued research efforts and clinical work by the cardiac transplant team at Stanford University. Patient survival has been enhanced by improved diagnosis and treatment of rejection and infection, immunosuppressive therapy, and improved patient and donor selection criteria (Andreone, Olivari, Ring, 1987; Copeland et al., 1987). Currently, a total of 4194 heart transplantations have been performed worldwide, (Kaye, 1987).

Since heart transplantation has proven to be a successful surgical procedure, interest is being focused on the psychological adjustment of patients post-transplantation. Heart transplantation, while offering an alternative to death, still requires significant lifestyle changes and psychological stability which are needed for
optimal psychological and physical survival. This research focuses on psychological aspects related to the follow-up care and health monitoring of patient's having undergone heart transplantation. The specific psychological variable of uncertainty during the yearly follow-up diagnostic period will be discussed and further described.

**Overview of the Problem**

The post-transplantation period is marked by physical and psychological stresses unique to the transplant patient. Rejection and infection are the major causes of morbidity for the patient post heart transplant (Copeland, 1985). Current survival statistics range from 80%-85% at one year to 50%-70% at five years (Copeland, et al. 1987). While these statistics have improved dramatically over the past decade the long-term future for the transplant patient remains limited.

In a study of 25 patients, Allender, et al. (1983), observed and categorized the following six stages of psychological adjustment to heart transplantation: the evaluation period; waiting period; immediate post-surgical period; first rejection episode; recovery period and hospital discharge. The hospital discharge, however, is actually a critical beginning for long term psychological and physical follow-up.
The patient's optimal physical and psychological health requires consistent 'health monitoring' by the patient and health care team. According to Allender et al., (1983), transplant patients realize that they have, in a sense, exchanged one form of illness for another - the previous symptoms of cardiac failure for new threats of rejection and infection. After the immediate three month post-transplant period the patient receives monthly follow-up by the patient's cardiologist, consisting of physical examination, chest X-ray and blood work. In addition, there is continued follow-up by the heart transplant team with immunosuppressive therapy and cardiac biopsies every three months until a year. At one year, and yearly intervals thereafter, the patient receives a thorough examination involving a cardiac catheterization and cardiac biopsy in addition to numerous other diagnostic procedures. Periodic counseling is provided by the heart transplant team and cardiologist. The patient also performs daily health monitoring activities to prevent infection or rejection and maintains specific diet, exercise and medication regimens. Physical health monitoring, in addition to general unpredictability after transplant places added psychological adjustment requirements on the patient.

There has been little research regarding psychological adjustment for heart transplant recipients (Lough, et al., 1985). Research is limited in the field of
renal transplantation, and mostly focuses on physiological rather than psychosocial adaptation. The psychological studies that have been performed are ex post facto analyses, anecdotal in nature, and are generally objective rather than subjective evaluations (Sophie, 1979).

The psychological problems identified in patient's that have received heart transplants are similar to those encountered by kidney transplant recipients (McAleer, et al., 1985). Gulledge, et al. (1983, p. 328) notes that the transplant recipient deals with unique health problems related to body image changes and the ongoing stress of potential kidney rejection. Common post-operative fears include the following: fear of the unknown, transplant rejection, lack of confidence in rehabilitation and long term health problems.

McAleer and colleagues (1985) studied a group of 28 cardiac patients surviving greater than three months post-transplant. In this exploratory study, all the patients were noted to experience psychological problems. Problems included mood alterations, marital stress, body image changes, family related problems, non-compliance, impotency and decreased libido. Similar problems were reported by the authors in a follow-up study collected from a sample of 595 heart transplant recipients from eleven centers.
Uncertainty

Of the many psychologic variables associated with the post-transplant period, uncertainty is a predominant emotional state affecting the patient. Uncertainty has been documented as a psychological manifestation in heart transplant patients (Christopherson, 1976a; Eisenman, 1986; Christopherson, Griepp, Stinson, 1976; Christopherson, 1976b). Heart transplantation, while extending life, provides no guarantee for long term or problem free survival. Christopherson (1976a, 1987) notes that death can be postponed by cardiac transplant, however, it is for an unknown length of time. Christopherson appropriately describes a process in which the patient and family prefer "the uncertainty of transplantation to the certainty of death." Christopherson relays a patient's observation: "It's like a game of hide-and-seek, in which there's always one more spook hiding around the corner waiting to leap out at you" (p.68, 1976a). Eisenman (1986), a heart transplant recipient states that the stresses a heart transplant patient faces can cause severe psychological disturbances requiring adaptation. Eisenman describes three fears a transplant patient lives with - rejection, infection and the unknown.

In a study of 123 renal transplant patients, perceptions of the patient's control over their own destiny were explored, through the use of quantitative scales.
Subjects who scored high in feelings of control over their destiny, can be likened to decreased uncertainty. Feelings of control over destiny was found in 22% of the subjects pre-transplant; 68% at one year post-transplant and 57% at 5-9 years post-transplant (Simmons, Kamstra-Hennen and Thompson, 1981). Other findings, however, indicate that with time and psychological adjustment, uncertainty lessens in intensity and severity. The uncertainty becomes more episodic rather than constant, however it always remains to some extent (Eisenman, 1986, Christopherson et al, 1976). Uncertainty becomes balanced by the quality of life achieved and the patient's and family's confidence that they can emotionally handle whatever consequences they encounter (Christopherson, 1976b). Interestingly, a positive result of the recipient's uncertain longevity, is that family's priorities are reassessed and often strengthened (Christopherson et al, 1976).

Diagnostic Procedures

Following the initial post-operative period, long term follow-up is accomplished by yearly evaluations. The areas of focus are the extent of rehabilitation and adequacy of graft function (Gaudiani, et al., 1981). The threat of acute rejection decreases dramatically after the first three months, however, chronic rejection increases in incidence (Jamieson, 1979). Chronic rejection refers to the insidious
process of graft atherosclerosis in the transplanted heart. Chronic rejection is the major limiting factor to long-term survival of transplant recipients (Murdock, Collins, Lawless, Molnar, Scanlon, Pifarre, 1987; McGregor, 1987). The etiology of chronic rejection is unknown but is felt to be a chronic, low grade immunologically mediated vascular injury (Andreone et al. 1987; McGregor, 1987; Murdock et al. 1987). Chronic rejection may cause myocardial infarction, death or necessitate retransplantation (Copeland, 1985).

Bieber (cited in Murdock, 1987) found that only 20% to 40% of patients are free of coronary artery disease 5 years after transplant. According to McGregor (1987) the process of accelerated atherosclerosis can occur within months of transplantation and is present in almost half of patients at five years. Two years after transplant Pennock (cited in Andreone, et al. 1987) found that accelerated atherosclerosis accounted for between 22% to 50% of deaths per year. Zusman et al., (1985, p. 587) also documents that accelerated graft atherosclerosis (AGAS) "is a major cause of death in the long-term." These authors compared patients on conventional therapy - Imuran and Prednisone (63 patients) vs. Cyclosporine therapy (72 patients). Between one to two years the conventional group demonstrated a 15% incidence of AGAS versus 23% in the Cyclosporine group. The incidence of AGAS at three to four years post transplant was, conventional 39%, and Cyclosporine 28%. The
differences between groups was insignificant, however the total amount of AGAS itself is impressive. To monitor the progression of coronary atherosclerosis, cardiac catheterization with coronary arteriography is performed yearly (Copeland, 1985; Murdock, et al. 1987; Andreone, et al, 1987).

During the cardiac catheterization, an endomyocardial biopsy is also obtained. Cardiac biopsy is the definitive diagnostic test for rejection, allowing early histological evidence of rejection and assessment of response to anti-rejection therapy (Jamieson et al., 1979; Copeland, 1984; McGregor, 1987).

Cardiac catheterization, including cardiac angiography and coronary angiography is an invasive procedure involving the insertion of a flexible catheter into a vein or artery and threaded into the right and left chambers of the heart. The catheter is also floated into the openings of the coronary arteries. In addition to delineating coronary arterial lesions, the study determines global and regional left ventricular contraction, oxygen saturation, chamber pressure measurements and any abnormalities in regional myocardial perfusion (Armstrong and Finesilver, 1983; Shabetai, 1978).
Statement of Purpose

The purpose of this study was to describe the presence of uncertainty experienced by heart transplant recipients at one year and two year diagnostic follow-up evaluations.

The research questions to be addressed in this study are:

1) What are the differences in levels of uncertainty in heart transplant recipients prior to and after their one year follow-up cardiac catheterization procedures?

2) What are the differences in levels of uncertainty in heart transplant recipients prior to and after their two year follow-up cardiac catheterization procedures?

3) What are the differences in levels of uncertainty in heart transplant recipients evaluated at one year and recipients evaluated at two years, prior to cardiac catheterization?

4) What are the differences in levels of uncertainty in heart transplant recipients evaluated at one year and recipients evaluated at two years, after cardiac catheterization?
Significance of Research

The influence of psychologic factors has been clearly supported by research to affect the emotional well-being of heart transplant recipients. The studies performed, while providing a conceptual base, are few and mainly exploratory in nature (Sophie, 1979; Lough, 1984; Freeman, 1984). The majority of relevant research stems from the field of renal transplantation. Kidney transplant recipients share similar issues with heart transplant recipients. Ultimately, however, in the case of kidney failure, the kidney patient has hemodialysis as a back-up while the heart transplant patient faces a much more uncertain future and possible death.

Heart transplant research has generally examined psychological well-being as a whole. Specific psychological factors have not been adequately examined. In addition, the long-term psychological state of the patient has been overlooked. Research has primarily examined the patient in the pre-operative and immediate post-operative period. Thus, research was needed to explore specific psychological factors affecting transplant patients during long-term follow-up.

Diagnostic procedures, such as cardiac catheterization, are highly stressful (Finesilver, 1980; Teasley, 1982; Ventura, 1984). No psychological research studies had examined patients undergoing heart
transplantation during cardiac catheterization. The results of the yearly follow-up cardiac catheterization becomes a critical focal point of evaluation for the patient. All the procedures performed at the yearly follow-up are important indicators of health, however the cardiac catheterization provides crucial information concerning the function of the heart, evidence of atherosclerosis and possible need for re-transplantation.

Uncertainty is documented as a psychological variable in this population, however it's specific causes and presence at different times post-transplant needed to be further defined. The literature presented inconsistent findings on whether or not uncertainty decreases with time post-transplant. Uncertainty had not been studied in the transplant population prior to or after cardiac catheterization. The psychological impact of the findings from this procedure on the patient's state of uncertainty regarding the future, had also not been examined.

Specific etiological factors responsible for uncertainty needed to be delineated and individually measured. Determining factors that predominately influence uncertainty promotes identification of factor specific intervention strategies for health care providers. Thus, health care providers can provide appropriate education and support in coping with uncertainty for the patient and
significant others. Awareness of psychological implications are essential to maximize the benefits of transplantation (Gulledge et al., 1983).

**Summary**

Psychological factors affecting transplant recipients have received little research attention. The long-term future for these patients is limited and uncertain. Psychological problems, including uncertainty, have been well-documented in the literature. The studies, however, have been primarily exploratory in nature. The concept of uncertainty had never been directly described, especially during diagnostic procedures.

Graft atherosclerosis (chronic rejection), is a primary complication post-transplant, resulting in death or re-transplantation. Cardiac catheterization is the major diagnostic tool to determine the presence and severity of chronic rejection.

This research examined uncertainty in patients one and two years post-transplant, prior to and after their yearly cardiac catheterizations. Describing uncertainty in this group provides information about one possible etiology of uncertainty and delineates differences in uncertainty at different time periods post-transplant for one type of procedure. In addition, the findings may promote intervention strategies to aid health care professionals in the psychologic care of these patients.
CHAPTER 2

CONCEPTUAL FRAMEWORK

The physical state of a patient after receiving a heart transplant is affected by the psychological state of uncertainty. Uncertainty prompts the patient to resolve this state by implementation of action strategies. The conceptual framework illustrating these concepts is shown in Figure 1. The figure depicts a set of constructs and concepts prior to and after implementation of a coping mechanism in the form of direct action strategies. Cognitive structure and coping form the construct level of the framework. The model proposes that cognitive structure forms a negative relationship with coping prior to achieving a state of adequate coping. After coping mechanisms are in place there is a positive relationship between coping and cognitive structure.

On the following, less abstract concept level there is a positive relationship between the concepts—uncertainty and direct action strategy, prior to implementation of a direct action strategy. A direct action strategy is exemplified by participation in cardiac catheterization in an attempt to gain information.
Figure 1. Conceptual framework
A negative relationship is formed between uncertainty and direct action strategy after cardiac catheterization. Uncertainty forms a negatively related element of cognitive structure. Direct action strategy is postulated to be a positively related element of coping.

On the lower conceptual level, specific uncertainty sub-types (ambiguity, complexity, deficient information and unpredictability) initially form a positive relationship with the concept of information gathering. Following the actual process of information gathering, after the cardiac catheterization procedure, these concepts form a negative relationship. The uncertainty sub-types are positively related to the more abstract concept of uncertainty. Information gathering is conceptualized as a positively related element of direct action strategy.

On the operational level the Mishel Uncertainty in Illness Subscales (MUIS) are positively related to Patient Retrieval of Test Results and Implications (PRTRI), prior to cardiac catheterization and retrieval of test results. After PRTRI has been implemented these variables form a negative relationship. The MUIS subscales are positively related to their more abstract uncertainty sub-types. The PRTRI is a positively related operational variable for information gathering. This chapter addresses these constructs, concepts, operational variables and their relationships in more detail.
Constructs - Cognitive Structure and Coping

The personal evaluation of a person's situation, in this instance, physical health - normal cardiac function, is based on cognitive appraisal. Cognitive appraisal, first described by Lazerus (1974, p. 322), refers to the evaluation of how an event will impact on the person's well-being and the opportunity for mastery in a continuously changing interplay between the person and environment. In the patient post-transplant then, this refers to the patient's cognitive evaluation of his cardiac state and associated maneuvers required for optimal adaptation.

Mishel similarly describes a mental state of cognitive appraisal as a cognitive structure. A cognitive structure refers to the patient's subjective evaluation of the physical state, associated treatment and hospitalization. This, in turn influences decision making and performance (Mishel 1981, p. 259). Further expanding on Mishel's theory, the person's cognitive structure is based on proper recognition and classification of the event. Recognition and classification are influenced by: symptom-pattern consistency in areas of intensity, frequency, number, location and duration; congruency of experiences, regarding the expected and the experienced; and event familiarity (Mishel 1985, p. 8).
Lazerus states that coping (or self-regulatory processes), in addition to cognitive appraisal (or structure), is a crucial factor in a person’s reaction to stress. He defines coping as a process utilizing goal directed strategies, which are influenced by cognitive structure, and the regulation of emotion and physiologic responses (Lazerus 1978). Scott, Oberst and Dropkin (1980) support this by stating that coping strategies to a stressful situation consist of neurocognitive, affective and physiologic responses exhibited by behavior. The continuous interaction between cognitive appraisal/reappraisal and coping mechanisms allows the patient an opportunity to overcome, postpone, prevent or tolerate stress (Lazerus 1974).

The cognitive structure of a situation forms an ongoing interplay with the coping response utilized. The implications and importance of a situation will differ from person to person and may change with time for the same person. Cognitive structure forms a negative relationship with coping prior to cardiac catheterization. By completing the procedure and obtaining the test results, coping is enhanced. As coping becomes more effective a cognitive structure is more likely to be formed. Thus, after cardiac catheterization, cognitive structure forms a positive relationship with coping. These integrally linked constructs guide the patient's response to cardiac function.
Concepts - Uncertainty and Direct Action Strategies

According to Mishel (1985), when proper recognition and classification of an event fails to take place, a cognitive structure cannot be formed and uncertainty results. Thus, while uncertainty is a type of cognitive assessment, its presence hinders formation of a cognitive structure and a negative relationship is formed. Uncertainty, also referred to as ambiguity in early research, was first examined by Frenkel-Brunswik in 1948 (Norton 1975). It is defined as a "situation which cannot be adequately structured or categorized by the individual because of lack of sufficient cues" (Budner 1961, p. 30).

Based on research findings, Budner proposes that ambiguity intolerance refers to ambiguous situations perceived as sources of threat. Through content analysis of the literature between 1933 to 1970, Norton synthesized terms referring to ambiguity. Intolerance to ambiguity could be described as information that was vague, unstructured, inconsistent, unclear, having multiple or incomplete meanings (Norton 1975, p. 608).

The specific concept of psychological uncertainty has received little attention, especially in the area of cardiac transplantation. The majority of nursing research and theoretical support for uncertainty has been conducted and developed by Mishel (1985, 1984, 1981).
Mishel has performed multiple studies on uncertainty, such as correlating uncertainty with stress, adjustment problems and lack of comprehension. In research on hospitalized medical patients, Mishel (1984) found a significant correlation between uncertainty and stress. These findings support research done by Berlyne (1976). Uncertainty, in addition to lower optimism and control levels, was also found to be a significant explanatory variable for adjustment problems in patients with newly diagnosed gynecological cancer (Mishel, Hostetter, King, and Graham 1984). In another study of 26 cancer patients, Mishel (1981) found a significant correlation between high levels of uncertainty and low levels of comprehension.

Abramson (1985) states that decision-making is highly subjective and complex when uncertainty exists and is affected by both cognitive and emotional biases. The appraisal state of uncertainty stimulates coping mechanisms to resolve the emotional state. Lazerus (1974) initially separated coping modes into the following two types: direct action, involving attempts to reduce the emotional impact of situations (i.e. through use of medication), rather than an approach directed at altering the distressing situation itself.

Mishel, however, separates coping into positive and negative strategies. Mishel's findings are based on empirical research findings and literature support. Some
research indicates that uncertainty may facilitate or prolong hope, thereby inferring a positive outcome (Mishel 1985). In general, however, uncertainty is associated with negative, harmful situations (Mishel 1981). When uncertainty implies danger, direct action mobilizing strategies are implemented, such as information seeking (Berlyne 1960; Lazerus 1974 and Mishel 1985). Thus, if uncertainty results in coping that is not perceived as adequate, direct action strategies are implemented (Lazerus 1974). Therefore direct action is a form of coping, implemented when adequate coping is not occurring. When uncertainty is high, direct action strategies are implemented. Direct action through an information search, if successful, should result in a sense of mastery and reduction of uncertainty.

In summary, uncertainty results when events are perceived as lacking a cognitive structure. Uncertainty, when viewed as danger, is associated with direct action mobilizing strategies. Direct action, a type of coping strategy is utilized in an attempt to reduce the perceived uncertainty and restore optimal coping. With the implementation of direct action strategies, uncertainty is predicted to decrease. With lowering levels of uncertainty, a cognitive structure should be more likely to be strengthened.
Concepts - Information Gathering and Sub-types of Uncertainty - Ambiguity, Complexity, Deficient Information and Unpredictability

Information gathering in the post-transplant evaluation period is viewed as a type of direct action coping strategy. Coronary atherosclerosis is perceived as a threat to a person's well-being. Participation in a diagnostic procedure infers an active vigilant search for information. Information gathering through participation in cardiac catheterization is implemented for uncertainty reduction when uncertainty is perceived as danger (Mishel 1985). Participation involves gaining an understanding of the presence and severity of the disease and an attempt to formulate an optimal treatment plan.

Information gathering, in the form of participation in diagnostic procedures such as cardiac catheterization, is related to four specific sub-types of uncertainty - ambiguity, complexity, deficient information and unpredictability. These characteristics of uncertainty arose from Norton's (1975) work, and have been supported by numerous research studies (Mishel 1983). Ambiguity refers to the illness as vague or unclear. Complexity describes the multiple and different cues a patient receives regarding treatment. Deficient information indicates an absence of known or shared information. Unpredictability refers to an unstable illness course and unknown outcome (Mishel 1983, Mishel et al. 1984).
The following section discusses increased levels of the uncertainty sub-types supported by research before and during diagnostic procedures, specifically cardiac catheterization. Cardiac catheterization is considered a diagnostic procedure to determine the presence or absence of disease in the heart. The conceptual model, proposes these uncertainty sub-types will be elevated prior to information gathering through cardiac catheterization, but will decrease when the procedure is completed and information regarding results are obtained.

Several researchers have found uncertainty levels to be high and aversive during the diagnostic period. Mishel (1981) theorized that the diagnostic period is characterized by unclear, unfamiliar cues, supporting one type of uncertainty, specifically ambiguity. This was demonstrated by research findings on 253 subjects from three patient groups: medical diagnosis, surgical diagnosis, and a rule-out diagnostic group. As theorized, in the rule-out group levels of ambiguity and unpredictability uncertainty were significantly higher than the medical or surgical groups with established diagnoses. These findings were further supported by another study comparing 37 cardiac catheterization patients to 18 hemodialysis patients. Again, cardiac catheterization patients, without a definite diagnosis had significantly higher levels of uncertainty than the dialysis patients with a firm diagnosis (Mishel 1981).
Emotional distress, exhibited in coronary care unit patients, was related to uncertainty from not knowing their diagnosis and the meaning of the diagnostic treatments and procedures being performed (Davis 1972). Another study by Mishel et al. (1984) of 54 women with gynecological cancer supports the aversive nature of uncertainty in the diagnostic period. Patients with higher levels of uncertainty were more pessimistic and exhibited more adjustment problems. Ambiguity about the illness and treatment events was associated with pessimism toward the health care plan and personnel. Increased levels of complexity and unpredictability were also correlated to pessimism concerning the future and unfavorable results. Deficient information was significantly related to a lack of motivation.

Cardiac catheterization is a very stressful, frightening procedure for most patients (Finesilver, 1980; Teasley, 1982; Ventura, 1984). Risks of the procedure, while rare, involve death, myocardial infarction, stroke, arterial occlusion, ventricular arrhythmias, hemorrhage, infection, pulmonary embolism (Teasley, 1982; Ventura, 1984). The psychological stress of the procedure is associated with the involvement of the heart, fear of the unknown, and the results of the catheterization, which may indicate the need for surgery (Finesilver, 1978). In the case of heart transplant recipients surgery means re-
transplantation, if possible. The feasibility of re-
transplantation is made more difficult secondary to the
physical condition of the patient, availability of a donor
heart and financial/insurance coverage problems.

Ambiguity and deficient information before and
during cardiac catheterization is common. Patients
frequently verbalize problems understanding and a lack of
information concerning the complex diagnostic procedures
(Vlay and Fricchione 1985, McCauley et al. 1984). In
addition, Rice (1986) notes that patients are often confused
and upset by physician/technician communication exchange
during the procedure. Identifying and providing information
the patient and family need and can understand remains a
primary challenge for nursing.

Procedural guidelines and teaching techniques vary
within and between institutions. Thus, patients often
receive multiple cues (complexity) during the cardiac
catheterization procedure. Events during the procedure
itself are also unpredictable, further influencing
uncertainty. The patient remains awake during the
catheterization which takes between one and a half to three
hours to complete. The patient is kept in a supine position
on a hard table. The length, difficulty and accuracy of the
procedure is variable from patient to patient and has been
shown to be increased by patient distress (Finesilver,
1978). Engel (1971), reports death occurring during cardiac
catheterization secondary to extreme distress. The foreignness of the bright lights, gowned personnel, and high-tech equipment can hamper cooperation needed during the procedure for position changes and breathing maneuvers. Kendall, et al., (1979) reports that anticipatory anxiety prior to cardiac catheterization can result in avoidance of the procedure, interference during the procedure, and potential for high residual levels of post-catheterization anxiety.

In conclusion, high levels of ambiguity, complexity, deficient information and unpredictability have been associated with patient's undergoing diagnostic testing, specifically cardiac catheterization. Information gathering through participation in cardiac catheterization is an example of a direct action coping mechanism. Information gathering is stimulated by increased levels of uncertainty sub-types. When cardiac catheterization is completed, however, the patient receives information concerning the severity of illness and treatment plan and uncertainty levels are theorized to decrease. Mishel et al. (1984) found in their study of women with gynecological cancer, that levels of uncertainty significantly decreased from diagnosis to treatment. The patient gains understanding and meaning regarding the illness state, resulting in uncertainty reduction.
Operational Variables - PRTRI and the MUIS

The operational variable for information gathering is patient retrieval of test results and implications (PRTRI). The operational variables for ambiguity, complexity, deficient information and unpredictability are measured by the Mishel Uncertainty in Illness Subscales (MUIS). These will be discussed in detail in Chapter 3.

Uncertainty levels generally decrease with information acquisition, whether the information obtained is positive or negative. Thus, participation in cardiac catheterization is considered a direct action coping mechanism to gain health information. When information gathering is completed through cardiac catheterization, the patient is supplied information concerning his treatment plan. It is proposed then, that uncertainty levels should be higher prior to cardiac catheterization. The patient's uncertainty levels should be lower after he/she receives the results of testing.

Summary

The conceptual framework (Figure 1) is based on cognitive structure as it relates to coping. Cognitive structure refers to the personal appraisal of an illness state and associated treatment plan. Coping, refers to an optimal regulation of physiological, emotional and cognitive responses to a situation (Lazerus 1978). The construct of
cognitive structure forms a negative relationship with coping prior to cardiac catheterization. Following cardiac catheterization, cognitive structure forms a positive relationship with coping.

At the concept level there is a positive relationship (proposition) between uncertainty and direct action strategies. Uncertainty is postulated to be a negatively related element of cognitive structure. Uncertainty refers to a situation that cannot be adequately structured or categorized by individual's cognitively (Budner 1961). Direct action is a positive index of coping. Direct action coping strategies aim to regain an optimal coping pattern. Direct action is stimulated by uncertainty that is perceived as dangerous, and is a primary mechanism for uncertainty reduction. As direct action strategies are implemented, however uncertainty should decrease. Thus, following implementation of direct action strategies, uncertainty forms a negative relationship with direct action strategies.

Information gathering is viewed as a specific type of direct action strategy, indicating a vigilant information search. A positive relationship is theorized between information gathering and the uncertainty sub-types: ambiguity, complexity, lack of information, and unpredictability. The uncertainty sub-types however, are proposed to decrease upon completion of the cardiac catheterization and information retrieval.
No studies have examined the specific concept of uncertainty in transplant patients undergoing cardiac catheterization to gather health status information. To examine this population, information gathering was operationalized by PRTRI. Ambiguity, complexity, deficient information and unpredictability were operationalized by the MUIS subscales.
CHAPTER 3

METHODOLOGY

In this chapter the research design, setting, sample and protection of human subjects are addressed. In addition, the data collection instruments, method of data collection and data analysis plan will be discussed.

Design

A descriptive design was used to describe the relationship between types and levels of uncertainty pre and post cardiac catheterization, in patient's post heart transplantation.

Setting

This study was conducted in a large nonprofit hospital, located in the southwestern United States.

Sample

A convenience sample of 23 subjects was obtained from patients participating in post-transplant yearly follow-up cardiac catheterization studies. Subjects were divided into two groups. Group one, refers to patients one year post-transplant and consisted of 12 subjects. Group two, includes patients two years post-transplant and consisted of 11 subjects.
Criteria for participation in the study included the following: 1) heart transplant recipient; 2) age 18 years or older; 3) mental alertness - oriented to person, place and time; and 4) the ability to read or speak English.

Protection of Human Subjects

Prior to data collection the research proposal was approved by the University of Arizona's Human Subjects Review Committee, (Appendix A).

Verbal permission to include the patient in the study was also obtained from the Chief of the Cardiac Transplant Program and the attending physicians directing the cardiac catheterization procedure.

The subjects received a 'Subject's Disclaimer Form', in addition to a verbal explanation of the study prior to participation (Appendix B). The disclaimer included the voluntary nature, withdrawal ability, purpose and confidentiality of the study. Consent to participate was indicated by completing the questionnaire.

Data Collection Instruments

Uncertainty

Uncertainty was operationalized by the Mishel Uncertainty in Illness Scale (MUIS) (Appendix C). This scale originates from the conceptual framework of uncertainty in illness by Mishel (1981). The MUIS is a 34-
item, multidimensional scale. The scale was factor analyzed into the four factors of uncertainty previously mentioned - ambiguity, complexity, deficient information and unpredictability. Factor 1, ambiguity, consists of 17 items; factor 2, complexity, consists of 7 items; factor 3, deficient information, consists of 4 items; and factor 4, unpredictability, is composed of 6 items. The MUIS uses an interval scale with a 1-5 point Likert format, with a response set ranging from strongly agree to strongly disagree.

Total scores and factor scores can be obtained from the scale. The total score is the sum of the subject's scores to items 1-34. The higher the total score, the greater uncertainty the subject is experiencing. The subscale score is computed by adding the scores of those items comprising each of the four scales. The multiambiguity factor can range from 17-85; the complexity factor ranges from 7-35; deficient information scores can range from 4-20; and the unpredictability factor scores range from 6-30. The scores indicate specific areas in which uncertainty is greatest.

Validity. Clustering of MUIS items by factor loading was consistent with theoretical predictions, providing initial construct validity for the MUIS (Mishel 1981). Discriminate validity was demonstrated on a sample of 253 subjects, by correlating uncertainty levels in
patients with determined medical or surgical diagnosis to patients with rule-out diagnoses. The population was separated into groups with medical diagnoses (N=134), surgical diagnoses (N=68), and rule-out diagnoses (N=51). The rule-out group mean (87.62) on the MUIS was significantly greater than both the medical group mean (76.62) and the surgical group mean (65.64), as proposed in theory (Mishel 1981).

These findings were also supported by a study of 37 cardiac catheterization patients and 18 hemodialysis patients. The cardiac catheterization patients, with nonspecific diagnoses, had significantly higher uncertainty levels than the dialysis patients with definite diagnoses. Thus, these study's findings support discriminate validity by demonstrating that the MUIS discriminates significantly between medical, surgical and diagnostic populations in predicted theoretical directions (Mishel 1981).

An additional validation study supports the theoretical relationships of the scale. A group of 100 medical subjects were administered the MUIS and the Hospital Stress Events Scale. Pearson product moment correlations demonstrated that the patient's level of uncertainty was significantly (r=.35, p ≤ .001) correlated to the perceived rating of hospital stress events (Mishel 1984). Thus, as predicted in theory, perceived uncertainty in illness is directly associated with stress.
Support for convergent validity was demonstrated in a study investigating the relationship between uncertainty and lack of comprehension on a group of 26 cancer patients. Results supported theoretical predictions, that higher levels of uncertainty are correlated with lower levels of comprehension ($r = -0.56$, $p < 0.002$). In summary, validity for the MUIS is adequate, as demonstrated by construct, discriminate, and convergent validity.

Reliability. Reliability findings for the MUIS are demonstrated by internal consistency. The reliability of the total scale has a standardized alpha of 0.91. The reliability alpha coefficients for subscales range from 0.70 to 0.91. Factor one, ambiguity, has a standardized alpha of 0.91. Factor two, complexity, has an alpha of 0.75. Factor three, deficient information, demonstrates an alpha of 0.71. Unpredictability, the fourth factor, has an alpha of 0.70 (Mishel 1983, Mishel et al. 1984). These alpha coefficient levels are adequate for instrument reliability.

Demographic Data

Demographic data was gathered on all the subjects, either by interview or written completion of the form at the time of instrument completion. The demographic data included age, sex, marital status, living arrangements, educational status, ethnic background, religious affiliation, and period of time since heart transplant (Appendix D).
Method of Data Collection

Data was collected in the patient's hospital room. The investigator administered the MUIS at the following time periods: within 4-24 hours prior to the cardiac catheterization procedure; and again within 4-24 after the completion of the procedure and PRTRI. Prior to initial testing the investigator verbally explained the study, and distributed the 'Subjects Disclaimer Form'.

The investigator gave verbal instructions for completing the Demographic Data Questionnaire and the MUIS. The investigator also remained nearby the subject during the time the subject completed the questionnaire, offering clarification when needed. When necessary, the demographic Data Questionnaire and MUIS were read to the respondent rather than be self-administered.

Patient retrieval of test results and implications (PRTRI), refers to the conference between patient and health care professional following the cardiac catheterization procedure. During this conference the results of the cardiac catheterization were discussed with the patient. In addition, the meaning of the results and implications for health care follow-up were explained to the patient. During this period, the patient was able to receive answers to questions about the test findings.
Analysis of Data

Descriptive statistics were used to analyze the data. Paired dependent t-tests were used to analyze data for research questions one and two. Research question one was tested for significant differences in uncertainty levels for patients at one year post-transplant, pre and post cardiac catheterization. Research question two, was tested for significant differences in uncertainty levels for patients at two years post-transplant, pre and post cardiac catheterization. In question three, differences in levels of uncertainty in recipients evaluated at one year and recipients evaluated at two years, prior to catheterization were tested for significance using independent t-tests and Manova statistics. Research question four also examined differences in levels of uncertainty in recipients evaluated at one year and recipients evaluated at two years, however, after catheterization. Independent t-test and Manova statistics were also used to analyze question four. Probability level was set at $\leq .10$.

Summary

In summary, a descriptive study was conducted in a hospital setting with a sample size of 23 subjects. The subjects were divided into two groups – group one containing 12 subjects one year post-transplant; group two, containing 11 subjects two-years post-transplant.
Protection of human subjects was obtained by study approval from the University of Arizona and the participating hospital, in addition to a Subjects Disclaimer Form. The MUIS was the data collection instrument used in this study, for patients participating in cardiac catheterization. Reliability and validity for the MUIS was discussed and demonstrated to be adequate. Data collection involved administration of the MUIS to the subjects pre and post cardiac catheterization. Paired dependent and independent t-tests, in addition to Manova statistics (descriptive statistics) were used to analyze the data.
CHAPTER 4

RESULTS OF ANALYSIS OF DATA

Results of the data analysis are presented in this chapter. Demographic characteristics of the sample are also discussed. The research questions were analyzed with t-tests and Manova statistics.

Description of the Sample

A convenience sample consisted of 12 subjects one year post transplant (group one) and 11 subjects two years post transplant (group two). Entire sample size was 23 subjects.

The mean age for group one was 48.58 years (range from 34 to 66) with a standard deviation (SD) of 2.61. Group two mean age was 46.73 years (range 35-55) with a SD of 6.65. The mean educational level for group one was 14.09 years (equivalent of 2 years of college education), with a range of 10-17 years (SD=2.31). Group two educational mean was lower at 12.82 years (approximately 1 year of college education) with a range from 3-20 years (SD=5.02). Table 1 summarizes age and educational characteristics for group one and two.

The majority of subjects were male, with 11 males (91.7 percent) in group one and 9 males (81.81 percent) in group two. The majority of subjects in both groups were
Table 1. Demographic Characteristics of the Sample: Age, Years of Education

<table>
<thead>
<tr>
<th></th>
<th>Group One n = 12</th>
<th>Group Two n = 12</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AGE IN YEARS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>48.58</td>
<td>46.73</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.61</td>
<td>6.65</td>
</tr>
<tr>
<td>Range</td>
<td>34-66</td>
<td>35-55</td>
</tr>
<tr>
<td><strong>EDUCATION LEVEL IN YEARS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>14.09</td>
<td>12.82</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.31</td>
<td>5.02</td>
</tr>
<tr>
<td>Range</td>
<td>10-17</td>
<td>3-20</td>
</tr>
</tbody>
</table>
also married, group one - 75 percent and group two - 72.7 percent. Sex and marital status demographic characteristics are shown in Table 2.

Only 16 percent of group one lived alone, with 9.1 percent of group two living alone. The majority of subjects lived with their spouse or family. The predominant ethnic background was caucasian, group one - 83.3 percent, group two - 72.7 percent. Religious affiliations were predominantly Protestant or Catholic. Living arrangements, ethnic background and religious affiliation characteristics are summarized in Table 3.

**Data Analysis Related to Research Questions**

Four research questions were proposed. Research question one and two were analyzed using dependent t-tests. Independent t-tests and Manova statistics were used to analyze questions three and four.

Research Questions One and Two

1) What are the differences in levels of uncertainty in heart transplant recipients prior to and after their one year follow-up cardiac catheterization procedures?

2) What are the differences in levels of uncertainty in heart transplant recipients prior to and after their two year follow-up cardiac catheterization procedures?
Table 2. Demographic Characteristics of the Sample: Sex, Marital Status

<table>
<thead>
<tr>
<th></th>
<th>Group One (n = 12)</th>
<th></th>
<th>Group Two (n = 11)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent</td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>SEX</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>11</td>
<td>91.7</td>
<td>9</td>
<td>81.8</td>
</tr>
<tr>
<td>Female</td>
<td>1</td>
<td>8.3</td>
<td>2</td>
<td>18.2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>12</td>
<td>100.0</td>
<td>11</td>
<td>100.0</td>
</tr>
<tr>
<td>MARITAL STATUS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>9</td>
<td>75</td>
<td>8</td>
<td>72.7</td>
</tr>
<tr>
<td>Divorced</td>
<td>3</td>
<td>25</td>
<td>2</td>
<td>18.2</td>
</tr>
<tr>
<td>Single</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>9.1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>12</td>
<td>100.0</td>
<td>11</td>
<td>100.0</td>
</tr>
</tbody>
</table>
### Table 3. Demographic Characteristics of the Sample: Living Arrangements, Ethnic Background, Religious Affiliation

<table>
<thead>
<tr>
<th></th>
<th>Group One (n = 12)</th>
<th>Group Two (n = 11)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td><strong>LIVING ARRANGEMENTS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spouse Only</td>
<td>5</td>
<td>41.7</td>
</tr>
<tr>
<td>Family</td>
<td>5</td>
<td>41.7</td>
</tr>
<tr>
<td>Alone</td>
<td>2</td>
<td>16.6</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>12</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>ETHNIC BACKGROUND</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>10</td>
<td>83.3</td>
</tr>
<tr>
<td>Hispanic</td>
<td>1</td>
<td>8.4</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>8.3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>12</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>RELIGION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protestant</td>
<td>7</td>
<td>58.3</td>
</tr>
<tr>
<td>Catholic</td>
<td>3</td>
<td>25.0</td>
</tr>
<tr>
<td>Jewish</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>None</td>
<td>2</td>
<td>16.7</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>12</td>
<td>100.0</td>
</tr>
</tbody>
</table>
The MUIS was administered to group one and group two, prior to and after cardiac catheterization. The purpose was to ascertain differences in levels of uncertainty after receiving cardiac catheterization test results and implications. Total MUIS scores were calculated pre and post-catheterization. A maximum total scale score of 170 could be achieved.

Addressing research question one, in recipients one year post-transplant, the pre cardiac catheterization mean value was 80.25 (SD=12.93). The post catheterization mean value was 78.42 (SD=13.39), t-value = .61 (NS). These findings indicate that recipient's one year post-transplant uncertainty scores did not significantly differ prior to and after catheterization. Post-catheterization means were lower than pre procedure means, however not at a significant level, (Table 4).

Research question two compares pre and post-catheterization scores for those recipients two years post-transplant. The pre cardiac catheterization mean value was 91.64 (SD=16.95) and post cardiac catheterization mean was 88.91 (SD=12.69), t-value = .92 (NS). As found in group one, the post cardiac catheterization uncertainty scores were lower than the pre cardiac catheterization scores, however, were not significant (Table 5).
Table 4. Dependent t-test on Group One - Recipient's One Year Post Transplant MUIS Uncertainty Scores, Pre and Post Cardiac Catheterization (n = 12)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>T-Value</th>
<th>Two-Tailed Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL MUIS SCALE SCORE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Catheterization</td>
<td>80.25</td>
<td>12.93</td>
<td>.61</td>
<td>.55</td>
</tr>
<tr>
<td>Post-Catheterization</td>
<td>78.42</td>
<td>13.39</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5. Dependent t-test on Group Two - Recipient's Two Years Post Transplant MUIS Uncertainty Scores, Pre and Post Cardiac Catheterization (n = 11)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>T-Value</th>
<th>Two-Tailed Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL MUIS SCALE SCORE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Catheterization</td>
<td>91.64</td>
<td>16.95</td>
<td>.92</td>
<td>.38</td>
</tr>
<tr>
<td>Post-Catheterization</td>
<td>88.91</td>
<td>12.69</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Research Questions Three and Four

3) What are the differences in levels of uncertainty in heart transplant recipients evaluated at one year and recipients evaluated at two years, prior to cardiac catheterization?

4) What are the differences in levels of uncertainty in heart transplant recipients evaluated at one year and recipients evaluated at two years, after cardiac catheterization?

Independent t-tests were used to analyze research questions three and four for the subject's total uncertainty scores. Research question three compares pre-catheterization total uncertainty scores for group one and group two. The mean value for group one was 80.25 (SD=12.93) and group two was 91.64 (SD=16.95), t-value = -1.82 (p=.08), see Table 6. This indicates that pre-catheterization uncertainty scores were significantly higher in recipients two year post-transplant when compared to recipients one year post-transplant.

Research question four compares the post-catheterization total uncertainty scores, for group one and group two. The mean total value for group one was 78.42 (SD=13.39) and group two was 88.91 (SD=12.69), t-value = -1.92 (p=.07), Table 7. Thus, similar to the pre-catheterization uncertainty scores, post-catheterization uncertainty scores were significantly higher in two year recipients than one year transplant recipients.
Table 6. Independent t-test on Pre-Catheterization Total MUIS Uncertainty Scores, for Group One (n = 12) and Group Two (n = 13)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>T-Value</th>
<th>Two-Tailed Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group One</td>
<td>80.25</td>
<td>12.93</td>
<td>-1.82</td>
<td>.08*</td>
</tr>
<tr>
<td>Group Two</td>
<td>91.64</td>
<td>16.95</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p ≤ .10

Table 7. Independent t-test on Post-Catheterization Total MUIS Uncertainty Scores, for Group One (n = 12) and Group Two (n = 13)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>T-Value</th>
<th>Two-Tailed Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group One</td>
<td>78.42</td>
<td>13.39</td>
<td>-1.92</td>
<td>.07*</td>
</tr>
<tr>
<td>Group Two</td>
<td>88.91</td>
<td>12.69</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p ≤ .10
Manova statistics were used to delineate and examine relationships in subscale scores taken as a group, between one and two year transplant recipients. There were no significant differences in pre-test subscale scores as a group, between group one and group two with a Wilks lambda value of .79, f-value = 1.22, degrees of freedom (df) 4,18 (p=.33). Multivariate tests of significance also revealed no significant differences with post subscale uncertainty scores between group one and two: Wilks lambda - value of .82, f = .76, df 4,14 (p=.57). Thus, when examining subscale scores as a group, there were no significant differences or interactions between group one or two, in pre or post-test subscale scores.

Univariate f-tests were used to examine specific subscale factors for differences between year. Table 8 summarizes pre and post uncertainty subscale scores for group one and group two. Pre subscale scores were found significant by one factor, ambiguity. Pre-ambiguity subscale score total for group one was a mean of 38.17 (SD=8.55). Group two had a significantly higher mean score of 45.64 (SD=10.18). Pre-ambiguity revealed an f-value of 3.65, df 1,21 and p=.07, between group one and group two.

Unpredictability was the only factor found significant by univariate analysis on the post-test subscale scores. Post-unpredictability subscale score totals were higher again in group two, with a mean value of 19.10
Table 8. Pre and Post Uncertainty Subscale Scores (Ambiguity, Complexity, Deficient Information and Unpredictability) for One Year (Group One) and Two Year (Group Two) Heart Transplant Recipients

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Group One (n = 12)</th>
<th>Group Two (n = 11)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PRE MEAN</td>
<td>PRE SD</td>
</tr>
<tr>
<td>Ambiguity</td>
<td>38.17</td>
<td>8.55</td>
</tr>
<tr>
<td>Complexity</td>
<td>14.58</td>
<td>3.70</td>
</tr>
<tr>
<td>Deficient Information</td>
<td>10.33</td>
<td>2.35</td>
</tr>
<tr>
<td>Unpredictability</td>
<td>17.17</td>
<td>2.95</td>
</tr>
</tbody>
</table>
(SD=3.51), than group one with a mean score of 16.42 (SD=3.18). Unpredictability f value was 2.99, df 1,17 at p=.10. Post-test subscores were also examined between group one and two, using pretest subscores as covariates and were not significant.

Summary

This chapter has presented the results of the analysis of data. The demographic sample characteristics were also presented. Total sample size was 23 subjects. The sample was separated into group one - 12 subjects one year post-transplant and group two - 11 subjects, two years post-transplant.

Research questions one and two were analyzed using dependent t-tests. Although post-catheterization scores were lower in both groups, no significant differences were found in uncertainty scores before and after cardiac catheterization in group one or group two.

Independent t-tests and Manova statistics were used to analyze research questions three and four. Pre-catheterization uncertainty scores were significantly higher in group two than group one. Likewise, post-catheterization uncertainty scores were also significantly higher in group two than group one.

Multivariate tests of significance revealed no significant differences in pre or post uncertainty subscale scores between recipients in group one and two. Using
Univariate f-tests, the pre-ambiguity factor score was significantly higher in subject's in group two than in group one. In addition, the post-unpredictability subscale score was also significantly higher in group two than in group one. Post-test uncertainty subscores were also analyzed, between group one and two, using pretest subscores as covariates. No significant differences were found.
CHAPTER 5

CONCLUSIONS AND IMPLICATIONS

This chapter presents the findings of the study as they relate to the conceptual framework. The conclusions, implications for nursing practice, limitations, and suggestions for further research are also presented.

Findings Related to the Conceptual Framework

This study was based on the conceptual framework depicted in figure 1. The construct level of the framework was based on cognitive structure as it relates to coping. Uncertainty and direct action strategy form the concept level of the framework. Uncertainty is further differentiated into uncertainty subgroups. Direct action strategy is narrowed down to information gathering on the following conceptual level.

The research questions examined differences in levels of uncertainty prior to and after performing a direct action strategy in the form of cardiac catheterization. These concepts are operationalized by the MUIS and PRTRI event respectively. Uncertainty levels are determined by the MUIS questionnaire administered prior to and after participation in cardiac catheterization and subsequent retrieval of test results and information.
Research questions one and two asked if there were differences in uncertainty levels prior to and after catheterization in transplant recipients? Recipients at one and two years post-transplant were evaluated. The conceptual framework proposed that after completion of cardiac catheterization and information retrieval, uncertainty levels would decrease. Uncertainty levels did decrease after catheterization and PRTRI, however, were not significantly lower. These findings may be influenced by recipients prior participation in cardiac catheterization during pre-transplant evaluation. Cardiac catheterization is noted to be a stressful procedure with known complications (Ventura, 1984). Transplant recipients, however, may have undergone cardiac catheterization multiple times, possibly reducing their fear of the actual procedure itself. In addition, cardiac catheterization is one of several evaluation procedures performed at the yearly follow-up and may represent an interaction effect. The subject's uncertainty response may be influenced by the complete evaluation process and results.

It is important to note that catheterization results (communicated through the PRTRI) were normal for group one, one year transplant recipients. However, in group two, patient's two years post transplant, one patient did have severe coronary artery disease necessitating retransplantation. It is interesting to note that the post-
uncertainty score (89) was higher than the pre-uncertainty score (81), for this subject. The subject had not however made a decision regarding retransplantation or fully discussed this option, when the post catheterization questionnaire was completed. This may have influenced uncertainty levels. This finding, however, does not support the proposal that uncertainty decreases after PRTRI, despite the nature (whether positive or negative) of the procedure findings.

The mean pre-uncertainty scores for the combined groups were 85.70 (SD=15.74) with a post-uncertainty mean of 83.44 (SD=13.84). While there were no significant differences between pre and post-test scores, the scores are higher than other populations studied by Mishel. Mishel (1981) found that rule-out diagnostic groups have significantly higher uncertainty levels than medical or surgical groups with established diagnoses. Mishel studied a group of 37 cardiac catheterization patients post procedure and obtained mean uncertainty scores of 82 (SD=14.9). This population, similar to the transplant population, had significantly higher levels of uncertainty when compared to a population of dialysis patients (n=18) t(53)=3.17, p<.003 (Mishel, 1981). The transplant patient's mean scores were also higher when compared to normative data by Mishel on a coronary group of myocardial infarction patients (n=224) with mean uncertainty levels of 81.80, SD=15.52, (Mishel, 1987).
Questions three and four asked if there were differences prior to and after cardiac catheterization between one year transplant recipients and two year recipients? Two year transplant recipients had significantly higher uncertainty levels, both before and after cardiac catheterization, than one year transplant recipients. These findings lend initial and tentative support that uncertainty increases with time post-transplant. This is supported by Simmons, et al. who found that feelings of lack of control over destiny, a concept similar to uncertainty, increased with time post-transplant in renal patients. In addition, a transplant recipient from this current study setting stated that when dealing with uncertainty, "there is no sanctuary". Literature specifically documenting uncertainty, however, is limited to exploratory findings. In an exploratory study on family adjustment to heart transplantation, Mishel and Murdaugh (1987, p. 332), describe uncertainty in the post-operative period as involving unpredictable occurrences of infections, rejections, and secondary illnesses. The recipients status can change suddenly and be catastrophic.

This study's findings differ with exploratory findings that uncertainty lessens in intensity and severity with time (Eisenman, 1986; Christopherson et al., 1976). Previous findings indicate that post-transplant uncertainty is always present to some degree but may become more
episodic rather than continuous in nature (Christopherson 1976a; Eisenman 1986; Christopherson et al., 1976). In between the yearly follow-up evaluation, the recipient is at home, generally feeling well and away from the reminder that transplantation ensures only limited survival, that decreases with time post-transplant. The yearly follow-up evaluation may represent the episodic focal point for transplant recipients when they are 'forced' to focus on their health status and future survival. The follow-up evaluation requires hospitalization, assumption of a patient role and focus on diagnostic procedures. All transplant recipients receive information regarding the purpose of the yearly follow-up evaluation. Specifically they are told that catheterization is to determine the incidence or extent of graft atherosclerosis. These recipients have also received both verbal and written survival statistics, indicating that survival decreases with time. With time and subsequent yearly follow-up evaluations, these facts are reinforced. In addition, recipients share information in the hospital setting regarding the health state of fellow transplant recipients, many of whom are facing re-transplantation or have died.

Research questions three and four also examine uncertainty subscales. The ambiguity subscale score was significantly higher pre-catheterization in two year recipients than in the one year recipients. Ambiguity refers
to the illness state as vague or unclear (Mishel et al, 1984). These findings indicate that transplant recipients regard their health status as less clear with time post-transplant prior to their participation in annual health evaluation. Two year recipient's ambiguity levels decreased after catheterization and retrieval of test results. Post-catheterization, however, they were not significantly different from recipients one year post-transplant. These findings support the conceptual framework proposing that ambiguity levels should decrease after information gathering.

Two year transplant recipients also had significantly higher post catheterization unpredictability scores than recipients one year post-transplant. The concept of unpredictability refers to the unknown illness course and outcome. Unlike the other uncertainty sub-type scores which lowered from pre-test to post-test unpredictability was higher post catheterization for group two. Unpredictability was heightened after PRTRI, not supporting the conceptual framework. These initial findings, however, reinforce the concept that unpredictability, as a type of uncertainty, increases with time and knowledge post-transplant.

The remaining uncertainty sub-types, complexity and deficient information were not significantly different, before or after catheterization, between year one and two.
In addition, there were no significant differences found on total uncertainty scores prior to or after catheterization for either year. Thus, information regarding the treatment plan and shared test results by the health care team were not significantly different between subject groups. Patient education and communication by health care professionals influences the subscale scores of complexity and deficient information. It is difficult to assess the impact of patient education and counseling by these findings. These scale factors did not differ significantly pre or post-catheterization, or between subject groups.

Conclusions

1) There was a decrease in uncertainty levels from pre to post-catheterization, however findings were not significant. This was demonstrated for both groups, one and two year transplant recipients. Recipients prior experience with catheterization may have reduced their uncertainty response to the procedure itself. In addition, the subject's uncertainty response may represent the interaction effects of the complete evaluation process or future health status, rather than just the catheterization and subsequent results.

2) Transplant recipient's uncertainty scores were similar or slightly higher when compared to other cardiac populations studied by Mishel using the MUIS. Since these
are different population groups, these comparisons are made cautiously. Mishel, however, has documented that uncertainty is significantly higher in diagnostic rule-out groups (such as transplant patients) than in medical or surgical groups with established diagnoses (Mishel, 1981).

3) Two year transplant recipients demonstrated significantly higher uncertainty levels, both before and after cardiac catheterization, when compared to one year transplant recipients. These findings lend initial and tentative support to the proposal that uncertainty increases with time post-transplant. There is minimal literature support in this area. The yearly follow-up evaluation may represent an episodic focusing for the transplant recipient on health status. This may result in uncertainty that increases with time post-transplant as documented survival decreases.

4) Ambiguity, an uncertainty sub-type, was significantly higher pre-catheterization in two year recipients than one year recipients. This supports findings that recipients regard their health status as less clear with time post-transplant. The uncertainty sub-type, unpredictability, was significantly higher post-catheterization in two year recipients than one year recipients. This may also indicate that unpredictability increases with time post-transplant.
5) The uncertainty sub-types of complexity and deficient information did not demonstrate significant differences between recipient groups pre or post-catheterization.

Implications for Nursing Practice

The following implications for nursing practice must be prefaced by the understanding that research findings from this study are preliminary and tentative in nature. Diagnostic testing, such as cardiac catheterization, in addition to the other procedures performed during the follow-up evaluation, heighten transplant recipients feelings of uncertainty.

Nurses caring for transplant recipients need to be aware of the unusual stressors the transplant recipient faces. The transplant recipient is given information that cardiac function must be evaluated annually to determine the incidence of insidious cardiac disease. This stimulates uncertainty and is associated with danger. Direct action strategies are implemented (Lazerus, 1974; Mishel, 1985). The patient participates in cardiac catheterization in an attempt to gain information. It is important to understand that the decision to participate is difficult and motivated by uncertainty. The recipient's participation in the evaluation process should be encouraged and supported as a positive quest to determine current health status. Timely medical treatment can then be implemented, if necessary.
Based on this study's research findings, uncertainty may increase with time post-transplant. Nurses should be aware that recipients may experience heightened levels of uncertainty the farther post-transplant they become. Uncertainty may be manifested in a number of ways, such as fear, anxiety, avoidance or denial.

The transplant recipient's feelings should be anticipated and acknowledged. The recipient should be encouraged to discuss and explore feelings of uncertainty, when appropriate. Feelings of ambiguity should be approached with clear, accurate information regarding the known aspects of the recipient's current condition. In addition, education regarding cardiac function should be verbally described at the patient's level of understanding. Education could be enhanced by pictorial diagrams and illustrations. Procedures and their purpose should be explained thoroughly, supplemented with audiovisual education materials. A formalized education protocol may reduce complexity regarding differing information the recipient receives regarding treatment. Test results should be explained and summarized to the recipient with adequate time for questions. Feelings of unpredictability regarding the future are real. Living with unpredictability may require the assumption that stability is not the norm and the recipient and partner are not invulnerable (Mishel and
Acknowledgement of the time gained since transplant and a constructive focus on the immediate future may be helpful.

Limitations of the Study

Several limitations of the study were identified. This study utilized a small sample size, with 12 subjects in group one and 11 subjects in group two. A larger sample would have increased representation. In addition, the data collection time required to obtain a minimal sample size was not economical.

The subject groups were similar in time since transplant. Differences and interaction between subject groups may have been greater if groups were more dissimilar in length if time since transplant, i.e., comparisons between one and five year transplant recipients.

While the subject groups were similar in time since transplantation there still may have been differences between the groups due to complications (i.e. infection and rejection). Complication rates and the differences between groups were not analyzed.

The transplant recipients may have exhibited a social desirability response, misrepresenting their level of uncertainty. The subjects were closely associated with the investigator as a member of the transplant team.
The measurement of uncertainty surrounding cardiac catheterization and retrieval of test results may of been influenced by an interaction effect of other evaluation procedures and/or recipient long-term future health.

**Suggestions for Further Research**

1) Replicate the study using a larger sample size

2) Utilize transplant recipients from other transplant programs to decrease data collection time.

3) Compare groups with greater variation in time since transplant, i.e., one year and five years post-transplant.

4) Perform a longitudinal study of patient groups, i.e. study group one at one year and again at two years. This would eliminate concern regarding group demographic differences and provide information about changes in uncertainty over time.

5) Utilize comparison groups of: a) patients tested at times other that annual evaluation. This may help determine if the annual evaluation represents an episodic elevation in uncertainty levels; b) a control group of general cardiac patients undergoing cardiac catheterization.

6) Additional descriptive research is needed on cardiac transplant recipients to better understand the effect of uncertainty, in addition to other psychological factors, affecting this population.
Summary

This chapter has discussed the findings as they relate to the conceptual framework. The conclusions, nursing implications, limitations and suggestions for further research have also been presented.
APPENDIX A

HUMAN SUBJECTS REVIEW MEMORANDUM
TO: Suzanne M. Nicholson  
Graduate Student  
College of Nursing  

FROM: Ada Sue Hinshaw, PhD, RN  
Director of Research  
Linda R. Phillips, PhD, RN  
Chairman, Research Committee  

DATE: October 23, 1986  

RE: Human Subjects Review: Uncertainty in Cardiac Transplant  
Recipients Prior to and after Cardiac Catheterization  

Your project has been reviewed and approved as exempt from University review by the College of Nursing Ethical Review Subcommittee of the Research Committee and the Director of Research. A consent form with subject signature is not required for projects exempt from full University review. Please use only a disclaimer format for subjects to read before giving their oral consent to the research. The Human Subjects Project Approval Form is filed in the office of the Director of Research if you need access to it.  

We wish you a valuable and stimulating experience with your research.  

ASH/fp
APPENDIX B

SUBJECT'S DISCLAIMER FORM

You are being asked to participate in a study entitled "Uncertainty In Cardiac Transplant Recipients Prior To and After Cardiac Catheterization." The purpose of this study is to investigate and compare how uncertainty affects patient's having experienced cardiac transplantation, before and after cardiac catheterization. The findings of this study may aid health care providers in understanding and providing appropriate education and support for patients undergoing diagnostic testing.

Your participation in this study is entirely voluntary. You may withdraw from participation at any time. Participation involves completing a questionnaire before and after you complete the cardiac catheterization and obtain the results. The questionnaire takes approximately 20 minutes to complete. The researcher will be available to answer questions while you complete the questionnaire.

There are no known risks to participating in this study. The decision to participate or decline to participate will not affect your medical or nursing care in any way.

Participation in this study is strictly confidential. Your name and information you provide will only be available to the researcher. Consent to participate in this study is indicated by completing the questionnaire.

Thank you for your participation,

Annie Nicholson, RN

Annie Nicholson, RN
APPENDIX C

MISHEL UNCERTAINTY IN ILLNESS SCALE
MISHEL UNCERTAINTY IN ILLNESS SCALE

Instructions: Please read each statement. Take your time and think about what each statement says. Then place an "X" under the column that most closely measures how you are feeling TODAY. If you agree with a statement, then you would mark under either "Strongly Agree" or "Agree." If you disagree with a statement, then mark under either "Strongly Disagree" or "Disagree." If you are undecided about how you feel, then mark under "Undecided" for that statement. Please respond to every statement.

1. I don't know if there is anything wrong with me
   - Strongly Agree (5)
   - Agree (4)
   - Undecided (3)
   - Disagree (2)
   - Strongly Disagree (1)

2. I have a lot of questions without answers.
   - Strongly Agree (5)
   - Agree (4)
   - Undecided (3)
   - Disagree (2)
   - Strongly Disagree (1)

3. I am unsure if my condition is getting better or worse.
   - Strongly Agree (5)
   - Agree (4)
   - Undecided (3)
   - Disagree (2)
   - Strongly Disagree (1)

4. It is unclear how bad my symptoms will be.
   - Strongly Agree (5)
   - Agree (4)
   - Undecided (3)
   - Disagree (2)
   - Strongly Disagree (1)

5. The explanations they give about my condition seem hazy to me.
   - Strongly Agree (5)
   - Agree (4)
   - Undecided (3)
   - Disagree (2)
   - Strongly Disagree (1)

6. The purpose of each treatment is clear to me.
   - Strongly Agree (5)
   - Agree (4)
   - Undecided (3)
   - Disagree (4)
   - Strongly Disagree (1)

7. When I have symptoms, I know what this means about my condition.
   - Strongly Agree (5)
   - Agree (4)
   - Undecided (3)
   - Disagree (4)
   - Strongly Disagree (5)

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Adapted for use (with author permission) 10-22-86
2. I do not know when to expect things will be done to me.  

<table>
<thead>
<tr>
<th>Strongly Agree (5)</th>
<th>Agree (4)</th>
<th>Undecided (3)</th>
<th>Disagree (2)</th>
<th>Strongly Disagree (1)</th>
</tr>
</thead>
</table>

9. My symptoms continue to change unpredictably.  

<table>
<thead>
<tr>
<th>Strongly Agree (5)</th>
<th>Agree (4)</th>
<th>Undecided (3)</th>
<th>Disagree (2)</th>
<th>Strongly Disagree (1)</th>
</tr>
</thead>
</table>

10. I understand everything explained to me.  

<table>
<thead>
<tr>
<th>Strongly Agree (5)</th>
<th>Agree (4)</th>
<th>Undecided (3)</th>
<th>Disagree (2)</th>
<th>Strongly Disagree (1)</th>
</tr>
</thead>
</table>

11. The doctors say things to me that could have many meanings.  

<table>
<thead>
<tr>
<th>Strongly Agree (5)</th>
<th>Agree (4)</th>
<th>Undecided (3)</th>
<th>Disagree (2)</th>
<th>Strongly Disagree (1)</th>
</tr>
</thead>
</table>

12. I can predict how long my improved condition will last.  

<table>
<thead>
<tr>
<th>Strongly Agree (5)</th>
<th>Agree (4)</th>
<th>Undecided (3)</th>
<th>Disagree (2)</th>
<th>Strongly Disagree (1)</th>
</tr>
</thead>
</table>

13. My procedures are too complex to figure out.  

<table>
<thead>
<tr>
<th>Strongly Agree (5)</th>
<th>Agree (4)</th>
<th>Undecided (3)</th>
<th>Disagree (2)</th>
<th>Strongly Disagree (1)</th>
</tr>
</thead>
</table>

14. It is difficult to know if the medications I am getting are helping.  

<table>
<thead>
<tr>
<th>Strongly Agree (5)</th>
<th>Agree (4)</th>
<th>Undecided (3)</th>
<th>Disagree (2)</th>
<th>Strongly Disagree (1)</th>
</tr>
</thead>
</table>

15. There are so many different types of staff, it's unclear who is responsible for what.  

<table>
<thead>
<tr>
<th>Strongly Agree (5)</th>
<th>Agree (4)</th>
<th>Undecided (3)</th>
<th>Disagree (2)</th>
<th>Strongly Disagree (1)</th>
</tr>
</thead>
</table>

16. Because of the unpredictability of my condition, I cannot plan for the future.  

<table>
<thead>
<tr>
<th>Strongly Agree (5)</th>
<th>Agree (4)</th>
<th>Undecided (3)</th>
<th>Disagree (2)</th>
<th>Strongly Disagree (1)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>---</td>
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</tr>
<tr>
<td>17.</td>
<td>The course of my condition keeps changing. I have good and bad days.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Undecided</td>
<td>Disagree</td>
</tr>
<tr>
<td></td>
<td>(5)</td>
<td>(4)</td>
<td>(3)</td>
<td>(2)</td>
</tr>
<tr>
<td>18.</td>
<td>It's vague to me how I will manage my care after I leave the hospital.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Undecided</td>
<td>Disagree</td>
</tr>
<tr>
<td></td>
<td>(5)</td>
<td>(4)</td>
<td>(3)</td>
<td>(2)</td>
</tr>
<tr>
<td>19.</td>
<td>I have been given many differing opinions about my present condition.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Undecided</td>
<td>Disagree</td>
</tr>
<tr>
<td></td>
<td>(5)</td>
<td>(4)</td>
<td>(3)</td>
<td>(2)</td>
</tr>
<tr>
<td>20.</td>
<td>It is not clear what is going to happen to me.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Undecided</td>
<td>Disagree</td>
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<tr>
<td></td>
<td>(5)</td>
<td>(4)</td>
<td>(3)</td>
<td>(2)</td>
</tr>
<tr>
<td>21.</td>
<td>I usually know if I am going to have a good or bad day.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Undecided</td>
<td>Disagree</td>
</tr>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>22.</td>
<td>The results of my tests are inconsistent.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Undecided</td>
<td>Disagree</td>
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<td></td>
<td>(5)</td>
<td>(4)</td>
<td>(3)</td>
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</tr>
<tr>
<td>23.</td>
<td>The effectiveness of the transplant is undetermined.</td>
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<tr>
<td></td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Undecided</td>
<td>Disagree</td>
</tr>
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<td></td>
<td>(5)</td>
<td>(4)</td>
<td>(3)</td>
<td>(2)</td>
</tr>
<tr>
<td>24.</td>
<td>It is difficult to determine how long I can care for myself.</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Undecided</td>
<td>Disagree</td>
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<tr>
<td></td>
<td>(5)</td>
<td>(4)</td>
<td>(3)</td>
<td>(2)</td>
</tr>
<tr>
<td>25.</td>
<td>I can generally predict the course of my symptoms.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Undecided</td>
<td>Disagree</td>
</tr>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
</tbody>
</table>
26. Because of the transplant, what I can do and cannot do keeps changing.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

27. I'm certain they will not find anything else wrong with me.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
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</table>

28. The procedures I am receiving have a known probability of success.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
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</table>

29. They have not given me a specific diagnosis.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

30. My physical distress is predictable; I know when it is going to get better or worse.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
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31. My symptoms are definite and will not change.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
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32. I can depend on the nurses to be there when I need them.

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<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
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33. The seriousness of my condition has been determined.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
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34. The doctors and nurses use everyday language so I can understand what they are saying.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
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APPENDIX D

DEMOGRAPHIC DATA QUESTIONNAIRE
1. _____ Age

2. Sex: _____ Male _____ Female

3. Marital Status:
   _____ a) Single (never married)
   _____ b) Married
   _____ c) Divorced/Separated
   _____ d) Widowed

4. Educational Status: Circle highest grade completed
   None
   Grade School  1  2  3  4  5  6  7  8
   High School   9  10  11  12
   College       13  14  15  16
   Graduate or Professional School  17 18 19 20

5. Ethnic Background:
   _____ a) Hispanic
   _____ b) Asian
   _____ c) Black
   _____ d) Caucasian
   _____ e) Native American
   _____ f) Other (specify)

6. Religious Affiliation:
   _____ a) Protestant (specify)
   _____ b) Catholic
   _____ c) Jewish
   _____ d) Other (specify)
   _____ e) None

7. Length of Time Since Heart Transplant:
   _____ a) Approximately one year
   _____ b) Approximately two years

8. Living Arrangements:
   _____ a) Living alone
   _____ b) Living with spouse only
   _____ c) Living with family members
   _____ d) Living with friends
   _____ e) Living with employed help
   _____ f) Living in retirement home or nursing home
REFERENCES


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