FACTORS INFLUENCING UNCERTAINTY AND HEALTH STATUS OUTCOMES IN CORONARY ARTERY BYPASS GRAFT SURGERY PATIENTS

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Factors Influencing Uncertainty and Health Status Outcomes in Coronary Artery Bypass Graft Surgery Patients

by

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Abstract

The purpose of this study was to examine the pattern of recovery up to 6 weeks in patients post-CABG surgery who were under the care of an acute care nurse practitioner (ACNP) while in hospital and to explore relationships among variables as hypothesized in Mishel's theory of uncertainty in illness.

A repeated measures design was used to investigate changes in symptom distress, uncertainty, and health status outcomes over three time periods (48 to 96 hours post-CABG surgery, 1 week after discharge, and 6 weeks after discharge). The relationships among four antecedent variables in Mishel's theory (symptom distress, coordination of care, patient participation in care with the ACNP, and patient education level), and uncertainty and physical and mental health status were also explored along with the best predictors of uncertainty and health status outcomes.

Participants in this study (n = 51) were comparable to other study samples in terms of age and gender, marital status, work/retirement status, and most surgically-related variables, but differed on level of education and number of grafts. In terms of recovery over time, patients had significantly less symptom distress at 1 and 6 weeks compared to in-hospital scores. Likewise, physical health status (as measured by the PCS of the SF-36) was significantly improved by 6 weeks, but there was no improvement in mental health status (as measured by the MCS of the SF-36). Total uncertainty scores that were in the moderate range did not change significantly over time. Patient participation in care and coordination of care scores were reported as high by patients.

Results indicated that the predicted relationships in Mishel's theory of uncertainty in illness were supported by the findings in this study with the exception of education

level, which was positively associated with in-hospital symptom distress but not associated with uncertainty. At 1 week, the best predictors of uncertainty were in-hospital uncertainty and coordination of care, explaining 39% of the variance. As well, higher patient participation in care was associated with lower symptom distress and higher perceived coordination of care at 1 week. The best predictor of physical health at 1 week was symptom distress ($r = -0.41$). No variables were found that significantly predicted mental health at 1 week. At 6 weeks, 56% of the variance in uncertainty was explained by symptom distress at 6 weeks and uncertainty scores at 1 week. Physical health at 1 week and symptom distress at 6 weeks explained 67% of variance in physical health at 6 weeks. Mental health status at 1 week was the best predictor of mental health at 6 weeks.

In conclusion, findings suggest that the ACNP may have an indirect influence on uncertainty through his/her role as coordinator of care. As well, symptom distress at 1 and 6 weeks were significant predictors of physical health status, a finding that has implications for early assessment and intervention. Mental health did not improve in this study, nor did any variables predict mental health suggesting that other variables not studied influenced mental health post-CABG surgery.

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Chapter 1: Introduction

Despite its frequency as a treatment for coronary artery disease, coronary artery bypass graft (CABG) surgery is a major operative procedure and patients and families have reported it as a stressful, sometimes overwhelming experience (Redeker, 1992; Stengrevics, 1997). Throughout the recovery period, patients experience uncertainty about pain, uncertainty about being able to perform daily activities after returning home, uncertainty surrounding potential complications, and uncertainty about the ability to return to a former lifestyle (McNamee & Wallis, 1999). Thus, for patients who have undergone CABG surgery, uncertainty is a continuing stressor that may influence coping and adaptation, including physical and mental health functioning (Caroll, Hamilton & McGovern, 1999; Redeker, 1992; Staples & Jeffrey, 1997; White & Frasure-Smith, 1995).

Over the past decade, there have been many changes to health care including changes in practice patterns in the area of cardiac surgery. One result has been increasingly shorter lengths of stay for CABG surgery patients (Hartford & Wong, 2000: Savage & Grap, 1999; Wu, 1995). Generally patients can expect to be discharged from hospital 6 to 8 days post-surgery and sometimes earlier with some patients being discharged as early as 4 days post-surgery (McNamee & Wallis, 1999; Wu, 1995). Of necessity, patients are assuming greater responsibility for their care at an earlier point in the recovery period, a situation that may have a negative impact on feelings of uncertainty and stress (Hartford & Wong, 2000).

In many settings, recent changes to health care delivery systems have included the development of new roles for health care professionals to enhance in-hospital care. One example of a new nursing role is the Acute Care Nurse Practitioner (ACNP). Role components of the ACNP include direct care to patients and families, support of systems, patient education, research activities, and leadership activities (Ackerman, Norsen, Martin, Wiedrich, & Kitzman, 1996). In this study, the researcher was interested in the ACNP and how aspects of the ACNP role might influence patients' uncertainty and adaptation after CABG surgery.

Background of the Study

Cardiovascular disease (CVD) is a term used to describe all diseases of the circulatory system, including acute myocardial infarction, ischemic heart disease (IHD) also known as coronary artery disease (CAD), valvular heart disease, peripheral heart disease, arrhythmias, high blood pressure and stroke (Health Canada, 2003). There are more deaths per year from CVD than any other disease (Heart and Stroke Foundation, 2003). In 1999 CVD accounted for 36% (n = 78,942) of all deaths in Canada (Health Canada, 2003). While mortality rates have been declining since the 1970s, it remains a major cause of illness, disability, and death among Canadians and, not surprisingly, is associated with high economic costs to society (Heart and Stroke Foundation of Canada, 1999; Statistics Canada, 1999). According to a 1994 study by the Heart and Stroke Foundation, CVD cost the economy over $18 million a year (Heart and Stroke Foundation, 2003). From a provincial perspective, Newfoundland and Labrador has the highest mortality rate of IHD in the country. The most recent national statistics reveal that 5-year (1995-1999) mortality rates for ischemic heart disease (IHD) were 176.79

deaths per 100,000 persons in Newfoundland compared to 138.05 per 100,000 persons in Canada (Health Canada, 2003).

CABG surgery is a common surgical procedure for patients with CAD and it remains an accepted and successful treatment option with the expected goal of improving quality of life. Statistics for 1995-96 showed that there were over 18,000 CABG surgeries performed in hospitals in Canada with men accounting for 14,000 cases and women accounting for 4,000 cases (Statistics Canada, 1999). At the major tertiary care centre in the province of Newfoundland and Labrador, CABG surgery is performed routinely for patients with CAD. There were 580 surgeries performed during the period from September 1, 2000 to August 31, 2001.

The Theory of Uncertainty in Illness and the ACNP

Mishel (1984, 1988), a nurse investigator, has conducted extensive research in the area of uncertainty in both acute and chronic illness populations. The theory of uncertainty in illness (1988) is the only middle range nursing theory developed to date that addresses the concept of uncertainty and adaptational outcomes. Mishel's pioneering work in this area has been the subject of many studies including studies of cardiac illness. However, few studies have been done with post-CABG surgery populations (Barron, 2000). As a result we know very little about the trajectory of uncertainty and patient outcomes in the early recovery period post-CABG surgery.

Uncertainty has been defined as the "inability to determine the meaning of illness-related events. Uncertainty occurs in a situation in which the decision maker is unable to assign definite value to objects or events and/or is unable to predict outcomes" (Mishel, 1988, p. 225). Mishel (1983) identified ambiguity and complexity as the two dimensions

of uncertainty around which data from cardiovascular populations cluster. Ambiguity refers to vague and indistinct cues related to the illness itself while complexity refers to cues about treatment and system of care as multiple, intricate and varied (Mishel, 1983, 1990).

Mishel proposed that a number of factors may influence uncertainty. These antecedent factors are classified under two major constructs: stimuli frame (symptom pattern, event familiarity and event congruence) and structure providers (credible authority, social support and education level). Four of these variables: symptom pattern, event familiarity, credible authority, and education level and their relationship to uncertainty have not been studied in post-CABG surgery patients and no studies were found that identified the nurse or the nurse practitioner as the credible authority in any patient population.

Mishel's (1988) theory posits that the credible authority may directly or indirectly influence uncertainty and adaptation. However, Mishel (1997) reported on evidence from only four acute care studies that supported the proposed relationship between the credible authority (i.e., trust in the health care provider) and reduced uncertainty. In 1999, Sidani and colleagues discussed patient outcomes related to the ACNP role as reported by a number of authors. These included patient satisfaction, improvements in functional status, compliance with treatment, knowledge of disease and treatment, comfort level, and well being. However, it is not known if any of these ACNP-related outcomes were associated with patients' levels of uncertainty.

Uncertainty and Impact on Recovery

There are a number of factors that influence uncertainty and, thus, impact on adaptational outcomes. As previously noted, Mishel (1988) has defined antecedent factors under the constructs of stimuli frame and structure providers. Demographic variables such as age and education level have been studied. Higher age and higher education are thought to bring experience and knowledge that may reduce uncertainty. However, Mishel (1997) reported on a number of studies that did not support a relationship between age and uncertainty and the support for the relationship between level of education and uncertainty has been inconsistent at best.

A number of studies have examined other variables, such as social support, and levels of teaching in relation to patient outcomes post-CABG surgery (Hilton, 1992; Redeker, 1992; White & Frasure-Smith, 1995). Since the period following discharge can be very stressful for patients, the amount of support patients receive may help to mediate some of the uncertainty and its subsequent effects on physical and mental health. According to Hilton (1992), uncertainty often continues after hospitalisation because there may still be lack of clarity around what patients can and cannot expect and if, in fact, they are improving. Few studies could be found that described the relationship between symptom pattern or distress (part of the stimuli frame in Mishel's model) and uncertainty. Most studies only described the post-discharge concerns of CABG surgery patients (Ball & Grap, 1999; McNamee & Wallace, 1999; Savage & Grap, 1999; Wu, 1995).

Investigators have also examined emotional distress, hope, coping and quality of life post-CABG surgery (Carroll, Hamilton & McGovern, 1999; Redeker, 1992; Staples & Jeffrey, 1997; White & Frasure-Smith 1995). A number of researchers have reported

finding a positive relationship between uncertainty and emotional distress, anxiety and depression (Bennett, 1993; Hilton, 1992; White & Frasure-Smith, 1995).

According to Mishel (1988), adaptation is an essential task for all patients and can only begin once patients define the meaning of illness stimuli, such as symptoms and illness events. Adaptational outcomes, such as physical and mental health status, have been examined in relation to uncertainty in coronary artery bypass graft patients and those with life threatening arrhythmias (Allen, Becker, & Swank, 1990; Barnason, Zimmerman, Anderson, Mohr-Burt, & Nieveen, 2000; Carroll, Hamilton, & McGovern, 1999; Ross & Ostrow, 2001). These studies have shown uncertainty to be significantly negatively related to patient outcomes over time.

Problem Statement and Rationale

Heart disease is a common health problem in Canada and Newfoundland and Labrador (NL) has the highest rate of heart disease amongst the provinces. CABG surgery is a common treatment for patients with CAD. Since 1997, patients undergoing CABG surgery at the Health Care Corporation of St. John's (HCCSJ) in St. John's, NL have been assigned ACNPs to manage their care in the post-operative period. The role of the ACNP is considered invaluable by the health care team; however, little research has been done to evaluate how ACNP care might influence patient outcomes.

According to Mishel's theory of uncertainty in illness, uncertainty is a variable that can influence adaptation in acute and chronic illness. However, little is known about how uncertainty may affect patient outcomes following CABG surgery. As in-hospital patient stays become shorter, it becomes important to identify factors that may influence uncertainty in this population of patients in the early recovery period. One of those

factors may be the ACNP as the "credible authority." Despite the preponderance of studies related to Mishel's uncertainty theory, there is a dearth of evidence supporting the credible authority construct to uncertainty and the few studies that have been done have identified the physician as the credible authority.

Uncertainty has been studied in many subgroups of patients, but only a few studies have examined uncertainty in patients who have undergone CABG surgery. Various constructs of Mishel's theory have been studied but no single study has examined the structure provider variables of ACNP as the credible authority, and education level, and the stimuli frame variables of symptom distress and event familiarity (which relates to patterns in the health care environment), and their relationship to uncertainty and adaptational outcomes in post-CABG surgery patients.

Purpose

The purpose of this study was to examine the pattern of recovery up to 6 weeks in patients post-CABG surgery who were under the care of an ACNP while in hospital. A secondary purpose was to explore the relationships between the following variables identified in Mishel's theory of uncertainty in illness: stimuli frame (symptom distress and event familiarity), structure providers (credible authority and education level), uncertainty, and adaptational outcomes. No published studies were found that examined this set of variables. While Mishel's theory has been widely studied in acute and chronic illness populations, further examination of the constructs of the theory in terms of CABG surgery patients will add to the body of nursing knowledge on uncertainty.

The current study is part of a larger study funded by the National Health Research and Development Program (NHRDP) that is being conducted in Ontario (Primary

Investigator: Dr. S. Sidani, Faculty of Nursing, University of Toronto). The Ontario portion of the study is examining practice patterns of ACNPs and patient outcomes. Data from the current study will become part of the database for the larger study of ACNPs being conducted in Ontario and Newfoundland and Labrador.

Research Questions

1. Are there differences in symptom distress and uncertainty in hospital (T1), at 1 week (T2), and 6 weeks (T3) post-CABG surgery?
2. Are there differences in adaptational outcomes at 1 week (T2) and 6 weeks (T3) post-CABG surgery?
3. What is the relationship between the stimuli frame variables (symptom distress and event familiarity) and uncertainty post-CABG surgery?
4. What is the relationship between the structure provider variables (credible authority and educational level) and uncertainty post-CABG surgery?
5. What is the relationship between the structure provider variables (credible authority and educational level) and the stimuli frame variables (symptom distress and event familiarity) post-CABG surgery?
6. What is the relationship between uncertainty and adaptational outcomes post-CABG surgery?
7. What are the best predictors of uncertainty and adaptational outcomes at 1 week (T2) and 6 weeks (T3) post-CABG surgery?

Chapter 2: Literature Review

This chapter provides an overview of the literature in relation to the study variables and is divided into six sections. The first section presents a brief overview of the concept of uncertainty and illness with special reference to Mishel's theory of uncertainty in illness. The second section discusses the literature relevant to uncertainty and cardiac illness particularly coronary artery bypass graft (CABG) surgery. The third section summarizes the literature on antecedents to uncertainty: the stimuli frame and structure providers as postulated in Mishel's uncertainty theory. Section four discusses literature relevant to outcomes in the early recovery period post-CABG surgery. The fifth section discusses the Acute Care Nursing Practitioner (ACNP) and patient outcomes, while the final section describes the conceptual model for this study.

The Concept of Uncertainty and Illness

The literature is replete with references to uncertainty and illness. An extensive search of the Medline and PsychInfo databases from 1982 to 1998 by Barron (2000) revealed more than 8000 records containing references to uncertainty and illness. Uncertainty may well be a fact of life for most people, whether it is uncertainty about employment, health, or finances. However, for people experiencing an illness episode, uncertainty may be a major source of stress that impacts adaptation. As Mishel (1997) stated, "uncertainty is not the total experience in acute and chronic illness, yet it is a constant occurrence from diagnosis through living with a long-term illness or condition" (p. 57). This theme is echoed by Babrow, Kasch and Ford (1998) who proposed that uncertainty is inherent in the stress, coping and illness experience.

Uncertainty is the central concept in Mishel's theory related to acute (1981, 1988) and chronic (1990) illness and is the only middle range theory of uncertainty in the nursing literature. Mishel (1984, 1988) has defined uncertainty as the inability to determine the meaning of illness-related events; uncertainty occurs when an individual is unable to categorise events and, thus, predict outcomes due to lack of sufficient cues. There are two main components of uncertainty – ambiguity and complexity. Ambiguity refers specifically to vague and indistinct cues related to illness while complexity refers to cues about treatment and the system of care as multiple, intricate and varied (Mishel, 1990). According to Mishel (1988), adaptation in the illness experience is a crucial task for patients. However, uncertainty about the severity of illness, success of the treatment, and the impact of the health problem on one's life and on the life of the family, as well as uncertainty about the ability to pursue life goals constitute major areas of concern for those with serious health problems such as coronary artery disease (Allan, 1990). In its negative state, uncertainty is threatening because individuals do not have a clear perception of what will happen (Hilton, 1992). Hence, while not all uncertainty is negative, it can make coping and adaptation more difficult. For the hospitalised patient undergoing CABG surgery, uncertainty may continue well after hospital discharge. Patients may wonder about their progress and about the future.

The key components of Mishel's theory are represented in Figure 1 and include: (a) stimuli frame, cognitive capacity and structure providers as antecedents to uncertainty; (b) inference and illusion as part of the appraisal process; (c) coping; and (d) adaptation. The stimuli frame has three parts: symptom pattern, event familiarity and event congruence.

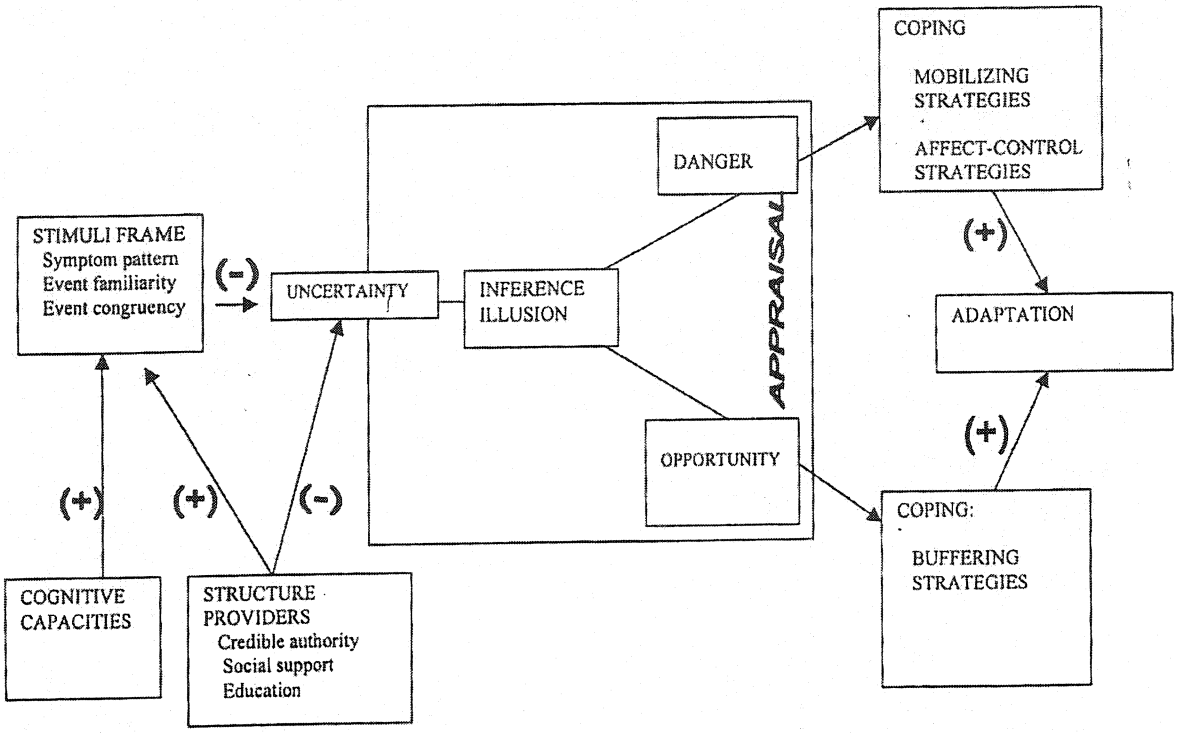

Figure 1: Model of perceived uncertainty in illness.

Uncertainty is likely to occur when there is inconsistency in the pattern of symptoms (symptom pattern), when the pattern within the health care environment is unfamiliar or unexpected (event familiarity), and when there is inconsistency between the expectations and experiences in the illness/treatment situation (event congruence) (Mishel, 1988). In turn, the components of the stimuli frame are influenced by two variables: cognitive capacity and structure providers. Cognitive capacity refers to how an individual processes information while structure providers refers to resources available to help in the interpretation of the stimuli frame. The latter includes credible authority such as a trusted health care provider, social support, and education level of the patient. When the patient can rely on structure providers to help interpret events, it is hypothesised that uncertainty

will be reduced and will then positively impact outcomes. The processes of inference and illusion are key in the appraisal of uncertainty. Inferences are built on general beliefs about the relationship between oneself and the environment; with illusion, beliefs are constructed out of the uncertainty situation itself (Mishel, 1988). Uncertainty may be viewed as an opportunity or threat depending on how an individual appraises the situation. According to Mishel (1988), however, there is substantial evidence that supports the appraisal of uncertainty as a danger.

One of Mishel's major accomplishments has been the development of a valid and reliable instrument to measure the concept of uncertainty in illness, the Mishel Uncertainty in Illness Scale (MUIS) (1997). Several versions of the instrument have been developed including the MUIS used for ill hospitalised adults, the MUIS-C and the MUIS-FC used for patients and family members living in the community, and the Parents' Perception of Uncertainty Scale (PPUS) used with parents whose children are ill. The development of these instruments has aided the testing and refinement of Mishel's theory of uncertainty in illness.

Uncertainty and Cardiac Illness

CABG surgery is a well-accepted surgical treatment for patients with coronary artery disease. According to Staples and Jeffrey (1997), uncertainty is inherent in the patient's experience of CABG surgery. All studies that investigated cardiac surgery and uncertainty were reviewed. These included three quantitative studies (Redeker, 1992; Staples & Jeffrey, 1997; White & Frasure-Smith, 1995) and two qualitative studies (Hawley, 1998; Higgins, Dunn, & Theobald, 2000) (see Appendix A, Table 1). Two quantitative studies used a repeated measures design and examined the relationship

between uncertainty, psychological distress and perceived social support (White & Frasure-Smith) and uncertainty and coping (Redeker). The third quantitative study included both spouses and CABG surgery patients and examined the relationship between uncertainty, quality of life, and hope prior to surgery (Staples & Jeffrey). All quantitative studies used instruments that were reliable and valid to measure uncertainty, such as the MUIS and other variables of interest, such as coping and quality of life. One qualitative study examined the meaning and experience of prayer for CABG surgery patients (Hawley) and the other investigated perceptions of recovery after angioplasty (Higgins et al.). Both studies identified uncertainty as a factor in the cardiac illness experience.

Quantitative Studies

Redeker (1992) examined the relationship between uncertainty and coping at 1 week (T1) and 6 weeks (T2) in 129 men post-CABG surgery. Uncertainty subscale scores were in the mid-range: 36.4 (T1) and 33.59 (T2) for ambiguity and 23.12 (T1) and 24.53 (T2) for complexity. Positive low to moderately high correlations ($r = 0.31$ to 0.72) were found between the subscales of ambiguity and complexity and emotion-focused coping at both 1 and 6 weeks. Ambiguity was positively correlated with the avoidance, blamed-self, and wishful-thinking subscales of the revised Ways of Coping Checklist (WCCL); complexity was positively correlated with the avoidance and wishful thinking subscales. The authors suggested that these findings were consistent with Mishel's uncertainty in illness theory (i.e., attempts to escape by using wishful thinking and avoidance may be related to the inability to structure meaning in uncertain situations). Only at 6 weeks was there a low positive correlation with problem-focused coping and uncertainty ($r = 0.23$,

$p < 0.01$). In addition, there was a positive low correlation at 6 weeks for both ambiguity and complexity with 'seeking social support' coping. This finding provided only limited support for the idea that informational, material and emotional support are sought in response to uncertainty later in the recovery trajectory.

White and Frasure-Smith (1995) examined the trajectory of uncertainty and psychological stress in 47 males following either angioplasty or CABG surgery at 1 month (T1) and 3 months (T2) post-intervention. The researchers also investigated the impact of social support on uncertainty and psychological stress in the two groups. Social support was significantly correlated to uncertainty and psychological stress in the angioplasty group, but not in the CABG group. In the CABG group, patients had decreased psychological stress at 3 months compared to 1 month while there was no change in uncertainty scores over the same period; however, there was a significant relationship between uncertainty and psychological stress at both time periods, which was not mediated by social support. The authors suggested that the stress experienced by the CABG group might be the result of additional factors such as physical condition after surgery.

Staples and Jeffrey (1997) examined the relationships between quality of life, uncertainty, and hope for 21 patients and their spouses prior to CABG surgery. While patients' and spouses' uncertainty scores were in the lower half of the possible range of scores, the spouses had significantly higher levels of uncertainty and rated their concern higher for the spouse who had undergone surgery. On average, both patients and spouses were very hopeful with similar scores. Quality of life scores were also relatively high for both groups. While the relationship between total quality of life scores and uncertainty

for patients was not significant, patients who reported greater quality of life for the health and functioning domains had significantly less uncertainty about their cardiac illness (r = 0.39). There was a significant negative relationship (r = -0.49) between hope and uncertainty in the study, suggesting that lower levels of hope were associated with greater uncertainty.

Qualitative Studies

Two qualitative studies have also investigated uncertainty in relation to cardiac illness. Hawley (1998) investigated the experience and meaning of prayer from the perspective of 13 CABG surgery patients. A grounded theory approach was used to develop 16 main categories using the constant comparative method. The principle problem facing the participants was one of "facing uncertainty of body, mind and spirit, including the possibility of death" (Hawley, p. 487). Participants discussed the reasons for their uncertainty, the manner in which they appraised the situation, and their coping patterns. Participants who had trust in their health care providers reported less uncertainty. Likewise, when patients did not feel confident with staff, uncertainty increased. Patients had reduced uncertainty when they received appropriate information and when they had easy access to staff. The patients' psychophysiological status was found to negatively influence uncertainty. Patients whose condition deteriorated could not effectively communicate their needs. Additionally, support from friends and loved ones was found to be helpful in reducing the participants' experience of uncertainty and risk of possible death. All patients had some degree of uncertainty pre-operatively due to the frailty of their "mind, body, and spirit." Participants' recollection of their post-operative experience included "uncertainty of the mind" since they wondered about the

recurrence of symptoms and the ability to resume former roles. Hawley noted that there were similarities between the stages described by participants and Mishel's major antecedents to uncertainty in her theory of uncertainty in illness.

Higgins, Dunn, and Theobald (2000) described 9 participants' perceptions of recovery from angioplasty 1 month after discharge using semi-structured taped interviews. The purpose of the study was to explore the recovery experience in terms of the "needs, concerns and challenges" angioplasty patients faced during the recovery period. Three major categories were identified: awareness of the problem or situation, coping response, and appraisal of the situation. Anxiety related to uncertainty about future health and potential complications was identified as a major concern. Psychological strategies to reduce the uncertainty surrounding the hospital experience were categorised as part of the participants' coping response. The presence of symptoms and their management was a central theme in the last category.

Summary.

Findings from the quantitative studies of CABG surgery patients demonstrated that patient outcomes improved over time and that there was support for significant relationships between uncertainty and health related quality of life. A number of studies found that although uncertainty did not significantly change over time, there were strong negative correlations between uncertainty and physical and mental health outcomes, including emotional distress. In general these findings support Mishel's work.

The qualitative studies also lend support to the claim that uncertainty is a real problem facing patients in the recovery period. Factors found to reduce or deal with uncertainty included managing symptoms, receiving appropriate information, easy access

to staff and having trust and confidence in the health professional looking after them. These concepts are similar to stimuli frame and structure provider variables in Mishel's uncertainty theory.

Antecedents to Uncertainty

Stimuli Frame

According to Mishel's (1988) theory of uncertainty in illness, stimuli frame variables can directly reduce the level of uncertainty. In this study, two stimuli frame variables – symptom pattern and event familiarity – were investigated. Only studies related to symptom pattern were found; no studies were found of event familiarity and CABG surgery.

Symptom Pattern

It is well recognised that there are physical and psychological symptoms that CABG surgery patients can experience in the post-operative period. These symptoms include a variety of common complaints, such as fatigue, pain, leg edema, lack of sleep, and nausea. Mishel's theory suggests that they can be distressing and can interfere with recovery and adjustment in the post-operative period. While these symptoms are expected, the degree to which they are experienced by patients will vary.

Five studies (Ball & Grap, 1999; McNamee & Wallis, 1999; Savage & Grap, 1999; Tack & Gilliss, 1990; Wu, 1995) were reviewed in this section (see Appendix A, Table 2). All were descriptive studies with the exception of one prospective study that provided a coaching and emotional support intervention to post-CABG surgery patients (Tack & Gilliss). Four studies used telephone interviews to elicit discharge concerns up

to 8 weeks after surgery. One study used face-to-face patient interviews at a physician visit 3 weeks after surgery (Ball & Grap). Different instruments were used to collect data, but not all had proven reliability and validity. Three of the five studies had adequate sample sizes. Although no studies specifically addressed symptom distress and uncertainty, there was agreement regarding the most frequently reported symptoms and concerns following surgery.

Tack and Gilliss (1990) conducted a telephone intervention with 75 post-CABG surgery patients and their primary family caregivers up to 8 weeks after discharge. The five nursing diagnoses occurring most frequently included (in decreasing frequency): 1) altered comfort: pain, 2) ineffective coping: individual, 3) activity intolerance, 4) sleep pattern disturbance, and 5) altered nutrition: less than body requirements. The authors concluded that education might help buffer the uncertainty patients experience regarding persistent symptoms in the post-operative period.

Wu (1995) documented the post-discharge concerns of 196 CABG surgery patients who used a 24-hour nurse clinician telephone contact service. Although calls were patient-initiated, symptoms and concerns reported were similar to Tack & Gilliss' (1990) study and included: incision healing, pain (chest and other), medications, gastrointestinal disturbances, activities of daily living, and sleep problems. By the 4th post-discharge week, patient-initiated calls to a nurse clinician were about concerns and symptoms of a less acute nature.

McNamee and Wallis (1999) described the problems experienced by 32 CABG surgery patients and their relationship to coping at 1 and 6 weeks. In general, patient symptoms and concerns were found to change between the two time periods. At the time

of the first interview, patients experienced an average of six symptoms compared to three symptoms 6 weeks later. The major problems identified at 1 week were difficulty sleeping (78.1%), sternal wound pain (75.0%), bad dreams (46.9%), mood changes (43.7%), and shoulder blade pain (34.4%). At 6 weeks, sternal wound pain was the most frequently reported problem (65.6%), followed by mood changes (43.7%). There was a statistically significant negative correlation ($r = -0.42$, $p = 0.02$) between coping and the number of problems at 6 weeks. In conclusion, patients who experienced more problems reported poorer coping at 6 weeks, but not at 1 week post-discharge. As well, patients reported that they had received inadequate information about some of the problems they faced.

Savage and Grap (1999) documented the concerns of 342 CABG surgery patients within 7 to 14 days after discharge. The major problems identified in the early recovery period were leg edema (48%), appetite disturbance (35%), dyspnea (29%), sleep disturbance (12%), and wound drainage (9%). These findings were consistent with other studies.

Ball and Grap (1999) interviewed 80 cardiac surgery patients regarding GI symptoms during a routine office visit to their physician two weeks following discharge. The three most common gastrointestinal symptoms reported at the office visit (in descending order of frequency) were poor appetite, lack of taste, and nausea with nausea being the most distressing. There were no significant relationships between level of anxiety and each of the gastrointestinal symptoms.

Summary.

The main symptoms identified by CABG surgery patients in this set of five studies were pain, sleep disturbances, GI symptoms, and mood disturbance. Generally patients reported fewer symptoms at 6 weeks. One study of coping found that there was a statistically significant relationship between the number of reported problems at 6 weeks and coping at 6 weeks suggesting that patients who continue to have more problems may have more difficulty coping in the early recovery period.

Structure Providers

According to Mishel (1988), structure providers can both directly and indirectly reduce the level of uncertainty. Educational level, social support, and credible authority are part of the structure provider construct and may directly and indirectly reduce uncertainty (Mishel, 1988). In the current study, only credible authority and education level of the patient were examined for their impact on the stimuli frame and uncertainty. Therefore, only studies examining these variables were reviewed.

Education Level and Uncertainty

Support for the premise that less education is related to more uncertainty was found in three early studies reported by Mishel (1997). Based on this earlier work, Mishel proposed that education level would have a direct inverse relationship with uncertainty. However, studies have not consistently supported this relationship. Three quantitative studies on level of education and uncertainty (Galloway & Graydon, 1996; Mishel, 1984; Wong & Bramwell, 1992) were reviewed (see Appendix A, Table 3). All studies used

reliable and valid instruments to measure uncertainty. Only one study (Galloway & Graydon) found a significant relationship between uncertainty and level of education.

Mishel (1984) examined the perception of hospital events as stressful in relation to perceived uncertainty in 100 medical Veteran Administration patients on their fifth day of hospitalisation. While lack of information was moderately correlated with uncertainty ($r = 0.50$. $p < 0.001$), education level was not found to have the expected relationship with uncertainty. There were no differences for patients with varying education levels and perceptions of stress.

Wong and Bramwell (1992) examined the relationship between uncertainty and anxiety after mastectomy for breast cancer ($n = 25$) 1 to 2 days before discharge and 1 to 2 weeks after discharge. No significant relationships were found between demographic variables (including level of education) and uncertainty or anxiety at either time period.

Galloway and Graydon (1996) examined the relationship between uncertainty, symptom distress, and discharge needs in 40 patients undergoing surgery for colon cancer. Education level was found to be significantly positively correlated with uncertainty ($p = 0.02$). Participants were dichotomised into two groups of higher and lower education due to the small sample size ($n = 40$). Those with education ranging from grade 6 to 13 ($n = 24$) comprised the lower education group and the remainder ($n = 15$) with college or university education were in the higher education group. Surprisingly, the higher education group had significantly more uncertainty ($M = 60.4$, $SD = 8.8$) than the lower education group ($M = 51.2$, $SD = 13.8$, $p = 0.02$).

Summary.

Results from the few studies on uncertainty and educational level have been inconsistent. One study found that lack of information was moderately correlated with uncertainty. While it has been suggested that lower levels of education can lead to more uncertainty, Galloway and Graydon (1996) found significantly higher uncertainty in a group with more education. There were no studies of educational level and uncertainty in CABG surgery patients.

Credible Authority and Uncertainty

Mishel's uncertainty in illness theory proposes that the credible authority, part of the structure provider construct, may influence uncertainty both directly and indirectly. Few studies have examined credible authority and uncertainty. No studies were found that explicitly examined the role of the nurse or ACNP to uncertainty in any patient population.

Four quantitative studies (Borgers, Mullen, Meertens, Rijken et al., 1993; Mishel & Braden, 1988; Molleman, Krabbendam, Annyas, Koops, Sleijfer, & Vermay, 1984; Van Den Borne, Pruyn, & Van Den Heuvel, 1987) and one qualitative study (Hawley, 1998) that examined the role of uncertainty and credible authority were included in this review (see Appendix A, Table 4). Three quantitative studies used a descriptive or descriptive correlational design (Borgers et al.; Mishel & Braden; Molleman et al.) and one used a quasi-experimental, non-equivalent control group design (Van Den Borne et al.). Only Mishel and Braden used the MUIS to measure uncertainty but all studies reported using instruments to measure uncertainty that had proven validity and reliability in the range of 0.73 to 0.93. Other instruments used to measure variables, such as credible

authority and social support, were also reported as reliable and valid. The qualitative study by Hawley discussed the credible authority and uncertainty.

Quantitative studies.

Molleman et al. (1984) examined how doctor-patient relationships may influence anxiety and uncertainty in 418 cancer patients. The researchers found that 79% of cancer patients had moderate to high uncertainty scores related to their illness with corresponding scores for anxiety in 50% of patients. Results indicated that four main methods were used for coping with uncertainty and anxiety: 1) social means, 2) self-instruction means, 3) ego-defensive means, and 4) direct action means. Uncertainty was reduced by using self-instruction means and social means. Social means included coping by talking to other patients, specialists, family doctors, partners, nurses, and family. A further distinction between "experts" (family doctors, specialists, and nurses) and "non-experts" (partners, family, and other patients) found an inverse relationship between the use of "experts" and the reduction of uncertainty experienced by patients [$F(2,370) = 5.13$, $p = 0.01$]. Uncertainty about illness and therapy was only effectively reduced when there was contact with "experts" as postulated in Mishel's theory while contact with "non-experts" helped reduce anxiety.

Van Den Borne et al. (1987) examined how contact with fellow sufferers could reduce uncertainty and negative feelings, strengthen feelings of control, and increase self-esteem in 498 patients with two types of cancer. Results showed a significant interaction effect between the two uncertainty variables (i.e., uncertainty about the prospects of disease and treatment and uncertainty about possibilities of help and finding solutions to problems) and three factors: type of cancer, contact with fellow sufferers, and perceived

amount of information from the specialist [$F(4,672) = 3.809$, $p < 0.01$]. Patients who had contact with other patients were found to have lower levels of uncertainty, particularly if the patients felt they had received relevant information from the specialist. The above finding supports Mishel's hypothesis that social support and credible authority influence uncertainty.

Mishel and Braden (1988) tested a portion of the theoretical model of uncertainty in illness with a group of patients receiving treatment for gynaecological cancer. The findings indicated that the credible authority defined as the physician did not aid in interpreting symptom pattern nor did patient education level predict symptom pattern. However, the credible authority was found to be a strong predictor of general uncertainty ($B = -0.59$, $r^2 = 0.35$, $p < 0.01$). Neither social support nor education level had a significant effect on uncertainty. The credible authority was found to be the major antecedent variable affecting total uncertainty and the ambiguity and complexity subscales. In summary, the study found that the physician as credible authority had a direct effect on uncertainty as predicted in Mishel's (1988) theory.

Borgers et al. (1993) examined uncertainty, anxiety and their relationship to information seeking behaviour of cancer outpatients before, during and after consultation with cancer specialists. Fear, uncertainty and satisfaction with information were measured. At T1, the intention to seek information was measured for the following six topics: diagnostic tests, physical complaints, nature of the disease, treatment, prognosis, and psychosocial complaints. At T2, self-reported information seeking behaviour was measured. Patients reported their intention to ask questions of the specialist in relation to the six topics in the following order of frequency: diagnostic tests (88%), physical

complaints (70%), prognosis (63%), treatment (51%), nature of disease (42%), and psychosocial problems (40%). Intention to seek information from the specialist was positively correlated with uncertainty ($r = 0.73$, $p < 0.05$) and negatively correlated with information received ($r = -0.28$, $p < 0.05$). The researcher's concluded that the patient's companion and the specialist were perceived as most apt to influence the patient's information seeking which may be a strategy to reduce uncertainty.

Qualitative study.

In her study of 13 CABG surgery patients, Hawley (1998) found that when patients had confidence and trust in health care professionals (including nurses), uncertainty was reduced whereas if patients did not feel comfortable with staff, their uncertainty increased. As patients' psychological status deteriorated so did their ability to communicate their needs, in turn negatively influencing uncertainty.

Summary.

In summary, the few studies that have investigated the relationship between the credible authority and uncertainty have consistently reported a positive relationship between credible authority and a reduction in patient's uncertainty. However, as previously noted, no studies have explicitly identified the nurse or nurse practitioner as the credible authority.

Patient Outcomes: Adaptation

In this study, adaptation was conceptualised in terms of overall physical and mental health status. Only a few studies have examined uncertainty in relation to health

status outcomes in CABG surgery patients. While some authors have examined outcomes up to 12 months post-CABG surgery (Kiebzak, Pierson, Campbell, & Cook, 2002), the current study was interested in the early recovery period up to 6 weeks. Three quantitative studies that examined outcomes post-CABG surgery in the early recovery period (Allen, Becker & Swank, 1990; Barnason, Zimmerman, Anderson et al., 2000; Ross & Ostrow, 2001) were reviewed (see Appendix A, Table 5). All studies used repeated measures designs to collect data, as well as instruments that were reliable and valid. The Medical Outcomes Study SF-36 was used in two studies to measure aspects of physical and mental health status while the study by Allen et al. (1990) used the Functional Status Questionnaire (FSQ). A limitation of this set of studies is that the times for data collections differ across the studies making direct comparisons difficult.

Allen et al. (1990) measured physical, social, and leisure functioning in 125 men 1 month before and 6 months after CABG surgery. Findings indicated significant improvements in functional status from 1 month before to 6 months post-CABG surgery. Although subscale scores on the FSQ indicated that only 13% of patients had significant functional disabilities 6 months after surgery, 45% did not report any improvement in the actual level of participation in normal physical, social, and leisure activity.

Barnason et al. (2000) examined functional status over time in 51 patients who had undergone CABG surgery. All patients received standard cardiac education prior to discharge. Results showed statistically significant improvements in seven of the eight scales of the SF-36 at 3 months post-CABG surgery compared to pre-surgery scores with all dimensions either improving or stabilising at 6 and 12 months. At 12 months, there was only minimal to moderate impairment in study participants, compared to 3 and 6-

month scores. The data from that study indicates that there was a pattern of functional recovery over time with the largest improvements occurring in the first 3 months for this group of CABG surgery patients.

Ross and Ostrow (2001) examined health status, quality of life and mood state over time in 32 patients undergoing CABG surgery. Significant differences were found over time in mean scores for a number of outcomes. On the SF-36 scales, physical functioning was significantly higher at 3 months ($M = 64.50$, $SD = 23.89$, $p = 0.004$) compared to before surgery ($M = 48.75$, $SD = 26.67$) and 6 weeks after surgery ($M = 47.96$, $SD = 23.91$). Vitality was found to be significantly higher at 6 weeks ($M = 42.41$, $SD = 20.49$) compared to before surgery ($M = 35.47$, $SD = 18.46$) and became even higher at 3 months ($M = 48.25$, $SD = 22.31$). Finally, social functioning decreased at 6 weeks ($M = 45.85$, $SD = 28.04$) compared to before surgery ($M = 60.28$, $SD = 27.22$) but returned to pre-surgery levels by 3 months ($M = 67.05$, SD 22.62, $p = 0.002$). Mean Quality of Life Index (QLI) total scores before surgery differed significantly depending on the patient's age ($p = 0.01$). Patients aged 30 to 49 years old had the lowest overall mean QLI scores followed by those aged 50 to 69 with those aged 70 to 89 years having the highest mean scores. The socio-economic domain of the QLI was the only domain that differed significantly over time. There was a statistically significant decrease from before surgery to 3 months after surgery ($p = 0.02$). Total mood disturbance was found to significantly improve and stabilise over time with the highest mood disturbance present before surgery ($p = 0.03$).

Summary.

In general, this set of studies indicated that patients undergoing CABG surgery had improved overall physical and mental health outcomes by 3 and 6 months compared to in-hospital scores and these improvements continued or were stabilised by 12 months. The largest rate of improvement occurred by 3 months in one study and 6 months in another. One study that investigated the early recovery period (6 weeks and 3 months) found that vitality was significantly higher at 6 weeks compared to before surgery and that social functioning decreased significantly at 6 weeks, but improved by 3 months. Physical functioning improved by 3 months compared to before surgery.

Acute Care Nurse Practitioners and Patient Outcomes

Over the last decade, changes to health care in Newfoundland and Labrador have included restructuring of hospitals and the introduction of program based management. With the emphasis on efficiency and effective utilisation of resources while maintaining quality patient outcomes, new roles have been introduced for nursing. One such role is the Acute Care Nurse Practitioner (ACNP). This role was first introduced in 1997. In Newfoundland and Labrador and other parts of Canada, it has evolved in response to factors such as lack of medical house staff, the complex nature of patient care and pressure on efficiency to move patients through the system.

The ACNP is well prepared to meet the challenges and demands of a changing health care system (Knaus, Felten, Burton, Forbes, & Davis, 1997). ACNPs are nurses prepared at the graduate level (Ingersoll, McIntosh, & Williams, 2000; Keane & Richmond, 1993) and, thus have developed advanced skills in critical thinking, assessment and decision making (DeGrasse & Nicklin, 2001). Additionally, the ACNP

has prescriptive authority and enhanced clinical and diagnostic decision-making abilities (Bond, Wilkie, Simpson, Levine & Whitney, 1996; Keane & Richmond, 1993).

A number of authors have attempted to clarify the role of ACNPs, resulting in four recognised role components: 1) clinical practice, such as assessment, planning, clinical interventions and evaluation; 2) education, such as staff education, student clinical education and teaching rounds; 3) participation in research activities, including conducting research and research utilisation; and 4) administrative/leadership activities, such as participation on committees and involvement in policy and protocol development (Ackerman et al.,1997; DeGrasse & Nicklin, 2001). In addition, other authors have examined the practice patterns of the ACNP. Two recent studies have indicated that ACNPs spend the majority of their time in clinical practice (39%-84%). Education accounted for 12%-15%; research, 5%-9%; and administrative activities, 13%-15% (Knaus et al., 1997; Sidani et al., 2000). According to Sidani et al. (2000), the variability in how the role components are implemented may be dependant on a number of factors, including experience in the role, expectations by the clinical unit or program and value placed on the non-clinical activities.

Surprisingly, little research has been done on the impact of the ACNP role on patient outcomes. As previously noted, most studies have been limited to descriptions of the role and studies comparing ACNP practice to other health professionals. The researcher in the current study was interested in how the ACNP role influenced uncertainty and the impact on adaptational outcomes such as physical and mental health status. No studies were found in the latter category. However, three studies were found

that compared nurse practitioners (NPs) and other health professionals with respect to their impact on patient outcomes.

Three quantitative studies (Mundinger, Kane, Lenz, Totten, Tsai, Cleary, Frieddewald, Siu & Serlanski, 2000; Piorio, Landefeld, Brennan, Daly, Fortinsky, Kim & Rosenthal, 2001; Rudy, Davidson, Daly, Clochesy, Sereika, Baldisseri, & Hravnak et al., 1998) were reviewed (see Appendix A, Table 6). Two studies used randomised clinical trials (Mundinger et al.; Piorio et al.) and the third was a descriptive comparative study with a longitudinal design (Rudy et al.). Piorio et al. randomised patients to medical wards staffed by either NPs and a Medical Director or medical house staff; a variety of medical and functional outcomes were measured at discharge and 6 weeks after discharge. Mundinger et al. compared outcomes for patients randomly assigned to NPs or physicians for primary care and ongoing follow-up after an emergency department visit. Lastly, Rudy et al. compared NPs and physician assistants with a matched group of resident physicians at two academic tertiary medical centres in the United States to determine if there were differences in activities performed by both groups and whether there were differences in clinical outcomes. Two of the three studies reported using reliable and valid measures. The third study did not. A limitation of the studies was that there were differences in measurement of outcomes and in patient populations studied.

Piorio et al. (2001) reported that outcomes at discharge and 6 weeks after discharge were similar ($p > 0.10$) for the two groups, NPs and medical residents, on primary outcomes (lengths of stay, charges/costs, consultations, complications, transfers to intensive care, 30-day mortality and patient assessments of care) and secondary outcomes (ADL, SF-36 scores and symptom severity). This was despite the fact that 47%

of the patients assigned to the NP ward were admitted to house staff wards at the request of attending physicians and NPs. Improvements in functional status (ADL), health status (SF-36 scores) and symptom severity generally improved over the 6 weeks. However, there were no differences by care provider.

Mundinger et al. (2000) measured patient satisfaction, health status (SF-36), satisfaction and physiological tests at 6 months and service utilisation at 1 year. No differences were found in patients' health status (NP vs. Physician) at 6 months.

Rudy et al. (1998) did not compare health status outcomes but rather compared ACNPs, physician assistants and medical house staff on a number of measures including: patients cared for, length of stay, in-hospital mortality, care related activities, and occurrence of drug reactions. Outcomes for patients did not differ markedly in the two treatment groups.

The outcomes cited in the above studies are for the most part traditional medical outcomes and, while selecting these outcomes allows for comparisons with other health care providers, they often do not capture the true contribution of the ACNP (Kleinpell-Nowell & Weiner, 1999). However, it is encouraging that certain groups of patients cared for by ACNPs do as well as patients cared for by physicians. Some authors suggest that nurse sensitive indicators are needed. In a study by Ingersoll et al. (2000), NPs were surveyed to determine what outcomes they recommended for measuring their effects on patient outcomes. The top five included: 1) satisfaction with care delivery, 2) symptom resolution or reduction, 3) perception of being well cared for, 4) compliance and adherence, and 5) knowledge of patients and families. Similarly, Irvine, Sidani, and McGillis Hall (1998), had previously reported patient satisfaction with care, symptom

resolution/reduction, compliance/adherence, and knowledge of patients and families, as well as quality of life and health status as indicators recommended for measurement.

Summary.

In summary, while several studies have reported a similar impact on patient outcomes for NPs as compared with other health professionals, it remains difficult to establish the true impact of care by an ACNP without indicators that are nurse sensitive. A recent study by Doran, Sidani, Keatings and Doidge (2002) used the Nursing Role Effectiveness Model to evaluate the outcomes of nursing care in a large tertiary care centre in southern Ontario. Findings revealed that a nurse's independent role performance was associated with better functional health status and less mood disturbance at hospital discharge for patients. The authors stated that functional health status has the potential to be sensitive to nursing care because patients' response to illness and treatment is a large part of nursing practice.

Conceptual Framework

Mishel's theory of uncertainty in illness includes the components of *stimuli frame*: symptom pattern, event familiarity and event congruence; *structure providers*: education, social support and credible authority; *uncertainty* and *appraisal*; and *coping* and *adaptation*. According to Mishel, patients are likely to experience uncertainty when there is inconsistency in symptoms to form a pattern, when patterns within the health care environment are new or unexpected, and when there is little congruence between expectations and experience with the illness and treatment situation. Moreover, how an individual processes information will determine his or her perception of uncertainty. The

interpretation of the stimuli frame is guided by the credible authority, social support, and education. Education has two dimensions that directly and indirectly influence uncertainty. The direct influence is the education level of the patient and the indirect influence is information/education received by the patient regarding the illness. The patient's perception of uncertainty will determine the coping mechanisms used and, in turn, will influence adaptation.

The conceptual framework for this study included four of the major constructs of Mishel's model. The *stimuli frame* was operationalized by two variables: symptom pattern as measured by the Symptom Distress Scale and event familiarity as measured by the Coordination of Care Scale, a measure of the perceived pattern and flow of care in hospital. *Structure providers* included credible authority and patient education level. The credible authority was operationalized using a measure of the patient's participation in care with the ACNP. Education level was defined as the highest level of education attained by the participants. *Uncertainty* was operationalized using the 28-item Mishel Uncertainty in Illness Scale. *Adaptational* outcome was defined as overall physical and mental health status post-CABG surgery and was measured by Medical Outcomes Study SF-36.

The conceptual model for this study was based on Mishel's uncertainty in illness theory and is illustrated below (see figure 2).

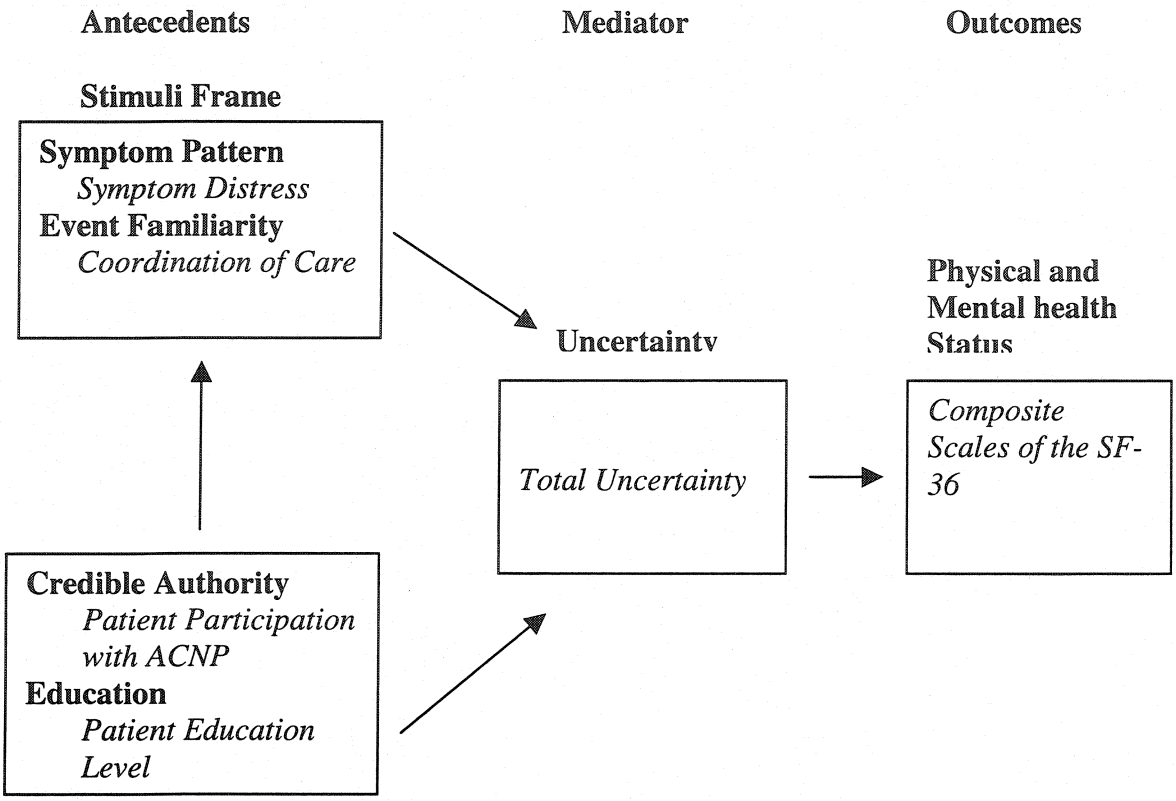

Figure 2. Constructs and variables in the conceptual model based on Mishel's (1988) theory of uncertainty in illness.

Definitions

Symptom Pattern: The degree to which symptoms form a pattern that patients can recognize. It was operationalized using a modified version of the Symptom Distress Scale (SDS) and included additional symptoms experienced by cardiac patients.

Event Familiarity: Patterns within the health care environment. It was operationalized using an instrument that measured patients perceptions of coordination of care by ACNPs. (Coordination of Care Scale – CCS).

Credible Authority:	The ACNP was identified as the credible authority in the study. It was operationalized using an instrument that measured patient participation in care with the ACNP (Patient Participation in Care Scale – PPC)
Uncertainty:	The person's ability to determine the meaning of illness related events. In this study uncertainty was measured using the 28-item version of the Uncertainty in Illness Scale (MUIS-A).
Outcomes:	Physical and mental health status as measured by the MOS SF-36.

Chapter 3: Methodology

A repeated measures design was used to investigate changes in symptom distress, uncertainty, and health status outcomes over three time periods: 48 to 96 hours after coronary artery bypass graft (CABG) surgery (T1); 1 week after discharge from hospital post-CABG surgery (T2); and, 6 weeks after discharge (T3). In this study, participants were under the care of an Acute Care Nurse Practitioner (ACNP) while in hospital. The relationships between four antecedent variables as depicted in Mishel's uncertainty in illness model (symptom distress, coordination of care, patient participation in care with the ACNP, and patient education level), and uncertainty and physical and mental health status were also explored along with the best predictors of uncertainty and health status outcomes at 1 and 6 weeks. This chapter provides an overview of the sample, setting, instruments, ethical considerations, and limitations of the study.

Population and Sample

The target population was all patients admitted for elective CABG surgery at the major tertiary care hospital in the province of Newfoundland and Labrador. The accessible population included all patients who met the following inclusion criteria: (a) consented to participate, (b) over 21 years of age, (c) were cognitively alert, (d) able to understand and speak English, (e) scheduled to undergo first time elective or repeat CABG surgery with or without valve replacement, and, (f) under the care of an ACNP while in hospital. Potential participants were excluded if they were: (a) too ill and/or (b) cognitively impaired.

A non-probability consecutive sample of CABG surgery patients who met the inclusion criteria was obtained from the target population. Ninety-two participants who were scheduled for CABG surgery and met the inclusion criteria were approached. Fifteen patients did not wish to participate in the study. The number of participants enrolled prior to surgery was 77. The sample size at the time of the first data collection in hospital dropped to 58 participants from the original 77. Reasons for loss of participants are reported in Chapter 4. The sample size dropped to 51 by the end of data collection at T3. This sample size was sufficient to meet the criteria of 10 subjects per variable for regression analysis (Norman & Streiner, 2000).

Setting

The researcher obtained consent from participants prior to surgery in hospital. The first data collection took place once participants had been under the care of an ACNP for at least 48 hours post-CABG surgery. Generally, data collection took place within 48 to 96 hours of surgery. Participant interviews for T1 data collection were conducted privately in rooms on the special care unit or 48-bed cardiology floor by the researcher. To ensure confidentiality in 4-bed rooms, privacy curtains were drawn and interviews were conducted in as private a manner as possible.

Participants were given the option of completing T2 and T3 questionnaires by either self-administering at home and submitting by mail or having the research assistant administer the questionnaire by telephone. All participants were provided with copies of T2 and T3 instruments prior to actual data collection times. All patients who completed T2 and T3 instruments did so by self-administration and submitted the completed instruments to the researcher by mail.

Procedure

Participants were recruited into the study during the period of September 2000 to May 2001, with the initial interview on September 18, 2000. Data collection at T2 took place approximately 1 week following participants' discharge from hospital and T3 data collection took place 6 weeks from the time of discharge.

Patients who met the criteria for the study were identified by either the Cardiac Nurse Educator or the Utilization Coordinator – Cardiac Program. An intermediary, who was either a staff nurse or nurse educator, then approached each potential participant. The role of the intermediary was to be the initial contact with participants who met the study criteria and to determine if they would be interested in hearing about the study. A written explanation for approaching patients was made available to the nursing staff (see Appendix B). In some instances participants met the criteria, but were assessed by the nurse to be unsuitable to approach regarding the study (e.g., extremely anxious or upset).

Once participants agreed to learn more about the study, the researcher visited them in their rooms at an appropriate time for the participant prior to surgery. Participants were given a brief explanation of the study and were given the study protocol and consent form to read. The researcher was able to answer all questions, if necessary. A few participants elected to have the study protocol and consent read to them. The researcher obtained written consent from participants following full explanation of the study (see Appendices C and D). Participants who consented to be in the study were provided with a copy of the study protocol, which included the name and telephone number of the researcher to take home. All participants were informed that they could contact the researcher by phone if they had further questions or concerns. Data were not collected at

that time and the researcher informed participants that T1 data collection would take place within 48 to 96 hours following surgery.

The researcher collected data at T1. This data included: (a) demographic data, (b) Symptom Distress Scale (SDS), and (c) Mishel Illness in Uncertainty Scale – Acute care version (MUIS-A). An interview format for data collection was used for all participants except for 1 individual who wished to self-administer the instruments. The design of the instruments was such that either method (interview or self-administration) could be utilized. Completion of data collection took an average of 20 to 40 minutes. Following completion of the T1 data, participants were given the T2 instrument booklet and a self-addressed envelope to take home. They were instructed that a research assistant would contact them approximately 1 week after discharge for T2 data collection and that instruments for T3 data collection would be mailed to them. The researcher also informed participants that the research assistant would contact them again at 6 weeks.

The researcher contacted the cardiac unit daily to track the discharge date of all study participants. Approximately 1 week after discharge, the research assistant contacted the participants and asked them to complete the T2 booklet. The instruments included: (a) Symptom Distress Scale (SDS), (b) Mishel Uncertainty in Illness Scale–Acute care version (MUIS-A), (c) SF- 36 Health Survey (SF-36), (d) Patient Participation Scale (PPS), a scale measuring the extent to which the ACNP involves patients in decision making regarding their care, and (e) a scale measuring patients' perceptions of coordination of care (CCS). Participants were given the option of completing T2 data by self-administering the questionnaire or having the research assistant conduct a telephone interview. Once contacted, all participants chose to complete the instruments at their

convenience and return them in the self-addressed envelope by mail. If booklets were not received within 2 weeks, the research assistant conducted a follow-up phone call to remind participants to complete the booklet and to return it as soon as possible.

Instruments administered at T3 included all of the above with the exception of (d) and (e). Instruments for T3 data collection were mailed to all participants approximately 4 weeks after discharge from hospital to ensure that they were received in time for completion at 6 weeks. At approximately 6 weeks after discharge, a research assistant contacted participants by phone to complete T3 data collection. All participants were given the option of completing the instruments on their own time and returning the data by mail. All chose to do so. Again, if data were not received within 2 weeks of the phone call, the research assistant made a follow-up reminder call. In some cases, participants had misplaced the instrument booklet and a new one was sent to them immediately, followed by a reminder phone call.

Data Collection Instruments

The researcher used six instruments to collect data: a demographic and medical/surgical history form; Symptom Distress Scale (SDS); Coordination of Care Scale (CCS); Patient Participation Scale (PPS); Mishel Uncertainty in Illness Scale (MUIS); and, the SF-36 Health Survey (SF-36).

Patient Demographic Form and Medical/Surgical History Form

Sidani et al. (1999) developed the patient demographic form and the medical/surgical history form. Demographic data included age (in years), sex, education level, marital status, work status, and ethnic background (see Appendix E). The

researcher collected the demographic information. The research assistant collected three commonly reported variables relating to medical history and surgery from the patient's chart after the patients were discharged from hospital in order to compare this sample to other samples in the literature. These data included primary diagnosis, comorbid conditions, and number of grafts (see Appendix F).

Symptom Distress Scale (SDS)

The researcher used an adapted version of the Symptom Distress Scale (SDS) developed by Sidani et al. (1999) to operationalize symptom pattern, a construct in Mishel's uncertainty theory. McCorkle and Young (1978) developed the SDS, which was used to measure symptom distress following CABG surgery at T1, T2, and T3 (see Appendix G). The original SDS is a 10-item scale measuring nausea, mood, appetite, insomnia, pain, mobility, fatigue, bowel pattern, concentration, and appearance (McCorkle & Young). The instrument uses a 6-point Likert scale which measures symptom distress on a scale ranging from 0 (not at all) to 5 (very much so) and patients are asked to identify the extent to which they have experienced each symptom in the past 2 days. This study used the 20-item adapted scale to increase the SDS's validity in the cardiac population. Additional items relating to symptoms experienced by cardiac patients (e.g., chest pain, difficulty breathing while walking, difficulty breathing while sitting/sleeping, etc.) were included. The total range of possible scores is 0 to 100. The adapted SDS has demonstrated internal consistency reliability ranging from 0.87 to 0.89 (Sidani et al., 2003).

Coordination of Care Scale (CCS)

This study used the Coordination of Care Scale (CCS) (Sidani et al., 1999) to operationalize event familiarity, defined as patterns in the health care environment in Mishel's (1988) theory of uncertainty. Coordination of care is defined as patients' perception of the extent the assigned ACNP is aware of all their treatments and patients' perceptions of the flow of their in-hospital care. It was hypothesized that patients would expect care to run smoothly for them, that there would be no surprises or unnecessary delays, and that staff would work as a team and provide consistent information to them resulting in "event familiarity." Higher scores indicate greater event familiarity. The CCS was developed for use in the larger study and has demonstrated acceptable internal consistency reliability (0.72) (Sidani et al., 2003). The instrument consists of 7 items with a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) (see Appendix H). The total range of possible scores is 7 to 35, with higher scores indicating greater perceived coordination of care.

Patient Participation Scale (PPS)

In this study, the credible authority is the ACNP. The Patient Participation Scale (PPS) was used to operationalize one aspect of this construct (Sidani et al., 1999). The PPS measures the extent to which patients perceive that the ACNP actively involved them and their families in decision-making regarding their care (e.g., "The nurse practitioner involved me in making decisions about my care", "The nurse practitioner listened to what I had to say regarding my care," etc.). The PPS had low internal consistency reliability (0.53) in one study (Sidani et al., 2003); however, in this study, the alpha coefficient was 0.93. The instrument consists of 5 items with a 6-point Likert scale

ranging from 0 (not at all) to 5 (very much so) (see Appendix I). The total range of possible scores is 0 to 25. Higher scores reflect greater perceived participation in decision-making with the ACNP. Participants completed this measure at T2.

Mishel Uncertainty in Illness Scale (MUIS)

Uncertainty was assessed using Mishel's two-factor 28-item version of the Uncertainty in Illness Scale – acute care version (MUIS-A) (see Appendix J). The scale has been used extensively in cancer, cardiac, and chronic illness populations (Mishel, 1997). Each item on the MUIS is measured using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) with the MUIS being scored in the direction of higher uncertainty (Mishel, 1997). Cardiac data (n = 852) using the 28-item scale has a coefficient alpha of .89 for the total MUIS (Mishel, 1997). Uncertainty data were collected at T1, T2 and T3. The researcher obtained permission to use the instrument from Mishel (see Appendix K).

SF-36 Health Survey (SF-36)

The Medical Outcomes Study Short-Form (SF-36) (Acute Form, version 1) (Ware, Snow, Kosinski, & Gandek, 1993) was used as a measure of adaptation over time, defined as the patients ability to engage in usual activities. The SF-36 health survey is a measure of health status and health-related quality of life that includes physical, social and psychological functioning (see Appendix L). The acute form uses a "1 week" recall period, as opposed to the standard form, which uses a "4 week" recall period.

The SF-36 has been used extensively in acute and chronic illness populations and has been documented in over 1000 publications (Ware, 2000). It consists of 36 items that

yield an 8-scale profile of scores, as well as physical and mental health summary scores. The eight domains measured are: physical functioning (PF), role physical functioning (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role emotional functioning (RE), and mental health (MH). These domains have consistently been identified with two factors – physical and mental health – and this two-factor model of health is measured using the physical component summary scale (PCS) and the mental component summary scale (MCS) (Ware, Kosinski & Keller, 1994). Three scales – PF, RP, and BP – correlate most highly with the PCS, while MH, RE, and SF correlate most highly with the MCS. The last two scales, VT and GH, correlate with both the PCS and MCS. According to Ware et al. (1994, 2001), the two composite summary scales measure more than 81% of the reliable variance in the eight subscales and simplifies the analysis and interpretation of the SF-36.

Scoring of the composite scales involves a number of steps: scoring the eight scales; standardizing scores (z-scores) from means and standard deviations from the general U.S. population; aggregating scale scores using weights from the U.S. population; and, lastly transforming aggregate scores into the summary scores using a linear T-score transformation to have a mean of 50 and a standard deviation of 10 (Ware et al., 1994). Higher scores indicate better overall physical and mental health status.

Substantial evidence of the reliability and validity of the SF-36 has been published. Internal consistency reliabilities for the scales are reported to be in the range of range of 0.78 to 0.93. As well, considerable support for the construct, convergent, and discriminant validity of the scales is also reported (Ware et al., 1993, 1994, 2001; Ware, 2000). Normative data for a healthy group of people in the U.S. population aged 55 to 64

reported mean scores of 45.90 (S.D. = 11.25) and 51.05 (S.D. = 9.69), respectively, for PCS and MCS (Ware et al., 1994, p. 8:16). While there were no data on CABG surgery patients, normative data for patients with myocardial infarction in the U.S. population reported mean composite scores of 35.97 (SD = 12.10) for PCS and 45.73 (SD = 12.41) for MCS (Ware et al., 1994, p. 8:28).

Two manuals from the Medical Outcomes Trust (Ware et al. 1993; 1994) that provide detailed information about scoring procedures were used to score the SF-36 data in the current study. In addition, SF-36 raw data were sent to Quality Metric Incorporated, an online scoring service for the SF-36, to confirm the scoring procedure (Quality Metric Inc., 2002). The SF-36 data were collected at T2 and T3. The researcher obtained permission from the author to use the instrument (see Appendix M).

Data Analysis

The Statistical Package for Social Sciences (SPSS 9.0 for Windows) was used for data analyses. Data were initially coded and entered in a data file. Data were subsequently cleaned to detect any errors and identify any outliers. Descriptive statistics were used to generate frequency tables for sociodemographic and medical history data. Internal consistency of instruments was conducted using Cronbach's alpha. Repeated measures ANOVA was used to determine if there were any differences over time for the variables of symptom distress and uncertainty over the three time periods. T-tests were used to detect differences between the PCS and MCS, the two summary measures of the SF-36, from week 1 to week 6. Coordination of Care Scale (CCS) scores and Patient Participation Scale (PPS) scores measured at T2 were calculated using descriptive statistics.

Correlation coefficients using Pearson's r were performed to examine the relationships among variables. According to Polit and Hungler (1999), a correlation is "an interrelationship or association between two variables... that is a tendency for variation in one variable to be related to variation in another" (p. 194). Spearman's rho (r_s) was used along with Pearson's r because three variables were slightly positively skewed (symptom distress at T3, participation in care, and coordination of care). When there were no appreciable differences between Spearman's rho and Pearson's r, results of the more robust tests were reported. The alpha level for correlations and tests of difference was set at .05 to determine statistical significance.

Multiple regression analysis, which used a hierarchical approach based on the logic of Mishel's uncertainty in illness theory, was used to determine the best predictors of uncertainty, and physical health status and mental health status at 1 week and 6 weeks post-CABG surgery. Only independent variables demonstrating a significant correlation with the dependent variable were entered into the regression equation. Where appropriate, baseline values of the dependent variable were entered into the regression equation first, followed by the independent variables.

Ethical Considerations

Approval to conduct the larger study of nurse practitioners, which included the patient component of the current study, was obtained from Memorial University, Faculty of Medicine, Human Investigation Committee (see Appendix N). An intermediary approached prospective participants to determine if they were willing to find out more about the study. Only if they agreed were patients approached by the researcher who then explained the purpose of the study and what was expected of their participation. The

researcher also explained participants' rights and methods of ensuring self-determination, privacy, and confidentiality. They were informed that they could withdraw from the study at any time and that their treatment would not be affected in any way. Patients who agreed to be included signed a consent form (see Appendix C) and were given a copy of the form to take home with them.

Confidentiality was maintained through the use of identification codes on all forms and questionnaires. A list of participants' names and corresponding identifying codes, as well as consent forms and all data, were kept in a locked filing cabinet accessible only to the researcher and her supervisor.

Limitations of the Study

A limitation of this study was the use of a non-probability consecutive sample and the relatively small sample size. This sampling approach limits the generalizability of the research findings to other CABG surgery patients. Self-selection bias may also have been influential as patients who participated may have different characteristics than those who elected not to participate. The researcher also considered the possibility of response bias as some participants may have given answers they thought were desired. This is often referred to as "social desirability response bias" (Polit & Hungler, 1999).

Chapter 4: Results

The findings of the research study are presented in this chapter. Section one provides a descriptive profile of the study participants as well as those who dropped out of the study. Section two reports the descriptive statistics and the results of tests of difference over time for the study variables. Section three discusses the relationships among the study variables and the best predictors of uncertainty and health status outcomes at 1 week and 6 weeks.

Descriptive Profile

Response and Attrition Rates

A total of 92 patients who met the inclusion criteria were approached to participate in the study in St. John's, Newfoundland. For ethical reasons, patients were approached at least 1 day prior to their scheduled surgery. Of the 92 patients approached, 77 consented to be in the study prior to surgery.

The sample size at the time of the first data collection dropped to 58 participants from the original 77. Nineteen participants did not complete data at T1 (within 48 to 96 hours after surgery and admission to ACNP care) for the following reasons: (a) 6 participants did not wish to continue in the study, (b) 8 participants were discharged before the researcher could visit them for an interview, (c) 4 participants were too ill, and (d) 1 participant died. Of the 58 participants who completed baseline data, 7 participants were lost to follow-up for a total of 51 participants who completed the study. The attrition rate was 12% (7 of 58 participants who completed baseline data).

Sociodemographic Characteristics

Table 4.1 presents the sociodemographic characteristics of the 51 participants who remained in the study and the 7 participants who dropped out of the study. Eighty percent of study participants were male and married/cohabiting. The ages of participants ranged from 45 to 83 years with a mean age of 61.04 years (SD = 8.86). Those who dropped out had an average age of 59.29 years (SD = 5.41). Forty-nine (49%) percent of participants had some high school or less than high school education, and 15% had graduated from high school, with the remaining 36% having technical training or higher. Participants who dropped out had similar education levels. More than two-thirds (71%) of the study participants were retired or unemployed; only 15 participants were working either full or part-time. The dropout group had similar employment patterns. No statistically significant differences were found between the two groups (study participants and dropouts) on any of the demographic variables.

Surgery-related Characteristics

Table 4.2 summarizes some of the surgery-related characteristics of study participants and of 5 dropouts. Two patient files of the dropout group could not be retrieved for data collection. All study participants (100%) had a primary diagnosis of coronary artery disease (CAD) compared to 80% of the dropout group. The five most common complications and comorbidities were diabetes (20%), elevated cholesterol (18%), hypertension (18%), atrial fibrillation and other electrical conduction disorders (14%), and arthritis and other pain problems (14%). Sixty percent of the dropouts had either diabetes or hypertension. Slightly more than two-thirds (69%) of participants had 4 or more grafts with a mean of 3.86 grafts (SD = 1.06). Forty-four percent of the dropouts

had 4 or more grafts with a mean of 3.40 (SD = 1.82); however, this was not significantly different from the participant group. No statistically significant differences were found on surgery-related characteristics between the two groups.

Table 4.1: **Socio-Demographic Characteristics of Study Participants and Dropouts**

Variable	Participants (n = 51)		Drop-outs (n = 7)		χ^2
	n[a]	%[a]	n[a]	%[a]	
Sex					
Male	41	80	5	71	n.s.[b]
Female	10	20	2	29	
Education Level					
Less than high school	23	45	2	29	n.s.
Some high school	2	4	2	29	
High school graduate	8	15	1	14	
Technical training	6	12	0	0	
Some college	6	12	1	14	
University degree	6	12	1	14	
Marital Status					
Single	1	2	1	14	n.s.
Divorced	5	10	1	14	
Married/cohabiting	41	80	5	72	
Widowed	4	8	0	0	
Employment Status					
Not employed	3	6	1	14	n.s.
Working part-time	5	10	0	0	
Working full-time	10	20	1	14	
Retired	33	64	5	72	

[a] n and % are the number and percentage of participants and dropouts with the identified sex, education level, marital status, and employment status at the time of the study.
[b] n. s. is $p > 0.05$

Table 4.2: **Surgery-related Characteristics of Study Participants and Dropouts**

Variable	Participants (n = 51)		Drop-outs (n = 5)		χ^2
	n[a]	%[a]	n[a]	%[a]	
Primary Medical Diagnosis					
CAD	51	100	4	80	n.s.[b]
CHF	0	0	1	20	
Other Medical Diagnoses					
Diabetes	10	20	2	40	n.s
High cholesterol	9	18	0	0	
Hypertension	9	18	1	20	
Atrial fibrillation	7	14	0	0	
Arthritis and other pain	7	14	0	0	
Number of Grafts					
One	1	2	1	20	n.s.
Two	4	8	1	20	
Three	11	21	0	0	
Four	22	43	1	20	
Five	12	24	2	40	
Six	0	0	0	0	
Seven	1	2	0	0	

[a] n and % are the number and percentage of participants and dropouts with the identified primary medical diagnosis, other medical diagnoses, and number of grafts at the time of the study.
[b] n. s. is $p > 0.05$

Descriptive Statistics and Tests of Difference

This section presents the descriptive statistics for the variables of symptom distress, coordination of care, patient participation in care, education level, uncertainty, and physical and mental health status. Differences in sample scores for symptom distress and uncertainty were examined over three time periods: in hospital 48 to 96 hours post-CABG surgery (T1), 1 week after discharge from hospital post-CABG surgery (T2), and

6 weeks after hospital discharge (T3). Differences in physical and mental health status were examined at T2 and T3. Patient participation in care and coordination of care were measured at T2 only.

Stimuli Frame (Symptom Distress and Coordination of Care)

In Mishel's uncertainty theory, the stimuli frame consists of three variables, two of which were operationalized in this study; they were symptom pattern and event familiarity. The 20-item Symptom Distress Scale (SDS) was used to measure symptom pattern (see Appendix F). Participants (n = 51) completed the instrument at all three time periods following CABG surgery (T1, T2, and T3). This instrument uses a 6-point Likert scale, which measures symptom distress on a scale ranging from 0 (not at all) to 5 (very much so). The total range of scores was 0 to 100 with higher scores indicating greater distress. Internal consistency estimates were analyzed on all items of the SDS at all time periods. Cronbach's alpha at T1 was 0.83, at T2 was 0.83, and at T3 was 0.95. The top five rated symptoms listed by participants in the study at T1 included: poor appetite, fatigue, insomnia, pain, and weakness. Pain, fatigue, insomnia, and weakness were found to persist over time in the top five reported symptoms. Table 4.3 presents the descriptive statistics for total symptom distress as well as the top five symptoms reported at all three time periods.

Table 4.3: **Total Symptom Distress Scores (SDS) and Top Five Symptoms at T1, T2, and T3 (n= 51)**

Variable	M[a]	SD[a]	Range
Total SDS (time 1)	21.57	12.46	1 – 57
Poor Appetite	2.69	1.86	0 – 5
Fatigue	2.65	1.55	0 – 5
Pain	2.29	1.22	0 – 5
Insomnia	2.18	1.93	0 – 5
Weakness	1.98	1.70	0 – 5
Total SDS (time 2)	14.54	9.20	1 – 54
Fatigue	2.13	1.35	0 – 5
Weakness	1.46	1.46	0 – 5
Pain	1.38	1.03	0 – 5
Insomnia	1.33	1.41	0 – 5
Poor Appetite	1.17	1.53	0 – 5
Total SDS (time 3)	8.69	7.97	0 - 100
Fatigue	1.24	1.39	0 – 5
Insomnia	1.14	1.43	0 – 5
Pain	1.00	1.17	0 – 5
Difficulty Breathing with Activity	0.80	1.18	0 – 5
Weakness[b]	0.68	1.12	0 – 5
Chest Pain[b]	0.68	1.09	0 – 5

[a] M and SD are the mean and standard deviation of symptom distress scores over time.
[b] Both variables were reported as the fifth most distressing symptom.

The mean SDS score for the total sample was 21.57 (SD = 12.46) at T1, 14.54 (SD = 9.20) at T2, and 8.69 (SD = 7.97) at T3. Multivariate results using repeated

measures ANOVA indicated a statistically significant decrease in symptom distress across the three time periods [Pillai's: $F(2, 49) = 24.02$, $p \leq 0.001$]. Further analyses using within subject contrasts indicated that there was a statistically significant difference between scores from T1 to T2 [$F(1, 50) = 13.68$, $p = 0.001$], from T1 to T3 [$F(1, 50) = 41.40$, $p = 0.001$], and from T2 to T3 [$F(1, 50) = 24.87$, $p = 0.001$] indicating that symptom distress decreased over each time period (see Table 4.4).

Table 4.4: **Results of Within Subjects Contrasts of the SDS at T1, T2, and T3**

Variable	Source	df	Mean Squares	F ratio
SDS				
T1 vs T2	Within cells	50	184.08	
	Time	1	2517.41	13.68*
T1 vs T3	Within cells	50	204.42	
	Time	1	8462.16	41.40*
T2 vs T3	Within cells	50	70.31	
	Time	1	1748.60	24.87*

* $p \leq 0.001$

The researcher used the 7-item Coordination of Care scale (CCS) (see Appendix H) to measure event familiarity, the second variable in the stimuli frame. It measures patients' perceptions of the extent the ACNP was aware of all their treatments and of the flow of their in-hospital care. The instrument uses a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Cronbach's alpha for the scale was 0.85. The mean score for CCS was 31.47 (SD = 4.64). Results are presented in Table 4.5.

Table 4.5: **Mean (SD) of Perceived Coordination of Care (CCS)**

n[a]	M[a]	SD[a]	Range
51	31.47	4.36	18 – 35

[a] n, M, and SD are the number, mean, and standard deviation of coordination of care measured 1 week post-CABG surgery

Structure Providers (Patient Participation and Patient Education Level)

Table 4.6 presents the descriptive statistics for patient participation in care with the ACNP. Patient participation with the ACNP, conceptualized as one aspect of credible authority, was measured using the Patient Participation Scale (PPS) (see Appendix I). The PPS consists of 5 items that ask specifically about the extent patients perceive that the ACNP actively involved them and their families in decision-making regarding their care. This instrument uses a 5-point Likert scale from 0 (not at all) to 5 (very much so). The total range of possible scores was 0 to 25 with higher scores reflecting greater patient participation in decision making and care for management of their condition. Internal consistency using Cronbach's alpha at T2 was 0.93. The mean score for patient participation was 20.33 (SD = 6.74). Results are presented in Table 4.6.

Table 4.6: **Mean (SD) of Patient Participation in Care with the Acute Care Nurse Practitioner (PPS)**

n[a]	M[a]	SD[a]	Range
51	20.33	6.74	0 – 25

[a] n, M and SD are the number, mean and standard deviation of patient participation 1 week post-CABG surgery

Mishel's theory also considers education level to be a structure provider. Forty-nine percent (n = 25) of participants had some high school or less than high school and 51% (n = 26) were high school graduates and had technical training or higher. (Refer to Table 4.1 at the beginning of this chapter for more details).

Uncertainty

Uncertainty was measured using the 28-item version of Mishel Uncertainty in Illness Scale – Acute care (MUIS-A) (see Appendix J). This instrument uses a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The range of scores for the 28-item scale is 28 to 140 with higher scores indicating greater uncertainty. Internal consistency was run on all 28 items at all three time periods. Cronbach's alpha for the total MUIS instrument was 0.89 at T1, 0.94 at T2, and 0.93 at T3. The descriptive statistics for uncertainty are presented in Table 4.7.

Table 4.7: **Total Uncertainty (MUIS) Scores at T1, T2, and T3 (n^a = 51)**

Variable	M^a	SD^a	Range
Time 1			
MUIS	56.29	11.73	28 - 76
Time 2			
MUIS	53.84	16.37	28 - 108
Time 3			
MUIS	53.08	15.65	28 - 97

[a] n, M, and SD are the number, mean, and standard deviation of uncertainty for Time 1, Time 2, and Time 3.

Total uncertainty scores were compared at all three time periods (n = 51). In hospital (T1), the mean uncertainty score for the total sample was 56.29 (SD = 11.73). At 1 week post-CABG surgery (T2), the mean score was 53.84 (SD = 16.37). At 6 weeks (T3), the mean uncertainty score was 53.08 (SD = 15.65). Multivariate results of repeated measures ANOVA of the uncertainty variable showed no significant difference in uncertainty scores over time [Pillai's: $F(2, 49) = 2.10$, $p > 0.05$].

Physical and Mental Health Status

Physical and mental health status was measured using the SF-36 acute form that uses a "1 week recall" period (see Appendix L). This instrument is a 36-item scale measuring eight health domains: physical functioning (PF), role physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role emotional (RE), and mental health (MH). These subscales have consistently identified a two-factor model of health status: (a) physical health status measured with the physical composite scores (PCS) and (b) mental health status using the mental composite scores (MCS). Three subscales of the SF-36 have been found to correlate highly with the PCS: physical functioning (PF), role physical functioning (RP), and bodily pain (BP); however, social functioning (SF), role emotional functioning (RE), and mental health (MH) correlate highest with MCS (Ware, Kosinski, & Keller, 1994).

Table 4.8 shows the means and standard deviations for the 8 subscales and the composite physical and mental health summary scores at T2 and T3. Internal consistency reliability was run on the 8 subscales and ranged from 0.59 to 0.93 for this study sample. As well, Pearson correlations were run for the two composite scores of the SF-36 with each of the 8 subscales to assess the pattern of relationships.

Table 4.8: **SF-36: Scores of 8 Scales and 2 Summary Scales (n = 51)**

	Time	M[a]	SD[a]	Range	Cronbach's alpha
PF[b]	T2	32.54	20.34	0 – 75	.92
	T3	56.06	25.23	0 – 95	.92
RP[b]	T2	9.44	20.18	0 – 100	.93
	T3	37.59	27.97	0 – 100	.87
BP[b]	T2	61.10	21.80	12 – 100	.79
	T3	76.42	21.21	22 – 100	.74
VT[b]	T2	42.50	13.08	10 – 75	.77
	T3	51.10	13.91	15 – 75	.80
SF[b]	T2	54.17	28.65	0 – 100	.73
	T3	64.95	26.10	12 – 100	.60
RE[b]	T2	53.70	43.32	0 – 100	.95
	T3	78.01	35.45	0 – 100	.85
MH[b]	T2	51.26	7.09	32 – 72	.59
	T3	47.66	7.52	32 – 64	.61
GH[b]	T2	70.19	15.82	25 – 100	.72
	T3	72.82	17.84	30 – 100	.75
PCS[c]	T2	37.69	7.18	21 – 53	--
	T3	45.67	12.55	0 – 65	--
MCS[d]	T2	41.82	7.19	26 – 57	--
	T3	42.52	5.55	29 – 55	--

[a] M, and SD are the mean, and standard deviation of the scores of 8 Scales and 2 Summary Scales for Time 2, and Time 3.
[b] PF, RP, BP, VT, SF, RE, MH, and GH are the physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health components of the SF-36
[c] PCS is the physical health component summary.
[d] MCS is the mental health component summary.

Consistent with the findings of Ware et al. (1994), the PF (r = 0.76 – 0.77), RP (r = 0.65 – 0.77), and BP (r = 0.63 – 0.75) correlated highest with the PCS at both time periods and the SF (0.46-0.55), RE (r = 0.77 – 0.85), and MH (r = 0.41 – 0.51) correlated most highly with the MCS (see Appendix O).

For purposes of this study only the composite summary scores, PCS and MCS, were analyzed to detect differences in mental and physical health status over time. Table 4.9 presents the results of paired samples t-tests. A significant improvement was found in physical health status from 1 week (T2) to 6 weeks (T3) post-CABG surgery [t (1, 50) = -6.42, $p \leq 0.001$], but not in mental health status [t (1, 50) = -0.71, $p > 0.05$).

Table 4.9: **T-test Results of the Physical and Mental Health Composite Scores (PCS, MCS) at T2 and T3 ($n^a = 51$)**

Variable	M[a]	SD[a]	Range	t value
PCS[b]				
T2	37.69	7.18	21 - 53	
T3	45.67	12.55	0 - 65	- 6.42*
MCS[c]				
T2	41.82	7.18	26 - 57	
T3	42.52	5.55	29- 55	- .71

[a] n, M, and SD are the number, mean, and standard deviation of physical and mental health status for Time 2, and Time 3.
[b] PCS is the physical health component summary
[c] MCS is the mental health component summary
* $p \leq 0.001$

Relationships Among Variables

This section explores the relationships among the study variables as postulated by Mishel's theory of uncertainty in illness. The variables are symptom distress, coordination of care, patient participation in care, patient education level, uncertainty,

and physical and mental health status. Spearman's rho was used along with Pearson's r because three variables were slightly positively skewed (symptom distress at T3, participation in care, and coordination of care). Because there were no appreciable differences, the results of the more robust tests are reported here. The exception to this is education level, a categorical variable, where Spearman's rho is reported.

Stimuli Frame Variables and Uncertainty

The relationships between the stimuli frame variables, symptom distress and coordination of care, and uncertainty were examined. Table 4.10 presents the correlations between symptom distress (SDS) and uncertainty (MUIS) and between coordination of care (CCS) and uncertainty (MUIS) at all three time periods.

Table 4.10: **Correlation Coefficients for Symptom Distress (SDS) and Uncertainty (MUIS) and between Coordination of Care (CCS) and Uncertainty at T1, T2, and T3 (n = 51)**

	SDS 1	SDS 2	SDS 3	CCS
Time 1				
MUIS	-0.03			-0.22
Time 2				
MUIS		0.44*		-0.44*
Time 3				
MUIS			0.64*	-0.24

* $p \leq 0.01$ (2-tailed)

These findings indicated that a decrease in symptom distress at T2 and T3 was significantly positively related to a decrease in uncertainty (T2: r = 0.44; T3: r = 0.64). Therefore, as symptom distress decreased so did uncertainty with the highest correlation at 6 weeks post-CABG surgery. Uncertainty was significantly negatively correlated with

coordination of care only at T2 (r = -0.44) indicating that higher perceived coordination of care was associated with a decrease in levels of uncertainty at 1 week post-surgery.

Structure Provider Variables and Uncertainty

The two structure provider variables in this study were Patient Participation in Care with the ACNP (PPS), an indicator of "credible authority" and education level of the patient. Patient participation in care was not significantly related to uncertainty at T1 (r = -0.20), T2 (r = -0.27), or T3 (r = -0.18) ($p > 0.05$). For purposes of analyzing relationships, education level was collapsed into two categories, less than high school (n = 25, 49%) and completion of high school or greater (n = 26, 51%). Education level was not significantly related to uncertainty at T1 ($r_s = -0.11$), T2 ($r_s = -0.11$) or T3 ($r_s = -0.02$) ($p > 0.05$).

Relationship between Stimuli Frame Variables and Structure Provider Variables

Mishel's uncertainty theory hypothesizes that structure providers indirectly impact uncertainty by influencing the patient's interpretation of the stimuli frame. Therefore, the relationships between symptom distress (SDS) and patient participation scale (PPS) and education level, and between coordination of care (CCS) and patient participation and education level were computed. Table 4.11 presents these results.

Table 4.11: **Correlation Coefficients for Stimuli Frame Variables (SDS, CCS) and Structure Provider Variables (PPS and Education Level) (n = 51)**

	SDS1	SDS2	SDS3	CCS
PPS	-0.16	-0.29*	-0.10	0.43**
Education Level	0.29*	0.05	0.22	-0.27

* $p \leq 0.05$; ** $p \leq 0.01$

Note: Spearman's rho correlations reported for education level.

There was a statistically significant low negative correlation between patient participation and symptom distress at T2 (r = -0.29), but not at T3. Therefore, the higher the perceived level of patient participation in care with the ACNP, the lower the symptom distress reported at 1 week post-CABG surgery. In addition, patient participation had a statistically significant low positive correlation with coordination of care (r = 0.43) at T2. Thus, the higher the level of patient participation in care with the ACNP, the more coordinated the patient perceived the care to be. Education level was found to have a statistically significant low positive relationship with symptom distress at T1 ($r_s = 0.29$), but not at T2 or T3. Therefore, patients with more education experienced more symptom distress at T1. Education level was not found to have a statistically significant correlation with coordination of care.

Predictors of Uncertainty

Hierarchical multiple regression was used to assess the best predictors of uncertainty at T2 and T3 as hypothesized in Mishel's uncertainty in illness theory. The presentation of results is restricted to outcome variables that had two or more predictor

variables in the equation. The intercorrelations of all study variables are presented in Appendix P.

At T2, only the stimuli frame variables of symptom distress (SDS 2) and coordination of care (CCS) were significantly correlated to uncertainty at 1 week (MUIS 2). MUIS 2 was also significantly correlated to baseline uncertainty in hospital (MUIS 1). The baseline uncertainty score was entered first, followed by both stimuli frame variables, which were entered into the analysis as a group. Results, as illustrated in Table 4.12, indicate that 39% of the variance in uncertainty at 1 week was explained by baseline uncertainty (standardized beta = 0.43) and coordination of care (standardized beta = -0.30). Standardized beta values indicate the relative predictive strength of the independent variables on the dependent variable. Interestingly, symptom distress was not a significant predictor of uncertainty at 1 week. To summarize, individuals with higher baseline uncertainty were more likely to have higher uncertainty scores at 1 week. However, those who perceived that the care they received was more coordinated (i.e., higher event familiarity) had lower levels of uncertainty as predicted in Mishel's theory.

At T3, symptom distress at 6 weeks (SDS 3) was correlated with uncertainty, as was uncertainty at week 1 (MUIS 2). Neither coordination of care (CCS), the other stimuli frame variable, nor the structure provider variables (PPS and education level) were significantly correlated to uncertainty at T3. To control for uncertainty scores at 1 week, the MUIS 2 score was entered first, followed by SDS 3. Results found that 56% of the variance in uncertainty at 6 weeks was explained by symptom distress at 6 weeks (standardized beta = 0.58) and uncertainty at 1 week (standardized beta = 0.41). See Table 4.12. Therefore, individuals with high levels of symptom distress at 6 weeks and

those with higher levels of uncertainty 1 week following CABG surgery were more likely to have higher uncertainty scores at 6 weeks post-CABG surgery. These results are consistent with Mishel's theory.

Table 4.12: **Multiple Regression Analysis: Uncertainty at 1 week (T2) and 6 Weeks (T3)**

Independent Variable	B	95% CI	Standardized Beta	p
On MUIS at 1 week (T2)				
MUIS 1	0.60	0.24 to 0.95	0.43	0.001
CCS	-1.14	-2.01 to -.23	-0.30	0.02
SDS 2	0.22	-0.26 to 0.69	0.12	0.37
$R^2 = 0.42$	**Adjusted $R^2 = 0.39$**	F (3, 47) = 11.51, p = 0.001		
On MUIS at 6 weeks (T3)				
MUIS 2	0.39	0.20 to 0.57	0.41	0.001
SDS 3	1.14	0.76 to 1.51	0.58	0.001
$R^2 = 0.58$	**Adjusted $R^2 = 0.56$**	F (2, 48) = 32.48, p = 0.001		

Uncertainty and Physical and Mental Health Status

The relationships between uncertainty and health status were examined at 1 week (T2) and 6 weeks (T3). Table 4.13 presents the results. Uncertainty had a significant low negative correlation with mental health status at T2 (MCS 2) (r = -0.29), indicating that higher uncertainty was related to poorer mental health, but not physical health status at 1 week post-CABG surgery. At T3, uncertainty was significantly negatively correlated with physical health status (PCS 2) (r = -0.51), but not mental health status. This correlation was in the moderate range. This suggests that greater uncertainty was related to lower physical health status at 6 weeks post-CABG surgery.

Table 4.13: **Correlation Coefficients for Uncertainty (MUIS), and Physical Health (PCS) and Mental Health (MCS) at T2 (1 week) and T3 (6 weeks) (n = 51).**

	PCS 2	MCS 2	PCS 3	MCS 3
Time 2				
MUIS	-0.12	-0.29*		
Time 3				
MUIS			-0.51**	0.08

* $p \leq 0.05$; ** $p \leq 0.01$

Predictors of Physical and Mental Health Status

Hierarchical multiple regression was used to determine the best predictors of physical health status (PCS) and mental health status (MCS) at 1 week and 6 weeks post-CABG surgery as hypothesized in Mishel's uncertainty in illness theory. The presentation of results is restricted to outcome variables that had two or more predictor variables in the equation. Appendix P shows the intercorrelations of all study variables.

At T2, physical health status (PCS 2) was significantly correlated with symptom distress (SDS 2) (r = -0.41). However, it was not significantly correlated with any of the other stimuli frame, structure provider variables or with uncertainty. Therefore, the best predictor of physical health status at 1 week was symptom distress at 1 week. By contrast, mental health status at T2 (MCS 2) was significantly correlated with symptom distress (SDS 2) (r = -0.34), coordination of care (CCS) (r = 0.32), and uncertainty (MUIS 2) (r = -0.29). The variables were entered into the regression equation in the following order: SDS 2, CCS, and MUIS 2. Results, as illustrated in Table 4.14, show that only 11% of the variance in mental health status was explained by these three

variables as a group. However, no single variable was a significant predictor of mental health status at 1 week after CABG surgery.

At T3, physical health status (PCS 3) was significantly correlated with symptom distress (SDS 3) ($r = -0.68$) and uncertainty (MUIS 3) ($r = -0.51$) as well as PCS 2 ($r = 0.72$). To control for physical health status at 1 week, the PCS 2 score was entered first followed by SDS 3, and then by MUIS 3. Results indicated that 67% of the variance in physical health status at 6 weeks was explained by physical health status at 1 week (standardized beta = 0.53) and symptom distress at 6 weeks (standardized beta = -0.34), but not by uncertainty. Therefore, individuals with better physical health status at 1 week and lower levels of symptom distress at 6 weeks were more likely to have better physical health 6 weeks after CABG surgery. Likewise, those with poorer physical status at 1 week and higher levels of distress at 6 weeks had lower physical health status 6 weeks post-CABG surgery.

At T3, mental health status (MCS 3) was not correlated to any of the stimuli frame variables, structure provider variables, or uncertainty contrary to predictions in Mishel's theory. Therefore, there were no predictors of mental health status at 6 weeks as postulated by Mishel's theory of uncertainty in illness. However, MCS 3 was correlated to both MCS 2 ($r = 0.41$) and PCS 2 ($r = -0.31$). Multiple regression analyses (with MCS 2 entered first, followed by PCS 2) showed that 20% of the variance in mental health at 6 weeks was explained, but only mental health at 1 week (MCS 2) was a significant predictor (standardized beta = 0.37). Therefore, the only predictor of mental health at 6 weeks was mental health at 1 week.

Table 4.14: **Multiple Regression Analysis: Mental Health Status at 1 week (T2) and Physical Health Status at 6 Weeks (T3)**

Independent Variable	B	95% CI	Beta	p
On Mental Health at 1 week (MCS 2)				
SDS 2	-0.17	-0.41 to 0.07	-0.22	0.16
CCS	0.31	-0.20 to 0.81	0.19	0.23
MUIS 2	-0.05	-0.19 to 0.09	-0.11	0.51
$R^2 = 0.16$	**Adjusted $R^2 = 0.11$**	F (3, 47) = 3.08, p = 0.04		
On Physical Health at 6 weeks (PCS 3)				
PCS 2	0.93	0.60 to 1.25	0.53	0.001
SDS 3	-0.53	-0.90 to –0.17	-0.34	0.005
MUIS 3	-0.12	-0.29 to 0.49	-0.1.5	0.16
$R^2 = 0.69$	**Adjusted $R^2 = 0.67$**	F (3, 47 = 34.78, p = 0.001		
On Mental Health at 6 weeks (PCS 3)				
MCS 2	0.29	0.09 to 0.49	0.37	0.005
PCS 2	-0.20	-0.40 to –0.00	-0.26	0.051
$R^2 = 0.24$	**Adjusted $R^2 = 0.20$**	F (2,48 = 7.41, p = 0.002)		

Summary

The majority of the 51 participants in this study were male (80%), married (80%), and retired (64%). The mean age of the sample was 61 years with an age range of 45 to 83 years. Eighty percent were married and approximately two-thirds were retired. Forty-nine percent of the sample had some high school or less than high school education. All patients had a primary diagnosis of CAD and almost one-fifth had a secondary diagnosis of diabetes. Sixty-nine percent (n = 35) had between 4 to 7 grafts during CABG surgery with a mean of 3.9 grafts for the sample as a whole. There were no significant differences

between the 51 participants who completed the study and the 7 patients who dropped out of the study on any of the socio-demographic variables or surgery-related characteristics.

In terms of recovery over time (in hospital (T1), 1 week (T2) and 6 weeks (T3) post-discharge), participants had significantly less symptom distress at 1 week and 6 weeks post-CABG surgery compared to in-hospital scores. In addition, there was a statistically significant improvement in physical health status as measured by the PCS of the SF-36 from 1 week to 6 weeks post-CABG surgery, but no improvement in mental health status (MCS) at 6 weeks compared to 1 week. Total uncertainty scores were in the moderate range and were not statistically different over the three time periods.

Patient participation in care, an index of credible authority, showed high scores reflecting patients' participation in decision-making and care with the ACNP while in hospital. Similarly, scores for coordination of care indicated that patients perceived that their care in hospital was well coordinated which reflected event familiarity (i.e., consistent expected patterns in the health care environment).

The relationships between the structure provider variables of patient participation and education level were examined with the stimuli frame variables of symptom distress and coordination of care. Patient participation in care had a low negative correlation with symptom distress at T2, but not at T3, and had a moderate positive correlation with coordination of care at T2. Education level had a low negative correlation with symptom distress at T1 only, but was not correlated with coordination of care.

Relationships between stimuli frame variables and structure provider variables with uncertainty were also examined. Symptom distress was found to be moderately positively correlated with uncertainty at T2 and T3, with a higher correlation at T3.

Coordination of care was moderately negatively correlated with uncertainty only at T2. No significant relationships were found when patient participation in care and education level were examined with uncertainty.

The analysis of the relationships between uncertainty and the adaptational outcomes of physical and mental health status found a low significant negative correlation at 1 week between uncertainty and mental health, but not physical health status. At 6 weeks (T3), uncertainty was significantly negatively and moderately correlated with physical health, but not mental health status.

Finally, multiple regression analyses were conducted to identify the best predictors of uncertainty and physical and mental health status at 1 and 6 weeks. At 1 week, the best predictors of uncertainty were in hospital uncertainty scores and coordination of care; these two variables explained 39% of the variance in uncertainty at 1 week post-CABG surgery. The best predictor of physical health status at 1 week was symptom distress at 1 week. No single variable was a significant predictor of mental health status at 1 week.

At 6 weeks, 56% of the variance in uncertainty was explained by symptom distress at 6 weeks and uncertainty scores at 1 week. The best predictors of physical health status at 6 weeks were physical health status at 1 week and symptom distress at 6 weeks. These two variables explained 67% of the variance in physical health at 6 weeks. The best predictor of mental health status at 6 weeks was mental health status at 1 week.

Chapter 5: Discussion

Mishel's (1988) uncertainty in illness theory was the framework used in this study of patients recovering from CABG surgery. The study variables included: two measures of the stimuli frame, symptom distress and coordination of care; two measures of structure providers, patient participation in care with the ACNP and patient education level; a measure of uncertainty in illness; and, a measure of physical and mental health status. These variables were studied over time (in hospital, and at 1 and 6 weeks post-hospital discharge following CABG surgery). In addition, the hypothesized relationships among the variables, as well as the best predictors of uncertainty and physical and mental health status, were investigated.

This chapter provides a discussion of the research findings in relation to the seven research questions identified at the outset of the study and in relation to the conceptual framework. Findings are compared and contrasted to the existing literature where applicable.

Sociodemographic Characteristics

In the current study, 80% of all participants were male and the average age was 61 years with a range of 45 to 83 years. This sample is typical of the group undergoing CABG surgery at the tertiary care center where this study was conducted. These findings are comparable to the sample of patients undergoing CABG surgery in two studies that reported a mean age of 61 years with a range from 34 to 74 years (McNamee & Wallis, 1999; White and Frasure-Smith, 1995). Other studies of CABG surgery patients have reported slightly higher mean ages. Staples and Jeffrey (1997) reported on a sample of

76% men with a mean age of 65 years, and a range 50 to 78 years and Barnason et al. (2001) in a study of functional outcomes over time in a sample of 76% men reported a mean age of 66 years (range 37 to 81 years).

In this study, 80% of participants were married or cohabiting, a finding similar to other studies such as McNamee and Wallis' (1999) study where 75% of the sample were married. Education was also reported in the current study. Only half of the participants (51%) were high school graduates, a finding that is different from education levels reported in other similar studies. White and Frasure-Smith (1995) reported that 88% of their sample were high school graduates, while others have reported that the mean years of formal education was 12 (Barnason et al., 2000; Staples & Jeffrey, 1997). In this study, almost two-thirds of the study participants were retired as would be expected given the age group.

Surgery-related characteristics were also examined. One hundred percent (100%) of the sample had a primary diagnosis of CAD and the five most common complications or comorbidities were: diabetes mellitus, elevated cholesterol, hypertension, atrial fibrillation and other electrical conduction disturbances, and arthritis and other pain problems. Barnason and colleagues (2000) in their study reported up to 10 comorbid conditions, including diabetes and hypertension. Similarly, McNamee and Wallis (1999) reported on a sample of post-CABG surgery patients with a variety of other health problems, including hypertension, diabetes and dysrythmmias. Slightly more than two-thirds of the participants (69%) in the current study had 4 or more grafts with a mean of 3.9 grafts, which is somewhat higher than reported in other studies. Ross and Ostrow (2001) reported that only 34% of their sample had 4 or more grafts and Allen et al. (1990)

reported a mean of 3 grafts; however, their sample was younger because they excluded those who were over 65 years old.

In summary, this study sample was comparable to samples in other similar studies in terms of age, gender, marital status, work or retirement status, and surgically-related variables with the possible exception of number of grafts. In addition, the sample in this study may be more variable in terms of education level, with a larger percentage of participants with less than high school education.

Differences in Symptom Distress, Uncertainty, and Physical and Mental Health Over Time

The first two research questions explored whether there were significant differences in symptom distress, uncertainty, and physical and mental health status over time. Differences were assessed over three points in time for symptom distress and uncertainty (T1: in hospital 48 to 96 hours after CABG surgery; T2: 1 week post-hospital discharge after CABG surgery; and T3: 6 weeks post-discharge after CABG surgery) and over two time periods (T2 and T3) for physical and mental health status.

Symptom Distress

In Mishel's (1988) theory of uncertainty in illness, symptom pattern – a component of the stimuli frame – is the primary antecedent variable to uncertainty. The degree to which symptoms are present with a consistent configuration is the symptom pattern. In this study, symptom pattern was operationalized as symptom distress (SDS) and included both general symptoms and those commonly experienced by the cardiac population, such as dyspnea and chest pain.

Symptom distress was found to be significantly decreased over the three time periods. This finding was expected given that there appears to be an established pattern of recovery from CABG surgery for most patients. Mean patient scores on the SDS were on the low end of the scale (scores can range from 0 to 100) at all three time periods, suggesting that participants did not have high symptom distress overall. The relatively low scores in this study may suggest that most patients were adequately prepared regarding what to expect in the immediate postoperative period and that symptoms, when present, were not overly distressing. However, the range of symptom distress scores indicated that some patients continued to have high levels of symptom distress at 1 week (score range: 1 – 54) and 6 weeks (score range: 0 – 100), indicating that for some patients symptoms persisted and were distressing even after the expected healing time.

Most studies that have investigated symptoms post-CABG surgery described the most common expected or actual problems and also discussed whether symptoms improved (Ball & Grap, 1999; McNamee & Wallis, 1999; Savage & Grap, 1999; Tuck & Gilliss; Wu, 1995). In this study, the top five symptoms described by patients in hospital were fatigue, weakness, pain, insomnia and poor appetite. Pain, fatigue, insomnia and weakness remained in the top five reported symptoms at 1 and 6 weeks post-discharge for some patients, suggesting a somewhat consistent pattern of symptoms. However, the number of patients reporting these symptoms and the level of distress associated with them was significantly reduced over time. Savage and Grap interviewed patients post-CABG surgery at 7 days who reported signs and symptoms such as sleep disturbances, leg edema, dyspnea, persistent poor appetite and, in a small number of patients, depression. McNamee and Wallis found frequent problems and concerns changed from 1

week to 6 weeks after CABG surgery with fewer patients reporting symptoms at 6 weeks. Difficulty sleeping was the most common reported problem at 1 week and sternal wound pain was the most common reported problem at 6 weeks, which is different from this study. Similarly, in a follow- up study up to 6 weeks post-CABG surgery, Wu found that symptoms and common concerns were most problematic in the first 2 weeks and then decreased. In summary, the literature and findings from this study suggest that although symptoms change and decrease over time for the vast majority of patients, symptoms may persist for up to 6 weeks after surgery for a small group of patients. This may hinder optimal recovery following CABG surgery.

Uncertainty

In this study, the finding that uncertainty did not change over time is consistent with reports from other studies. Wong and Bramwell (1992) found no change in uncertainty from 1 to 2 days to 2 weeks post-discharge after mastectomy. White and Frasure-Smith (1995) found no differences in uncertainty scores in patients following CABG surgery from 1 month to 3 months, and Carroll, Hamilton, and McGovern (1999) found no differences in uncertainty in patients with life-threatening arrhythmias before treatment and 6 months later. Given the nature of the recovery process following CABG surgery, it may not be surprising that patients in this study continued to experience a moderate level of uncertainty throughout the 6-week period following surgery. Although patients may be told what to expect, they may continue to be uncertain about the future and further potential problems related to their health and recovery.

Interestingly, mean uncertainty scores in this study were lower than that reported by Mishel (1997) for a subsample of cardiac data (n = 852) where the mean was 69.1

using the same 28-item version of the MUIS. There were no comparable data available on coronary artery bypass surgery patients specifically (Mishel, 1997). However, mean uncertainty scores in the current study were also lower than scores in subsets of patients recovering from myocardial infarction (68.2), cancer (74.3), and vascular surgery (65.0) but similar to mean scores from those recovering from bowel resection (53.3) and general surgery (55.7) (Mishel, 1997). The reasons for this need to be further explored.

In summary uncertainty did not change over time, a finding consistent with other studies, and participants in this study had moderate levels of uncertainty at all three time periods. Total uncertainty scores were somewhat lower than data reported for other cardiac populations as a whole (Mishel, 1997).

Physical and Mental Health Status

According to Barnason et al. (2000), patient outcomes measurement is essential to evaluating quality of care following CABG surgery. The effectiveness of interventions to improve outcomes such as health status can be assessed using measurements of self-perceived health status (Kiebzak et al., 2002). In this study the SF-36 was used to measure two composite health-related quality of life variables: physical health status and mental health status. In this study, physical health status improved significantly from 1 week to 6 weeks post-CABG surgery, but there was no change in mental health status.

Studies of CABG surgery patients in the early postoperative period have examined patient outcomes over time using the SF-36. The results of this study were difficult to compare directly to other studies because most studies reported on the eight subscales of the SF-36 rather than on the composite scores. As well, only one study was found that reported SF-36 scores at the 6-week recovery period. In their study of 32

patients before, 6 weeks, and 3 months after CABG surgery, Ross and Ostrow (2001) reported significant improvements in only two subscales of the SF-36, physical functioning (PF) and vitality (VT) at 6 weeks and 3 months post-CABG surgery. The social functioning subscale (SF) was significantly worse at 6 weeks but improved at 3 months compared to baseline levels. The other five subscales – role physical functioning (RF), bodily pain (BP), role emotional functioning (RE), mental health (MH) and general health (GH) – remained unchanged. Barnason et al. (2000) examined outcomes in patients post-CABG surgery at 4 points in time: in hospital after surgery and at 3, 6 and 12 months. They reported statistically significant improvements in all of the subscales of the SF-36 (comprising the PCS and MCS) at 3 months with all scales either improving or remaining stable over 6 and 12 months.

In this study, patients had mean physical health status scores of 37.69 at 1 week and 45.67 at 6 weeks. This represented a mean change of 7.98, which is considered clinically significant (Ware et al., 1994). This supports recent findings that ACNP care results in clinically important patient outcomes (Mundinger et al., 2000; Pioro et al., 2001). As well, the mean 6-week score compares favourably with the normative data for a "healthy" group of people aged 55-64 whose mean physical health status score was 46.90 (Ware at el., 1994). By contrast, mean mental health scores did not improve at 6 weeks (42.52) in this population of patients and remained low compared to the mean scores of those with myocardial infarction (45.73) and the 55-65 year old group in the general population (51.60). No normative data were available for CABG surgery patients.

There may be a number of explanations for no improvement in mean mental health status at 6 weeks. First, recovery from CABG surgery is a stressful experience

requiring a high degree of psychosocial adjustment. In a study of CABG surgery patients, Grap, Savage and Ball (1992) found that depression persisted for up to 6 weeks after discharge from hospital. Savage and Grap (1999) reported anecdotal findings of patients reporting feeling depressed and "blue" 7 to 14 days post-surgery. Second, mental health status was not measured prior to surgery and, therefore, it is unclear how they differed compared to post-surgery. Finally, the mental health status summary scores may not be completely reliable since two subscales of the SF-36 that load more heavily on the MCS had lower than expected internal consistency indicators (Mental Health Subscale alphas: 0.59 - 0.61 and Social Functioning Subscale alphas: 0.73 - 0.60). Therefore, the scores may not truly reflect mental health status of the patients in this study.

In summary, the results of the analysis of the SF-36 at 1 and 6 weeks post-CABG surgery are generally consistent with a pattern of improvement for physical health status over time that has been documented in other studies. Mental health status was one area that did not improve by 6 weeks in this study sample, a finding that was generally consistent with the only other study found that examined 6-week recovery post-CABG surgery.

Relationships among Stimuli Frame Variables, Structure Provider Variables, Uncertainty and Physical and Mental Health Status

The following section addresses research questions number three, four and five related to the pattern of relationships, as hypothesized in Mishel's uncertainty in illness theory. Relationships between the following sets of variables were examined: (a) stimuli frame variables (symptom distress and coordination of care) and uncertainty; (b) structure provider variables (patient participation in care and education level) and uncertainty; (c)

structure provider variables (patient participation in care and education level) and stimuli frame variables (symptom distress and coordination of care); and (d) uncertainty and physical and mental health status.

Stimuli Frame Variables and Uncertainty

The third research question to be investigated in this study was the nature of the relationship between the stimuli frame variables of symptom distress and coordination of care with uncertainty.

The stimuli frame is an antecedent to uncertainty in Mishel's theory; however, few studies have directly tested the linkage between the stimuli frame and uncertainty (Barron, 2000). This study investigated two components of the stimuli frame. *Symptom pattern*, the consistency of symptoms to form a pattern, was operationalized as levels of symptom distress and *event familiarity*, which refers to familiar and expected patterns in the health care environment, was measured using the coordination of care scale. The stimuli frame variables are hypothesized to have a direct influence on uncertainty.

At T1 (in hospital 48 to 96 hours after CABG surgery), the finding that there was no significant relationship found between symptom distress and uncertainty is consistent with findings of a study of colon surgery patients (Galloway & Graydon, 1996). However, at T2 and T3 in this study, there were significant positive correlations between symptom distress and total uncertainty ($r = 0.44$ to 0.64, respectively). Therefore, decreases in symptom distress were associated with decreases in uncertainty, which is consistent with the hypothesized relationships in Mishel's model (1988).

From a clinical perspective, most patients post-CABG surgery have a predictable outcome in terms of the trajectory of recovery and patients are told what they may expect

related to improvement of symptoms over time. The findings that symptom distress was significantly correlated with uncertainty at 1 week and 6 weeks suggest that high symptom distress may lead to high uncertainty. When symptoms do not decrease as expected, patients may be more uncertain about whether their symptoms will improve at all and they may be concerned about their overall health.

Coordination of care is one aspect of event familiarity, which refers to the familiar and expected patterns in the health care environment (Mishel, 1988). The researcher hypothesized that patients would expect care to run smoothly for them, that there would be no "surprises" or unnecessary delays, and that the ACNP and staff would work as a team, and provide consistent information to patients (i.e., good coordination of care) resulting in event familiarity by patients. The finding that high perceived coordination of care was significantly negatively correlated with uncertainty at 1 week supports Mishel's (1988) theory. This finding also suggests that better coordinated care in hospital can influence the level of uncertainty patients experience post-discharge at 1 week. Clearly, this has direct implications for ACNPs who are often the key provider in terms of influencing processes of care while the patient is in hospital.

Interestingly, only one study was found that had tested the relationship between event familiarity and uncertainty. Mishel and Braden (1988) tested the relationship between event familiarity and uncertainty in a sample of women being treated for gynaecological cancer, and found that event familiarity accounted for significant variance in the complexity (a component of uncertainty) perceived in treatment and system of care.

Structure Provider Variables and Uncertainty

The fourth research question to be investigated was the relationship between the structure provider variables of patient participation in care with the ACNP and patient education level and uncertainty.

In Mishel's (1988) theory, structure provider variables are hypothesized to influence uncertainty directly as well as indirectly by influencing components of the stimuli frame. In this study, structure provider variables included credible authority and patient education level. Credible authority was operationalized as patient participation in care with the ACNP. This measured the extent to which patients perceived that the ACNP actively involved them and their families in decision-making regarding their care. It was hypothesized that higher patient participation in care was an indicator of trust and confidence in the ACNP (credible authority) and, thus, could influence uncertainty directly.

In this study, no direct relationship was found between the credible authority variable and uncertainty. Other studies have generally supported the positive impact of the credible authority on uncertainty, especially in relation to information provided by the physician (Borgers et al., 1993; Mishel & Braden, 1988; Molleman et al., 1984; Van Den Borne et al., 1987). For example, trust and confidence in the physician explained 35% of the variance in uncertainty in a study of women with gynaecological cancer (Mishel & Braden, 1988). However, all of these studies operationalized this construct using different instruments. Therefore, direct comparisons cannot be made.

The second structure provider, patient education level (measured as "less than high school completion" or "high school graduate or higher"), was also examined in relation to uncertainty. Mishel (1984) proposed that patients with more education would

perceive less uncertainty. However, the findings in the current study did not support this hypothesis as no significant relationship was found between educational level of participants and uncertainty at T1, T2 or T3. Wong and Bramwell (1992) and Mishel and Braden (1988) also reported finding no relationship between education level and uncertainty, as did Mishel's study (1984) of 100 Veteran Administration patients. Conversely, Galloway and Graydon (1996) found the opposite with higher education being correlated with higher levels of uncertainty. Taken as a whole, the evidence does not seem to support a direct relationship between patient education level and uncertainty.

Relationship between Structure Provider Variables and Stimuli Frame Variables

The fifth question to be investigated was the relationship between the structure provider variables (patient participation in care with the ACNP and education level) and the stimuli frame variables (symptom distress and coordination of care).

In Mishel's theory (1988), the structure providers are resources available to help patients in the interpretation of the stimuli frame, which in turn can reduce uncertainty in the illness situation. The credible authority is one part of the structure provider variable along with patient education level. According to Mishel (1988), uncertainty may be lessened either directly or indirectly, if the health care provider is perceived to be highly credible; it is the patient's relationship with the health care provider that is the basis for reduced uncertainty. As Mishel and Braden (1987) state, lower levels of uncertainty, less ambiguity concerning the illness and less complexity concerning treatment and the health care health environment are the result of trust and confidence in the health care worker.

In this study, there was a low significant negative correlation between the credible authority (i.e., patient participation in care with the ACNP) and symptom distress at T2

(r = -0.29) indicating that higher levels of patient participation were related to less symptom distress 1 week after discharge. Participation in care was also positively correlated with coordination of care (r = 0.43). This indicated that higher levels of participation in care were associated with higher perceived coordination of care. As previously discussed, lower levels of symptom distress and higher levels of coordination of care were moderately associated with lower levels of total uncertainty at T2. Therefore, it may be that the credible authority in this study had an indirect impact on uncertainty by primarily helping patients interpret patterns in the health care environment as well as their symptom pattern.

To the researcher's knowledge, this is the first study to investigate both the possible direct and indirect relationships between the ACNP as the credible authority and uncertainty. No quantitative studies could be found that examined the credible authority and uncertainty in CABG patients. However, a qualitative study by Hawley (1996) with 13 CABG surgery patients reported that participants who had trust in the health care providers, including nurses, had less uncertainty. When patients did not feel confident with staff, uncertainty increased. Patients also had reduced uncertainty when they received appropriate information and when they had easy access to staff. These qualitative comments lend support to findings in this study with respect to the role of health care providers and nurses, especially the ACNP in reducing uncertainty.

Education level was the second structure provider in this study. Education was found to have a low significant positive relationship with symptom distress at T1 (r = 0.29) but no relationship with symptom distress at T2 or T3. Therefore, patients with higher levels of education were more likely to experience higher levels of symptom

distress while in hospital at T1, a finding that is contrary to the hypothesized relationship in Mishel's theory (1988).

In summary, study findings of the relationships between the structure provider variables and stimuli frame variables are mixed. Findings related to the ACNP as the credible authority support the indirect impact of structure providers on uncertainty through the interpretation of the stimuli frame (symptom distress and coordination of care) as proposed by Mishel (1988), while the results related to education level do not.

Uncertainty and Physical and Mental Health Status

The sixth research question to be investigated addressed the relationship between uncertainty and adaptational outcomes operationalized as physical health status and mental health status.

In this study, higher levels of uncertainty were related to lower mental health status ($r = -0.29$) at 1 week but not at 6 weeks post-CABG surgery. This finding was similar to findings by Mishel (1984) who found uncertainty to be correlated with stress at the 5^{th} day of hospitalization for 100 medical patients. White and Frasure-Smith (1995) examined psychologic stress and uncertainty in patients post-CABG surgery and found that uncertainty and psychologic stress were significantly positively correlated at both 1 month and 3 months. These findings may warrant further investigation of mental health and its relationship to uncertainty in post-CABG surgery patients.

This study also found that uncertainty was significantly moderately correlated with physical health status at 6 weeks ($r = -0.51$), but not at 1 week. Therefore, at 6 weeks post-CABG surgery, participants who had high levels of uncertainty were more likely to have poorer physical health status. As previously noted, symptom distress at 6

weeks was highly correlated to uncertainty at 6 weeks (r = 0.64). Therefore, it may be that for patients who continue to have high levels of symptom distress at 6 weeks, a time that patients may feel that symptoms should be abated, high levels of uncertainty continue. This may negatively impact physical health status.

Predictors of Uncertainty, Physical Health Status and Mental Health Status

The final research question to be addressed in this study was: what were the best predictors of uncertainty and physical and mental health status at 1 week and 6 weeks post-CABG surgery? In this study, the best predictor of uncertainty at 1 week, controlling for the baseline uncertainty score, was coordination of care. This suggests that the role of the ACNP in coordination of care directly influenced uncertainty in the early recovery period. As previously discussed, the credible authority (measured by participation in care with the ACNP) was significantly correlated to coordination of care and therefore, may also exert influence by indirectly reducing uncertainty at 1 week. The other important predictor at 1 week was symptom distress, which was the only significant predictor of physical health status at 1 week. These findings highlight aspects of the ACNP role, including direct care to patients and families, support of systems, and patient education (Ackerman et al., 1996; DeGrasse & Nicklin, 2001). As hospital stays become shorter, nurses need to use the time they have to teach patients and their families about the expected recovery trajectory. Understanding what to expect in the period following CABG surgery is essential for patients and families as concerns or questions regarding managing care may result in additional stress and uncertainty, which may impact on health status and ultimately on health care resources (Hartford, Wong, & Zakaria, 2002). Having someone, such as the ACNP, coordinate care, include patients in decisions about

their care, and help patients and families make the transition to home may help to alleviate some of the uncertainty patients feel.

The most important predictor of uncertainty and physical health status at 6 weeks (controlling for baseline scores at 1 week) was symptom distress at 6 weeks. Participants with high levels of symptom distress at both 1 and 6 weeks were clearly at risk for lower levels of physical health status and at 6 weeks, for higher levels of uncertainty. These results suggest that interventions, such as the telephone coaching intervention described by Tack and Gilliss (1990), may help buffer uncertainty about persistent symptoms and may ultimately lead to better outcomes. Such an intervention would be cost effective if high-risk clients could be identified early in the recovery trajectory prior to the traditional 6-week check up.

A somewhat surprising finding in this study was that there were no significant predictors of mental health status. This suggests that factors other than those postulated in Mishel's theory (symptom distress, coordination of care, patient participation in care, education level, and uncertainty) may have influenced mental health status. Factors such as the social environment (i.e., social support) as well as the participant's pre-existing mental health status were not examined in this study, but may be important in understanding these results. As was previously noted, the internal consistency of some of the subscales of the mental health composite score may also be in question. Nevertheless, these results suggest that more attention should be paid to the mental health aspects in the early recovery period after CABG surgery.

Summary

This study explored differences in symptom distress, uncertainty and physical and mental health status over time in 51 post-CABG surgery patients who had been under the care of an ACNP while in hospital. As well, relationships postulated in Mishel's theory of uncertainty in illness were examined.

The sample in this study was similar to other CABG surgery study samples with respect to age, gender, marital status, work or retirement status, and co-morbid conditions. The sample population may have had more grafts compared to other CABG surgery populations and the education levels in other studies was found to be higher than in the current study.

Analysis of the first two research questions that investigated change over time revealed that symptom distress was significantly decreased by 6 weeks post-CABG surgery. This was consistent with findings in other studies. Total uncertainty scores did not differ across time, which was consistent with other studies but uncertainty scores in this study were generally lower than those reported in other studies. There were clinically significant improvements in physical health status by 6 weeks, but not in mental health status, which showed no change.

A number of research questions dealt with relationships among study variables and tested the strength of the hypothesized relationships in Mishel's uncertainty in illness theory. Generally, the predicted relationships in Mishel's model were supported by findings in this study with the exception of patient education level. Findings suggested that lower levels of symptom distress and higher perceived coordination of care were all directly associated with lower levels of uncertainty. Regression analysis found that, controlling for in-hospital uncertainty scores, coordination of care was the best predictor

of uncertainty at 1 week. As well, higher patient participation in care with the ACNP was associated with lower symptom distress at 1 week and with higher perceived coordination of care. This suggests that the patient relationship with the ACNP as the credible authority may have had an indirect influence on uncertainty. To the researcher's knowledge, this was the first study to investigate the ACNP as the credible authority in a study of uncertainty in illness in any patient population. Although no direct relationship was found with the ACNP and uncertainty, the findings suggest that the ACNP may be in a position to indirectly influence uncertainty with patients recovering from CABG surgery in her role as coordinator of care. This finding has important implications both for clinical practice and nursing administration as well as nursing research.

Education level had no direct relationship with uncertainty but was related to in-hospital symptom distress. However, the relationship was contrary to that predicted in Mishel's theory (i.e., higher education level was related to higher levels of symptom distress). This result suggests that education level may not be as important as other structure provider variables in Mishel's theory, such as credible authority or social support.

Finally, symptom distress at 1 and 6 weeks was a significant predictor of physical health status in the early recovery period. This is an important finding that could lead to early interventions. In this study, mental health status scores did not improve from 1 week to 6 weeks, nor did any of the variables postulated in Mishel's theory predict mental health status suggesting that there were other variables not studied that influenced mental health post-CABG surgery.

Chapter 6: Implications

This chapter will address the implications of the study findings for nursing practice, education, administration, and research.

Nursing Practice

An important finding in this study was that the effect of the antecedent variables on uncertainty and the impact of uncertainty on patient outcomes continued up to 6 weeks post-discharge after CABG surgery. In fact, the correlations between symptom distress and uncertainty and between uncertainty and physical health status were highest at 6 weeks. As well, the most important predictor of physical health status at 6 weeks was symptom distress. This suggests that in the early recovery period following CABG surgery, those patients who continue to have high symptom distress may have higher uncertainty and may be at greater risk for poorer physical health status at 6 weeks. These findings suggest the importance of identifying those at risk for high symptom distress in the early recovery period.

These results have several practice implications for nurses and ACNPs caring for patients undergoing CABG surgery. First, patient teaching while in hospital is an important role for nursing. The period following CABG surgery is one of high anxiety that can impact on the patients ability to learn new information, make necessary lifestyle changes and cope with the effects of CABG surgery (Hartford et al., 2002). Patients need to understand their symptoms and what they can expect for up to 6 weeks following surgery. At the current time there is no way to identify patients who may be continuing to

experience high symptom distress once they are discharged from hospital. Therefore, early assessment and intervention may be crucial.

In Newfoundland and Labrador, most patients who are discharged home generally have a visit by the community health nurse between 10-14 days after surgery for removal of staples to the sternum, leg, and arm. This is approximately 1 week following discharge for most patients. As a group, the patients in this study had substantially less symptom distress at 1 week post-discharge compared to in hospital. However, some patients continued to have high levels of symptom distress. Therefore, these patients could be identified by the community health nurse and referred for further follow-up.

As well, further follow-up could be done later in the recovery trajectory. Identification at 3 to 4 weeks following discharge could consist of either a telephone call initiated by the ACNP or a letter sent to all patients to identify those who still may be experiencing problems in the post-operative recovery period and who may need further education and support. As noted in Wu's (1995) study of patient-initiated calls, there were less acute symptoms and concerns being reported by the 4th week post-discharge. This suggests that this time period may be appropriate to contact patients. Finally, all patients have a 6-week appointment with either the cardiac surgeon or an internist. Physicians need to be aware that patients who still have high symptom distress may also have high uncertainty, which may lead to poorer health outcomes. Therefore, patients should be assessed for symptom distress at this 6-week visit as well.

The second important finding in this study relates to the in-hospital factors that had indirect associations with uncertainty. Coordination of care was found to be a significant predictor of uncertainty at 1 week. The finding that the ACNP as the credible

authority influenced uncertainty as a coordinator of care may have important implications. Patients who believed that things ran smoothly for them and that there were no unnecessary delays or surprises, reported less uncertainty. Given that some patients are discharged as early as 4 days after surgery, it is important to have a key person who can provide consistent information to patients and families. The ACNP is often the only other link with the surgeons and, therefore, can provide the patient and family with consistency during their hospital stay and help coordinate the patient's transition from hospital to home. The ACNP role facilitates these activities. For example, the ACNP directs and coordinates patient care in collaboration with appropriate health care professionals in a number of ways: conducting daily rounds and communicating findings to the attending physician and other members of the team; collaborating with patients and their families, physicians and other members of the health care team to develop a comprehensive plan of care; promoting continuity of care from admission through to discharge; referring patients/families to appropriate members of the team; facilitating communication and collaboration among members of the health care team; promoting patient participation in goal identification and implementing strategies to assist patients to meet these goals; and acting as a patient/family advocate.

Specific mention needs to be paid to mental health status. As previously noted, mental health status did not improve over time for participants in this study. There was no way to know if additional factors such as length of stay, previous mental health or social environment may have had an impact on this variable. The mental health composite scale (MCS), however, did not prove to be as reliable as the physical health composite score (PCS) of the SF-36. Hence, any interpretation of findings must be viewed with caution.

Given the findings of other studies suggesting that depression, emotional, and psychologic stress may persist for some patients after CABG surgery (Carroll, Hamilton, & McGovern, 1999; Savage & Grap, 1992; White & Frasure-Smith, 1995), it is important for nurses to be aware that depression may be a problem in the post-operative period and should be assessed at both the home visit and at the 6-week follow-up visit.

Nursing Administration

As previously noted, the findings from this study suggest that the ACNP may indirectly influence uncertainty. To the researcher's knowledge, these findings are unique because most research to date has focused on describing the ACNP role only and has not highlighted the potential impact on outcomes to patients. In these days of rising health care costs, hospitals are under pressure to meet national benchmarks for care. Nursing, as well, is being challenged to show how nurses make a difference to patient care. Therefore, this study may have important implications for nursing administration.

The results suggest that the ACNP in her role as coordinator of care may be in a key position to influence uncertainty and, hence, impact on patient outcomes. This is important given that patient lengths of stay are shorter and coordinating in-hospital care and patient discharge is an essential part of the ACNP role. It may also be of interest to nursing administration because few studies to date have investigated health status outcomes in relation to the ACNP role. Results of this study provide support for components of the ACNP role and could be used by nurse administrators to support the development of similar roles in areas other than cardiac surgery.

Nursing Education

The results of this study have important implications for both basic nursing education and continuing education for nurses and physicians. The findings suggest that nurses may have an important role to play in reducing uncertainty in their role as coordinator of care and in the direct care giver role by involving patients and families in decision making. Students should be taught in their basic program that involving patients and families in decisions concerning their care is an important part of their role and that results from studies such as this reinforce its importance. Also, students need to be aware that coordination of care is an integral part of the nurses' role and that it has direct implications for patients' well being.

Continuing education for nurses should include education on the recovery pattern for patients post-CABG surgery, including symptoms that patients may experience and the impact that uncertainty may have on health status outcomes over time. Results from this study emphasize the importance of educating nurses in their role as coordinators of care and the potential to influence patients' transition from hospital to home.

Community health nurses also need education about symptoms patients may experience post-CABG surgery, their pattern of recovery, and the importance of early identification of problems given that some patients may still experience high symptom distress, high uncertainty, and poor mental health up to 6 weeks after surgery. Since most patients' recovery is done at home, the community health nurse is in a unique position to assist patients in the recovery process.

Finally, physicians should be aware of the impact that high symptom distress and uncertainty may have on health status over time so that patients at risk can be identified early.

Nursing Research

The study was the first to investigate the ACNP as the credible authority in Mishel's uncertainty in illness theory. Further, the finding that the ACNP may indirectly influence uncertainty is important, as it is the first study that examined these relationships. Additional research to test the relationships found in this study should be undertaken in order to add to the existing body of knowledge about uncertainty in illness and the impact that nursing and the ACNP role in particular may have on uncertainty and adaptation.

Findings from this study revealed that there is a pattern of functional recovery over time similar to findings reported in other studies of patients undergoing CABG surgery. While some patients in this study experienced low levels of symptom distress or uncertainty, others experienced relatively high levels of symptom distress and uncertainty at 6 weeks, which was correlated to poorer physical health status. Using this knowledge, interventions might be developed to help improve outcomes and then tested in randomized clinical trials. To date, rigorous designs of nursing interventions for post-CABG surgery patients have been limited. Interventions to decrease symptom distress could include both an educational and a supportive component early in the recovery period. Educational interventions by telephone could be conducted by the ACNP. Supportive visits or group sessions involving the community health nurse could help patients deal with problems early in their recovery. Also studies of existing interventions, such as cardiac rehabilitation and its role in reducing uncertainty might also be investigated.

While uncertainty has been studied extensively, there have been very few intervention studies. Mishel (1997) reported on a number of intervention trials used to

modify uncertainty, but results were mixed with some interventions showing significant decreases in uncertainty, while others did not. However, Mishel reported that the most promising results were from education-based interventions. Further testing of an educational intervention to reduce uncertainty in post-CABG patients may be a promising area for further nursing research.

A number of studies of CABG surgery patients examined health status outcomes at 3 and 6 months. In the current study, only the time up to 6 weeks was examined. A study that examined the relationships in Mishel's uncertainty in illness theory over a longer time period, such as 3 and 6 months, would add to our understanding of the long term impact of uncertainty and its antecedents on outcomes. In addition, future studies should pay particular attention to mental health outcomes since findings related to mental health status in this study need to be interpreted with caution.

Finally, research using qualitative inquiry may add further to our knowledge of uncertainty in post-CABG surgery patients. As reported in this study, several qualitative studies found that there are a number of factors that may help patients deal with uncertainty. One finding was that having trust and confidence in the health care professional may modify uncertainty. Therefore, a study to explore the role that the ACNP may have in reducing uncertainty in post-CABG surgery patients could add further support to the ACNP as a credible authority in Mishel's theory of uncertainty in illness.

Conclusion

This study examined a number of variables as postulated in Mishel's uncertainty in illness theory and CABG surgery patients. A unique feature of this study was the

examination of the relationship of the ACNP to uncertainty and its impact on health status outcomes. Previous studies of uncertainty have not investigated the ACNP role, nor have they examined a number of variables in the theory in a single study.

Although the findings cannot be generalized, it represents work that has not been previously done with a CABG-surgery population and offers the opportunity for further research. Also, findings from this study support some results from previously conducted studies of uncertainty in illness and, therefore, adds to the current body of nursing knowledge related to Mishel's theory of uncertainty in illness, as well as to the early recovery trajectory of CABG surgery patients.

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Appendix A: Tables Summarizing Literature Review

Table 1: ***Studies Examining Uncertainty in Cardiac Populations***

Author/Date	Study Design (sampling, measurement intervals)	Characteristics of the Sample and Setting	Variables	Measures, Reliability and Validity	Relevant Outcome(s)/ Limitations
Quantitative Studies					
Redeker, 1992	Repeated measures correlational design; male patients one week and six weeks following CABG surgery	129 male patients who underwent CABG surgery	Uncertainty (28-item MUIS), coping (42-item revised ways of coping checklist WCCL)	MUIS - alpha coefficients of 0.84 and 0.89 for ambiguity and 0.75 and 0.78 for complexity at T1 and T2. WCCL - T1 and T2 respectively: avoidance - 0.88, 0.79; blamed-self - 0.86, 0.90; wishful thinking - 0.88, 0.86; problem focused - 0.69, 0.91; and seeks social support - 0.72, 0.87.	Low-moderately high correlations between ambiguity and complexity and emotion focused subscales of the WCCL at T1 and T2. Low correlations with problem focused coping and uncertainty at T2 ($p < 0.01$). Limitation: white males from one setting
Staples & Jeffrey, 1997	Descriptive correlational design; convenience sample of patients undergoing CABG surgery and their spouses	Patients undergoing CABG surgery and their spouses (n = 21)	Uncertainty (2 versions of MUIS community scale); quality of life Quality of Life Index – Cardiac version (Ferrans & Powers, 1985).; hope (12-item Health Hope Index and self-rating hope scale).	Not reported for this study on the instruments used.	Spouses of patients waiting for surgery had significantly higher levels of uncertainty. There was no significant relationship between total QL and uncertainty. Greater QL for health and function was significantly correlated with uncertainty. There was a statistically significant relationship between hope and uncertainty.

Author/Date	Study Design (sampling, measurement intervals)	Characteristics of the Sample and Setting	Variables	Measures, Reliability and Validity	Relevant Outcome(s)/ Limitations
Quantitative Studies					
White & Frasure-Smith, 1995	Descriptive correlational design; Convenience sample of patients who underwent angioplasty or CABG surgery; one month (T1) and three months (T2) post procedure	47 males who underwent angioplasty (PTCA) (n = 22) or CABG surgery (n = 25)	Uncertainty (30-item version of MUIS); psychological distress (GHQ); social support (perceived social support scale-PSSS).	Cronbachs alpha for the following: MUIS - PTCA (0.90) and CABG surgery (0.89); GHQ - PTCA (0.84) and CABG surgery (0.82); PSSS-PTCA (0.86) and CABG surgery (0.92)	Uncertainty did not change over time for either group. CABG surgery patients had significantly lower uncertainty than angioplasty patients at both T1 and T2. There was a positive correlation between uncertainty and psychological stress for both groups.

Author/Date	Study Design (sampling, measurement intervals)	Characteristics of the Sample and Setting	Relevant Outcome(s)/ Limitations
Qualitative Studies			
Hawley, 1998	Grounded theory approach to investigate the experience and meaning of prayer	13 CABG surgery patients described their experience	The principle problem facing the participants was one of "facing uncertainty of body, mind, and spirit including possibility of death" (p. 487). Patients who had trust in the health care system had less uncertainty and uncertainty increased when they did not feel comfortable with staff. Appropriate information and access to staff also decreased uncertainty.
Higgins, Dunn, & Theobold, 2000	Grounded theory using semi-structured taped interview to describe patients' perceptions of recovery after angioplasty; sampling: one month post intervention	Eight men and one woman described their perception of recovery from angioplasty in terms of needs, concerns and challenges	Three major categories emerged following analysis of the data: awareness of the problem or situation, anxiety related to uncertainty about future health and potential complications

Table 2: ***Studies Examining the Antecedents to Uncertainty: Symptom Pattern***

Author/Date	Study Design (sampling, measurement interval)	Characteristics of the Sample and the Setting	Variables	Measures, reliability and validity	Relevant Outcome(s)/ Limitations
Ball & Grap, 1999	Descriptive survey; convenience sample of 80 CABG surgery patients; two weeks post hospital discharge	80 CABG surgery patients; routine office visit to physician	Gastrointestinal Symptom Frequency (GSF) and Symptom Distress Scale (SDS), Modifications of Transplant Symptom Frequency and SDS, MAACL	Content validity established	Three most common GI symptoms identified; no significant relationship between level of anxiety and GI symptoms
McNamee & Wallis, 1999	Descriptive and comparative research design using both qualitative and quantitative methods; non-probability sample of CABG surgery patients; one week and six weeks post-CABG surgery	32 CABG surgery patients	Medical records and semi-structured interviews: problems described by patients in the post-operative period	Instruments were developed from: clinical experience, reference to literature and expert consultation	At week 1, the mean number of problems was 6.3 (SD = 1.6). At the second interview, the mean was 3.3 (SD = 2.2).Coping had a significant negative correlation with number of problems and coping at six weeks (p = 0.02)
Savage & Grap, 1999	Descriptive survey; convenience sample of English speaking patients following CABG surgery; 7 to 14 days post bypass	342 CABG surgery patients	10 open-ended questions to elicit physical concerns, education received and satisfaction with hospital experience post-CABG surgery	Clinical expert reviewed questions and pilot was completed prior to data collection	Five main problems identified consistent with other similar studies

Author/Date	Study Design (sampling, measurement interval)	Characteristics of the Sample and the Setting	Variables	Measures, reliability and validity	Relevant Outcome(s)/ Limitations
Tack & Gillis, 1990	Prospective longitudinal; one, two, three, four, six and eight weeks post-CABG surgery	75 CABG surgery patients and their primary care givers	Telephone interventions-coaching and emotional support	Not reported	Education may help buffer uncertainty about persistent symptoms; five most common symptoms were: pain, ineffective coping, activity intolerance, sleep disturbance and altered nutrition
Wu, 1995	Descriptive study of post-discharge concerns up to six weeks post-CABG surgery	196 out of 356 CABG surgery patients participated in a 24-hour nurse clinician telephone contact service	Self-report symptoms post-discharge CABG surgery	Not reported	Identified common concerns included incision healing, activities of daily living, sleep problems and symptoms, such as pain and GI disturbances; 75% of phone calls occurred in first 2 weeks

Table 3: ***Quantitative Studies On Structure Provider: Education Level***

Author/Date	Study Design (sampling, measurement interval)	Characteristics of the Sample and the Setting	Variables	Measures, reliability and validity	Relevant Outcome(s)/ Limitations
Galloway & Graydon, 1996	Prospective non-experimental design; convenience sample of patients who underwent surgery for cancer of the colon; 72 hours prior to discharge and 4 weeks following surgery	40 men and women (n = 20 men, n = 20 women)	Uncertainty (modified 28-item MUIS), Symptom distress (visual analog scaling), Perceived Importance of Information Needs (PLNS)	MUIS – total scale internal consistency reliability was 0.80. PLNS – Cronbachs alpha coefficient of 0.96.	Moderate uncertainty related to the surgical experience; higher uncertainty for patients with more education ($p = 0.02$); positive correlation with longer hospitalization ($p < 0.01$); symptom distress correlated with longer hospitalization ($p < 0.01$)
Mishel, 1984	Descriptive correlation design; 5th day of hospitalization	100 medical patients selected from a Veterans Administration Hospital	Uncertainty (28-item MUIS), Stress (Hospital Stress Rating Scale-HSRS)	Not reported for this study	Lack of information correlated with uncertainty ($p < 0.001$); education level not correlated with uncertainty ($p > 0.05$)
Wong & Bramwell, 1992	Descriptive correlational study using convenience sample of women who underwent mastectomy 1 to 2 days prior to discharge and 1 to 2 weeks post discharge	25 women who underwent mastectomy	Uncertainty (28-item MUIS) only 23-items used for hypothesis testing; State-Trait Anxiety Inventory (STAI) and semi-structured interviews which focused on understandings of illness, major concerns, coping, sources of anxiety and view of the future	Coefficient alphas: MUIS - 0.92 for 28-item and 0.91 for 23-item at T1. At T2 0.86. STAI - 0.91 for S-anxiety scale and 0.92 for T-anxiety scale at T1. 0.91 for S-anxiety at T2	Significant relationships between uncertainty and its subscales of ambiguity and complexity and state anxiety at T2; limitation: small convenience sample

Table 4: ***Quantitative Studies on Credible Authority and Uncertainty***

Author/Date	Study Design (sampling, measurement interval)	Characteristics of the Sample and the Setting	Variables	Measures, reliability and validity	Relevant Outcome(s)/ Limitations
Borgers et al., 1993	Sample of cancer outpatients before (Interview 1), during (Interaction) and after (Interview 2) consultation with cancer specialist	60 cancer outpatients patients from the Netherlands	Interview 1: intention to seek information (measured for 6 topics), fear and uncertainty (13 items), satisfaction with information received (9 statements). Interaction: measure of information-seeking behavior (question asking and initiation of discussion of certain topics. Interview 2: self-reported information seeking behavior (measured using the question, Did you ask questions or discuss.... with your specialist?)	Cronbachs alpha for the scales were: fear (0.89), uncertainty (0.93), and satisfaction (0.77).	Intention was correlated with patient's uncertainty ($r = 0.73$), fear of disease ($r = 0.35$) and dissatisfaction with information received ($r = -0.28$). Uncertainty is a factor that may stimulate patients to seek information from the specialist. Reasons for seeking information are influenced by conditions such as: knowing what is important to discuss, a need to discuss certain topics with the specialist and being convinced about the advantages of information seeking.
Mishel & Braden, 1988	Descriptive correlational design of women undergoing treatment for gynecological cancer who had previously consented to a 3 phase longitudinal study; 2 weeks following surgery, during 3rd week of treatment for chemo, during 4^{th} week radiation treatment, and 3 months into treatment for radiation and chemotherapy	61 women undergoing treatment for gynecological cancer	Symptom pattern (single item on demographic form); social support (NSSQ); credible authority (Health Care Orientation) subscale of the Psychological Adjustment to Illness scale (PAIS); Uncertainty (34-item MUIS)	MUIS - total scale alpha coefficient was 0.93. All other measures valid and reliable.	Credible authority did not aid in interpreting symptom pattern. Credible authority was found to be a strong predictor of uncertainty ($p < 0.01$). The physician as credible authority had a direct effect on uncertainty.

Author/Date	Study Design (sampling, measurement interval)	Characteristics of the Sample and the Setting	Variables	Measures, reliability and validity	Relevant Outcome(s)/ Limitations
Molleman et al., 1984	Sample of cancer patients	418 cancer patients	Uncertainty (3 multiple choice questions developed by the researchers); Anxiety (STAI); coping (18 ways listed based on a review of the literature	Not reported in this study	Contact with experts helped reduce uncertainty while contact with non-experts helped reduce anxiety
Van Den Borne et al., 1987	Quasi-experimental non-equivalent control group design; consecutive sample of patients with cancer; 3 week consecutive period (T1) and 18 months later	369 patients with either breast cancer or lymphoma; 15 medical across the Netherlands	Depression (Zung-Depression Scale); anxiety (Speilberger State Anxiety Scale; Symptoms (Rotterdam Symptom Checklist); Instruments developed by the researchers to measure uncertainty, cancer specific fear and openness to discuss illness in the family	Cronbachs alphas for the scales ranged from 0.69 to 0.95 at T1, and from 0.66 to 0.94 at T2.	Significant interaction effect between two uncertainty variables and the 3 factors: type of cancer, contact with fellow sufferers, and perceived amount of information from doctor ($p < 0.01$)

Table 5: ***Quantitative Studies on Patient Outcomes: Physical and Mental Health Functioning***

Author/Date	Study Design (sampling, measurement interval)	Characteristics of the Sample and the Setting	Variables	Measures, reliability and validity	Relevant Outcome(s)/ Limitations
Allen et al., 1990	Longitudinal correlational study; male patients; 1 month and 6 months post-CABG surgery	125 men who underwent first time CABG surgery at a major medical center in the U.S.	Physical, social, leisure and psychological functioning as measured by the Functional Status Questionnaire (FSQ)	Internal consistency reliability for 5 subscales in the range of 0.64 – 0.91	Physical, social and leisure functional status outcomes at 6 months were good. Thirteen percent reported important functional status difficulty at 6 months; findings difficult to compare to other studies because instruments, sample and time periods defined differently.
Barnason et al., 2000	Prospective repeated measures design; CABG surgery patients at 3, 6 and 12 months	51 patients from a community hospital and regional cardiac referral center	Functional status outcomes using the SF-36; reported results of 8 subscales	Did not report internal consistency reliability for the 8 subscales	Improvements in physical and mental health functioning after CABG surgery; all dimensions improved from preoperative levels at 3 months and stabilized or gradually improved at 6 and 12 months. 12 month scores were in the range of 71.77 to 96.11.

Author/Date	Study Design (sampling, measurement interval)	Characteristics of the Sample and the Setting	Variables	Measures, reliability and validity	Relevant Outcome(s)/ Limitations
Ross & Ostrow, 2001	Descriptive, comparative repeated-measures design; convenience sample of adult patients undergoing CABG surgery at 3 time periods: before surgery, 6 weeks after and 3 months after CABG surgery	32 adult patients undergoing CABG surgery at 2 cardiovascular affiliated service hospitals.	Quality of life (QLI); mood state (POMS); and physical and mental functioning and well being (SF-36)	QLI - test-retest reliability coefficient of 0.87 for healthy population and 0.81 for an ill population; POMS - 0.90; SF-36 – no reliabilities reported.	Patients perceptions of physical and psychological well-being in the areas of mood, physical functioning, vitality, and social functioning improved significantly from before surgery. A limitation was the large number of questions patients had to answer and the time required to complete the data.

Table 6: ***Quantitative Studies on Acute Care Nursing Practitioners and Patient Outcomes***

Author/Date	Study Design (sampling, measurement interval)	Characteristics of the Sample and the Setting	Variables	Measures, reliability and validity	Relevant Outcome(s)/ Limitations
Mundinger et al., 2000	Randomized trial with patients randomly assigned to nurse practitioners or physicians for primary care follow-up and ongoing care after an emergency department visit or urgent care visit; patient interviews at 6 months and health services utilization data recorded at 6 months and 1 year.	1316 patients randomized to a nurse practitioner (n = 806) or physician (n = 510)	Health status (SF-36); patient satisfaction (15-item satisfaction questionnaire used in MOS); physiologic measures (taken by research nurse); and utilization data	Established instruments	Overall health status improved from baseline to follow-up and the improvement was statistically significant. There was no significant difference between the patients assigned to nurse practitioners and physicians on any scale of the SF-36 in the composite scores.
Piorio et al., 2001	Randomized clinical trial of NP-based care vs. traditional house staff care for resource use and outcomes of general medical patients at discharge and 6 weeks after discharge	Medical patients aged 18-69 randomly assigned to NP based care (n = 193) or house staff care (n = 188) in a 947-bed private, non-profit teaching hospital.	Length of stay, charges, costs, consultations, complications, transfers to intensive care, 30-day mortality, patient assessments of care, and changes in activities of daily living, SF-36 scores and symptom severity	Not reported	Secondary outcomes such as functional status, health status and symptom severity generally improved between admission and discharge and/or between admission and 6 weeks and changes were similar ($p > 0.1$) for patients receiving NP-based care and housestaff care.

Author/Date	Study Design (sampling, measurement interval)	Characteristics of the Sample and the Setting	Variables	Measures, reliability and validity	Relevant Outcome(s)/ Limitations
Rudy et al., 1998	Descriptive, comparative study using a longitudinal design with 4 data collection points in a 14-month period comparing activities of ACNPs and physician assistants and the outcomes of their patients with a matched group of resident physicians	16 ACNPs and physicians and a matched group of resident physicians at 2 academic medical centers in the U.S.	Activities and tasks related to care of patients recorded in log diaries; seven clinical outcomes: length of stay; in-hospital mortality; occurrence of a transfusion reaction; occurrence of a drug reaction; complications with an invasive procedure; completeness of the admission note and readmission to ICU within 48 hours or the hospital with same or related diagnoses within 2 weeks.	Established instruments	Patient outcomes similar for both groups with the tasks and activities performed by both groups being similar.

Appendix B: Permission to Discuss Study With Patients

MEMORIAL UNIVERSITY OF NEWFOUNDLAND
SCHOOL OF NURSING

Permission to Discuss Study with Patients

There is a special nurse who works with your surgeon who will see you before your surgery and who will be responsible for your care when you return from surgery to 5 South A.

Two researchers are interested in your experience following surgery and while you are under the care of this special nurse. They are doing a study to find out how people who have heart surgery manage once they go home, and also how people feel about the care these special nurses provide.

Do I have your permission to allow one of the researchers, Cathy Burke, to come and talk to you about the study?

Eligible Patients:

(1) CABG surgery patients

(2) Re-do of CABG

August 30, 2000
/mcp

Appendix C: Consent to Participate

Memorial
University of Newfoundland

School of Nursing

Consent to Participate in a Research Study
Patient Consent Form

Title: Evaluating the Impact of Nurse Practitioners in Acute Care Settings

Investigators in St. John's:

Sandra LeFort, School of Nursing, Memorial University of Newfoundland
Souraya Sidani, Faculty of Nursing, University of Toronto
Cathy Burke, Health Care Corporation of St. John's and Master of Nursing Student, Memorial University of Newfoundland

I am being asked to participate in a research study. Participation in this study is entirely voluntary.

This study is conducted by a team of researchers led by Dr. S. LeFort and Dr. S. Sidani. The Newfoundland portion of the study is funded by the General Hospital Health Foundation, St. John's.

Purpose of the study:

The study attempts to examine the effects of the services offered by nurse practitioners and clinical nurse associates on the care of clients, and on the cost of care in acute care hospitals.

Description of research:

I understand that participation will involve answering questions about my health, the care I received during my stay in the hospital, and my ability to carry on with my life after leaving the hospital. This will take place at three time periods after my surgery: within 48 hours of returning to 5 South A, Health Sciences Centre; at about one week of being discharged from the hospital; and, within 6 to 8 weeks of being discharged from the hospital. Answering the questions in hospital after my surgery will take about 20 minutes and between 20 and 30 minutes at one week and 6 weeks at home. .

I understand that I will be contacted by telephone by a research assistant to complete the questionnaires at about one week and at 6-8 weeks after discharge from the hospital. It is possible that I may complete the questionnaires by mail if I prefer. All mailing costs will be covered by the research project.

I also understand that researchers will collect information from my health record about my medical condition, about the medications and other treatments I received during my hospital stay, and about the tests such as blood tests and X-rays that I had during my hospital stay, and about how long I stayed in the hospital.

Confidentiality:

I understand that only the researchers will have access to my name and address, and that information about me will be kept locked and will not be disclosed to anyone; it will be destroyed once the study is completed. I understand that my name will not be recorded with my answers or identified in any report that may be published. Code numbers will be used on all the forms I complete.

I understand that I am free to withdraw from the study at any time or refuse to answer any specific questions; this decision will not affect my care in any way.

I understand that I will not directly benefit from participating in this study. However, there are no known risks in participating in this study. The results will inform the investigators about the services provided by nurse practitioners and how the services may benefit patients. This may influence the development of the nurse practitioner role in the future.

Liability statement:

Your signature indicates your consent and that you have understood the information regarding the research study. In no way does this wave your legal rights nor release the researchers from their legal and professional responsibilities.

Signature Page

Title of Project: Evaluating the Impact of the Nurse Practitioner in Acute Care Settings

Name of Principal Investigator: Dr. Sandra LeFort and Dr. Souraya Sidani

To be signed by participant

I, , the undersigned, agree to my participation in the research study described above.

Any questions have been answered and I understand what is involved in the study. I realise that participation is voluntary and that there is no guarantee that I will benefit from my involvement.

I acknowledge that a copy of this form has been given to me.

(Signature of Participant) (Date)

(Signature of Witness) (Date)

To be signed by investigator

To the best of my ability I have fully explained the nature of this research study. I have invited questions and provided answers. I believe that the participant fully understands the implications and voluntary nature of the study.

(Signature of Investigator) (Date)

Phone Number

Appendix D: Explanation of the Study to Patients (by RA)

EXPLANATION OF THE STUDY TO PATIENTS (BY RA)

My name is _____ (Cathy Burke or the name of the Research Assistant). I am working on the study that the nurse (name) told you about.

The study is conducted by a group of researchers from Memorial University School of Nursing and University of Toronto Faculty of Nursing. The study will examine the type of services provided by nurses who have an expanded role in cardiac care. These nurses are called Nurse Practitioners or Clinical Nurse Associates. The study will examine the benefits these nurses bring to the care of patients in hospital. It will also examine how you are doing once you leave the hospital and go back home.

The study will involve about 80 patients who undergo heart surgery and who receive care from Nurse Practitioners working on 5 South A.

If you agree to take part in this study, you will be asked to answer questions about your health, the care you received during your hospital stay, and your ability to carry on with your life activities after you leave the hospital. Answering these questions takes about 20-30 minutes. I will ask you to answer these questions three times **after** your surgery: within 48 hours of being back on 5 South A; within a week of being discharged from the hospital (i.e., of going home); and 6-8 weeks later.

If you agree, we will also collect information from your health record. The information relates to your medical condition, the type of medication and treatments you received during your hospital stay, the type of tests such as blood tests and X-Rays that you had, and how long you stayed in the hospital.

If you are willing to volunteer for this study, a research assistant will contact you after you leave the hospital. She can call you at a time that is convenient to you, and she will ask you the questions on the phone. This will take about 20-30 minutes. She will record your answers as you give them to her. You will receive a copy of the questionnaire to make it easier for you to follow the questions that will be asked during the phone call.

If you prefer, we can mail the questionnaire to your home address. You could answer the questions at your convenience and return the completed questionnaire in a stamped return envelop that we will provide. All mailing costs will be paid by the researchers.

Only the researchers will have access to your name and address, and I assure you that this information will be kept locked in a filing cabinet at the School of Nursing, Memorial University of Newfoundland. The information will not be disclosed to anyone. We will destroy it by shredding the papers, once the study is completed.

Your name will not be recorded on any form you complete nor will it be identified in any report that may be published. We will use code numbers on all the forms.

I have to remind you that:

1. You are free to decide whether or not you would like to voluntarily participate in this study. I will not inform the doctors or nurses of your decision, and whatever your decision is, it will not affect the care you receive, in any way.

2. You are also free to withdraw from the study at any time and to refuse to answer any question. This decision will not affect your care in any way.

3. You will not directly benefit from taking part in this study.

4. There are no known risks for taking part in this study.

5. The results of this study will provide information about the services provided by nurse practitioners and how the services may benefit patients. It may also help us provide better services to patients undergoing heart surgery in the future.

Do you have any questions about the study?

If you are willing to participate, please read carefully the consent form and sign it.

Appendix E: Patient Demographic Form

Section 1: Patients' Demographics Form

Instructions: Please provide the following information about yourself, by circling the number associated with the most appropriate response or by writing your answer in the space provided.

What is your age: _____ Years

Are you a:
1. Female
2. Male

What is the highest education you attained:

1. Less than high school
2. Some high school
3. High School Graduate
4. On-the-job training
5. Formal technical training
6. Some college
7. B.S./B.A.
8. M.S./M.A.
9. Ph.D.

Are you:

1. Single
2. Engaged
3. Separated
4. Divorced
5. Married/cohabitating
6. Widowed

Are you currently:

1. Going to school
2. Not employed
3. Working on a part-time basis
4. Working on a full-time basis
5. Retired

What is your ethnic background?

_____

Appendix F: Medical/Surgical History Form

ACUTE CARE NURSE PRACTITIONER STUDY

MEDICAL/SURGICAL HISTORY FORM

Medical Condition Form

Location: _____

Patient Medical Record Number (MRN): _____

Patient Code: _____

Date: _____

Primary medical diagnosis:

_____

Other medical diagnoses:

_____

_____

_____

_____

_____

_____

Number of bypass grafts: _____

Appendix G: Symptom Distress Scale

Section 1: Symptom Distress Scale

Instructions: Individuals may experience any of the following symptoms during an illness episode. Please, indicate the extent to which you have experienced each of the listed symptom during the past two days, by circling the most appropriate number ('0' means that you have not experienced the symptom; '5' means that you have experienced the symptom and it was very severe).

In the past **two days**, to what extent have you experienced each of the following?

Symptom	Level of severity					
	Not at All					Very much so
Pain	0	1	2	3	4	5
Fatigue (feeling tired)	0	1	2	3	4	5
Weakness	0	1	2	3	4	5
Nausea	0	1	2	3	4	5
Confusion	0	1	2	3	4	5
Insomnia (difficulty sleeping)	0	1	2	3	4	5
Difficulty breathing while doing some activity such as walking	0	1	2	3	4	5
Difficulty breathing while sitting or laying in bed	0	1	2	3	4	5
Vomiting	0	1	2	3	4	5
Chest pain	0	1	2	3	4	5
Fever	0	1	2	3	4	5
Headache	0	1	2	3	4	5
Difficulty walking/moving around	0	1	2	3	4	5

Symptom	Level of severity					
	Not at All					Very much so
Diarrhea	0	1	2	3	4	5
Constipation	0	1	2	3	4	5
Difficulty concentrating	0	1	2	3	4	5
Leakage of urine	0	1	2	3	4	5
Difficulty urinating (starting and/or maintaining the flow of urine)	0	1	2	3	4	5
Poor appetite	0	1	2	3	4	5
Shortness of breath	0	1	2	3	4	5
Other, specify: _____	0	1	2	3	4	5

Appendix H: Coordination of Care Scale

Section 4: Services

This section relates to **activities performed by the nurse practitioners or clinical nurse associates** who looked after you while you were on 5 South A . Their names are One or more of them may have been responsible for the management of your condition along with your doctors.

Instructions: The following are general statements about patient care in hospitals. Please circle the number of the response that best reflects your judgement about the care on this unit.

1. The nurse practitioner was aware of all the treatments I received during my hospital stay.

Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
1	2	3	4	5

2. Things went smoothly during my hospital stay.

Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
1	2	3	4	5

3. There were unnecessary delays in getting the medications or treatments I needed.

Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
1	2	3	4	5

4. There were unnecessary delays in getting the tests I needed done.

Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
1	2	3	4	5

5. There were unnecessary delays in sending me home.

Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
1	2	3	4	5

6. The teamwork of all hospital staff who took care of me helped in getting the treatments I needed on time.

Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
1	2	3	4	5

7. The explanations about tests, treatments, and what to expect that I received from hospital staff were consistent.

Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
1	2	3	4	5

Appendix I: Patient Participation Scale

Instructions: The following statements describe activities that nurse practitioners (. . . .) do to involve you or your family member in your care. Please, rate the extent to which these statements reflect your experience with the nurse practitioner responsible for the management of your condition.

Circle the appropriate number, where

'0' means that the statement does not reflect your experience at all and
'5' indicates that it very much reflects your experience.

There are no right or wrong answers.

Statements	**Not at all**					**Very much so**
The nurse practitioner involved my family member/significant other in making decisions about my care	0	1	2	3	4	5
The nurse practitioner involved my family member/ significant others in providing care to me	0	1	2	3	4	5
The nurse practitioner involved me in making decisions about my care	0	1	2	3	4	5
The nurse practitioner listened to what I have to say regarding my care	0	1	2	3	4	5
The nurse practitioner involved me in my care	0	1	2	3	4	5

Appendix J: Uncertainty in Illness Scale

Note: Only 28 items of this 33-item scale were used in this study. Items 12, 21, 25, 27 and 30 were not used, as per Mishel's instructions (Mishel, 1997).

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 what is 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 illness is getting better or worse.

Strongly Agree (5)	Agree (4)	Undecided (3)	Disagree (2)	Strongly Disagree (1)
____	____	____	____	____

4. It is unclear how bad my pain 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 (1)	Agree (2)	Undecided (3)	Disagree (4)	Strongly Disagree (5)
____	____	____	____	____

7. When I have pain, I know what this means about my condition.

Strongly Agree (1)	Agree (2)	Undecided (3)	Disagree (4)	Strongly Disagree (5)
____	____	____	____	____

8. I do not know when to expect things will be done to me.

Strongly Agree (5)	Agree (4)	Undecided (3)	Disagree (2)	Strongly Disagree (1)
____	____	____	____	____

9. My symptoms continue to change unpredictably.

Strongly Agree (5)	Agree (4)	Undecided (3)	Disagree (2)	Strongly Disagree (1)
____	____	____	____	____

10. I understand everything explained to me.

Strongly Agree (1)	Agree (2)	Undecided (3)	Disagree (4)	Strongly Disagree (5)
____	____	____	____	____

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

Strongly Agree (5)	Agree (4)	Undecided (3)	Disagree (2)	Strongly Disagree (1)
____	____	____	____	____

12. I can predict how long my illness will last.

Strongly Agree (1)	Agree (2)	Undecided (3)	Disagree (4)	Strongly Disagree (5)
____	____	____	____	____

13. My treatment is too complex to figure out.

Strongly Agree (5)	Agree (4)	Undecided (3)	Disagree (2)	Strongly Disagree (1)
____	____	____	____	____

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

Strongly Agree (5)	Agree (4)	Undecided (3)	Disagree (2)	Strongly Disagree (1)
____	____	____	____	____

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

Strongly Agree (5)	Agree (4)	Undecided (3)	Disagree (2)	Strongly Disagree (1)
____	____	____	____	____

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

Strongly Agree (5)	Agree (4)	Undecided (3)	Disagree (2)	Strongly Disagree (1)
____	____	____	____	____

17. The course of my illness keeps changing. I have good and bad days.

Strongly Agree (5)	Agree (4)	Undecided (3)	Disagree (2)	Strongly Disagree (1)
____	____	____	____	____

18. It's vague to me how I will manage my care after I leave the hospital.

Strongly Agree (5)	Agree (4)	Undecided (3)	Disagree (2)	Strongly Disagree (1)
____	____	____	____	____

19. I have been given many differing opinions about what is wrong with me.

Strongly Agree (5)	Agree (4)	Undecided (3)	Disagree (2)	Strongly Disagree (1)
____	____	____	____	____

20. It is not clear what is going to happen to me.

Strongly Agree (5)	Agree (4)	Undecided (3)	Disagree (2)	Strongly Disagree (1)
____	____	____	____	____

21. I usually know if I am going to have a good or bad day.

Strongly Agree (1)	Agree (2)	Undecided (3)	Disagree (4)	Strongly Disagree (5)
____	____	____	____	____

22. The results of my tests are inconsistent.

Strongly Agree (5)	Agree (4)	Undecided (3)	Disagree (2)	Strongly Disagree (1)
____	____	____	____	____

23. The effectiveness of the treatment is undetermined.

Strongly Agree (5)	Agree (4)	Undecided (3)	Disagree (2)	Strongly Disagree (1)
____	____	____	____	____

24. It is difficult to determine how long it will be before I can care for myself.

Strongly Agree (5)	Agree (4)	Undecided (3)	Disagree (2)	Strongly Disagree (1)
____	____	____	____	____

25. I can generally predict the course of my illness.

Strongly Agree (1)	Agree (2)	Undecided (3)	Disagree (4)	Strongly Disagree (5)
____	____	____	____	____

26. Because of the treatment, what I can do and cannot do keeps changing.

Strongly Agree (5)	Agree (4)	Undecided (3)	Disagree (2)	Strongly Disagree (1)
____	____	____	____	____

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

Strongly Agree (1)	Agree (2)	Undecided (3)	Disagree (4)	Strongly Disagree (5)
____	____	____	____	____

28. The treatment I am receiving has a known probability of success.

Strongly Agree (1)	Agree (2)	Undecided (3)	Disagree (4)	Strongly Disagree (5)
____	____	____	____	____

29. They have not given me a specific diagnosis.

Strongly Agree (5)	Agree (4)	Undecided (3)	Disagree (2)	Strongly Disagree (1)
____	____	____	____	____

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

Strongly Agree (1)	Agree (2)	Undecided (3)	Disagree (4)	Strongly Disagree (5)
____	____	____	____	____

31. I can depend on the nurses to be there when I need them.

Strongly Agree (1)	Agree (2)	Undecided (3)	Disagree (4)	Strongly Disagree (5)
____	____	____	____	____

32. The seriousness of my illness has been determined.

Strongly Agree (1)	Agree (2)	Undecided (3)	Disagree (4)	Strongly Disagree (5)
____	____	____	____	____

33. The doctors and nurses use everyday language so I can understand what they are saying

Strongly Agree (1)	Agree (2)	Undecided (3)	Disagree (4)	Strongly Disagree (5)
____	____	____	____	____

Appendix K: Permission to Use the MUIS-A Scale

Appendix L: SF-36

Your Health and Well-Being

This survey asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities. ***Thank you for completing this survey!***

For each of the following questions, please mark an ☒ in the one box that best describes your answer.

1. In general, would you say your health is:

Excellent	Very good	Good	Fair	Poor
☐1	☐2	☐3	☐4	☐5

2. <u>Compared to one week ago</u>, how would you rate your health in general <u>now</u>?

Much better now than one week ago	Somewhat better now than one week ago	About the same as one week ago	Somewhat worse now than one week ago	Much worse now than one week ago
☐1	☐2	☐3	☐4	☐5

3. The following items are about activities you might do during a typical day. Does <u>your health now limit you</u> in these activities? If so, how much?

	Yes, limited a lot	Yes, limited a little	No, not limited at all
a Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports	☐ 1	☐ 2	☐ 3
b Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	☐ 1	☐ 2	☐ 3
c Lifting or carrying groceries	☐ 1	☐ 2	☐ 3
d Climbing several flights of stairs	☐ 1	☐ 2	☐ 3
e Climbing one flight of stairs	☐ 1	☐ 2	☐ 3
f Bending, kneeling, or stooping	☐ 1	☐ 2	☐ 3
g Walking more than a mile	☐ 1	☐ 2	☐ 3
h Walking several blocks	☐ 1	☐ 2	☐ 3
i Walking one block	☐ 1	☐ 2	☐ 3
j Bathing or dressing yourself	☐ 1	☐ 2	☐ 3

4. **During the <u>past week</u>, have you had any of the following problems with your work or other regular daily activities <u>as a result of your physical health</u>?**

	Yes	No
a Cut down on the <u>amount of time</u> you spent on work or other activities	☐ 1	☐ 2
b <u>Accomplished less</u> than you would like	☐ 1	☐ 2
c Were limited in the <u>kind</u> of work or other activities	☐ 1	☐ 2
d Had <u>difficulty</u> performing the work or other activities (for example, it took extra effort)	☐ 1	☐ 2

5. **During the <u>past week</u>, have you had any of the following problems with your work or other regular daily activities <u>as a result of any emotional problems</u> (such as feeling depressed or anxious)?**

	Yes	No
a Cut down on the <u>amount of time</u> you spent on work or other activities	☐ 1	☐ 2
b <u>Accomplished less</u> than you would like	☐ 1	☐ 2
c Did work or other activities <u>less carefully</u> than usual	☐ 1	☐ 2

6. **During the <u>past week</u>, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?**

Not at all	Slightly	Moderately	Quite a bit	Extremely
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

7. **How much <u>bodily</u> pain have you had during the <u>past week</u>?**

None	Very mild	Mild	Moderate	Severe	Very Severe
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

8. **During the <u>past week</u>, how much did <u>pain</u> interfere with your normal work (including both work outside the home and housework)?**

Not at all	A little bit	Moderately	Quite a bit	Extremely
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

9. **These questions are about how you feel and how things have been with you during the <u>past week</u>. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the <u>past week</u>...**

	All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time
a Did you feel full of pep?	☐1	☐2	☐3	☐4	☐5	☐6
b Have you been a very nervous person?	☐1	☐2	☐3	☐4	☐5	☐6
c Have you felt so down in the dumps that nothing could cheer you up?	☐1	☐2	☐3	☐4	☐5	☐6
d Have you felt calm and peaceful?	☐1	☐2	☐3	☐4	☐5	☐6
e Did you have a lot of energy?	☐1	☐2	☐3	☐4	☐5	☐6
f Have you felt downhearted and blue?	☐1	☐2	☐3	☐4	☐5	☐6
g Did you feel worn out?	☐1	☐2	☐3	☐4	☐5	☐6
h Have you been a happy person?	☐1	☐2	☐3	☐4	☐5	☐6
i Did you feel tired?	☐1	☐2	☐3	☐4	☐5	☐6

10. **During the <u>past week</u>, how much of the time has your <u>physical health or emotional problems</u> interfered with your social activities (like visiting friends, relatives, etc.)?**

All of the time	Most of the time	Some of the time	A little of the time	None of the time
☐1	☐2	☐3	☐4	☐5

11. How TRUE or FALSE is <u>each</u> of the following statements for you?

	Definitely true	Mostly true	Don't know	Mostly false	Definitely false
a I seem to get sick a little easier than other people	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b I am as healthy as anybody I know	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c I expect my health to get worse	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
d My health is excellent	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Thank you for completing these questions!

Appendix M: Permission to Use SF-36

Subject: Permission to Use
Date: Tue, 4 Apr 2000 10:42:00
From: Pam Gagnon <pgagnon@qmetric.com>
Organization: QualityMetric, Inc.
To: hcc.burca@hccsj.nf.ca

Tuesday, April 04, 2000

Cathy Burke
Profesional Practice Coordinator-Nursing
Health Care Corporation St. John's
Professional Practice-Nursing
7th Floor, Southcott Hall
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Canada

Regarding your project: Uncertainty in Cardiac Surgery Patients

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Sincerely,

John E. Ware, Jr., Ph.D.
President and Chief Executive Officer
QualityMetric, Inc.

Executive Director, Health Assessment Lab

Research Professor of Psychiatry
Tufts University School of Medicine

Adjunct Professor of Health and Social Behavior
Harvard University School of Public Health

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Appendix N: Approval From Human Investigation Committee

Appendix O: Correlations of Physical Health (PCS) and Mental Health (MCS) with the 8 Subscales of the SF-36

	PCS		MCS	
	T2	**T3**	**T2**	**T3**
PF	.76	.77	.04	.12
RP	.65	.77	.31	.07
BP	.63	.75	.16	.11
GH	.46	.72	.34	.10
VT	.72	.60	.34	.22
SF	.41	.39	.55	.46
RE	.11	.08	.85	.77
MH	.31	.11	.51	.41

Appendix P: Intercorrelations of Study Variables at T2 and T3 (n = 51)

	SDS1	SDS2	SDS3	CCS	Education	PPS	MUIS1	MUIS2	MUIS3	PCS2	PCS3	MCS2	MCS3
SDS1	1.00												
SDS2	.24	1.00											
SDS3	.07	.53**	1.00										
CCS	-.17	-.38**	-.09	1.00									
Education	.29*	.05	.22	-.27	1.00								
PPS	-.16	-.29*	-.10	.43**	-.12	1.00							
MUIS1	-.03	-.48**	.38**	-.22	-.11	-.20	1.00						
MUIS2	-.02	.44**	.16	-.44**	-.11	-.27	.55**	1.00					
MUIS3	-.11	.52**	.64**	-.24	-.02	-.18	.64**	.50**	1.00				
PCS2	-.14	-.41**	-.46**	.05	-.22	.11	-.16	-.12	-.26	1.00			
PCS3	-.20	-.46**	-.68**	.08	-.21	.14	-.39**	-.14	-.51**	.72**	1.00		
MCS2	-.26	-.34*	-.29*	.32*	.00	-.04	-.32*	-.29*	-.41**	-.14	.12	1.00	
MCS3	-.29*	.08	-.04	.06	.03	-.18	-.15	-.08	-.08	-.31*	-.25	.41**	1.00

* $p \leq 0.05$; ** $p \leq 0.01$