THE EFFECT OF PRE-OPERATIVE PAIN-EDUCATION ON SELECTED POST-OPERATION OUTCOMES IN PATIENTS UNDERGOING URGENT CORONARY BYPASS SURGERY

BY

Anna Fedorowicz

A Thesis
Submitted to the Faculty of Graduate Studies
In Partial Fulfillment of the Requirements for the Degree of

MASTER OF NURSING

Faculty of Nursing
University of Manitoba
Winnipeg, Manitoba, CANADA

THE UNIVERSITY OF MANITOBA

FACULTY OF GRADUATE STUDIES

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ABSTRACT

Coronary artery disease remains a leading cause of death in North America. Coronary artery bypass graft (CABG) surgery is a common therapeutic modality when medication does not relieve angina and when coronary angioplasty is not suitable. The CABG procedure is a major surgical intervention resulting in moderate to severe acute pain. Uncontrolled pain is a potentially dangerous problem, particularly for urgent CABG surgery patients. Patient misconceptions influencing the pain experience and leading to ineffective pain management for urgent CABG should be identified and corrected. No known study had previously addressed this clinical research gap.

This randomized clinical trial aimed to compare standard care to an experimental pre-operative pain-education intervention. A sample of 72 urgent CABG surgery patients, 59 male and 13 female, was randomized into two groups. Specific patient outcomes were evaluated, namely pain, anxiety, barriers to pain management, and length of stay. The Symptom Management Model guided the research. Compared to patients receiving standard care, patients receiving the pain-education intervention reported significantly less interference from pain during daily activities, a greater reduction in anxiety and distress pre to post surgery, fewer perceived barriers to pain management, and a shorter length of stay and, although not statistically significant, lower pain intensity and better pain relief from analgesia.

This study supports and extends previous research in pain management of the acute cardiac surgical patients, and underscores the importance of pain education

intervention. Study results will guide clinical practice recommendations targeting pre-operative patients' programs in the urgent CABG patient population.

ACKNOWLEDGEMENTS

It is with deep appreciation that I would like to recognize the many individuals who were supportive through all phases of my research. I thank each one of you.

Dr. Diana McMillan, my thesis committee chairperson, I thank you for taking me under your wing, and your support throughout the entire project. Your logical approach, enthusiasm, and much needed sense of humour helped me complete this project. Thank you for sharing your research expertise, and expanding my understanding of the research process.

Dr. Barbara Naimark, my internal committee member, I thank you for your expertise with the use of the theoretical framework that guided this research. Your promptness in returning valuable feedback is truly remarkable, as is your meticulous attention to detail, which positively impacted this project.

Dr. S. Kowalski, my external committee member, I thank you for your expert advice, support, and interest during the entire project.

I also wish to extend a heart-felt thank you to the study participants, who so willingly shared their pain-experiences with me.

Finally, I would like to acknowledge my husband, John Fedorowicz, who has been with me through every step of this, at times trying, experience. I have drawn on his intellect, understanding, patience, and time. I would like to extend a special thank you to my lovely daughters, Natalie and Jacqueline, who always believed in me, were supportive, and understood their mother's experiences.

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CHAPTER ONE

Statement of the Problem

Introduction

Coronary artery disease (CAD) remains a leading cause of death in North America (American Heart Association, 2001). Coronary artery bypass graft (CABG) surgery is a common therapeutic modality when medication does not relieve angina and when percutaneous transluminal coronary angioplasty (PTCA) is not suitable (Koivula, Paunonen-Ilmonen, Tarkka, Tarkka & Laippala, 2001). The CABG procedure is a major surgical intervention resulting in moderate to severe post-operative pain (Nelson, Zimmerman, Barnason, Nieveen & Schmaderer, 1998; Watt-Watson & Stevens, 1998).

Post-operative pain (also known as acute pain) is one aspect of the body's response to surgical trauma. Specific to CABG surgery, the patients' pain is the most common and anticipated problem related to the surgical intervention (Nelson et al., 1998). CABG surgery involves many pain-sensitive structures during sternotomy, harvesting saphenous veins, manipulations and retractions required in the dissection of the internal mammary artery from the chest wall (Watt-Watson, Stevens, 1998). Post-operative procedures associated with CABG surgery, such as chest tube or pacing wire removal, may also result in moderate to severe pain (Watt-Watson & Stevens).

Uncontrolled pain may be a barrier to recovery for patients who have undergone CABG surgery (Chito Gujol, 1994). There are many factors contributing to inadequate pain control, including gaps in patients' knowledge on pain and pain management, existing misconceptions such as the belief that "pain is

an inevitable consequence of aging and should be expected after surgery" (Celia, 2000, p. 10), and controversies such as fear of opioid addiction (Celia, 2000). A review of the literature generated only a limited body of research concerning the effect of pre-operative pain-education on elective CABG surgery outcomes, and no studies were found concerning outcomes following pre-operative pain-education for urgent CABG surgery patients. Usually overall health in individuals in the "high risk" or urgent category is more compromised than individuals in the elective category, and pain management in these patients may be more challenging. Pain management strategies may be even more significant in patients categorized as urgent or "high risk" cases, as their overall condition may be more compromised than their elective counterparts. The focus of this study therefore, is to examine the impact of pre-operative pain-education on urgent CABG surgery outcomes.

Significance of the Problem

Uncontrolled post-operative pain is a universal and potentially dangerous problem, particularly for urgent CABG surgery patients. To understand the significance of the problem it is important to know the trends in urgent CABG surgery rates, the criteria for urgent revascularization, and the effect of age on pain management in urgent CABG surgery patients. As a growing number of CABG procedures are performed each year nationally and provincially, it is imperative to recognize the psychological, physiologic, and economic consequences of inadequately treated acute pain.

Trends in Urgent CABG Surgery Rates

Currently, a growing number of CABG procedures are performed each year in the United States and Canada (Parent & Fortin, 2000). In Manitoba, a similar increase in the rate of CABG surgeries has been reported. As the rates for elective CABG surgeries increase, the incidence of urgent CABG surgeries rises as well. In the fiscal year 2001/2002, 836 CABG (only) procedures were performed at the St. Boniface Hospital (SBGH), of which 179 cases were done on an urgent basis. In the following fiscal year, a total of 863 CABG surgeries were done, of which 160 were urgent cases. In 2003/2004, the CABG surgery rate increased to 1,007 procedures per year, of which 169 (and steadily growing) were performed on an urgent basis (St. Boniface Hospital Cardiac Waitlist Database, June 14, 2004). In the period April 1, 2005 to March 31, 2006, a total of 1,101 surgeries were performed, 235 of which were urgent cases (F. LaBossiere, personal communication, May 1, 2006). The urgent cases represent approximately 20–30 % of all CABG procedures performed at the SBGH (SBGH Cardiac Waitlist Database, June 14, 2004). In summary, the number of CABG surgeries performed each year in Canada and at the SBGH is growing steadily, as is the number of cases categorized as urgent.

Criteria for Urgent Coronary Revascularization

The urgency of the requirements for surgery is generally based on how long the individual can wait for the surgery before serious negative consequences occur (Con, Linden, Thompson & Ignaszewski, 1999). The priority criteria for CABG surgery at the SBGH are established by the Maximum Recommended Wait Time and are categorized into four levels: emergent surgery (needed immediately),

urgent (needed with the maximum recommended wait time between 1 to 14 days), semi-urgent (needed to be done in 15 - 42 days), and elective (needed in 43 - 180 days). The procedure is arranged by the patient's surgeon, and the patient is slated into an available operating time, based on the aforementioned criteria.

The assessment of priority for the coronary revascularization procedure is dependent on the doctors' informed appraisal of patients' symptoms, and on reasonable trials of medical therapy for symptom control (Naylor, Baigrie, Goldman & Basinski, 1990). The main urgency determinants are: severity and stability of symptoms of angina and response to medical therapy, assessment of coronary anatomy based on angiographic studies, and results of non-invasive tests for ischemic risks (i.e., exercise electrocardiography [EKG]) (Naylor et al., 1990). Of the urgency determinants, angina symptoms are of key importance, as is risk of ischemic damage to a large area of the myocardium (Naylor, et al., 1990). In summary, the priority for urgent or "high risk" CABG surgery is based on the overall condition of the patient and his/her associated risk factors, such as age.

Effect of Age on Pain Management in Urgent CABG Surgery Patients

It should be noted that urgent CABG surgery patients tend to be older, and often have pre-existing medical and cardiovascular diseases (Watt-Watson & Stevens, 1998). One of the variables that may contribute to the problem of post-operative pain management in urgent CABG surgery is the patient's age. In general, management of pain among elderly individuals is not adequate and is believed to be less effective than care provided for other groups (Celia, 2000). This is particularly concerning because demographic predictions indicate that the elderly population in Canada is increasing.

According to statistics provided by the Government of Canada (2002), it was estimated that 3.92 million Canadians were 65 years of age or older. The proportion of seniors in the overall population increased from one in twenty in 1921, to one in eight in 2001. As the "baby boomers" age, the seniors population is expected to reach 6.7 million in 2021 and 9.2 million in 2041 (Government of Canada, 2002). In addition, the most rapidly expanding segment of the elderly population is the group above 85 years of age (Government of Canada, 2002). In 2001, over 430,000 Canadians were 85 years of age or older, which is more than twice as many as in 1981, and more than twenty times as many as in 1921 (Government of Canada, 2002). This segment of the population is expected to grow to 1.6 million in 2041 (Government of Canada, 2002). As our population ages, a greater number of individuals are reaching the age when CAD becomes prevalent and will become prime candidates for urgent CABG surgery. As a consequence of these demographic trends, combined with advances in technology and increasing accessibility, the demand for urgent CABG surgeries is expected to continue. Therefore, it is important to improve post-operative pain management in the urgent CABG surgery population to minimize the psychological and physiological consequences of acute pain, which may compromise the patients' overall condition, thereby increasing the cost to the health care system.

Psychological and Physiological Consequences of Pain

Psychologically, a common negative consequence of pain is anxiety, the affective state most closely associated with acute pain (Jacques, 1994). Anxiety stimulates a physiological response involving activation of the autonomic nervous system (Nelson et al., 1998), including arousal of the reticular activating system

and increased awareness of noxious stimuli through cortical activation (Ferguson, 1992). Anxiety may adversely influence anesthetic induction, patient recovery from anesthetics, and may decrease patient satisfaction with the perioperative experience, an outcome measure increasingly used for monitoring quality of patient care (Kindler, Harms, Amsler, Ihde-Scholl, & Scheidegger, 2000).

Specific to CABG patients, a high level of anxiety has been reported in patients awaiting elective surgery (Kuivula, Paunonen-Ilmonen, Tarkka, Tarkka & Laippala, 2002; Nelson et al., 1998). Intense anxiety associated with elective CABG surgery has been reported to alter the perception of and response to pain, and to impede patients' capacity to learn and utilize the information and guidance offered by caregivers (Cupples, 1991; Kuivula et al., 2002; Meeker, Sehrt, Rodriguez & Johnson, 1992). No research was found that examined the effect of anxiety on urgent CABG surgery patients' outcomes. Therefore, this area of research warranted investigation and has been explored in this study.

Physiologically, a consequence of pain's disruptions of the body's homeostatic regulatory systems produces "stress" initiating complex reactions to reinstate homeostasis (Melzack, 1999). These reactions are responsible for several consequences, including: breakdown of body tissue, impaired immune functioning, increased metabolic rate, water retention, and "fight or flight" alarm reaction with autonomic features and negative emotions (Agency for Health Care Policy & Research, 1992). Unrelieved pain from surgery predisposes patients to various adverse responses, including: psychological distress, such as anxiety, confusion and delusions, which can mask the presence of pain; pulmonary conditions such as atelectasis and pneumonia; cardiovascular complications such

as thrombosis (Celia, 2000; Nelson et al., 1998; Watt-Watson & Stevens, 1998; Watt-Watson et al., 2000; Yorke, Wallis, McLean & 2004); and the potential development of chronic pain syndromes (Watt-Watson & Stevens, 1998).

In patients with established heart disease, which may include those requiring urgent CABG surgery, the physiologic response to acute pain may be detrimental to their overall condition. While the mechanisms of sympathetic nervous system (SNS) stimulation and cardiovascular excitation, associated with acute pain, may be tolerated in healthy individuals, they may lead to de-compensation in the already compromised CABG surgery patients (Watt-Watson & Stevens, 1998). For example, common effects of pain include symptoms such as increased arousal, restlessness, increased respiratory rate, shallow breathing and tachycardia (Caunt, 1992; Jackson, 1995; Watt-Watson & Stevens, 1998). Tachycardia and the decreased diastolic filling time associated with an increased heart rate and elevated blood pressure may cause an imbalance between the myocardial oxygen demand and supply, which may lead to myocardial ischemia or infarction (Briggs, 2003; Fitzsimons, Parahoo, Richardson, & Stringer, 2003; Watt-Watson & Stevens, 1998). A rise in the systolic and a fall in the diastolic blood pressure may compromise the blood flow to the coronary arteries and to the cardiac muscle, where it is needed to promote healing after CABG surgery. To reduce cardiovascular demand, treatment of acute pain is critically important for post-operative urgent CABG surgery patients.

In addition, without adequate pain management, patients may also become less compliant with treatment regimens, resulting in a diminished performance of post-operative routines such as deep breathing and coughing, range-of- motion

exercises, and early mobilizing (Celia, 2000; Chito Gujol, 1994; Yorke, Wallis & McLean, 2004). This may lead to complications, which may delay recovery, extend the length of hospital stay (LOS), increase hospital costs and compromise the patients' outcomes (Celia, 2000).

Economic Consequences of Acute Pain

CABG surgery is a costly procedure. In Canada this surgery costs approximately $ 22,000 per patient, and has a significant impact on our health-care system (Watt-Watson, Stevens, Costello, Katz & Reid, 2000). Its cost is compounded by the secondary complications related to unrelieved post-operative pain, which may lead to longer LOS (Celia, 2000; Nelson et al., 1998; Watt-Watson et al., 2000). The rate for one day in the hospital throughout Canada is $ 715 (Arthur, Daniels, McKelvie, Hirsh & Rush, 2000). In summary, the cost of urgent CABG surgery is significant from the patient and economic perspectives, and is predicted to grow, as is the number of urgent CABG procedures performed each year. Therefore, to help minimize the effect of negative psychologic, physiologic and economic consequences of acute pain on urgent CABG surgery patients' outcomes, pain treatment needs to be improved. In addition, satisfaction with pain management should be assessed as one component of a total quality assurance program (Miaskowski, Nichols, Brody & Synold Pharm, 2004), as recommended by the American Pain Society (APS), the AHCPR and the Canadian Pain Society (CPS) (Whelan et al., 2004).

Purpose and Objective

Numerous factors may contribute to the problem of inadequate pain management in urgent CABG surgery patients, including caregiver factors, system factors, and patient factors. While the general surgery literature is replete with evidence related to caregiver and system factors, little research has focused on patient factors. Studies that have explored the patients' perception of their pain experience suggest that patients often hamper their own pain management due to their misconceptions of pain and its treatment, and poor communication of concerns about pain to care providers (AHCPR, 1992; Celia, 2000; Dillon McDonald, McNulty, Erickson & Weiskopf, 2000; Kuperberg & Grubbs, 1997; Pargeon, Hailey, 1999; Redeker, 1993; Watt-Watson et al., 1998; Watt-Watson et al., 2000).

Watt-Watson and Stevens (1998) reported that older and less educated patients are more reluctant to report pain and use analgesia. This is particularly concerning because patients undergoing CABG surgery tend to be older and therefore may be reluctant to report pain and request pain relief (Watt-Watson et al., 1998). Patient misconceptions that may influence the patients' pain experience and lead to ineffective pain management for CABG surgery patients should be identified and corrected. The change cannot occur if patients are not aware of or do not understand the consequences associated with their misconceptions that may influence their pain experience (Scott & Hodson, 1997).

One possible solution to the problem of ineffective pain management may be pre-operative pain-education, targeted at addressing misconceptions that may influence the patients' pain experience and contribute to an escalation of post-

operative pain. Proper pain control may also decrease the patients' anxiety and enhance their abilities to perform effective post-operative exercises, which in turn may prevent complications, improve patients' satisfaction, and decrease the LOS.

To date, very little evidence has been found on research that examined the effect of pre-operative pain-education on CABG surgery patient outcomes. There is no evidence in the literature examining how the urgency of the surgery may influence patients' pain-education interventions' outcomes. Therefore, this study aims to evaluate the impact of one pain-education intervention on urgent CABG surgery patient outcomes, namely, pain, anxiety, barriers to pain management, satisfaction with pain management, and LOS. It was anticipated that the results of this study would be used to formulate recommendations for clinical practice regarding pre-operative patient education programs in the CABG patient population.

Hypotheses

The conducted research is based on the hypothesis that urgent CABG surgery patients selected for a pre-operative pain-education session would better understand the benefits of pain control post-operatively compared with a control group of urgent cases who did not receive pain education. Specifically, it was hypothesized that urgent CABG surgery patients who had pre-operative pain-education would display more favorable outcomes than those in the control group, as demonstrated by:

1. a decreased level of pain, measured by the Brief Pain Inventory (BPI)
2. a decreased level of anxiety, measured by the Visual Analogue Scale (VAS)

3. fewer barriers to pain management, measured by the Barrier Questionnaire (BQ)
4. a higher level of satisfaction with pain management, measured with the Outcome Questionnaire (OQ)
5. a shorter length of stay (LOS), measured by the number of days spent in the hospital following urgent CABG surgery

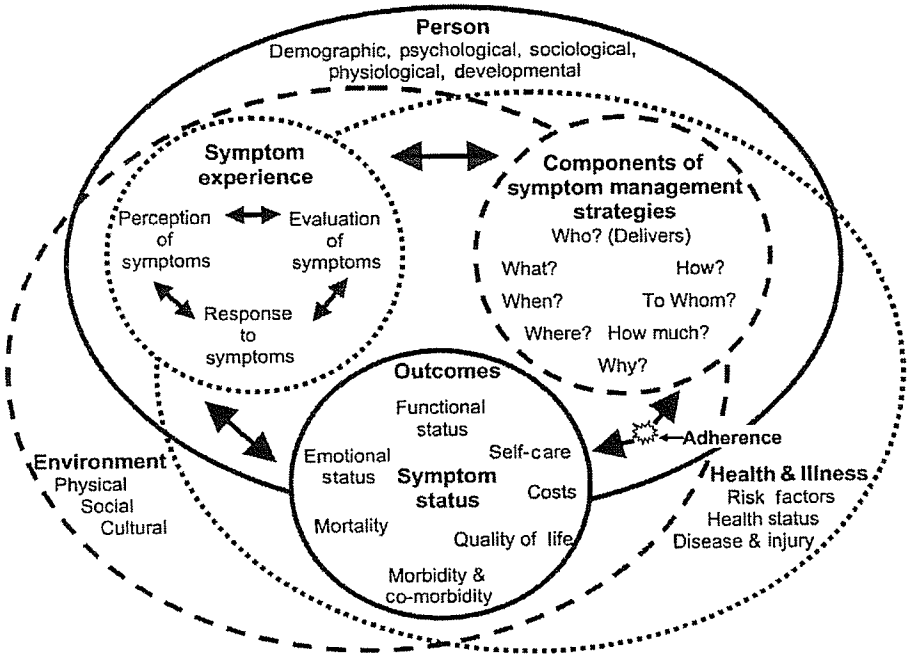
The Symptom Management Model (SMM) (Dodd, Janson, Facione, Faucett, Froelicher, Humphereys, Lee, Miaskowski, Puntillo, Rankin, & Taylor, 2001) was selected to provide an organizing framework to test the proposed hypotheses.

Conceptual Framework

The SMM, focusing on symptom experience, management strategies, and outcomes, was developed in 1994 by the Centre for Symptom Management faculty of the University of California, San Francisco (UCSF, 1994). The model was revised in 2001 (Dodd et al., 2001). The primary assumption of the SMM is that all troublesome symptoms should be managed (UCSF, 1994). Symptoms create distress, disturb social functioning, and are viewed as the primary reasons for people seeking health care (UCSF, 1994). System management is a dynamic process requiring changes in strategies, in response to a patient's acceptance or lack of acceptance of the strategies (UCSF, 1994). The goal of symptom management is to prevent or delay a negative outcome through intervention such as biomedical, professional and self-care strategies (UCSF, 1994). The main focus of the model can be a single symptom, such as acute pain, or a group of associated symptoms.

Symptom management may be challenging for health-care professionals and for patients alike. If the symptom management is too problematic, patients often rely on their own or lay persons' suggestions, which may result in underreporting or inappropriate management of serious symptoms (UCSF, 1994), such as post-operative pain. Therefore, a basic assumption of the model is that effective symptom management requires understanding of its three interrelated dimensions: symptom experience, symptom management, and symptom outcome (UCSF, 1994). These three dimensions of the SMM are influenced or modified by the three domains of nursing science: person, environment, and health/illness (Dodd et al., 2001). All dimensions of the model and the relationships among them are conceptualized in Figure 1.

Figure 1. Revised Symptom Management Conceptual Model



Note. From " Advancing the science of symptom management" by Dodd, Janson, Facione, Faucett, Froelicher, Humphereys, Lee, Miaskowski, Puntillo, Rankin, and Taylor, 2001, Journal of Advanced Nursing, 33(5), p. 670.

Person

As illustrated in Figure 1, person variables are seen to influence the individual's symptom experience, symptom management, and outcomes. Person variables include factors that the individual brings to the situation. They are intrinsic to the way an individual views and responds to the symptom experience (Dodd et al., 2001). In the context of this study, person variables include: age, gender, marital status, education level, personality traits, and culture.

Environment

The environment refers to the aggregate of conditions or the context within which a symptom is experienced, including: physical, social, and cultural environment (Dodd et al., 2001). Environmental variables may influence the individual's symptom experience and the selection of management strategies and outcomes (Dodd et al., 2001). For example, the critical care environment, which consists of alarms, strange noises, and unfamiliar machines and faces, may cause the patients distress, which may exacerbate their pain experience (Ferguson, 1992). Adequately modifying any of the afore-mentioned factors, for example reducing the noise level, may decrease the patient's distress and pain level. Environmental factors will be discussed in greater detail in chapter two.

Health and Illness

This category is comprised of the variables unique to the health or illness of the individual. It includes: risk factors, health status, and disease or injury. In the context of this study, "disease" reflects the severity of angina and "injury" relates to the surgical incisions. Signs of illness or injury, such as acute pain following urgent CABG surgery, are included in this category. Acute pain after

urgent CABG surgery should be anticipated, and may be prevented or diminished through appropriate pre-operative system management strategies.

Symptom Experience

As illustrated in Figure 1, the symptom experience is one of the major components of the SMM. The symptom experience is a dynamic process involving the interactions that may occur among its components, which include: an individual's perception of a symptom, such as acute pain, the evaluation of the meaning of a symptom, and the response to a symptom.

Perception

Perception of a symptom is defined as a conscious, cognitive interpretation of information gathered by the senses in the context of a particular environment or situation (UCCF, 1994). A person can perceive acute pain simply by recognizing the sensation (Dodd et al., 2001).

Evaluation

Evaluation of a symptom refers to judgement patients make about the severity, cause, treatability and effect of the symptom on their lives (UCSF, 1994). The difference between perception and evaluation of a symptom is that evaluation is a "higher order" phenomenon. It involves a higher cognitive process of attaching meaning to the symptom. For example, if an individual believes that the symptom, such acute pain after urgent CABG surgery, is not threatening, the perception of its intensity and response to it may be minimized.

Response

Human responses are defined by Shaver (1985) as "change in human functional dimensions as evidenced by a potential or real change in health status" (p. 189). Examples of responses to a symptom such as acute pain are feelings, thoughts, or behaviours that are secondary to an actual or potential health problem. Responses to symptoms are categorized as physiological, psychological, or behavioural (UCSF, 1994). Understanding the interactions among these responses is essential to effective symptom management (Dodd et al., 2001). An understanding of the symptom experience of patients undergoing urgent CABG surgery may help guide the treatment of acute pain that remains poorly understood.

Symptom Management Strategies

The practice of nursing involves "caring" for people and symptom management is an example of care (Shaver, 1985). Care is defined by Shaver (1985), as an "Assessment and planned change of individuals' functions and/or environments designed to anticipate or facilitate changes in human responses for restoring, maintaining, or promoting health/wellness status" (p. 189).

Symptom management is an approach used by nurses designed to promote patient self-care symptom management abilities (Dodd et al., 2001). Symptom management should influence both the symptom experience and symptom outcomes. The nature of the intervention depends on the state of the science for the particular symptom. For example, little information is available on the impact of pre-operative education on urgent CABG surgery outcomes. Therefore, this study

aims to test how providing patients with pain-education, self-care skills and support may impact on their outcomes.

The success of the system management strategy on symptom outcomes depends on the patient's adherence to the strategy prescribed. Adherence may at times be challenging to patients, as illustrated in Figure # 1 by the broken arrow between the symptom management and outcome. Intervention strategies that are too demanding may be associated with non-adherence.

Symptom Outcomes

As shown in Figure # 1, all outcomes associated with the symptom experience are conceptualized as eight indicators. Each model indicator and its corresponding study-specific indicator are identified as follows: symptom status (level of acute pain); self-care (symptom management ability); costs (expenses associated with the LOS); quality of life (adequacy of pain management); morbidity and co-morbidity (related to acute pain), mortality (potential complications related to unrelieved post-operative pain); emotional status (anxiety level associated with acute pain management); and functional status (affected by the patient experiencing post-operative pain). According to the revised model, outcomes may be related to each other, as well as to symptom status (Dodd et al., 2001). When a symptom is successfully treated the model is no longer relevant, but if the symptom persists, then the model continues to be applicable.

Summary

The SMM was selected to guide this study for several reasons. First, the model is broad and makes it possible to study a symptom, such as the acute pain associated with urgent CABG surgery, in a consistent manner, from both

subjective and objective perspectives (Ahlberg, Ekman, Wallgren, & Gaston-Johansson, 2004). Second, the SMM is patient focused. If pain is defined as "whatever the experiencing person says it is" (McCaffery, 1968, p. 95), then the patient experiencing pain is the expert about his/hers pain experience. Third, the model makes it possible to manage symptoms effectively because three inter-related dimensions are taken into consideration including: symptom experience, symptom management, and symptom outcome (Ahlberg et al., 2004). Fourth, the model provides a comprehensive organizational structure that directs the process of managing symptoms and that can be used to understand and characterize all phases of a symptom under investigation (Caldwell, & Miaskowski, 2000). Lastly, intervention strategies may be initiated even before the individual at risk for the development of the symptom experiences it. For example, to avert or modify anticipated post-operative pain in urgent CABG surgery patients, pain-education intervention may be implemented to influence symptom experience and outcomes before the pain is experienced.

Definition of Terms

As stated earlier, acute pain is also known in the literature as post-operative pain. Throughout this study, both terms will be used synonymously to represent this subjective symptom. While there are many interpretations of the term, McCaffery's (1968) definition of pain as, "whatever the experiencing person says it is and exists whenever he says it does" (p. 95), provides the most useful framework for this study. This definition emphasizes the subjectivity of the pain experience and the importance of accepting the person's self-report of subjective symptom such as acute pain (Watt-Watson et al., 1998).

A symptom is defined as a "subjective experience reflecting changes in the biopsychosocial functioning, sensations, or cognition of an individual" (Dodd et al., 2001, p. 669). In the SMM, signs are included in the assessment of the disease status and evaluation of the effectiveness of management strategies. A sign is defined as, "any abnormality indicative of disease that is detectable by the individual or by others" (Harver & Mahler, 1990). Signs and symptoms are important because they bring problems to the attention of patients and clinicians, and patients should be taught about their importance (Dodd et al., 2001).

Conclusion

Acute pain is a symptom of great significance to urgent CABG surgery patients and to overall health care. A symptom, such as acute pain in urgent CABG surgery patients, cannot be directly observed, perceived or verified, except by the person experiencing acute pain (Larson, Uchinuno, Izumi, Kawano, Takemoto, Shigeno, Yamamoto, & Shibata, 1999). Consistent with this view, the patient should be involved as an active participant in pain management, rather than as a mere recipient of the pain management efforts of the health care providers (Dillon et al., 2000; Watt-Watson et al., 1998). Therefore, it is critically important to provide patients with the information they need to understand pain management and their role in it to achieve a positive outcome. This study's intent was to test the impact of pre-operative pain-education on urgent CABG surgery outcomes. The SMM was used as a framework to guide this study. The examination of all dimensions of the model in the context of the urgent CABG surgery patient has helped to identify gaps in the existing knowledge base, and areas where further research is needed.

CHAPTER TWO

Review of the Literature

Introduction

A review of the literature on acute pain, with the focus on urgent CABG surgery patients, was conducted using the SMM as an organizational framework. A synthesis of viewpoints from the model, as well as research findings that apply to the model and the field of CABG surgery, is presented. The review has been organized into the following categories: domains of nursing science such as person, environment, and health/illness and the three dimensions of the model: symptom experience, symptom management, and symptom outcomes. A definition of acute pain and its mechanism is presented first.

Definition of Acute Pain

To engage in effective symptom management it is important to have a clear definition of the symptom (Larson et al., 1999). While there are many interpretations of the term, McCaffery's (1968) definition of pain as "whatever the experiencing person says it is and exists whenever he says it does" (p.95), provides the most useful framework for this review. This definition emphasizes the subjectivity of the pain experience and the importance of accepting the person's self-report of pain (Watt-Watson & Stevens, 1998). Acute pain has several defining features including: sudden onset, limited duration, decreasing intensity, specific location and an association with a distinct cause (Mitchell & Smith, 1989). This is in contrast to chronic pain, which is long lasting, unpredictable in duration, poorly localized, often of unknown origin, does not respond to many forms of therapy, and causes personality and lifestyle changes (Ready & Laird, 1998).

These definitions of pain, and specifically acute pain, represent the symptom under study.

Mechanism of Pain

According to the SMM, knowledge of mechanisms of the symptom is important before its management can be attempted (Larson et al., 1999). Understanding the mechanism of acute pain will assist nurses in determining the best system management strategy and what essential information and skills the patient will need to have to perform self-care (Larson, et al., 1999). The extent of the information the patient needs depends on the type of information the patient requires to understand the symptom and to achieve a positive outcome (Larson et al., 1999). To facilitate the understanding of acute pain, the mechanism of this symptom will be reviewed.

Physiologic regulatory responses are based on the concept of normative or usual biologic functioning. In a study of acute pain, this leads to an examination of neurotransmitters and activity of neural pathways that serve sensory processing (Mitchell, Gallucci & Fought, 1991). The portions of the nervous system responsible for the sensation and perception of pain are divided into three areas: the afferent pathways, the central nervous system (CNS), and the efferent pathways (Leo & Huenther, 1998). The afferent portion of the system, which terminates in the dorsal horn of the spinal cord, is composed of the pain receptors called nociceptors located in the tissues (Leo & Huenther). The portions of the CNS involved in the interpretation of pain are the limbic system, reticular formation, thalamus, hypothalamus, medulla and cortex (Leo & Huenther). The efferent pathways, which are made of fibers connecting the reticular formation,

midbrain and substantia gelatinosa, are responsible for modulating pain sensation (Leo & Huenter).

The first step leading to the sensation of pain is the activation of nociceptors, by thermal, mechanical or chemical stimuli (McHugh & McHugh, 2000). Only stimulation of fibers connected to nociceptors results in pain (Sorking & Wallace, 1999). The primary afferent fibers at the site of injury release substance P and other neurotransmitters. Tissue damage initiates the inflammatory responses and release of chemical mediators such as histamine, bradykinin and prostaglandins (Jackson, 1995). They act synergistically to augment the transmission of nociceptive impulses along sensory afferent fibers to the dorsal horn of the spinal cord (McHugh & McHugh).

A variety of nerve fibers emerge from the nociceptors, including: A-delta fibers and C fibers (Sherwood, 1997). A-delta fibers, small and myelinated, are associated with sharp localized pain. They transmit the pain impulses quickly and are important in initiating rapid reactions to stimuli (Jackson, 1995). They are involved in the reaction of the body part, which occurs before the individual perceives the pain, and is known as a reflex arc (Leo & Huether, 1998). The neural pathway involved in accomplishing the reflex arc, to and from the spinal cord, is much faster than the transmission of the pain stimulus. C fibers, slower and unmyelinated, are associated with dull and poorly localized pain. Both fibers transmit impulses to the spinal cord, where they form synapses with the secondary neurons in the dorsal horn of the spinal cord (Leo & Huether). From there the information is transmitted to the ventral and lateral horn, crossing to the other side of the spinal cord.

The impulse is carried to the brain through the two divisions of the spinothalamic tract: the neospinothalamic tract for fast pain- producing sharp, prickling sensations, and the paleospinothalamic tract for slow pain- producing dull and burning pain. Two different neurotransmitters are released from afferent pain terminals: glutamate- a major excitatory neurotransmitter that acts on the plasma-membrane receptors on the dorsal horn neurons, and substance P. Substance P activates ascending pain pathways that transmit nociceptive signals to higher levels for further processing (Sherwood, 2001). The neospinothalamic tract carries information to the midbrain, posterior gyrus where the pain is perceived, and the cortex. The paleospinothalamic tract transmits information to the reticular formation, the pons, the limbic system, and the midbrain (Leo & Huether, 1998). According to Sherwood (2001), ascending pain pathways have poorly understood destinations in the somatosensory cortex, the thalamus, and the reticular formation. The role of the cortex in pain perception is not clear, the reticular formation is known to increase the level of alertness associated with the noxious stimuli, and the limbic system appears to be particularly important in perceiving the unpleasant aspects of pain (Sherwood). Interconnections from the thalamus and the reticular formation to the hypothalamus and limbic system elicit the behavioral and emotional responses related to the painful experience (Sherwood).

The efferent pathway is responsible for modulation or inhibition of afferent pain signals. Afferent stimulation of the gray matter, surrounding the cerebral aqueduct in the midbrain, stimulates the efferent pathway. Efferent neurons form synapses with structures in the medulla that inhibit pain through a noradrenergic system. From there the nociceptive impulses are transmitted through the spinal

cord to the dorsal horn to impair or block its transmission with the pain neuromodulators (Leo & Huether, 1998). One type of neuromodulator are endorphins, also called endogenous morphines, which inhibit the transmission of pain impulses in the spinal cord and brain (Leo & Huether). They are classified into: Beta- lipotropin, enkephalin and dynorphin. All endorphines act by attaching to opiate receptors, thus blocking the transmission of pain (Leo & Huether). In much the same way, exogenous opiates relieve pain by attaching to the opiate receptors and augmenting the natural endorphin response (Leo & Huether). Events occurring in the periphery and in the dorsal horn of the spinal cord can cause a dissociation of pain perception from the presence or degree of actual tissue injury (McHugh & McHugh, 2000).

The mechanism of pain is very complex, and some theories of pain have been proposed to describe this phenomenon. The most influential is Melzack and Wall's Gate Control Theory (1965). According to this theory, nociceptive impulses are transmitted, through large A and small C fibers, from specialized skin receptors to the substantia gelatinosa, in the dorsal horn of the spinal cord. There, cells function as a gate, regulating transmission of impulses to the central nervous system (CNS). The gate control mechanism is either opened or closed. Substance P, as an excitory transmitter, opens the gate facilitating the perception of pain (Jackson, 1995, p. 27). Opening the gate allows the transmission of the pain impulse along the spinoreticular and reticularthalamic tracts into the sensory cortex (Jackson). Closing of the gate can be controlled by impulses from within the CNS or A-beta fibers (Jackson). A closed gate decreases stimulation of trigger cells, decreases transmission impulses, and diminishes pain perception (Leo &

Huether, 1998). Persistent stimulation of the large fibers may allow adaptation, which may "open the gate" (Leo & Huether). Adaptation to impulses from large fibers results in a relative increase in small neuron activity, which inhibit cells in the substantia gelatinosa and open the gate (Leo & Huether). An open gate increases the stimulation of trigger cells, increases transmission of impulses, and enhances pain perception (Leo & Huether). In addition to controlling the gate through large and small fiber stimulation, the CNS, through efferent pathways, may close or open the gate (Leo & Huether). Pain, beyond the biologic signal, is pathological. The pathophysiologic responses to pain will be described in the latter part of the SMM discussion.

In summary, the mechanism of acute pain is very complex. It is important however, for nurses to understand the mechanism of acute pain. Understanding the mechanism of acute pain in urgent CABG surgery patients will assist nurses in determining what essential information and communication skills the patients will need to understand to enable them to share their symptom experiences and to achieve a positive outcome (Larson et al., 1999).

Domains of Nursing Science

In the revised SMM, the following three domains of nursing science, person, environment, and health/illness, influence all three dimensions of the model: symptom experience, symptom management, and outcomes. Variables that influence a patient's perception of a symptom mirror the bio-psychosocial factors of person, environment and health/illness.

Person Factors

Demographic characteristics are personal factors that describe the distinctive traits of an individual. Person factors selected for their ability to describe the patient population of interest in this study include: age, gender, marital status, education level, personality traits, and culture.

Age

This variable has been positively related to a higher surgical risk for CABG surgery patients due to pre-surgical comorbidities, more severe CAD (Barnason, Zimmerman, Anderson, Mohr-Burt & Nieveen, 2000), and longer LOS resulting from the patients' overall health and social reasons (Barnason et al., 2000; Cox, 2003). Age is a characteristic that has been extensively studied in relation to pain management. This variable has been related to under-medication of pain, as elderly patients present special challenges for pain management. Researchers have found that older adults are more reluctant than younger individuals to disclose pain or any concerns about treatment and, as a consequence, receive less analgesia (Celia, 2000; Watt-Watson & Stevens, 1998).

Several researchers identified a number of misconceptions and barriers to pain assessment and management in the elderly. For example, some elderly patients think that pain serves a purpose in recovery (Kuperberg & Grubbs, 1997). According to Miaskowski (2000), elderly persons may not complain of pain because they want to be seen as "good patients". Older adults may not ask for analgesia because they believe that everything possible is being done to relieve their pain (Kuperberg & Grubbs). Zalon (1997) found that elderly patients in pain expect their caregivers to take care of their post-operative pain without being told

about it. Another misconception, especially common among older males, is that pain builds character and a certain amount of it should be tolerated without complaint (Kuperberg & Grubbs, 1997; Scott & Hodson, 1997). Elderly patients may fail to report pain and ask for analgesia because they perceive that health care professionals are "too busy" (Miaskowski, 2000) and they do not want to bother the caregivers or take them away from other patients (Kuperberg & Grubbs, 1997; Wider-Smith & Schuler, 1992). Many elderly individuals believe that pain is an inevitable consequence of aging (Miaskowski, 2000) and should be expected and endured after CABG surgery (Celia, 2000).

A number of age-related changes are believed to occur in the body as people age. These include, according to Miaskowski (2000), impairments of hearing or vision, memory or cognitive impairments, and difficulties in articulating or selecting and comprehending certain words. Also, as people age, their ability to clear drugs from the system decreases, creating the problem of drug accumulation and overdosing (Celia, 2000; Miaskowski, 2000). Studies have shown that fear of narcotic overdosing has often been a reason why physicians under-prescribe analgesics, especially opioids, why nurses under-medicate and why patients underreport pain (AHCPR, 1992; Carr, 1997; Celia, 2000). Reduced levels of analgesia, combined with the reluctance to request pain medication, may result in ineffective pain management (Tullmann & Dracup, 2000). Elderly patients may also have concerns about drug addiction, drug toxicity and the side effects of analgesia, preferring to remain in pain rather than experiencing drowsiness or confusion (AHCPR, 1992; Celia, 2000; Donovan & Serlin, 2001; Miaskowski, 2000; Watt-Watson et al., 2000; Watt-Watson & Stevens, 1998; Wider-Smith &

Schuler, 1992). The elderly also have more concerns about their treatment, and generally have higher pain levels (AHCPR, 1992; Carr, 1997; Celia, 2000; Ward, Goldberg, Miller-McCauley, Mueller, Nolan, Pawlik-Plank, Robbins, Stormoen, & Weissman, 1993; Watt-Watson & Stevens, 1998). As Watt-Watson and Stevens (1998) pointed out, patients undergoing CABG surgery tend to be older and may be at risk for inadequate pain management

In summary, misconceptions and barriers to pain assessment and management, and age-related physiological changes, need to be considered in clinical practice and patient education to provide optimal pain management to the elderly.

Gender

This section focuses on gender differences in pain experience. Research consistently indicates that gender differences exist in pain perception (Keogh & Herdenfenfeldt, 2002). CAD has been viewed as a "men's disease" (Con, Linden, Thompson & Ignaszewski, 1999), resulting in a disparity where 71 % of CABG surgeries are performed on men (Carroll, 1995). As nurses care for a greater number of men after having CABG surgery, gender differences in pain perception and response to pain need to be recognized.

Gender differences in perception of pain have been identified in research literature. According to Myers, Riley and Robinson (2003), men respond to pain with embarrassment and are reluctant to disclose it. Gender differences in pain perception have been attributed to a different socialization process between sexes that influences bodily experience and willingness to report pain (Cepeda & Carr, 2003; Harthorne, 1994). Men tend to display their ability to withstand pain as

evidence of being "tough" (Myers, Riley & Robinson, 2003). They are generally considered to be more stoic than women.

Among CABG patients, women tend to report more pain then men (Con, Linden, Thompson & Ignaszewski, 1999). There is consistent research evidence to support the contention that women have lower pain thresholds than men (Keogh & Herdenfenfeldt, 2002; Myers, Riley & Robinson, 2003; Ramirez-Maestre, Lopez & Esteve, 2004) and that women require 30 % more morphine to achieve a similar degree of analgesia compared with men (Cepeda & Carr, 2003). Pain threshold is defined as the lowest level of pain a person can recognize, and pain tolerance is the greatest level of pain a person can tolerate (Puntillo & Weiss, 1994). Women also report a greater magnitude of pain sensations, which they are better able to describe. In addition, women respond to pain with anxiety and are more emotionally expressive (Celia, 2000; Myers, Riley & Robinson, 2003; Puntillo & Weiss, 1994). As a result, women are often viewed as more prone to dramatize pain complaints and tend to receive more sedation, instead of analgesia (Celia, 2000).

Numerous explanations have been proposed to account for gender differences in pain perception, including social and psychological factors (Keogh & Herdenfenfeldt, 2002), as well as hormonal and physiological factors (Barsky, Peekna, & Borus, 2001; Cepeda & Carr, 2003). For example, levels of estrogen, progesterone, and testosterone have been shown to affect cardiovascular physiology and possibly pain perception (Cepeda & Carr, 2003). Hormonal status affects women who in the periovulatory, luteal, and premenstrual phases have lower pain thresholds than women in the follicular phase (Barsky et al., 2001;

Cepeda & Carr, 2003). In addition, the endogenous opioid systems are modulated by estrogen and other sex hormones (Barsky et al., 2001). Overall, gender difference in pain perception may play an important role in effective pain management in CABG surgery patients. CABG surgery patients tend to be mostly older males who bring their own beliefs and attitudes about pain and treatments, are often reluctant to disclose pain or to ask for analgesia, which may preclude effective pain management (Tullmann & Dracup, 2000; Watt-Watson & Stevens, 1998).

Marital Status

Researchers have found that there is a relationship between spousal support and the pain experience of patients recovering from CABG surgery (Con et al., 1999; Tullmann & Dracup, 2000). Findings support evidence that married individuals who received support during recovery from CABG surgery report less pain (Nelson et al., 2000), use less pain medication, are discharged from critical care sooner (Tullmann & Dracup, 2000), and recover faster than their unmarried counterparts (Con et al., 1999; Tullmann & Dracup, 2000). Thus, the marital status of CABG patients recovering from surgery may play an important role in patients' pain experience.

Education Level

There are some studies in the literature that have examined the relationship between patient education attainment and patient pain experience. Lack of knowledge and a lower education level are often cited as the reasons for persons' under-reporting of pain and the resulting ineffective analgesia (AHCPR, 1992; Carr, 1997; Celia, 2000). Research studies provide evidence that patients who

were less educated (Watt-Watson & Stevens, 1998) or had lower income were more likely to have a higher pain level and a higher level of concern about reporting pain or using analgesia (Ward et al., 1993). It is possible that the patients' educational attainment may be related to their ability to seek and utilize the information given by the health care providers (Koivula, Tarkka, Tarkka, Laippala & Paunonen-Ilmonen, 2002).

Personality Traits

Pain intensity, sensation and the emotional response to it are influenced by the unique characteristics of the person and his/her personality attributes (Puntillo & Weiss, 1994). Individuals with higher levels of extroversion, are described by Ramirez-Maestre, Lopez and Esteve (2004) as impulsive, uninhibited, and sociable, which is the opposite of introversion. Emotional and social individuals complain more and receive more analgesia than introverts, who apparently feel pain sooner and at a higher intensity, but complain less (Ramirez-Maestre et al., 2004; Wells, 1994). Ferguson (1992) noted that personality traits may influence an individual's appraisal and experience of pain. Additionally, individuals with a Type A personality, which is an established risk factor for CAD, are characterized by an increased need to control and rationalize their environment. A lack of perceived control, commonly experienced by patients undergoing CABG surgery, may heighten their pain perception (Ferguson, 1992). In summary, personality traits may play an important role in CABG surgery patients' pain experience.

Culture

One of the factors that may influence a person's perception of the pain experience is culture. Culture has a vital influence on illness beliefs, behaviours,

health care practices, health-seeking activities, and receptivity to medical care interventions (Lasch, 2000). According to Lasch (2000) reactions to pain vary by cultural group and reflect the beliefs of the group. Certain cultures value stoicism and as a result demonstration of pain experiences may be minimized (Celia, 2000; McCaffery, 1980; Watt-Watson et al., 2000; Watt-Watson & Stevens, 1998). Cultural stoicism may be a contributing factor to patients from visible minorities not asking for analgesia and consequently receiving less opioid analgesia (a cornerstone of management of moderate to severe post-operative pain) than their Caucasian counterparts (AHCPR, 1992; Watt-Watson & Stevens, 1998; Watt-Watson et al., 2000). Clinical studies have reported that white and Hawaiian patients receive or require significantly more analgesics than Filipino, Japanese, or Chinese patients (Lasch, 2000). In summary, as our society continues to be culturally diverse it is important to consider patient's cultural background as one of many characteristics that may impact provision of effective pain management.

Environment

Humans are in continuous interaction with their environment. The environment includes the subcategories of the physical, social, and cultural variables. Environmental factors impact on the individual's perception and response to symptoms such as acute pain.

Physical Environment

The physical environment may encompass home, work or, as in the context of this study, unfamiliar hospital surroundings, including the critical care unit. Patients often find the critical care environment to be cold, impersonal, and frightening (Tullmann & Dracup, 2000). Hospitalization and surgery are reported

stressors, which may lead to increased anxiety and, subsequently, increased pain levels (Oberle, Wry, Paul & Grace, 1990). The physical environment of the hospital may accentuate the experience of pain either psychologically through separation from loved ones and fear, or physically, because of aversive lights, temperature, and noise level (Ferguson, 1992; Meehan, McRae, Rourke, Eisenring & Imperial, 1995; Tullmann & Dracup, 2000). Therefore, more research is needed on the impact of nursing interventions, such as education, to reduce fear and subsequent anxiety related to environmental factors.

Social Environment

The social environment of the individual may include support from family, friends or health care providers. After admission to the hospital patients will experience significant change in their social environment. They will probably feel isolated from family and friends when surrounded by unfamiliar people working at a frantic pace (Ferguson, 1992). According to Con, Linden, Thompson and Ignaszewski (1999), social support serves as a counterweight to psychological stress and acts to reduce distress, enhance physical recovery, and reduce mortality. Their study found evidence that there is a link between social support and levels of pain in CABG surgery patients' recovery. In the case of women, the lack of adequate support may predict pain levels in an additive fashion. For men, higher levels of support were related to lower levels of pain (Con, Linden, Thompson & Ignaszewski, 1999). This finding suggests that being supported may help to motivate men to maximize function in everyday life, perceive less pain, and feel less psychologically distressed (Con et al., 1999). Support from the spouse is of particular importance for patients undergoing CABG surgery (Koivula, Paunonen-

Ilmonen, Tarkka, Tarkka & Laippala, 2002). For both sexes, social support may have a positive effect on mood and may allow others to help out in the recovery process (Con et al., 1999). Tullmann and Dracup (2000) confirmed the importance of social support in CABG surgery patients' recovery. The researchers provided evidence that patients that receive a high level of social support during the entire hospitalization take less pain medication and recover more quickly than those with limited social support.

In summary, the support from the social environment plays an important role in the effectiveness of pain management and recovery of CABG surgery patients. How additional support from the health care professionals, in the form of pre-operative pain-education, may impact urgent CABG surgery patients' outcomes is not known. Therefore, research on the effectiveness of this intervention is warranted.

Cultural Environment

The cultural aspects of the environment include practices, beliefs, and values that are unique to one's ethnic group (Dodd, et al., 2001). Cultural beliefs and attitudes with respect to the way people react to pain are acquired through socialization and are passed on through the generations (Jacques, 1994). Villarruel and Ortiz de Montellano (1992) believe that, while responses to pain may be universal, meanings and attitudes associated with pain, which determine if and when these behaviours are expressed, may be different across cultural groups. Knowledge of cultural meaning of pain is an important component of providing culturally congruent nursing care (Villarruel & Ortiz de Montellano). Therefore, cultural factors related to the individuals' pain experience need to be taken into

account in the provision of care to those experiencing pain, such as urgent CABG surgery patients.

Health and Illness

This category comprises the variables unique to the patient's health or illness state, including risk factors, health status and disease or injury. Variables included in the health and illness domain have direct and indirect effects on symptom experience, management and outcomes (Dodd, et al., 2001). Specific to urgent CABG surgery patients, post-operative pain may be influenced by many factors, several of which are discussed in this study. These factors include: the amount of surgical damage related to the number and type of grafts used, the type of incisions, the position of the patient during surgery, the occurrence of intra-operative complications, and the duration of the surgery.

Numerous intra-operative factors influence the post-operative pain in urgent CABG surgery patients. It is commonly known that before retraction of the sternum can be done, the midline incision, from the sternal notch to the xiphoid process, is usually made during median sternotomy. The skin, subcutaneous tissues, overlying muscle, and periosteum are cut during sternotomy. This procedure causes cutaneous pain, which involves the skin and superficial tissues, and is described as a sharp and well-localized sensation (Ferguson, 1992). Its sources are: invasive lines, chest tubes and pacing wires and two examples of such pain are: incisional pain and suture tension (Ferguson, 1992).

The retraction of the sternum, often considered as the most traumatic part of the CABG procedure, is followed by a graft harvest (Heye, 1991). The amount of surgical trauma is determined by the extent of the procedure and the skill of the

surgeon (Heye). Injury to visceral tissue results from organ handling and the damage to internal structures. In CABG surgery, visceral pain is generally not expected because the pericardium is largely insensitive to pain (Ferguson, 1992). However, injury to the visceral structures, during anastomosis of the internal mammary arteries (IMA) to the coronary circulation, may produce dull, aching, diffuse pain. This pain may be localized or referred to the chest or the abdominal wall (Ferguson, 1992; Heye, 1991).

Injury to deep somatic structures, such as bone, muscle, cartilage, tendons, and ligaments, causes pain that varies, depending on the structure involved (Ferguson, 1992; Heye, 1991). For example, injury to the bone periosteum produces a sharp pain while an injury to muscle or blood vessels causes dull pain. An arterial puncture or a saphenous vein harvesting procedure, from the donor leg, produce deep pain.

Pain is especially a problem for patients whose surgery involved one or both IMAs for a bypass graft (Cohen, Moore, Jones, Miner, Carter, Zurcher, Lupkas, & Edwards, 1993; Ferguson, 1992; Heye, 1991; Meehan et al., 1995; Yorke, Wallis, & McLean, 2004). Harvesting the IMA requires more time and more extensive retraction of the left sternum to dissect the needed artery(s) from the chest wall (Heye, 1991; Meehan et al., 1995). That results in extra incisions to facilitate anastomosis of the IMA to coronary circulation, and an additional pleural chest tube (Heye, 1991). Patients with an IMA graft report increased pain intensity compared to those who had a saphenous vein graft (SVG) and/or a radial artery graft (RAG) (Heye, 1991; Yorke, Wallis & McLean, 2004). A SVG requires a leg incision of varying length, depending on the number of grafts needed.

The number and the condition of the grafts, as well as the state of the patient, contribute to the duration of the surgery (Heye, 1991). Generally, the more grafts that are performed, the longer it takes to finish the surgery. As indicated earlier, grafting of the IMA takes longer than SVG (Heye, 1991). Additionally, the pain of a patient who underwent a four-hour surgery, using a combination of grafts IMA and SAG, may differ from that of the patient who had only a two-hour surgery, using SAG.

The patient's position during surgery also influences the post-operative pain. For example, the patient is placed in a supine position but thoracic and cervical musculo-skeletal structures are strained, the patient's head is hyper-extended, and both arms are abducted and externally rotated. As a result of positioning during surgery, the patient may experience post-operative discomfort in the chest area, shoulder, both arms, upper back, and neck (Ferguson, 1992; Heye, 1991). The total relaxation of the musculature during anaesthesia and resulting stretching of muscles and ligaments may also add to the general feeling of discomfort after surgery (Ferguson, 1992; Heye, 1991).

Pain after surgery may be influenced by the occurrence and severity of intra-operative complications. For example, the exploration of bleeding from chest tubes may require a re-opening of the sternum, sternal retraction, clamping and cauterization of arteries. All of these procedures prolong the length of the surgery and influence post-operative recovery, and the post-operative pain. In summary, it is evident that the CABG surgery generates various types of pain from a diversity of sites, which should be considered in the post-operative pain management.

The Patients' Symptom Experience

The symptom experience is dynamic, involving the interaction of the individual patient's perception of a symptom, the evaluation of its meaning, and the patient's response to it (UCSF, 1994). The symptom experience should be viewed as a multidimensional and personal manifestation of illness, injury, and treatment. Understanding the interaction of the components of the symptom experience is essential for effective symptom management.

Perception of a Symptom

The perception of a symptom, such as acute pain, is influenced by a variety of factors. Pain perception and the response to it are not predictable but vary with each individual and every experience (Watt-Watson & Stevens, 1998). Webster's Dictionary (1965, p. 626) defines perception as a "physical sensation interpreted in the light of experience". Individuals give meaning to their pain against a background of their experience and within their current social context (Ferguson, 1992). Depending on the meaning given to the symptom, such as acute pain, its presence may have a different effect on the individual experiencing it (Ferguson, 1992). For example, angina pain, experienced by urgent CABG surgery patients prior to surgery, is perceived as life threatening (Ferguson, 1992). CABG surgery eliminates such pain and, as a result, other pain experienced by those individuals after surgery may be perceived as insignificant (Ferguson, 1992). Therefore, the psychological component of pain is as important as the physiological one (McCauley & Polomano, 1980).

The most common psychological response to pain, which increases the perception of pain and heightens patients' attentiveness to it, is anxiety (Nelson,

Zimmerman, Barnason, Nieveen & Schmaderer, 1998). In CABG surgery patients, anxiety is caused by a situation where an individual's safety is threatened (Koivula, Tarkka, Tarkka, Laippala & Paunonen-Ilmonen, 2002). Anxiety results in feelings of tension, apprehension, nervousness, and worry, and is accompanied by the activation of sympathetic and parasympathetic nervous systems and cardiovascular excitation, all of which are especially detrimental to cardiac patients (Nelson, Zimmerman, Barnason, Nieveen & Schmaderer, 1998; Koivula, Tarkka, Tarkka, Laippala & Paunonen-Ilmonen, 2002). Numerous situational factors may increase anxiety and enhance pain perception: the lack of perception of control over the noxious stimulus, expectations that are not accurate, and an anticipation of pain (Wells, 1984). The anticipation of pain may be emotionally traumatic for patients. The fear of pain ranks high among threats perceived by patients waiting for cardiac surgery (McCauley & Polomano, 1980; Koivula, Tarkka, Tarkka, Laippala & Paunonen-Ilmonen, 2002).

The individual's response to a threat, such as post-operative pain, does not depend on the degree of the threat, but on the individual's capacity for coping (Ferguson, 1992). To help patients cope with pain, nursing interventions should focus on their psychological state by providing pre-operative pain-education. (Ferguson, 1992; Hancock, 1996; Heye, 1991; Koivula, Tarkka, Tarkka, Laippala & Paunonen-Ilmonen, 2002; McCauley & Polomano, 1980; Watt-Watson & Stevens, 1998). Providing patients with the information about the sources of pain, and informing them that it is expected and will be treated, may alleviate some of their concerns (Heye, 1991). Information may reduce patients' anxiety, and restructure the pain experience by activating pain suppressing systems in the

brainstem and by inhibiting the transmission of pain (Ferguson, 1992). However, no research was found that examined the relationship between pre-operative pain-education and the urgent CABG surgery patients' perception of pain. Therefore, the impact of nursing interventions, such as pain-education on the urgent CABG surgery patients' psychological state, requires investigation.

In summary, the psychological state of the patient has a significant influence on his perception of the post-operative pain and should be considered as an important component in pain management. A better understanding of the relationship of psychological factors, such as anxiety, with CABG surgery pain may help improve pain management.

Evaluation of Symptom

The evaluation of a symptom, such as acute pain, in the SMM refers to the judgment individuals make about their symptom: severity, seriousness, treatability, cause, or how the symptom will affect their lives (UCSF, 1994). Evaluation of a symptom involves a complex interaction of various psychological factors (Caldwell & Miaskowski, 2000). A qualitative study by Fitzsimons, Parahoo and Stringer (2000) illustrates how patients waiting for CABG surgery evaluated their symptom of chest pain and how CABG surgery could affect their evaluation of their pain after surgery.

The patients (N = 70) regarded their diagnosis of severe CHD warranting urgent CABG surgery, as a serious condition, particularly because the heart, in our contemporary society, is viewed as "the body's central organ", and "the source of both life and emotion" (Fitzsimons, Parahoo & Stringer, 2000, p. 1244). Chest pain, described by patients as a "major difficulty in their lives" (Fitzsimons,

Parahoo & Stringer, 2000, p. 1247), prevented them from leading a "normal life-style", impaired their ability to work, interfered with their family relationships, leisure, social activities, and even self-care. Each episode of the chest pain posed a threat to their lives because it could be the start of another heart attack and it reminded patients about the severity of their condition, and the fact that they were waiting for the impending CABG surgery (Fitzsimons et al., 2000). According to Ferguson (1992), CABG surgery can eliminate a life threatening chest pain and, as a result, the post-operative pain could be evaluated as insignificant by CABG surgery patients. Therefore, pre-operative educational programs should teach patients how to appropriately evaluate the symptom, such as acute pain, and how to respond to it.

In summary, the evaluation of a symptom, such as acute pain, is a complex process. If a patient appropriately evaluates the symptom, a suitable response to it is more likely.

Response to Symptom

As indicated earlier, the response to a symptom, such as acute pain, includes physiological, psychological, and behavioural components, all of which are discussed in this section.

Physiologic Response

Physiologically, pain is a warning signal and a normal defence mechanism which helps protect the body from tissue damage (Fields & Levine, 1984). Once the initial warning signal has been given, the effects of pain become harmful (Count, 1992). The body's response to pain can be summarized as "fight or flight"

because the pain impulses activate the sympathetic nervous system and increase hormonal activity (Jackson, 1995). The antiduretic hormone causes a surge in the amount of water reabsorbed from the renal tubules and the retention of water within the body (Jackson). Aldosterone also increases the reabsorbtion of sodium from the renal tubules (Jackson). Cytokines are released within seconds after the injury (Malzack, 1999). The noradrenergic system activation causes an adrenalin release, which activates the whole sympathetic system to produce readiness and start complex programs to reinstate homeostasis (Jackson, 1995).

Observable signs of the sympathetic nervous system (SNS) activation include: increased arousal, consciousness and emotions (Jackson, 1995). The increased SNS activity resulting in an increased heart rate and an increased contractility due to the inotropic effect of the SNS activation, cause increased oxygen consumption, may cause an imbalance between the myocardial oxygen demand and supply, and may lead to myocardial ischemia or infarction (Briggs, 2002; Watt-Watson & Stevens, 1998). An increased peripheral vascular resistance causes an elevated blood pressure (Jackson). A rise in the systolic and a fall in the diastolic blood pressure may compromise the blood flow to the coronary arteries and to the cardiac muscle, where it is needed to promote healing after this major surgery.

One of the most important responses of the body to pain is the release of cortisol by the adrenal cortex (Melzack, 1999). Cortisol is an essential hormone for survival after injury because it is responsible for producing high levels of glucose, by breaking down the protein in muscle, and for rapid response after injury (Melzack). It has an antagonistic action on insulin, resulting in a rise in blood

glucose (Jackson, 1995). Cortisol is a potentially harmful substance, which may produce destruction of muscle, neural tissue, and bone by inhibiting the ongoing replacement of calcium in bone. It can produce the conditions for many kinds of chronic pain (Melzack, 1999). Cortisol acts on the endogenous opioid system and the immune system by suppressing them (Melzack). Cortisols' anti-inflammatory effect may slow wound healing and increase the secretion of hydrochloric acid and pepsinogen, which may harm the lining of the stomach (Jackson, 1995).

In conclusion, it is obvious from the above examples that the degree to which many biologic responses are abnormal or undesirable for healthy functioning depend upon the context in which they occur (Michell, Gallucci & Fought, 1991).

Psychological Response

Psychologically, a common negative consequence of acute pain is anxiety, the affective state most closely associated with acute pain (Jacques, 1994). As indicated earlier, anxiety may amplify the acute pain cycle because it evokes a response similar to pain on the patients' physiologic systems (Nelson, Zimmerman, Barnason, Nieveen & Schmaderer, 1998). Intense anxiety hampers post-operative recovery and weakens the patients' coping and information processing (Koivula, Paunonen-Ilmonen, Tarkka, Tarkka, Laippala, 2002; Meeker, Sehrt, Rodriguez & Johnson, 1992). Strategies, which include the provision of information on how to deal more positively with the situation, may alleviate or minimize the maladaptive responses (Koivula, Paunonen- Ilmonen, Tarkka, Tarkka & Laippala, 2001).

The high level of anxiety associated with the life threatening nature of CABG surgery has been reported to alter the perception of, and response to, pain, and to impede patients' capacity to learn and utilize the information and guidance offered by the caregivers (Cupples, 1991; Kuivula, Paunonen-Ilmonen, Tarkka, Tarkka & Laippala, 2002). Inadequate patient knowledge about post-operative routines such as early mobilization, incentive spirometry and deep breathing and coughing, may decrease patients' compliance, which, in turn, may result in complications and increase the length of the hospital stay (LOS). Longer hospitalization may reduce the patients' satisfaction with the quality of care provided, and may postpone their return to the activities of daily living and compromise their family, work, and financial responsibilities.

Behavioural Responses

Behavioral responses include directly observable and measurable motor and verbal behaviors manifested by the individual experiencing the symptom (Mitchell, Gallucci & Fought, 1991). To date, this is the perspective through which the phenomenon of acute pain has mostly been measured.

The expression of pain may take many forms. Behavioral responses, that can be observable and quantified by others, include grimacing, body positioning and vocalization by crying and moaning (Loesner & Melzack). Particularly, the verbalization of pain is influenced by cultural attitudes and the degree of extroversion/ introversion, with extroverts expressing pain more freely (Wells, 1984). Pain behaviors result from pain and suffering and are described as the things a person does or does not do that are related to the presence of tissue damage (Loesner & Melzack, 1999). Those in pain may try to reduce and alter the

sensory and affective components of pain by postural readjustments, massage and counter-irritation (Wells, 1984). To alter the affective response to acute pain those experiencing pain may use different methods, such as distraction and relaxation, which are less apparent in the observation of the person in pain (Wells).

When observing behavioral responses to pain, it is important to remember that pain is a psycho-physiologic phenomenon that patients experience and react to within a variety of social systems, which include the family, culture and care delivery (Donavan, 1990). These systems regulate patient behavior, influence how pain is interpreted cognitively, how it is expressed and what is done to relieve it (Donovan, 1990). Pain does not occur in isolation but in a psychosocial, economic and cultural context that influences the meaning, experience, and expression of pain for each individual (Kuperberg & Grubbs, 1999). Each culture has unique attitudes, acquired through socialization and passed from generation to generation, toward pain (Jacques, 1994).

Although all pain behavior is real, it does not always indicate the presence of nociception (Ready & Laird, 1998). However, since pain cannot be expressed overtly, the absence of pain behaviors does not mean the absence of pain (Wells). The clinician cannot see or objectively measure nociception or pain experience because these are processes internal to the persons experiencing the pain (Donovan, 1990). Only the behaviors that the patient shares with the clinician, by verbal and nonverbal communication, are observable and quantifiable indicators of pain (Donovan, 1990). According to McDowell and Newell (1996) pain measurement has been considered to be the most challenging and difficult area of subjective health measurement. To respond to the challenges of measuring pain a

variety of pain measurement methods have been proposed and will be discussed in greater detail in chapter three.

Symptom Management Strategies

According to the SMM (Dodd, et al., 2001), the intervention strategy may be targeted at one or more components of the individual's symptom experience to achieve desired outcomes. In order to establish that there is a correlation between patient education and improved patient outcomes, it is appropriate to review the research literature that examined this issue. The review focuses on the research evidence of the benefits of general surgery patients' pre-operative education and is followed by a review of the research literature specific to pain education, in particular for CABG surgery.

Pain-education and Surgical Patient Outcomes

A substantial body of research has examined the impact of pre-operative education on the recovery from a variety of surgical procedures. The premise for this research is that the information provided by health professionals prior to surgery facilitates patients' understanding and improves their abilities to cope with potential problems associated with the experience (Shuldham, 1999; Koivula et. al., 2001; Koivula et. al., 2002).

To expedite the process of assessing the effectiveness of general pre-operative education on surgical patients' recovery, several comprehensive meta-analyses of research studies, conducted over the past two decades, were reviewed. Several researchers have examined the efficacy of psycho-educational interventions on general surgery patients' outcomes.

Hathaway (1986), in a meta-analysis of 68 studies that examined the effects of pre-operative instructions on post-operative outcomes, documented a 20 % improvement in post-operative outcomes, including physiological outcomes, among experimental groups of surgical patients who received procedural, sensory and psychological information.

Devine and Cook (1983), in a meta-analysis of 49 studies that examined the relationships between brief psycho-educational intervention and the length of stay (LOS) after surgery, demonstrated more favorable recovery and reduced LOS, by 1.25 days, in patients who had educational interventions.

Devine and Cook's (1986) meta-analysis of 102 studies that examined how psycho-educational interventions influence recovery, pain, psychological well-being, and satisfaction with care, confirmed positive effects of educational-intervention on recovery and clinical outcomes such as psychological well-being, satisfaction with care, and pain.

In a meta-analysis of 191 studies of the effectiveness of psycho-educational care on the recovery, post-surgical pain and psychological distress of adult surgical patients, Devine (1992) reconfirmed support for psycho-educational intervention with respect to pain, psychological distress and LOS, which was reduced by an average of 1.5 days. Devine reported that patients who received an educational intervention had fewer complications, better results in respiratory function tests and resumed activities earlier than those in the control group.

In summary, the beneficial effects of pre-operative education on general surgical patients' post-operative outcomes such as LOS, medical complications, pain and anxiety, have been documented in meta-analyses of RCT research.

Pre-Operative Education and CABG Surgery Outcomes

To establish whether providing pre-operative education, in particular pain-education, as a symptom management strategy, is beneficial to CABG surgery patients' outcomes, research studies using RCT and published in the last 20 years were reviewed. Only nine studies meeting these criteria and specific to CABG surgery were found. The researchers used different formats, methods, timing and content of educational intervention as a symptom management strategy.

Formats

Booklet

Booklets have been found to be an effective method of providing information to adult learners. Supplementing oral instructions with written material has been demonstrated to be beneficial to patients who could repeatedly refer to the written information (Lepczyk, Hunt Raleigh, & Rowley, 1990).

Watt-Watson, Stevens, Costello, Katz and Reid's (2000) RCT was entirely dedicated to pain management, using a booklet on pain management. The target population consisted of elective patients undergoing their first CBAG surgery. A total of 45 patients were randomly assigned to one of three groups: (a) control group (n = 16), receiving standard pre-operative education; (b) experimental group receiving booklet (n = 15); and (c) experimental group receiving booklet and interview with the research nurse (n = 16). The control group received a generic hospital booklet and a taped video containing general information about surgery and recovery, with minimal guidelines for pain management. The experimental groups received the standard education given to the control group, and group (b) received a booklet, 2 to 7 days before surgery, entitled "Pain Relief After

Surgery". The booklet contained information on the importance of pain relief and its different methods, how and when to ask for help, and discussed patients' concerns about seeking help. Group (c) received the same information as the first two groups, and it had an interview with the research nurse to discuss salient points.

The results of the study showed that all patients received inadequate analgesia. However, the experimental group receiving the pre-operative education intervention consumed 46% more analgesia, had fewer concerns about asking for help ($p < 0.003$), taking analgesia ($p < 0.02$), and tended to be more satisfied with their pain treatment ($p < 0.06$). These results supported the researchers' hypothesis that patients receiving more pain information would receive more adequate pain management (Watt-Watson et al., 2000).

Rice, Mullin and Jarosz (1992) also assessed the effectiveness of the pre-admission education by using a booklet of instructions. The booklet was sent six to ten days before admission to patients scheduled for their first CABG surgery. The purpose of their study was to compare the effects of two approaches to teaching on post-admission mood state, exercise performance, teaching time and post-operative recovery. A convenience sample (N = 50) of patients was randomly assigned, either to the pre-admission self-instructions group or to the post-admission instructions given by a nurse. Post-operatively, the researchers found no significant differences between the groups in analgesic use, physical activity, or LOS. However, both groups reported higher positive mood states ($p < 0.01$) and tended to use less pain medication than that reported by researchers in other studies.

Telephone

Lamarche, Taddeo and Pepler (1998), used a pre-admission telephone educational-intervention to examine its impact on anxiety, knowledge, and discharge readiness for patients who attended a pre-admission teaching program prior to cardiac surgery. The goal of this research was to examine the effectiveness of a telephone conversation that provided support to patients by giving them additional information. This intervention was followed by a routine pre-admission teaching session. Elective patients (N = 54) were randomly assigned to an experimental (n = 28) or control (n = 26) group. On admission, the experimental group had a significantly higher level of anxiety (p = 0.02), suggesting that the telephone intervention did not reduce anxiety in the experimental group. Paired t test showed that both groups increased their actual and perceived knowledge significantly ($p < 0.001$), from the teaching session to admission. However, the control and experimental groups' actual knowledge levels before the teaching session and on admission were similar, suggesting that the difference in anxiety level did not affect the patient's ability to learn. Readiness for discharge was significantly correlated with perceived knowledge at discharge (p = 0.04) and actual knowledge on admission (p = 0.05). The research findings did not support the use of the telephone educational intervention for patients waiting for CABG surgery.

Videotapes

Mahler and Kulik (1998) used videotapes as another method of pre-operative education for CABG patients. Male patients (N = 258) were recruited at two different hospitals. Subjects were randomly assigned, to four groups

(n = 60 - 67 per group): a usual care control group and three intervention groups each of which was shown one of three videos on the evening before the surgery. One of the three videos showed a nurse providing procedural and sensory information about what to expect during the hospitalization. In the two other tapes, a patient was portrayed successfully overcoming difficulties in recovery. The LOS was shorter in the experimental groups ($p = 0.05$) and patients who viewed any of the videos felt more prepared for recovery ($p < 0.001$), and reported higher self-efficacy beliefs ($p < 0.02$) than the control group. This suggests that the preparation itself may be more important to increase patients' self-efficacy beliefs, than the specific focus of the videos' content.

Multidimensional Pre-Operative Intervention

Arthur, Daniels, Hirsh and Rush (2000) examined the effect of multidimensional, pre-operative interventions during the entire waiting period (a minimum of 10 weeks) for elective CABG surgery outcomes. A sample of patients (N = 249) was randomly assigned to usual care or to an intervention group. The intervention group received exercise training and education sessions with nurse clinicians who provided detailed pre-operative teaching, information about cardiac risk factors and cardiac surgery as well as what to expect in an early post-surgery recovery. Patients were given opportunity to ask questions. In addition to educational-interventions with nurse clinicians information was provided in both videotaped and written formats. Monthly nurse-initiated telephone contact to answer questions and provide reassurance was also utilized. The researchers implemented exercise training, before CABG surgery, with the hypothesis that it would reduce the patients' physical deterioration during the waiting period and

encourage them to continue with exercise after surgery. The results indicated that patients in the experimental group had shorter hospital LOS by one day ($p = 0.002$), shorter stay in the intensive care ($p = 0.001$), and higher perceived social support ($p = 0.002$). Patients reported better quality of life during the waiting period and higher physical health-related quality of life scores six months after surgery.

Timing

Cupples (1991) examined the relationship between the timing of the pre-operative education and the post-operative recoveries. The sample of 40 patients having CABG surgery received a combination of pre and post-admission education. The experimental and control groups were identical with respect to sex but there was only one woman in each group. The patients in the experimental group had significantly higher pre-operative knowledge scores ($p < 0.001$), more positive mood states, more favourable physiologic recoveries ($p = 0.03$), and lower pre-admission state anxiety ($p = 0.02$). Cupples found that patients were less anxious 5-14 days before admission and argued that pre-admission is a more appropriate time for education, as anxiety does not interfere with learning.

Lepczyk, Raleigh and Rowley (1990) did not lend support to Cupples' (1991) findings and found no significant differences in anxiety or knowledge between groups. A convenience sample of patients ($N = 72$), in two hospitals, attended a pre-operative education session, either as inpatient participants the day before surgery, or as outpatients four to eight days before surgery. In addition to basic pre-operative information on anatomy and physiology, the critical care environment, and the procedures that would be undertaken, the experimental

patients received a booklet containing basic pre-operative information and instructions for exercise. Anxiety and knowledge levels were compared before and after class and the evening before surgery. Both groups reported moderate levels of anxiety prior to the intervention ($p = 0.75$), which did not change significantly either immediately after the educational intervention ($p = 0.856$) or prior to surgery ($p = 0.604$). The knowledge gained with the class was significantly greater for the outpatient group ($p = 0.018$). The researchers concluded that it makes no difference whether patients receive information up to a week before surgery or just the day before.

Education and Anxiety level

A few studies have examined the relationship between pre-operative education and anxiety. Anderson (1987) evaluated the effect of pre-operative information on the anxiety and physical recovery of 60 male CABG patients. The researcher compared the effects of the information-only group and the information plus-coping group with the contact-control group. The experimental information-group received detailed information about the procedures and sensations they would experience and the information plus-coping group was additionally taught the exercise that they could perform after surgery. The speed of their physical recovery was judged by reductions in analgesic use, medical complications and LOS. Post-operatively, patients in the experimental groups reported less anxiety ($p < 0.02$), and were judged by nurses as making better psychological ($p < 0.005$) and physical recoveries ($p < 0.04$). Anderson emphasized that the amount of information was not as important as the opportunity for the patients to

use the information to control events. Overall, the results of the study supported the belief that pre-operative information facilitates recovery and reduces anxiety.

Shuldham, Fleming and Goodman (2002) reported findings that contradicted previous research and generally accepted beliefs on benefits of education. Their study was designed to elucidate the consequences of pre-admission education on post-operative pain, anxiety, depression, well-being and LOS. Of the 1,018 eligible patients approached, only 374 agreed to take part in the study and were randomized into an experimental (n = 188) and a control (n = 168) group. The results showed no significant differences between the groups in the primary outcomes, namely, anxiety (p = 0.09), pain (p = 0.48), depression (p = 0.62), and well-being ("worn out" p = 0.11; "tense and uptight" p = 0.29) six months after surgery. There was a significant difference in the LOS (p = 0.01), with the experimental patients having the longer stay. Based on those findings, the researchers concluded that there is no benefit to patients from a day of pre-operative education provided by members of a multidisciplinary team, prior to admission for surgery.

In conclusion, the findings of this review suggest that there has been insufficient research conducted on the impact of pre-operative education on CABG surgery patients' outcomes, especially where pain management is concerned. A review of the studies on the benefits of CABG patient-education intervention showed inconsistent results, which at times were in direct contrast with generally accepted beliefs on benefits of this intervention on pain, anxiety, and LOS in general surgical patients. Surprisingly, despite a long and well-documented history of patients' inadequate pain relief, only one pilot study by Watt-Watson, Stevens,

Costello, Katz and Reid (2000) evaluated the impact of a pre-admission educational booklet on pain-related CABG surgery patients' outcomes. The minimal amount of information on pain management in the content of pre-operative education suggests that CABG surgery patients do not receive sufficient pain education to enable them to actively participate in their own pain management and positively impact their outcomes. Although Watt-Watson, Stevens, Costello, Katz and Reid (2000) tested a pain-education intervention on the elective CABG surgery patients, there is no known research that examined how the circumstances surrounding unexpected, life-threatening, urgent CABG surgery may impact the effectiveness of this intervention and subsequent surgical outcomes. Therefore, a study is needed to explore the relationship between the pain-education and the urgent CABG surgery patients' outcomes, including pain, anxiety, satisfaction and LOS.

CHAPTER THREE

Methodology

Introduction

This chapter describes the design and methodology used for this quantitative study. The pain-education intervention selected for this study was developed specifically for a CABG population by Watt-Watson, Stevens, Costello, Katz and Reid (2000). The main focus of the intervention was to address misconceptions that may influence the patients' pain experience and lead to ineffective pain management. The goal of this intervention therefore was to avert or modify acute pain and its consequences in urgent CABG surgery patients. It was anticipated that adequate pain management may decrease the patient's anxiety and promote compliance with post-operative routines. These, in turn, may prevent complications, improve patient's satisfaction, and decrease the LOS. The researcher provided pre-operative pain-education to patients scheduled to have urgent CABG surgery at the St. Boniface Hospital. The intervention included the booklet "Pain relief after surgery" by Judy Watt-Watson (used with permission of the author, see Appendix A) plus an interview/education session, based on the content of the booklet, with the researcher.

A description of the research design, population and setting, sample criteria, sample procedure, recruitment procedure, research instruments, data analysis, and ethical considerations will be presented.

Research Design

A randomized clinical trial (RCT) approach was employed to answer the research questions. The RCT was chosen for this study as the strongest and most appropriate research design to obtain evidence about causation, eliminate the researcher's bias and reduce between-subject bias (Shuldham, 1999). The dependent variables included: pain intensity and anxiety level, hesitancy to use analgesia, patients' satisfaction and the LOS. The independent variables were as follows: 1) the standard pre-operative pain education, provided to all participants, 2) the booklet entitled "Pain relief after surgery" by Judy Watt-Watson (see Appendix A) and the interview/education session with the researcher, provided to the experimental group only. A statistician from the Statistical Advisory Service at the University of Manitoba was consulted to assist with the study design, sampling procedures and analysis.

Population and Setting

The population of interest consisted of adult patients, diagnosed with severe coronary artery occlusion(s), who required urgent CABG surgery that needed to be done in 1 to 14 days from admission to the St. Boniface General Hospital; one of the two tertiary care hospitals in Winnipeg, Manitoba.

Sample Criteria

Potential participants for this study were recruited from the Cardiac Surgery Wait List. It was anticipated that two to four patients would be recruited each week over a two to four month period. Recruitment began on December 1, 2004. Based on a power analysis using an 80 % confidence interval, significance level of alpha = 0.05 and effect size of 0.70, a sample size of 33 per group was

predicted to be sufficient to test the study hypotheses. To account for attrition of subjects during the course of the study, a 10 % over-sampling was decided to be acceptable to maintain the power of the study and measure the concepts under investigation. The final sample size was 72.

The population of this study consisted of adults ≥18 years of age undergoing their first CABG surgery who had the ability to read, write and speak English and the capability to respond in an interview situation. Exclusion criteria comprised history of chronic pain, allergy to opioids, pre-existing psychiatric history and/or abuse of analgesics or opioid use and other conditions that might influence reaction to pain or ability to provide information and voluntary consent.

Sampling Procedure

Consenting patients were randomly assigned, with blocking by sex, using a table of random numbers, to the control or to the experimental group. A random allocation of patients to the experimental and control groups was a cardinal measure of the quality of the study.

Recruitment Procedures

Following ethical approval and institutional access, a letter was sent by the researcher to all cardiac surgeons to inform them about the study and to solicit their co-operation (see Appendix B). Letters of introduction of the study were sent to all nurse managers of the hospital wards that the potential participants in the study were admitted to (see Appendix C). The researcher arranged a meeting with the cardiovascular associate (CVT) nurses, at which they were invited to participate in the study. CVT nurses willing to participate were asked to sign the consent (see Appendix D). The CVT nurses identified the potential participants

and then informed them about the study (see Appendix E). The CVT nurses obtained permission to release names of potential participants to the researcher. The researcher contacted potential participants to explain the study to them, and obtained informed consent from those interested in participating. Consenting participants were given the opportunity to read and sign the consent form (see Appendix F).

Intervention

To maintain the blinding of the staff, all participants received an envelope containing a copy of the consent form, the researcher's phone number, and a letter thanking them for participating in the study. Subjects from the experimental group only also received the booklet "Pain relief after surgery" by Judy Watt-Watson (see Appendix A). It was estimated that, on average, it took approximately 20 minutes to read the booklet. The eight-page booklet, printed on non-glare paper, using larger lettering, which was easier for a visually impaired person to read, discussed the importance of pain relief. The content of the booklet included information on how and when to ask for help with pain, e.g. when the pain rating on the numerical rating scale (NRS) was four or more; pain-relief methods, including pharmacological and non-pharmacological; common concerns patients have about seeking help with pain and taking analgesia, e.g. fear of addiction and side effects of medication; and examples of pain relief methods. Subjects from the experimental group only received pain education, based on the content of the booklet, provided by the researcher.

The information provided in the booklet emphasizes the importance of good pain relief for recovery and the individuality of pain responses. The booklet

included an NRS to describe the pain intensity and quality, similar to that used in the Brief Pain Inventory (BPI), which will be described in detail in the Research Instruments section.

According to Watt-Watson and colleagues (2000), the content of the booklet was derived from previous research and reflects the Canadian Pain Society position statement on pain relief (Watt-Watson, Clark, Finley & Watson, 1999). The booklet's face and content validity were assessed by nursing, psychology, and medical pain experts. The booklet was pre-tested for readability and understandability at the Grade six level (Watt-Watson, Stevens, Costello, Katz & Reid, 2000). The participants receiving the booklet were encouraged to read it as soon as possible. They were also asked not to discuss its content with other patients.

The researcher met with each participant from the experimental group on the evening prior to surgery for an interview/pain-educational session. The researcher taught each subject about pain management, using the booklet as a guide. The content of the entire booklet was discussed with each participant. The extent of the information provided varied, based on the researcher's clinical expertise, depending on each subject's individual learning needs. Examples of educational criteria for pain management and sources are provided in Appendix G. The researcher allocated time to answer questions.

Data Collection Procedure

After obtaining informed consent, all participants completed a demographic and socio-economic characteristics - Baseline Questionnaire developed by the author (see Appendix H), and the Barriers Questionnaire (BQ)

(American Pain Society Quality of Care Committee, 1995) to assess obstacles to seeking help and taking analgesia (see Appendix I). Patients' charts and medical records were used to collect information on the participants' general condition. All information collected had a code number assigned to protect the identity of the participant. The participants were randomized to experimental and control groups with blocking for sexes.

Both the experimental and control group received the standard pre-operative education, which included a videotape and routine cardiovascular teaching about "do's" and "don'ts" after surgery. The videotape contained general information about the surgery, post-operative routines and recovery. The experimental group, in addition to the standard pre-operative education, received the pain education booklet, plus an interview/education session with the principal investigator. On the evening prior to surgery, which Kindler and colleagues (2000) reported to be a time representative of the anxiety individuals experience pre-operatively, the researcher collected data on all patients' anxiety and chest pain distress level, using the Visual Analogue Scale (VAS) (see Appendix J), which took two to three minutes to complete. At that time the pre-operative pain-education intervention was provided to subjects in the experimental group only, and took approximately 15 to 30 minutes per patient.

Post treatment assessment took place on post-operative day (POD) # 5. The researcher collected data on all the participants' post-operative pain using the Brief Pain Inventory (BPI) (see Appendix K) (McCaffery & Pasero, 1999); their anxiety and post-operative pain distress level using the VAS (see Appendix J); the barriers to pain management were measured again by using the BQ-II (see Appendix I)

(Gunnarsdottir, Donovan, Serlin, Voge & Ward, 2002); and the Patient Outcome Questionnaire (POQ) were filled out (see Appendix M). It took approximately 10 to 25 minutes per patient to complete the POQ.

The POD # 5 was chosen for data collection for a variety of reasons. First, the effects of anesthesia on the patients' level of analgesia should have been resolved, thereby eliminating this factor as a potential cause for reduced pain. Second, by the fifth post-operative day, all patients in this study should have been ambulating, which requires more analgesics for effective pain control. Third, all patients should have been using oral analgesics, on request or on an as needed (PRN) basis, which requires the patients' initiative. Fourth, all chest tubes should have been removed and pleurotomies should have been sealed, eliminating their effect on post-operative pain. Fifth, the patients' anxiety level should have been lower than their pre-surgery level, decreasing its effect on post-operative pain. Finally, by POD # 5, patients in the experimental group should have been familiar with the content of the booklet addressing barriers to pain management.

Information related to relevant surgical outcomes was collected by the researcher from the patients' charts and recorded on the Post-Operative Data Collection Form (see Appendix L).

Research Instruments

The Baseline Questionnaire (BQ)

Data relating to the patients' pre-operative status, including their demographic and socioeconomic characteristics, was collected using a self-report Baseline Questionnaire (see Appendix F) developed by the author, and by chart review.

The Barriers Questionnaire II (BQ- II)

The BQ-II is a tool used to evaluate patients' beliefs, which can act as barriers to optimal management of acute pain. Using the BQ-II barriers to seeking help and taking analgesia were assessed (Gunnarsdottir et al., 2002) (see Appendix I). The BQ-II was developed from the original BQ, which is a self-report instrument designed to measure the extent to which patients have concerns thought to be barriers to pain management (American Pain Society [APS], 1995; Ward, Goldberg, Miller-McCauley, Mueller, Nolan, Pawlik-Plank, Robbins, Stormoen, & Weissman, 1993). To reflect changes in pain management practices, the original BQ has been revised, resulting in BQ-II, (Gunnarsdottir et al., 2002). The two subscales from the original BQ that addressed the fear of injections and the fear that pain indicated disease progression were eliminated (Gunnarsdottir et al., 2002). Two new subscales addressing the fear that analgesics impair immune functioning were added to the BQ-II. After these changes, the BQ-II consists of 27 questions addressing eight barriers: fear of addiction, fatalism about experiencing uncontrolled pain, concerns about tolerance, belief that "good " patients do not complain about pain, concerns about distracting the physician from treating the illness, concerns about side effects, fear that pain medication may impair the immune system, and that analgesics may block one's ability to monitor illness symptoms (see Appendix I).

The BQ-II consists of 27 items grouped into four subscales labeled: physiological effects, fatalism, communication, and harmful effects. The physiological effects subscale consists of 12 items addressing the beliefs that side effects of analgesia are inevitable and unmanageable, concerns about tolerance,

and not being able to monitor changes in one's body when taking strong pain medication. The fatalism subscale consists of three items addressing fatalistic beliefs about pain and its management. The communication subscale consists of six items addressing the concerns that reports of pain distract the physician from treating the disease and that "good" patients do not complain of pain. The harmful effects subscale consists of six items addressing the fear of becoming addicted to pain medication and that pain medication harm the immune system.

Participants were asked to rate the extent to which they agreed with each item on a 6 - point scale, 0 (do not agree at all), and 5 (agree very much). Items 1, 8 and 24 (Fatalism) were reverse scored before analysis. Mean scores for each of the subscales and mean scores for the total scale were used in the analysis (Gunnarsdottir et al., 2002). The BQ-II is reported to be a reliable and valid tool to measure patient-related barriers to pain management (Gunnarsdottir et al., 2002). The BQ-II total reported internal consistency was 0.89, and alpha for the subscales ranged from 0.75 - 0.85 (Gunnarsdottir et al., 2002).

The Visual Analogue Scale (VAS)

The VAS in this study was used to measure anxiety pre and post urgent CABG surgery distress associated with chest pain prior to surgery and acute pain after the surgery. The participants were asked to mark the point, on a 100 millimeter long horizontal line, that represented their level of anxiety or distress. The line was marked from 0 (no anxiety or distress) to 10 (maximum anxiety or distress).

The VAS, was used on the evening before surgery and on post-operative day five, to measure current anxiety level (see Appendix H). The measure took

less than five minutes to complete. It allowed for graphically quantifying subjective phenomena (Dudgeon, Raubertas & Rosenthal, 1993) such as anxiety. Patients were asked to indicate their degree of anxiety by marking a point on a horizontal line with descriptions ranging from 0 "no anxiety" to 10 "maximal anxiety". The intensity level of their experience was measured in millimetres, from the left of the scale to the patient's mark, using the same ruler.

This tool has undergone extensive testing and is considered to be reliable and valid for this purpose (Agency for Health Care Policy and Research, 1992; Kindler, Harms, Amsler, Ihde-Scholl & Scheidegger, 2000; Wewers & Lowe, 1990). For example, in one study of post-operative pain, on days 1 and 2, the 15-minute test-retest reliability of the VAS ranged from 0.73-0.83 (with $p < 0.01$ to 0.001), the convergent validity ranged from $r = 0.90$- 0.92, while the construct validity of sensation and distress was $r = 0.72$- 0.85, and the discriminant validity was $r = 0.65$- 0.78 (Good, Stiller, Zauszniewski, Cranston Anderson, Stanton-Hicks, & Grass, 2001). Those results demonstrate support for the reliability and validity of the VAS (Good, Stiller, Zauszniewski, Cranston Anderson, Stanton-Hicks, & Grass, 2001). The VAS was selected for this study because it is readily understandable, easily completed, and quick to administer in a clinical setting (Kindler et al., 2000; McDowell & Newell, 1996; Tamiya et al., 2002; Vogelsang, 1988).

The Brief Pain Inventory (BPI)

The BPI assesses relevant aspects of pain such as history, location, intensity, quality, and interference with activities (Daut, Cleeland & Flanery, 1983; McDowell & Newell, 1996). The BPI measures the intensity of pain (sensory

dimension) and its interference with patient's activities (reactive dimension) over the past five days. In this study, the BPI was modified to measure the patients' pain over the previous 24 hours on post-operative day five (see Appendix I). Day five after surgery was selected to measure the patients' pain because initially after surgery the health care professionals tend to "take over" the patients' pain management. Pain measure done on day five after surgery, should provide more accurate information on the patients' (not health care professionals) ability to control their own pain close to the time when patients on average are discharged. Patients rated the severity of their pain, at the specified time point, using a numerical rating scale (NRS) ranging from 0- "no pain" to 10- "pain as bad as you can imagine". These ratings were combined to give a composite index of pain severity. The NRS has demonstrated significant test-retest item correlations and has been previously validated (Yorke et al., 2004). The seven item subscale of the BPI estimates the degree to which pain limits patient function and examines whether pain is severe enough to interfere with usual activities, such as: general activities, mood, walking, deep breathing and coughing, relations with others, sleep, and enjoyment of life. The mean of these scores was used to indicate the level of pain interference. The BPI is a reliable and valid measure of pain, and was selected by the World Health Organization to monitor the effectiveness of the Cancer Pain Relief Program (Ward et al., 1993). The reliability of the BPI has demonstrated test-retest item correlations with coefficient alpha values for the four pain intensity items reported at 0.87 (for the English version), and for the interference scale at 0.91 (McDowell & Newell, 1996).

Evidence for the validity of the BPI comes from several studies that demonstrated expected differences in pain severity between groups of patients who differed in the site of the disease and requirements for analgesia (Cleeland & Ryan, 1994; McDowell & Newell, 1996). Reports of pain interference with activities increased as ratings of pain severity were higher (Cleeland & Ryan, 1994; McDowell & Newell, 1996). The BPI is sensitive to differences in pain characteristics associated with different diseases (Cleeland & Ryan, 1994). It usually takes less than15 minutes to complete the measure (McDowell & Newell, 1996). The BPI has demonstrated its utility across cultures and languages in clinical pain assessment and the effectiveness of pain treatment (Cleeland & Ryan, 1994). The BPI was selected for this study because of its simplicity, clarity to patients, ease of administration and its ability to assist clinicians to measure different aspects of patients' pain.

It is important to note that the reliability and validity of the BPI was affected by the time frame adaptation made to the instrument. The original instrument questions, asking patients to rate their pain "over the past 5 days", were changed to rate the pain variability "over the past 24 hours", and specifically for day five after surgery. By day five after the surgery, the patients are typically close to discharge and are expected to be able to manage their pain without excessive support from the health professionals. The adaptation of the BPI was done purposefully to capture the patients' ability to manage their pain independently.

The Patient Outcome Questionnaire (POQ)

Patient satisfaction with pain management was measured using selected questions adapted from the American Pain Society (APS) POQ (Appendix M), which has reported internal consistency and validity (APS, 1995). The purpose of the POQ was to evaluate adequacy of instructions regarding the patients' pain treatment, assess their ability to contact staff when needed, and measure the patients' satisfaction with various aspects of their pain management. Patients were asked 11 questions, which took them approximately 15 minutes to complete. Questions one to four were designed by the APS Committee (1995) based on the underlying hypothesis, that the systemic gaps in communication often underlie inadequate pain treatment. Question five addressed patient satisfaction with the overall results of pain treatment. Questions five to eight were constructed to assess satisfaction with responsiveness of the staff to the patients' reports of pain. Extensive evidence for validity of patient satisfaction questions was provided by Ware et al., (1993). Questions nine and ten were designed for an inpatients setting to measure the maximum time the patient waited after a request for additional or different pain treatment (APS, 1995). Question # 11 was added to inquire into the reasons for patients' reluctance to ask for pain medication (APS, 1995). The POQ was selected for this study because it is easy for patients to understand, quick to administer in a clinical setting, and provides prompt feedback to clinicians on practices that contribute to sub-optimal pain relief.

The Length of Stay (LOS)

The LOS was measured by the number of days the patient stayed in the hospital after surgery, as determined by chart review.

Data Analysis

The study results were scored, coded and entered in the Statistical Package for the Social Sciences (SPSS version 13), a data analysis software program. A statistician from the University of Manitoba Advisory Service was consulted to confirm selection of appropriate methods of statistical analysis for describing the data. The demographic data was analyzed using descriptive statistics, including means and standard deviations. The intervention and control group data were compared using parametric and nonparametric approaches, to test differences between groups.

To test hypothesis # 1, "Urgent CABG surgery patients who receive pre-operative pain-education will experience a lower pain level after surgery", the Mann-Whitney U-test was used to test differences in ranks of scores between two independent group means, and determine the impact that pain-education had on differences in patient pain levels.

To test hypothesis # 2, "Urgent CABG surgery patients who receive pre-operative pain-education will experience a lower anxiety level after surgery", a repeated-measures ANOVA test was used to test the difference among the means of pre and post treatment sets of scores. The central interest here was the difference in anxiety values before and after the pain-education intervention.

To test hypothesis # 3, "Urgent CABG surgery patients who receive pre-operative pain-education will have fewer barriers to effective pain management", a paired t-test was used to test the difference between two related group means, and determine to what extent pain-education intervention has accounted for differences in patient barriers to pain management.

To test hypothesis # 4,"Urgent CABG surgery patients who receive pre-operative pain-education will be satisfied with pain management", the Mann-Whitney U-test was used to test the differences in ranks of scores between two independent group means. According to Polit and Hungler (1999), this non-parametric test is used for testing differences between two independent samples when the dependent variable is measured on an ordinal scale.

To test hypothesis # 5, "Urgent CABG surgery patients who receive pre-operative pain-education will have a shorter LOS after surgery", independent samples t -test was used. A summary of the measurement tools is provided in Table 1.

Ethical Considerations

Ethical approval was obtained from the Education and Nursing Ethical Review Board of the University of Manitoba. Facility access to the St. Boniface Hospital was sought prior to the beginning of recruitment and data collection.

To ensure that participants were not to be identifiable, the researcher followed the institutions' confidentiality policies in accordance with the Personal Health Information Act. To eliminate undue pressure on the subjects to participate, a third party (CVT Associates) was used to introduce the study to the potential participants (Appendix D). All potential participants were provided with verbal and written information about the purpose and nature of the study before agreeing to become involved (Appendix D). Each subject was informed verbally and in writing that participation in the study was voluntary. The care of patients was not to be affected if they decided not to participate or to withdraw from the study. All

potential participants were informed that there were no expected risks as a result of participation and that there were no immediate benefits from participating.

Informed consent (Appendix E) was obtained and each participant was given a copy of the signed document. To ensure anonymity, all participants were given an identification number and no subject names were used. Data were reported in aggregate format only. A master list with identification numbers has been kept in a locked filing cabinet separate from the raw data. The raw data will be held in a secure location for seven years and then destroyed. There was only authorized access to the raw data by the researcher, the thesis committee and the statistician. All participants were made aware that they could request a copy of the study results if they wish to have them.

Summary

In this chapter, details of the study design have been addressed, including identification of the population of interest and setting, sample criteria and sample procedure, recruitment procedure, and research instruments. Data analysis was outlined and a variety of statistical approaches were selected to describe the relationship between pain-education and the study variables. A summary of the measurement tools is provided in Table 1. Ethical issues pertinent to the study were identified and measures to protect the rights of the participants were described.

Table # 1

Measurement of Variables

Concept	**Hypothesis**	**Tool Measure**	**Level of Measurement**	**Analysis of Findings**	**Model**
Acute Pain Intensity	↓ Level of Pain	BPI	Ordinal	Mann-Whitney *U*-test	Symptom Experience
Anxiety Level	↓ Level of Anxiety	VAS	Interval	Repeated-measures ANOVA Test	Symptom Experience
Barriers to Pain Management	↓ Barriers to Pain Management	BQ	Ratio	Paired *t*-Test	Symptom Experience
Patient Satisfaction with Pain Management	↑ Patient Satisfaction	OQ	Ordinal	Mann-Whitney *U*-test	Symptom Status
LOS	↓ LOS	# of Days and Hours	Ratio	Independent Samples *t*-Test	Symptom Status

CHAPTER FOUR

Results

Introduction

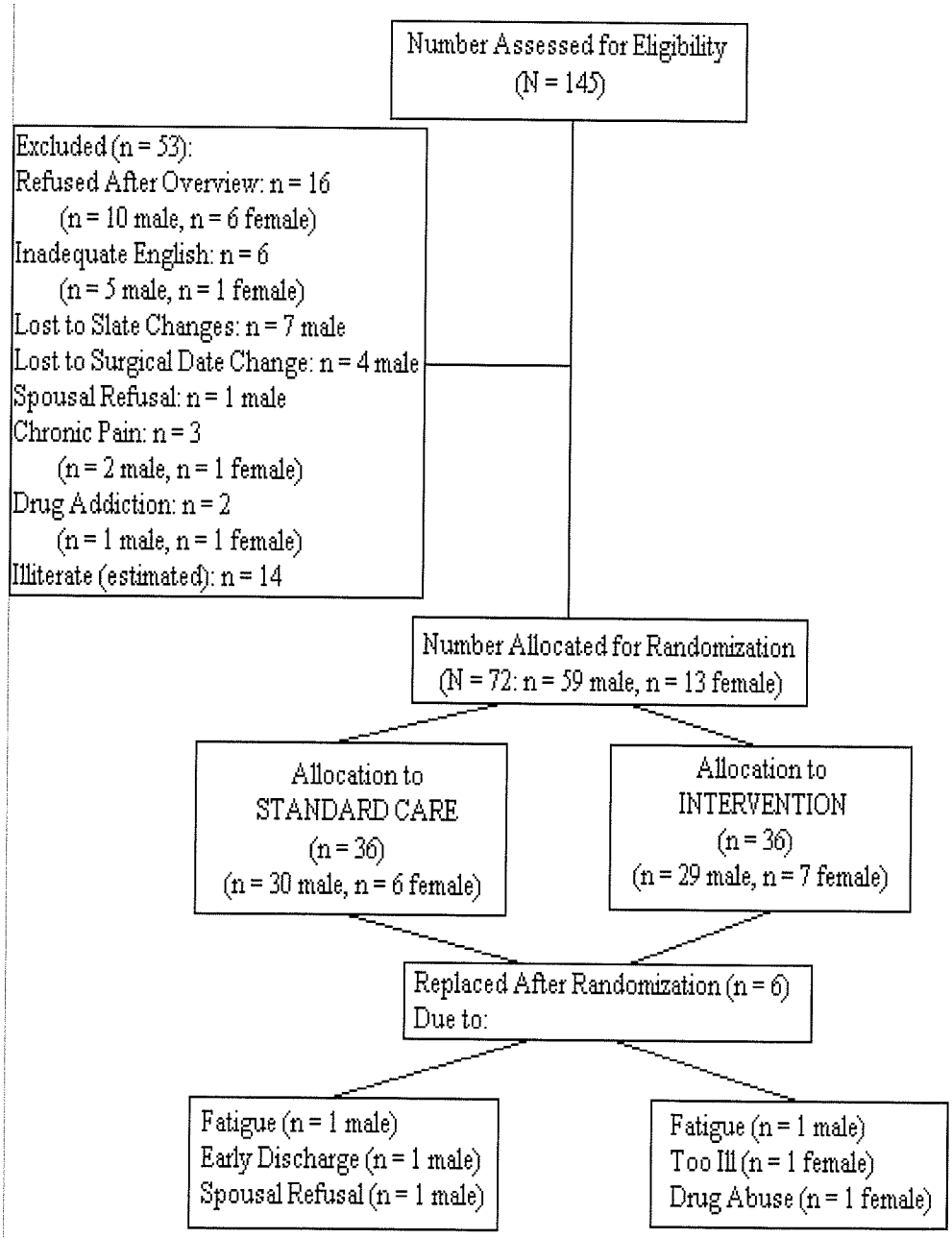
This chapter presents the findings of this quantitative study, which explored the effects of pre-operative pain-education on selected post-operative outcomes in patients who underwent urgent coronary bypass surgery. A brief summary of the data collection will be presented, followed by a summary of the findings, including an overview of the demographic variables, to provide insight into the clinical characteristics of the sample. Data analysis, including the statistical analysis performed will be discussed to provide answers to the five research hypotheses.

Data Collection

Data collection for this research took place at a tertiary care hospital over a seven-month period from December 2004 to June 2005. A total of 72 (N = 72) participants was recruited for the study (Figure # 2). The participants were randomized, with blocking for sexes, to the control (n = 36) and the intervention group (n = 36). Unexpectedly, approximately 20 - 25 % of the potential subjects approached could not participate in the study because they were illiterate, or did not have an adequate knowledge of English. Unfortunately, the exact number of either group was not kept. Some of the potential subjects approached refused to participate in the study due to fatigue, "too much going on", or fear that the stress of answering questions may cause chest pain. Six patients who initially agreed to participate were excluded from the study because of a history of chronic pain, drug dependency or addiction.

Figure # 2

Flow Chart of the Trial



Demographic Characteristics of the Sample

A summary of the demographic characteristics of the sample is provided in Table # 2. The majority of the 72 participants were male (n = 59). Of the 13 females, 7 were in the intervention group and 6 were in the control group. The mean participant age was 64 years (± 9.07), ranging from 40 to 83 years. The majority of participants were married (73.6 %), lived with a spouse (63.9 %), and had completed an average of 10.6 years of education (± 3.5). Within the sample, 36 (50 %) of the participants were retired, 32 (44.4 %) were in the laborer/craftsman job category, and 23 (31.9 %) were working full time. When asked about annual income, 25 participants (34.7 %) placed themselves in the $ 25,000 to $ 40,000 category, 22 participants (30.6 %) in less than $ 25,000, 4 (5.6 %) in the greater than $ 84,000 category, and 7(9.7 %) refused to answer.

In summary, the majority of the participants were male, married or partnered, living with a spouse or their family, and had an average of ten years of education. Half of the participants were retired. The majority of the participants placed themselves in the laborer/craftsman, or professional /executive category and claimed an annual income of $ 25,000- $ 44,000.

Table # 2

Demographic Characteristics of the Sample

Characteristics	Total N= 72	Control n= 36	Intervention n= 36
Age (years) (SD)	64.66 (± 9.07)	65.33 (± 8.63)	64.00 (± 9.57)
	Freq (%)	Freq (%)	Freq (%)
Sex			
Male	59 (81.9)	30 (83.3)	29 (80.6)
Female	13 (18.1)	6 (16.7)	7 (19.4)
Marital Status			
Single	4 (5.6)	1 (2.8)	3 (8.3)
Married	53 (73.6)	26 (72.2)	27 (75.)
Common-law	6 (8.3)	5 (13.9)	1 (2.8)
Widowed	4 (5.6)	1 (2.8)	3 (8.3)
Separated	2 (2.8)	1 (2.8)	1 (2.8)
Divorced	3 (4.2)	2 (5.6)	1 (2.8)
Living Situation			
Live Alone	11 (15.3)	6 (16.7)	5 (13.9)
With Spouse	46 (63.9)	20 (55.6)	26 (72.2)
With Spouse and Children	13 (18.1)	9 (25.0)	4 (11.1)
Other	2 (2.8)	1 (2.8)	1 (2.8)
Education (years) (SD)	10.62 (± 3.56)	11.0 (± 3.23)	10.5 (± 3.9)
Occupation			
Professional/Executive	14 (19.4)	8 (22.2)	6 (16.7)
Manager/Business Owner	13 (18.1)	7 (19.4)	6 (16.7)
Clerk/Sales	11 (15.3)	5 (13.9)	6 (16.7)
Laborer/Craftsman	32 (44.4)	15 (41.7)	17 (47.2)
Other	2 (2.8)	1 (2.8)	1 (2.8)
Work Status			
Full Time	23 (31.9)	9 (25.0)	14 (38.9)
Part Time	3 (4.2)	1 (2.8)	2 (5.6)
Medical Leave	7 (9.7)	5 (13.9)	2 (5.6)
Retired	36 (50.0)	20 (55.6)	16 (44.4)
Other	2 (2.8)	1 (2.8)	1 (2.8)
Annual Income			
< $ 25.000	22 (30.6)	10 (27.8)	12 (33.3)
$ 25.000-44.000	25 (34.7)	12 (33.3)	13 (36.1)
$ 45.000-64.000	11 (15.3)	6 (16.7)	5 (13.9)
$ 65.000-84.000	1 (1.8)	0	1 (2.8)
>$ 84.000	4 (5.6)	4 (11.1)	0
Refused to Answer	7 (9.7)	4 (11.1)	3 (8.3)

Ethnic Characteristics of the Sample

Table # 3 provides a summary of the ethnic characteristics of the sample. The largest group (n = 15) was composed of participants who classified themselves as Canadians. Sixteen participants (22.2 %) came from different parts of the world, including: Europe, Asia, the Mediterranean, the Caribbean, and the Middle-East.

Table # 3

Ethnic Characteristics of the Sample

Cultural Group	**Total Sample N = 72 Freq (%)**	**Control n = 36 Freq (%)**	**Intervention n = 36 Freq (%)**
Canadian	15 (20.8)	6 (16.7)	9 (25.0)
French	8 (11.1)	3 (8.3)	5 (13.9)
Scottish	8 (11.1)	2 (5.6)	6 (16.7)
Ukrainian	8 (11.1)	7 (19.4)	1 (2.8)
English	6 (8.3)	4 (11.1)	2 (5.6)
German	5 (6.9)	4 (11.1)	1 (2.8)
Aboriginal	3 (4.2)	2 (5.6)	1 (2.8)
Scandinavian	3 (4.2)	3 (8.3)	0
Others	16 (22.2)	5 (13.8)	11 (30.5)

Clinical Characteristics of the Sample

A summary of the clinical characteristics of the study participants is provided in Table # 4. Within the sample, 26 (72.2 %) participants in the control and 27 (75 %) in the intervention group were diagnosed, according to the New York Heart Association (NYHA) guidelines (Appendix N), with class IV angina. Seven participants (9.7 %) did not have angina severity documented. Twenty-one participants (58.3 %) in the control group, and 23 (63.9 %) had one previous myocardial infarction. Within the sample, 64 (88.9 %) participants were diagnosed with the left main disease. Forty-six (62.5 %) participants had left ventricular ejection fraction (EF) between 41-60 %. The three most common co-medical conditions that participants were diagnosed with were: hypertension (75 %) for both groups, elevated cholesterol (52.8 %) for the control and (44.4 %) for the intervention group, and diabetes mellitus (33.3 % and 27.8 %, respectively). In addition, more than half of the participants in the control group (58.3 %) and in the intervention group (55.6 %) had a history of smoking and/or have been smoking. The body mass index (BMI) for the majority of participants indicated higher than normal values (Table # 4) (mean 29.19, normal range between 20 to 24).

In summary, 75 % of all the participants were hypertensive, more than half suffered at least one myocardial infarction, most had left main artery disease, and a left EF between 41-60 %. In addition, over half of the participants in each group had a history of smoking, and an abnormally high BMI.

Table # 4

Clinical Characteristics of the Sample

Characteristics	**Total** **N = 72 Freq (%)**	**Control** **n = 36 Freq (%)**	**Intervention** **n = 36 Freq (%)**
NYHA Angina Classification Class II Class III Class IV	 1 (1.4) 11 (15.3) 53 (73.6)	 1 (2.8) 7 (19.4) 26 (72.2)	 0 4 (11.1) 27 (75)
Number of MI's one two	 44 (61.1) 28 (38.9)	 21 (58.3) 15 (41.7)	 23 (63.9) 13 (36.1)
Left Main Disease	64 (88.9)	32 (88.9)	32 (88.9)
Left Ventricular Ejection Fraction 20 % - 40 % 41 % - 60 % 61 % or greater	 7 (9.7) 46 (62.5) 19 (26.4)	 5 (13.9) 22 (61.1) 9 (25.0)	 2 (5.5) 24 (66.7) 10 (27.7)
Co- Morbidity Category Hypertension Elevated Cholesterol Diabetes Mellitus Elevated Lipids	 54 (75.0) 35 (48.6) 22 (39.6) 17 (23.6)	 27 (75.0) 16 (44.4) 12 (33.3) 9 (25.0)	 27 (75.0) 19 (52 8) 10 (27.8) 8 (22.2)
History of Smoking	41 (56.9)	21 (58.3)	20 (55.6)
Body Mass Index, Mean (SD)	29.19 (±4.6)	29.59 (±5.12)	28.80 (±4.08)

Pre-operative Pain and Treatment Expectations

All study participants (N = 72, 100 %) were asked pre-operatively, using the Baseline Questionnaire (BQ), about their expectations related to the post-operative pain and its treatment. All participants denied routine use of pain medication or tranquilizers. When asked, 11 (30.6 %) participants in the control group and 23 (63.9 %) participants in the intervention group did not know how much pain to expect after the operation. Surprisingly, 2 participants in the intervention group did not expect any pain after surgery. Table # 5 provides a summary of the patients' responses to the BQ – question # 18.

Table # 5

BQ - Question # 18

How much pain do you expect to have after your operation?

	Control Group		**Intervention Group**	
	Frequency	**Percent**	**Frequency**	**Percent**
No pain	0	0	2	5.6
Mild pain	1	2.8	1	2.8
Moderate pain	19	52.8	9	25.0
Unbearable	5	13.9	1	2.8
Do not know	11	30.6	23	63.9
Total	36	100.0	36	100.0

Fifteen (41.7 %) participants in the control group and 20 (55.6 %) in the intervention group expected medication to provide them with complete relief from pain after the surgery. Table # 6 provides a summary of responses for both groups.

Table # 6

BQ – Question # 19

If you were given medicine after your operation, do you want it to give you:

	Control Group		Intervention Group	
	Frequency	**Percent**	**Frequency**	**Percent**
Little relief	0	0	0	0
Moderate relief	9	25.0	11	30.6
A lot relief	12	33.3	5	13.9
Complete relief	15	41.7	20	55.6
Total	36	100	36	100

When questioned about requesting pain-relieving medication, 15 (41.7 %) participants in the control group intended to ask for it when pain became severe. One participant (2.8 %) in the intervention group did not intend to ask for pain medication, preferring to wait until medication was offered to him. The other participant (2.8 %) in the intervention group chose to put up with the pain rather than have medication. The following Table # 7 provides the summary of all participants' responses to that question.

Table # 7

BQ - Question # 20

If you have pain after surgery, when would you ask for pain relieving medicine?

	Control Group		Intervention Group	
	Frequency	Percent	Frequency	Percent
When having some pain	17	47.2	17	47.2
When pain becomes severe	15	41.7	17	47.2
Not ask, wait until is offered	0	0	1	2.8
Ask, regardless of the amount of pain	4	11.1	1	2.8
Total	36	100	36	100

When asked about pain treatment expectations, 17 (47.2 %) participants in the control group anticipated pain-relieving medication to be given to them immediately, after having to put up with the pain for as long as possible. Fifteen participants (41.7 %) in the control group and 20 (55.6 %) in the intervention group expected pain-reliving medication immediately, unless the nurse was interrupted by an emergency. In each group, three participants (8.3 %) expected to receive medication when the nurse was not busy. Table # 8 provides the summary of participants' responses to that question.

Table # 8

BQ - Question # 21

If you ask for pain relieving medication when would you expect it to be given?

	Control Group		Intervention Group	
	Frequency	Percentage	Frequency	Percentage
Immediately, having to put up with the pain for as long as possible	17	47.2	12	33.3
Immediately, unless the nurse was interrupted by an emergency	15	41.7	20	55.6
When the nurse is not busy	3	8.3	3	8.3
The next time the nurse is giving medication	1	2.8	1	2.8
Total	36	100.0	36	100.0

Analgesics Administered Post-Operatively

Data about the total analgesics administered, over the five days after surgery, was gathered from the patients' charts. The total narcotic dose was converted to Morphine equivalents (eq) (McCaffery & Pasero, 1999), and calculated per kilogram (kg) of the patient's body weight. The total Tylenol dose was calculated in milligrams (mg) per kilogram of body weight. The total dose of analgesics, such as: Naproxen and Percoset, administered in mg/kg, was calculated over a period of five days (post-operative day one to five) (Table # 9).

Table # 9

Analgesics Administered by Group

Analgesic	**Dose/ 5 Days**	**Group**	**N**	**Mean (SD)**	***t***	**df**	***p* - value**
Morphine/ Morphine equivalent	eq/kg	Treatment Control	35 36	0.95 (0.35) 0.72 (0.35)	2.83	69	0.006
Tylenol	mg/kg	Treatment Control	35 36	97.06 (45.62) 98.58 (48.42)	– 0.13	69	0.892
Naproxen	mg/kg	Treatment Control	35 36	6.51 (10.28) 4.60 (8.05)	0.87	69	0.386
Percocet	mg/kg	Treatment Control	36 36	0.01 (0.06) 0.01 (0.04)	– 0 .20	70	0.836

The five-day total analgesic use, differed between the groups for Morphine/Morphine equivalent, with a statistically significant ($p = 0.006$) higher group mean consumption observed for the participants in the treatment group compared to participants in the control group. This finding suggests that the

participants in the treatment group used significantly more narcotics for pain management when compared to the control group.

Table # 10

Analgesics Administered by Gender

Analgesic	**Dose/ 5 Days**	**Gender**	**N**	**Mean (SD)**	***t***	**df**	***p* value**
Morphine/ morphine equivalent	eq/kg	Female Male	12 59	0.76 (0.44) 0.85 (0.35)	– 0.73	69	0.465
Tylenol	mg/kg	Female Male	12 59	121.38 (39.09) 93.04 (46.98)	1.95	69	0.055
Naproxen	mg/kg	Female Male	12 59	6.76 (9.84) 5.03 (9.13)	0.50	69	0.619
Percocet	mg/kg	Female Male	13 59	0.02 (0.04) 0.01 (0.05)	0.37	70	0.712

Total Tylenol use (over the five days) did not differ by gender, with a marginally non-significant ($p = 0.055$).

Table # 11

Analgesics Administered by Group and Gender

Analgesic	**Dose/ 5 Days**	**Gender**	**Group**	**N**	**Mean (SD)**	***t***	**df**	***p* value**
Morphine/ Morphine equivalents	eq/kg	Female	Treatment Control	6 6	1.05 (0.31) 0.48 (0.38)	2.829	10	0.018
Tylenol	mg/kg		Treatment Control	6 6	93.72(21.21) 149.0 (32.81)	–3.46	10	0.006
Naproxen	mg/kg		Treatment Control	6 6	10.69 (12.31) 2.84 (4.97)	1.448	10	0.193
Percocet	mg/kg		Treatment Control	7 6	0.002 (0.005) 0.04 (0.06)	–1.50	11	0.193
Morphine/ Morphine equivalents	eq/kg	Male	Treatment Control	29 30	0.94 (0.35) 0.77 (0.33)	1.874	57	0.066
Tylenol	mg/kg		Treatment Control	29 30	97.74 (49.43) 88.49 (44.86)	0.754	57	0.454
Naproxen	mg/kg		Treatment Control	29 30	5.65 (9.83) 4.96 (8.56)	0.288	57	0.774
Percocet	mg/kg		Treatment Control	29 30	0.017 (0.06) 0.011 (0.03)	0.378	57	0.707

The analgesics used (over the five days) differed significantly by group and gender. Within the female study participants, the women in the treatment group used significantly more total Morphine eq/kg compared to women in the control group (treatment = 1.05, ± 0.31; control = 0.48, ± 0.38, $p = 0.018$), while the women in the control group used statistically more total Tylenol mg/kg (control = 149.04, ± 32.81; treatment = 93.72, ± 21.21, $p = 0.006$). Although analgesic use did not differ significantly between groups for the males, participants in the treatment group consistently used more analgesics when compared to those in the control group (Table # 11).

Urgent CABG Surgery Characteristics

Table # 12 provides a summary of the urgent CABG surgery characteristics. Most surgical procedures were done under general anesthesia. Within the sample, 53 (73.6 %) participants had previous anesthesia and only one participant reported a prolonged waking up period as a complication. The mean waiting time for surgery for the control group was 4.7 days (± 4.9) and for the intervention group 4.9 (± 3.9) days. Sixteen participants (44.4 %) in the control group and eight (22.2 %) in the intervention group waited only one day for surgery. The majority of participants had three diseased coronary arteries; 32 (88.9 %) in the control group and 29 (80.6 %) in the intervention group. Four was the highest number of grafts completed; 15 (41.7 %) participants in the control group and eight (22.2 %) participants in the intervention group. An equal number of participants in both groups had left main disease. The internal mammary artery (IMG) was used for the majority of grafts; 36 (100 %) participants in the control group, and 35 (97.2 %) in the intervention group. The left saphenous vein (SVG) was the most frequently used peripheral graft for CABG. The left SVG was used for 30 participants (83.3 %) in the control group, and for 32 (88.9 %) participants in the intervention group. The radial artery graft was used infrequently, seven times (16.7 %) for each group. The endoscopic technique for graft harvesting was the most common surgical technique used; 18 times in the control group (50.0 %), and 19 (52.8 %) in the intervention group. The average duration of surgery was 5.32 hrs (± 1.62) for the control group, and 5.50 hrs (± 1.38) for the intervention group. The intra-operative complications occurred 31 times (86.1 %) in the control

group, and 26 times (72.2 %) in the intervention group. The most common documented intra-operative complication was surgical bleeding.

Table # 12 **Characteristics of the Urgent CABG Surgery**

Urgent CABG Surgery	**Control n = 36 Freq (%)**	**Intervention n = 36 Freq (%)**
Waiting Time (days)		
One	16 (44.4)	8 (22.2)
Two	4 (11.1)	3 (8.3)
Three	2 (5.6)	8 (22.2)
Four	2 (5.6)	4 (11.1)
Five	1 (2.8)	1 (2.8)
>Five	11 (30.55)	12 (33.33)
# 0f Diseased Arteries		
One	1 (2.8)	0
Two	1 (2.8)	7 (19.4)
Three	32 (88.9)	29 (80.6)
> Three	2 (5.6)	0
# 0f Bypasses Completed		
One	2 (5.6)	0
Two	6 (16.7)	11 (30.6)
Three	13 (36.1)	17 (47.2)
> Three	15 (41.7)	8 (22.2)
Type of Graft Used		
IMG	36 (100)	35 (97.2)
Left SVG	30 (83.3)	32 (88.9)
Right SVG	3 (8.3)	0
Right RAG	1 (2.8)	1 (2.8)
Left RAG	5 (13.9)	6 (16.7)
Graft Harvest Technique		
Open	18 (50. 0)	16 (44.4)
Endoscopic	18 (50.0)	19 (52.8)
Duration of Surgery (hrs/min)	5.32 (±1.62)	5.50 (± 1.38)
Surgical Complications		
Yes	31 (86.1)	26 (72.2)
No	5 (13.9)	10 (27.8)

NOTE: IMG = Internal Mammary Graft, SVG = Saphenous Vein Graft, RAG = Radial Graft.

Data Analysis

This section presents the results of the data analysis using the Statistical Package for the Social Sciences (SPSS program version 13.0), a data analysis software program. Data analysis was conducted using the following statistical tests: descriptive statistics, t-test to compare means of two groups, analysis of variance (ANOVA) to test the significance of differences between means, Pearson r correlation co-efficient to describe the relationship between two measures and chi-square test to compare proportions. The study findings will be presented as related to each of the five research hypotheses.

Research Hypothesis # 1: Patients who had pre-operative pain-education display more favorable outcomes than those in the control group, as demonstrated by a decreased level of pain, measured by the Brief Pain Inventory (BPI).

The BPI was used to record the site of the post-operative pain; and to measure its intensity, relief obtained from the analgesia, and its interference with the patients' functioning.

To record the site of the post-operative pain, participants were asked to shade in the areas, using a diagram of a human figure, where they felt pain. Three participants in each group (8.3 %) denied having post-operative pain at the time of the questionnaire. Twenty-seven participants (75.0 %) in the control group, and 24 (66.7 %) in the intervention group reported pain at the primary surgical site. Thirteen participants (36.1 %) in the control group, and 11(30.6 %) in the intervention group reported pain at the graft site. Pain at other sites was reported by an equal number of participants, 16 (44.4 %), per group.

The BPI was used to measure the post-operative pain intensity. As the post-operative pain may vary during the day, its total intensity score includes the following pain ratings: at its least, average, at the time of completing the questionnaire, and at its worst. The BPI mean scores for pain intensity are presented in Table # 13.

Table # 13

The BPI- Pain Intensity

Group Statistics

	Group	N	Mean (SD)	*t*	df	*p*-value
Rate your pain at its least in the past 24 hours	Treatment	35	1.51 (2.35)	−.985	69	.328
	Control	36	2.06 (2.39)			
Rate your pain on the average	Treatment	34	2.73 (1.37)	−1.73	63.08	.088
	Control	36	3.43 (1.94)			
Rate your pain you have right now	Treatment	35	1.65 (1.90)	−1.51	63.72	.134
	Control	36	2.48 (2.64)			
Rate your pain at its worst in the past 24 hours	Treatment	35	5.01 (2.82)	−1.32	69	.190
	Control	36	5.87 (2.66)			

The total BPI-pain intensity score represents the sum of the above ratings. The BPI – pain intensity scores showed higher means for the participants in the control group, when compared to the intervention group (Table # 13). However, when using the independent sample *t* – test, no significant between - group mean differences were found (Table # 13).

The BPI was also used to assess total scores for the post-operative pain intensity, pain relief obtained from analgesics, pain interference with patients' daily functions, and "pain at its worst in the past 24 hours". The summary of the BPI total mean scores by factor and group are presented in Table # 14.

Table # 14

The BPI Scores

Group Statistics

	Group	**N**	**Mean (SD)**	***t***	**df**	***p*-value**
Total BPI pain intensity score	Treatment	34	10.72 (6.72)	−1.78	68	.078
	Control	36	13.86 (7.88)			
BPI pain relief obtained from analgesics	Treatment	35	78.00(26.12)	1.02	69	.311
	Control	36	71.66(26.13)			
BPI pain interference score	Treatment	35	23.21(19.49)	−2.12	69	.037
	Control	36	31.97(15.01)			
Pain at its worst in the past 24 hours	Treatment	35	5.01 (2.82)	−1.32	69	.190
	Control	36	5.87 (2.66)			

Note: Not adjusted for gender

Based on the mean total score, the pain intensity for the control group was 13.86 (± 7.88), and for the intervention group 10.72 (± 6.72) (Table # 14). Participants in the intervention group had a lower mean pain intensity score, and experienced less pain than those in the control group. However, the difference between group means was not significant, with the independent sample *t* - test value of $p = 0.078$ (Table # 14).

To further explore the data for covariates, and test between group differences in the "pain at its worst" adjusting for gender, the two-way ANOVA was used (Table # 15).

Table # 15

The BPI-Pain Intensity

Tests of Between-Subjects Effects

Dependent Variable: rate your pain at its worst in the past 24 hours

Source	Type III Sum of Squares	df	Mean Square	*F*-value	*p*-value
Corrected Model	52.865(a)	3	17.622	2.464	.070
Intercept	1207.731	1	1207.731	168.856	.000
group	47.295	1	47.295	6.612	.012
BQ6	.259	1	.259	.036	.850
group * BQ6	39.440	1	39.440	5.514	.022
Error	479.213	67	7.152		
Total	2641.500	71			
Corrected Total	532.077	70			

a R Squared = .099 (Adjusted R Squared = .059)

There was a statistically significant interaction between group and gender ($p = 0.022$) (Table # 15). In order to examine this interaction, a gender-specific analysis was performed.

The BPI score for the "pain at its worst" showed a higher mean for females in the control group 7.66 (± 3.01), when compared to the females in the intervention group 3.50 (± 2.16). There was no significant between group mean differences for the "pain at its worst" in the male to male comparison. The gender-specific mean difference between the groups is presented in Table # 16.

Table # 16

The BPI Pain Intensity

By Gender and Group

	Gender	Group	N	Mean (SD)	*t*	df	*p*-value
Rate your pain at its worst in the past 24 hours	Female	Treatment Control	6 6	3.50 (2.16) 7.66 (3.01)	−2.751	10	.020
	Male	Treatment Control	29 30	5.32 (2.87) 5.51 (2.48)	− 0.271	57	.788
Rate your pain at its least in the past 24 hours	Female	Treatment Control	6 6	1.16 (1.47) 2.91 (2.45)	−1.496	10	.165
	Male	Treatment Control	29 30	1.58 (2.51) 1.90 (2.38)	−.492	57	.625
Rate your pain on average	Female	Treatment Control	6 6	2.50 (1.87) 4.50 (2.25)	−1.671	10	.126
	Male	Treatment Control	28 30	2.78 (1.28) 3.21 (1.85)	−1.035	52	.305
Rate your pain you have right now	Female	Treatment Control	6 6	2.66 (2.16) 4.00 (2.75)	−.933	10	.373
	Male	Treatment Control	29 30	1.44 (1.82) 2.18 (2.56)	−1.273	52	.209

In summary, there was a statistically significant difference ($p = 0.02$) for the "pain at its worst" by group and gender. The females in the treatment group had a lower score, and experienced lower pain intensity "at its worst", when compared to the females in the control group (Table # 16).

Age was another covariate considered for the rating of the "pain at its worst". To test for differences in the "pain at its worst" between groups, the analysis of covariance (ANCOVA) was used.

Age did not contribute to the difference in the "pain at its worst" ($p = .816$) (Table # 17).

Table 17 **The BPI-Pain Intensity**

Tests of Between-Subjects Effects

Dependent Variable: rate your pain at its worst in the past 24 hours

Source	Type III Sum of Squares	df	Mean Square	*F*-value	*p*-value
Corrected Model	53.263(a)	4	13.316	1.835	.132
Intercept	44.015	1	44.015	6.067	.016
age	.398	1	.398	.055	.816
group	47.210	1	47.210	6.507	.013
BQ6	.317	1	.317	.044	.835
group * BQ6	38.790	1	38.790	5.347	.024
Error	478.815	66	7.255		
Total	2641.500	71			
Corrected Total	532.077	70			

a R Squared = .100 (Adjusted R Squared = .046)

The BPI was used to measure the relief of pain obtained from analgesics. The mean BPI scores obtained from both groups were compared. Participants in the intervention group had a higher mean score in pain relief obtained from analgesia, 78.00 (± 26.12), than those in the control group 71.66 (± 26.13) (Table # 14). However, the difference was not statistically significant, as evidenced by the independent sample t-test value of $p = 0.311$. The Pearson Correlation Coefficient test was performed, to determine if there was a correlation between the level of perceived pain relief as measured by the BPI question # 8 and the amount of analgesics the patients consumed. The r was not significant for the total Morphine/Morphine eq/kg, total Naproxen mg/kg, and total Percocet mg/kg. The correlation approach statistical significance ($r = -0.331$, $p = 0.056$), for the total dose of Tylenol consumed in the treatment group. The negative relationship indicated that the more relief the patients in the treatment group obtained the less total Tylenol mg/kg they consumed.

The BPI was also used to measure the impact of the post-operative pain on the patients' usual activities, including: general activity, mood, walking ability, deep breathing and coughing, relations with others, sleep, and enjoyment of life. The mean summative score for the pain interference for the control group was 31.97 (± 15.01), and for the intervention group it was 23.21 (± 19.49) (Table # 14). The difference between the groups was statistically significant, as supported by findings from an independent sample t-test, $p = 0.037$ (Table # 14). This result suggests that participants in the intervention group experienced overall less interference from pain than those in the control group.

The individual scores for the seven components of pain-related interference with activities were analyzed by group, and are presented in Table # 18.

Table # 18

The BPI- Pain Interference Components by Group

Group Statistics

	Group	N	Mean (SD)	*t*	*df*	*p*- value
General activity	Treatment Control	35 36	3.41 (3.48) 5.36 (3.01)	- 2.51	69	0.014
Mood	Treatment Control	35 36	2.65 (3.30) 4.16 (3.39)	- 1.89	69	0.062
Walking ability	Treatment Control	35 36	2.82 (3.14) 4.29 (2.97)	- 2.01	69	0.048
Deep breathing and coughing	Treatment Control	35 36	5.00 (3.01) 5.18 (2.34)	- 0.282	69	0.779
Relations with others	Treatment Control	35 36	2.21 (3.06) 3.00 (3.07)	- 1.078	69	0.285
Sleep	Treatment Control	35 36	3.11 (3.39) 4.33 (3.43)	- 1.504	69	0.137
Enjoyment of life	Treatment Control	35 36	3.98 (3.68) 5.63 (3.15)	- 2.033	69	0.046

Significant differences between the groups were evident, specifically in interference with general activities ($p = 0.014$), walking ($p = 0.048$), and enjoyment of life ($p = 0.046$) (Table # 18). The participants in the intervention group had a lower mean pain interference score, and experienced less pain-related interference in activities than those in the control group. The individual scores for the seven components of interference with activities, by gender, are presented in Table # 19.

Table # 19

The BPI- Pain Interference Components by Gender

	Gender	N	Mean (SD)	*t*	df	*p* - value
General activity	female male	12 59	4.58 (2.90) 4.36 (3.48)	0.203	69	0.821
Mood	female male	12 59	3.41 (3.44) 3.42 (3.43)	- 0.006	69	0.995
Walking ability	female male	12 59	2.75 (1.65) 3.73 (3.33)	- 0.997	69	0.322
Deep breathing and coughing	female male	12 59	3.50 (1.78) 5.41 (2.72)	- 2.328	69	0.023
Relations with others	female male	12 59	2.83 (3.27) 2.56 (3.06)	0.271	69	0.787
Sleep	female male	12 59	3.29 (3.16) 3.82 (3.51)	- 0.484	69	0.630
Enjoyment of life	female male	12 59	4.04 (3.16) 4.98 (3.57)	- 0.847	69	0.400

In the deep breathing and coughing pain-related interference, a significant difference ($p = 0.023$) was found, with the male participants having a higher score than females. This finding suggests that male participants perceived a higher pain level than female participants during this activity.

In summary, compared to women who received the intervention, the women in the control group had a significantly higher intensity score for the pain "at its worst in the past 24 hours". Although not statistically significant, the intervention group as a whole (both men and women) also reported lower pain intensity and better pain relief obtained from analgesia than the control group.

Participants in the intervention group reported statistically significantly less interference from pain during daily activities, such as: general activities, walking, and enjoyment of life, compared to the control group.

Research Hypothesis # 2: Urgent CABG patients who had pre-operative pain-education will have a decreased level of anxiety and distress, as measured by the VAS.

I. Anxiety VAS. To check for equality of groups at baseline, the mean pre-operative VAS anxiety rating scores for the control and intervention groups were compared. The mean pre-operative VAS anxiety rating score for the control group was 45.36 (± 29.70), and for the intervention group it was 47.50 (± 32.01). There were no significant between group mean differences in the pre-operative VAS anxiety ratings (independent sample t - test $p = 0.770$).

Table # 20

The VAS Pre-Operative Anxiety Ratings

Group Statistics

	Group	**N**	**Mean (SD)**	***t***	**df**	***p*-value**
VAS pre-operative Anxiety rating	treatment	36	47.50 (32.01)	0.294	70	0.770
	control	36	45.36 (29.70)			

To further explore the data for covariates, and test between group differences in the pre-operative VAS anxiety by group and gender, the two-way ANOVA was used (Table # 21).

Table # 21

The VAS Pre-Operative Anxiety

Tests of Between-Subjects Effects

Dependent Variable: VAS pre-operative anxiety rating

Source	Type III Sum of Squares	df	Mean Square	*F*-value	*p*-value
Corrected Model	2211.418(a)	3	737.139	.776	.512
Intercept	78519.317	1	78519.317	82.608	.000
group	877.433	1	877.433	.923	.340
BQ6	1099.348	1	1099.348	1.157	.286
group * BQ6	1157.531	1	1157.531	1.218	.274
Error	64634.234	68	950.503		
Total	222063.000	72			
Corrected Total	66845.653	71			

a R Squared = .033 (Adjusted R Squared = -.010)

No statistically significant difference was found in the pre-op VAS anxiety by gender ($p = 0.286$), and the group results were not interacting with gender ($p = 0.274$). Another covariate considered was age. Again, age did not contribute statistically to the pre-operative VAS anxiety ratings by group ($p = 0.802$) (Table # 22).

In summary, there were no significant differences at baseline, between the control and intervention groups in pre-operative VAS anxiety by gender and age.

Table # 22

The VAS Pre-Operative Anxiety

Tests of Between-Subjects Effects

Dependent Variable: VAS pre-operative anxiety rating

Source	Type III Sum of Squares	df	Mean Square	*F*-value	*p*-value
Corrected Model	143.654(a)	2	71.827	.074	.928
Intercept	3845.086	1	3845.086	3.978	.050
age	61.307	1	61.307	.063	.802
group	71.753	1	71.753	.074	.786
Error	66701.998	69	966.696		
Total	222063.000	72			
Corrected Total	66845.653	71			

a R Squared = .002 (Adjusted R Squared = -.027)

Further data analysis was performed to compare the groups, tested with the independent samples t-test, on the pre to post surgery VAS anxiety difference. The VAS anxiety difference score in the pre-post surgery between groups was not significant, $p = 0.214$.

Table # 23

The VAS Anxiety Difference (pre-post)

Independent Samples Test

	Group	**N**	**Mean (SD)**	***t***	**df**	***p*-value**
VAS anxiety difference (pre-post)	treatment	36	12.00 (30.58)	1.253	70	.214
	control	36	3.05 (29.96)			

In order to test the emotional impact of the intervention, within subject difference between pre and post surgery anxiety levels was compared between groups.

Table # 24

The VAS Anxiety Difference

Paired Samples Statistics

	Group	N	Mean (SD)	*t*	df	*p*-value
VAS pre-operative anxiety rating	treatment	36	47.50 (32.01)	2.354	35	.024
Anxiety rating post-operative			35. 50 (29.51)			
VAS pre-operative anxiety rating	control	36	45. 36 (29.51)	.612	35	.545
Anxiety rating post-operative			42.30 (29.19)			

The difference in the VAS anxiety pre to post surgery within the control group, tested with the paired samples *t* - test, was not statistically significant ($p = 0.545$), but within the intervention group the difference was statistically significant with a $p = 0.024$. The anxiety level after surgery decreased significantly from pre to post surgery for subjects in the intervention group but not in their counterparts in the control group, suggesting that the pre-operative teaching intervention positively influenced the post-operative anxiety level.

Data were analyzed further for covariates, using the two-way ANOVA to test for the VAS anxiety difference by group and gender. The difference in anxiety by gender was not significant ($p = 0.187$) (Table # 25). However, when the effect

of gender and the interaction with gender was controlled for, there was a statistically significant VAS anxiety difference ($p = 0.044$) between groups (Table # 25). This suggests that gender had an impact on the treatment effect, but its effect was not statistically significant because of a fewer number of women in the sample.

Table # 25

The VAS Anxiety Difference (pre-post)

Tests of Between-Subjects Effects

Dependent Variable: VAS anxiety difference (pre-post)

Source	Type III Sum of Squares	df	Mean Square	*F*-value	*p*-value
Corrected Model	5142.979(a)	3	1714.326	1.928	.133
Intercept	496.843	1	496.843	.559	.457
group	3738.472	1	3738.472	4.205	.044
BQ6	1578.631	1	1578.631	1.776	.187
group * BQ6	2341.869	1	2341.869	2.634	.109
Error	60452.965	68	889.014		
Total	69676.000	72			
Corrected Total	65595.944	71			

a R Squared = .078 (Adjusted R Squared = .038

Another covariate considered was age. To test for differences in the pre-post surgery VAS anxiety score between groups adjusted for age, the analysis of covariance was used. Age also contributed significantly to the pre-post surgery VAS anxiety difference ($p = 0.048$) (Table # 26).

Table # 26

The VAS Anxiety Difference (pre-post)

Tests of Between-Subjects Effects

Dependent Variable: VAS anxiety difference (pre-post)

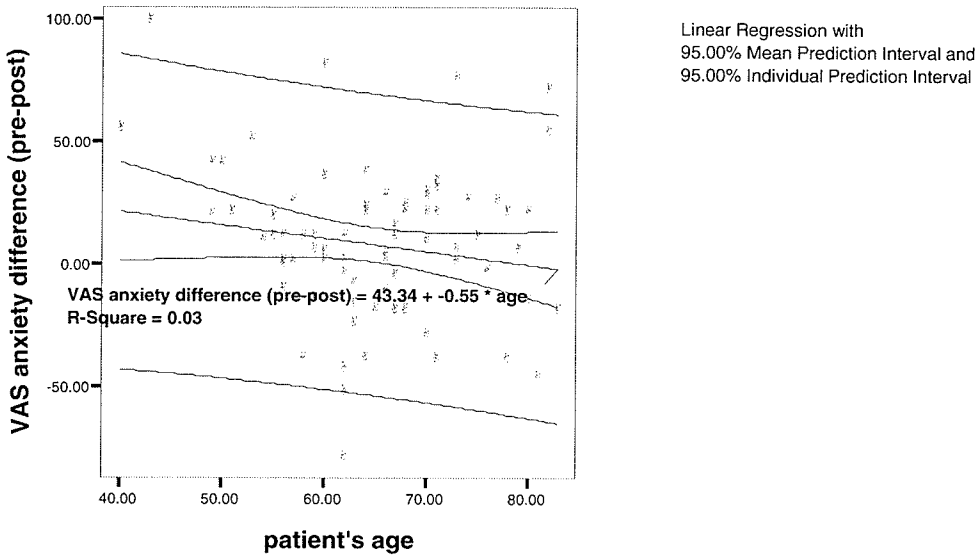
Source	Type III Sum of Squares	df	Mean Square	*F*-value	*p*-value
Corrected Model	8584.052(a)	4	2146.013	2.522	.049
Intercept	3805.805	1	3805.805	4.473	.038
age	3441.073	1	3441.073	4.044	.048
group	3269.712	1	3269.712	3.843	.054
BQ6	1519.256	1	1519.256	1.785	.186
group * BQ6	2269.359	1	2269.359	2.667	.107
Error	57011.892	67	850.924		
Total	69676.000	72			
Corrected Total	65595.944	71			

a R Squared = .131 (Adjusted R Squared = .079)

The Pearson Correlation Coefficient test was performed, to determine if there was a correlation between the patient's age and the VAS anxiety difference. The $r = -0.243$, with a statistically significant $p = 0.039$, indicates that the younger participants had a bigger difference in their pre to post VAS anxiety rating. The graphic representation of this relationship is presented in Figure # 3.

Figure # 3

VAS Anxiety Difference By Age- Linear Regression



The patient's age was found to have a statistically significant ($p = 0.048$) effect on the positive changes in the VAS anxiety rating (pre to post) difference. The younger patients had a bigger change in anxiety level (pre to post surgery) and a lower anxiety after surgery.

The differences in the pre - post surgery VAS anxiety scores between the groups, adjusted for age and gender, are presented in Table # 27.

Table # 27

The Age and Gender Adjusted VAS Anxiety Difference (pre-post operative)

				95 % Confidence Interval	
Group	**Gender**	**Mean**	**Std. Error**	**Lower Bound**	**Upper Bound**
treatment	female	13.630 [a]	11.028	– 8.383	35.643
	male	10.970 [a]	5.423	.146	21.794
control	female	– 18.603 [a]	11.917	– 42.390	5.184
	male	8.002 [a]	5.330	– 2.637	18.642

a. Covariates appearing in the model are evaluated at the following values: age = 64.6667

Females in the control group experienced, on average, more anxiety after the surgery compared to pre surgery (that is why the estimated change is negative). While, on average, the intervention group experienced less anxiety, only the males in the intervention group had a significant change, based on the 95 % confidence interval (positive value - for male - lower bound), and a lower anxiety following surgery. When controlled by age and gender the treatment effect was found to be specific for the males in the intervention group, who had significantly lower anxiety after surgery.

The emotional impact of the pre-operative intervention on the anxiety difference within subjects was positive for the male subjects in the treatment group, who showed lower anxiety after surgery when compared with pre surgery scores. Females in the control group experienced more anxiety after the surgery compared to pre surgery scores.

II. Distress VAS. Data were analyzed further to test for differences in the level of VAS distress related to pre-operative chest pain. The mean pre-operative rating of the VAS distress related to chest pain for the control group was 62.22 (± 29.77), and 51.44 (± 32.62) for the intervention group. There was no statistically significant difference between the groups in the pre-operative VAS distress rating related to chest pain, assuming equality of variances (Levine's test $p = 0.268$), and an independent sample t- test $p = 0.148$ (Table # 28).

Table # 28

The VAS Pre-Operative Distress

Independent Samples Test

	Group	**N**	**Mean (SD)**	***t***	**df**	***p*-value**
VAS pre-operative rating of distress related to chest pain	Treatment	36	51.44 (32.62)	– 1.464	70	.148
	Control	36	62.22 (29.77)			

To further explore the data, the two-way ANOVA was used to test between group differences in the VAS distress, related to chest pain by group and gender. There was no statistically significant ($p = 0.853$) difference found between groups in the level of the reported pre-operative distress (Table # 29).

Table # 29

The VAS of Pre-Operative Distress

Tests of Between-Subjects Effects

Dependent Variable: VAS pre-operative rating of distress related to chest pain

Source	Type III Sum of Squares	df	Mean Square	*F*-value	*p*-value
Corrected Model	8043.433(a)	3	2681.144	2.925	.040
Intercept	106580.413	1	106580.413	116.293	.000
group	31.692	1	31.692	.035	.853
BQ6	4407.182	1	4407.182	4.809	.032
group * BQ6	1868.557	1	1868.557	2.039	.158
Error	62320.567	68	916.479		
Total	302926.000	72			
Corrected Total	70364.000	71			

a R Squared = .114 (Adjusted R Squared = .075)

There was a statistically significant ($p = 0.032$) difference, by gender, in the pre-operative VAS distress. The pre-operative rating of the VAS distress showed a higher mean in the distress rating for the males, in both the control group (67.83) and the intervention group (52.82) when compared to females in the control group, (34.16) and treatment group (45.71) (Table # 30). However, the level of pre-operative distress was not significant between groups after adjusting for gender.

Table # 30

The VAS of Pre-Operative Distress

group * gender

Dependent Variable: VAS pre-operative rating of distress related to chest pain

Group	Gender	Mean	Std. Error	95 % Confidence Level	
				Lower Bound	Upper Bound
treatment	female	45.714	11.442	22.882	68.547
	male	52.828	5.622	41.610	64.045
control	female	34.167	12.359	9.505	58.829
	male	67.833	5.527	56.804	78.863

To test for differences in the pre-operative VAS distress by age and group, the Analysis of Covariance was used. After correcting for age, there was no statistically significant difference in VAS distress between the groups $p = 0.123$ (Table # 31). The patients' age did not have a significant effect on the participants' pre-operative distress related to chest pain.

Table # 31

The Pre-Operative VAS Distress

Tests of Between-Subjects Effects

Dependent Variable: VAS pre-operative rating of distress related to chest pain

Source	Type III Sum of Squares	df	Mean Square	*F*-value	*p*-value
Corrected Model	3679.489(a)	2	1839.745	1.904	.157
Intercept	11211.951	1	11211.951	11.601	.001
age	1588.600	1	1588.600	1.644	.204
group	2356.946	1	2356.946	2.439	.123
Error	66684.511	69	966.442		
Total	302926.000	72			
Corrected Total	70364.000	71			

a R Squared = .052 (Adjusted R Squared = .025)

Intervention Impact

The data were further analyzed to determine if there was a difference between groups in the distress related to post-operative pain after surgery. The mean VAS distress score for the control group was significantly higher 37.66 (± 25.75), when compared to the intervention group 32.00 (± 29.14) ($p = 0.385$) (see Table # 32).

Table # 32

The VAS Distress
Paired Samples Statistics

Group			Mean	N	Std. Deviation	Std. Err
treatment	Pair 1	VAS pre-operative rating of distress related to chest pain	51.4444	36	32.62203	5.43700
		distress rating related to post-operative pain	32.0000	36	29.14496	4.85749
control	Pair 1	VAS pre-operative rating of distress related to chest pain	62.2222	36	29.77354	4.96226
		distress rating related to post-operative pain	37.6667	36	25.75489	4.29248

However, the pre to post-operative difference in the mean VAS distress score within both groups was highly significant. A paired samples t test yielded a $p < 0.001$ for the control group, and a $p = 0.010$ for the intervention group.

The VAS distress related to post-operative pain within the groups was significantly lower for subjects in both groups when compared to the pre-operative distress related to chest-pain. However, the subjects in the treatment group experienced a lower average distress level when compared to subjects in the control group.

To compare groups in terms of the difference in distress, the independent samples *t*-test was performed. The difference in pre to post-operative distress between the groups was not statistically significant ($p = 0.592$) (Table # 33).

Table # 33

The VAS Distress (pre-post) Independent Samples Test

	Group	**N**	**Mean (SD)**	***t***	**df**	***p*-value**
VAS distress difference (pre- post)	treatment	36	19.44 (42.96)	− .539	70	.592
	control	36	24.55 (37.33)			

There was a statistically significant decrease within both groups in the pre to post operative VAS distress related to acute pain. A larger change in VAS distress was observed in the control group. However, the difference in the change in distress between the groups was not statistically significant.

In further covariate analysis, the two-way ANOVA was used, to test the VAS distress difference by group and gender. When adjusted by gender the VAS distress difference was statistically significant by group and gender, with $p = 0.030$ (Table # 34).

Table # 34

The VAS Distress Difference

Tests of Between-Subjects Effects

Dependent Variable: VAS distress difference (pre-post)

Source	Type III Sum of Squares	df	Mean Square	*F*-value	*p*-value
Corrected Model	14129.247(a)	3	4709.749	3.210	.028
Intercept	7484.586	1	7484.586	5.102	.027
group	1605.081	1	1605.081	1.094	.299
BQ6	7245.098	1	7245.098	4.938	.030
group * BQ6	7234.181	1	7234.181	4.931	.030
Error	99760.753	68	1467.070		
Total	148738.000	72			
Corrected Total	113890.000	71			

a R Squared = .124 (Adjusted R Squared = .085)

The VAS scores indicated that the mean difference in pre to post operative distress in groups varied by gender (Table # 35). The higher mean distress difference for the males in both the control and intervention groups indicates a significant reduction in the distress after surgery. However, for the females in the control group, the distress actually increased significantly after surgery (— 19.00). The distress difference for the females in the intervention group also improved, on average, but the confidence interval included 0, indicating a non-significant reduction in distress after surgery.

Table # 35

The VAS Distress Difference

group * gender

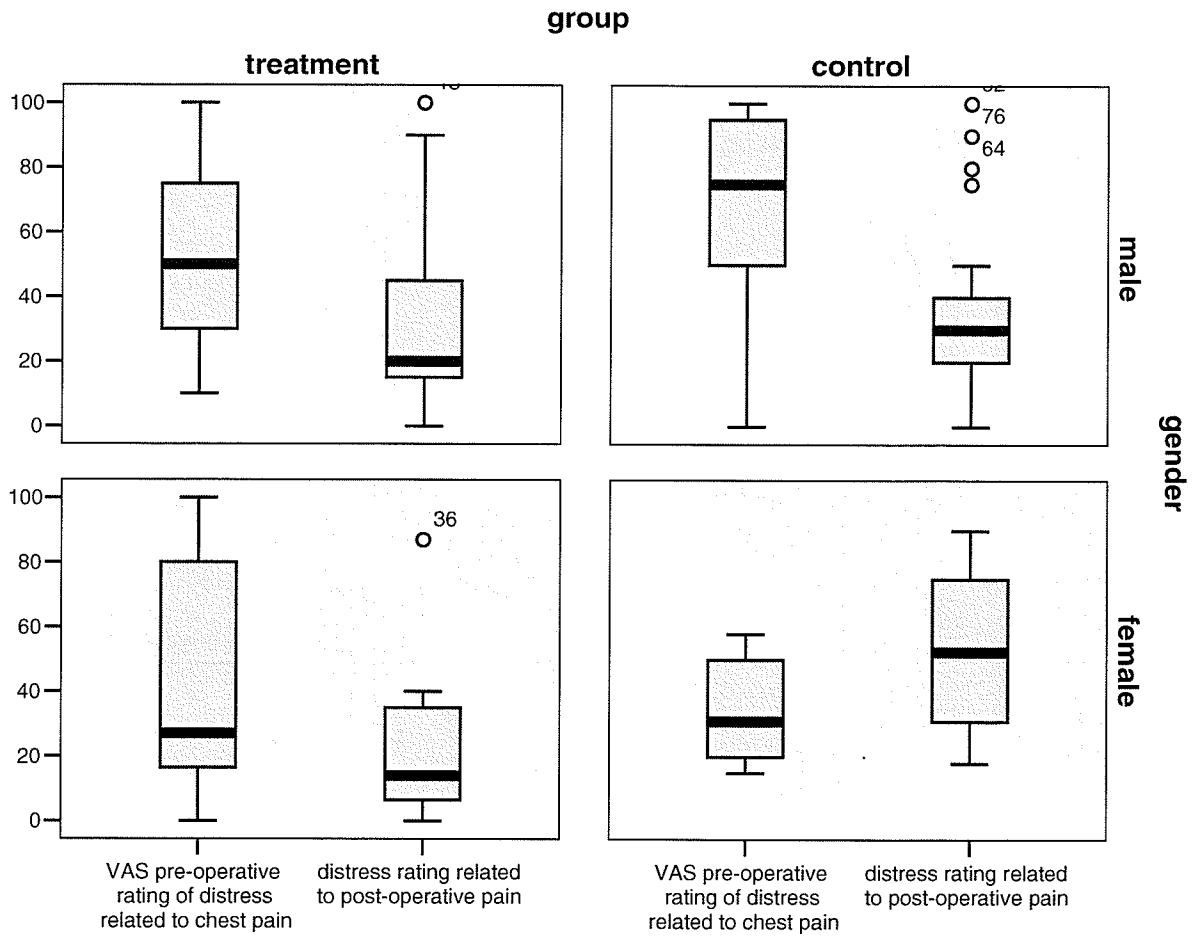
Dependent Variable: VAS distress difference (pre-post)

Group	Gender	Mean	Std. Error	95 % Confidence Interval	
				Lower Bound	Upper Bound
treatment	female	19.429	14.477	-9.460	48.317
	male	19.448	7.113	5.255	33.641
control	female	-19.000	15.637	-50.203	12.203
	male	33.267	6.993	19.312	47.221

Figure # 4 illustrates the VAS pre and post surgery distress ratings by group and gender.

Figure # 4

The VAS Distress (pre to post surgery)



To look for a correlation between the patients' age and the VAS distress difference, the Pearson Correlation test was performed. The small negative correlation of r = – 0.016, and a not significant $p = 0.891$, indicated that age had no significant effect on the VAS distress difference. To test between group mean differences in the VAS distress, the one-way ANOVA was used. The difference in the VAS distress, by age ($p = 0.860$), and by group ($p = 0.586$), was not significant. No correction for age was required.

Table # 36

The VAS Distress Difference

Tests of Between-Subjects Effects

Dependent Variable: VAS distress difference (pre-post)

Source	Type III Sum of Squares	df	Mean Square	*F*-value	*p*-value
Corrected Model	521.570(a)	2	260.785	.159	.854
Intercept	1076.114	1	1076.114	.655	.421
age	51.348	1	51.348	.031	.860
group	490.850	1	490.850	.299	.586
Error	113368.430	69	1643.021		
Total	148738.000	72			
Corrected Total	113890.000	71			

a R Squared = .005 (Adjusted R Squared = -.024)

No significant between-group mean differences in the VAS distress were found. The patients' ages had no significant effect on the VAS distress difference between groups.

In summary, the anxiety level following surgery decreased significantly from pre to post surgery for subjects in the intervention group. Younger participants experienced lower anxiety after surgery, compared to pre surgery.

Females in the control group experienced more anxiety after the surgery compared to pre surgery scores.

The distress related to post-operative pain within the groups was significantly lower for subjects in both groups when compared to the pre-operative distress related to chest-pain. However, the subjects in the treatment group experienced a lower average distress level when compared to subjects in the control group. The males in both the intervention and control groups had significantly reduced distress after surgery, compared to their pre-operative levels. The distress for the females in the control group increased significantly after surgery.

Research Hypothesis # 3: Patients who had pre-operative pain-education will have fewer barriers to pain management, measured by the Barrier Questionnaire-II (BQ-II).

To test for pre and post-operative within-group differences in perceived barriers to pain management, the paired samples t – test was used (Table # 37). The difference in the BQ-II within the control group was statistically significant for fatalism ($p = 0.046$) and harmful effects ($p = 0.043$). The difference within the intervention group was statistically significant for physiological effects ($p < 0.001$), communication ($p < 0.001$), harmful effects ($p < 0.001$), and the BQ-II total score difference ($p < 0.001$).

Table # 37

The BQ-II

Paired Samples Statistics

Group	Pair	BQ-II	N	Mean (SD)	*p*-value
Treatment	1	Physiological effects Pre-op Post-op	36	27.83 (14.62) 14.58 (13.09)	<.001
	2	Fatalism (reverse scored) Pre-op Post-op	36	2.00 (2.75) 1.11 (2.29)	.152
	3	Communication Pre-op Post-op	36	10.05 (9.04) 4.11 (5.32)	<.001
	4	Harmful effects Pre-op Post-op	36	16.91 (9.58) 8.25 (9.76)	<.001
	5	Total score Pre-op Post-op	36	56.80 (30.65) 28.05 (26.46)	<.001
Control	1	Physiological effects Pre-op Post-op	36	25.27 (12.42) 25.00 (18.38)	.919
	2	Fatalism (reverse scored) Pre-op Post-op	36	1.0 (1.37) 1.97 (2.76)	.046
	3	Communication Pre-op Post-op	36	7.72 (7.81) 7.65 (8.40)	.958
	4	Harmful effects Pre-op Post-op	36	16.83 (8.60) 14.41 (9.78)	.043
	5	Total score Pre-op Post-op	36	50.83 (25.26) 49.04 (31 57)	.684

To test for correlations in the pre to post-operative BQ-II scores within groups, a paired samples correlations was used. In the control group, the correlation coefficient was statistically significant for physiological effect ($p = 0.002$), communication ($p = 0.001$), harmful effects ($p < 0.001$), and the BQ-II total score ($p < 0.001$) (Table # 38). There was also a highly significant correlation in the intervention group for physiological effect ($p = 0.005$), communication ($p < 0.001$), harmful effects ($p = 0.029$), and the BQ-II total score ($p = 0.001$) (Table # 38). No significant correlation was found in either group for fatalism, with $p = 0.234$ for the control group, and $p = 0.854$ for the intervention group (Table # 38).

Table # 38

The BQ-II

Paired Samples Correlation

Group	Pair	BQ-II	N	r	*p*-value
Treatment	1	Physiological effects Pre-op Post-op	36	.455	.005
	2	Fatalism (reverse scored) Pre-op Post-op	36	−.032	.854
	3	Communication Pre-op Post-op	36	.729	<.001
	4	Harmful effects Pre-op Post-op	36	.363	.029
	5	Total score Pre-op Post-op	36	.536	.001
Control	1	Physiological effects Pre-op Post-op	36	.499	.002
	2	Fatalism (reverse scored) Pre-op Post-op	36	.203	.234
	3	Communication Pre-op Post-op	36	.528	.001
	4	Harmful effects Pre-op Post-op	36	.725	<.001
	5	Total score Pre-op Post-op	36	.594	<.001

To test for group differences in perceived barriers to pain management, the independent sample *t*-test was performed on the difference scores (pre-operative minus post-operative). A statistically significant between-group mean difference was found in all categories: physiological effects ($p = 0.001$), fatalism ($p = 0.018$), communication ($p = 0.001$), harmful effects ($p = 0.005$), and the BQ-II total difference ($p < 0.001$) (Table # 39). The larger mean scores were evident in the treatment group, suggesting larger treatment effect, and fewer barriers to pain management for participants who took part in the educational intervention.

Table # 39

The BQ-II

Independent Samples Test

				t-test for Equality of Means		
BQ-II	**Group**	**N**	**Mean (SD)**	***t***	**df**	***p* value**
physiological effects difference (pre-op minus post-op)	Treatment	36	13.25(14.53)	3.569	70	.001
	Control	36	.27 (16.25)			
fatalism (reverse scored) difference (pre-op minus post-op)	Treatment	36	.88 (3.63)	2.424	70	.018
	Control	36	−.97 (2.82)			
communication difference (pre-op minus post-op)	Treatment	36	5.94 (6.31)	3.486	70	.001
	Control	36	.06 (7.89)			
harmful effects difference (pre-op minus post-op)	Treatment	36	8.66 (10.92)	2.902	59.155	.005
	Control	36	2.41 (6.91)			
total score difference (pre-op minus post-op)	Treatment	36	28.75(27.74)	4.238	70.00	<.001
	Control	36	1.79 (26.20)			

Both gender and age were explored for their impact as potential covariates on barriers to pain management. Based on the results of the ANCOVA, the participants' gender and age did not have an effect on their score differences in perceived barriers to pain management.

After surgery, to test for group differences in the BQ-II score, the independent sample *t*-test was performed. A statistically significant between group mean difference was found post-operatively in: physiological effects ($p = 0.007$), communication ($p = 0.037$), harmful effects ($p = 0.009$), and the BQ-II total score ($p = 0.003$) (Table # 40). The difference in fatalism between groups was not significant, with the $p = 0.154$ (Table # 40).

Table # 40

The BQ-II Difference

				***t*-test for Equality of Means**		
	Group	**N**	**Mean (SD)**	***t***	**df**	***p*-value**
BQ-II physiological effects (post-op)	Treatment	36	14.58(13.09)	−2.769	70	.007
	Control	36	25.00(18.39)			
BQ-II fatalism (reverse scored) (post-op)	Treatment	36	1.11 (2.29)	−1.440	67.680	.154
	Control	36	1.97 (2.76)			
BQ-II communication post-op)	Treatment	36	4.11 (5.33)	−2.136	59.237	.037
	Control	36	7.65 (8.40)			
Harmful effects (post-op)	Treatment	36	8.25 (9.767)	−2.676	70	.009
	Control	36	14.42 (9.78)			
BQ-II total score (post-op)	Treatment	36	28.06(26.47)	−3.06	70.00	.003
	Control	36	49.04(31.57)			

To further explore the data for covariates, and test for post-operative between group differences in barriers to pain management by gender and group, the two-way ANOVA was used. After correcting for gender, there was a statistically significant difference found in the physiological effects ($p = 0.034$), communication ($p = 0.046$), harmful effects ($p = 0.015$), and the BQ-II total score ($p = 0.010$) by group. No significant difference was found for fatalism, with the p value of 0.088 (Table # 41).

Table # 41

The BQ-II Post-Operative Score

	Group	N	Gender	Mean	*p*-value
Physiological effects	Treatment	36	Female Male	11.571 15.310	.034
	Control	36	Female Male	23.000 25.400	
Fatalism (reverse scored)	Treatment	36	Female Male	.714 1.207	.088
	Control	36	Female Male	2.833 1.800	
Communication	Treatment	36	Female Male	5.000 3.897	.046
	Control	36	Female Male	10.667 7.050	
Harmful effects	Treatment	36	Female Male	8.286 8.241	.015
	Control	36	Female Male	17.833 13.733	
Total score	Treatment	36	Female Male	25.571 28.655	.010
	Control	36	Female Male	54.333 47.983	

Data were further analyzed for age as a covariate, using the ANCOVA, to test for the BQ-II post-operative difference by group and age. After correcting for age, there was a statistically significant difference in the post-operative BQ-II score by group for: physiological effect ($p = 0.007$), communication ($p = 0.047$), harmful effects ($p = 0.010$), and the BQ-II total difference score ($p = 0.004$). No significant difference was found for fatalism (reverse scored), with the p value of 0.18 after correcting for age.

After surgery, to test for differences in the BQ-II score difference (pre-operative minus post-operative) by group and gender, the ANOVA analysis of covariance was used. After correcting for gender, the difference in the BQ-II score difference between the groups was statistically significant for all barriers: physiological effect ($p = 0.008$), fatalism ($p = 0.014$), communication ($p = 0.002$), harmful effects ($p = 0.023$), and the BQ-II total difference score ($p = 0.001$). In summary, after correcting for gender, there was still a statistically significant difference between the groups in the post-operative BQ-II difference score for all barriers. The patients' gender did not have an effect on the participants' difference in barriers to pain management.

Data were further analyzed for age as a covariate, using the ANCOVA, to test for the BQ-II difference (pre-operative minus post-operative) by group and age. After correcting for age, there was a statistically significant difference in the post-operative BQ-II score by group for: physiological effect ($p < 0.001$), fatalism (reverse score) ($p = 0.022$), communication ($p = 0.001$), harmful effects

($p = 0.004$), and the BQ-II total difference score ($p < 0.001$). A statistically significant change in the BQ-II total difference score was found between groups. Compared to the control group, the intervention group had a significant change in the BQ-II difference score, resulting in fewer barriers to pain management.

In summary, a statistically significant difference within the control group was found for: fatalism, harmful effects; and within the intervention group for: physiological effects, communication, harmful effects, and the BQ-II total score difference. A statistically significant correlation in the pre to post-operative BQ-II scores was found within the control group for: physiological effect, communication, harmful effects, BQ-II total score; and for the intervention group for: physiological effect, communication, harmful effects, and the BQ-II total score. No correlation was found in either group for fatalism.

The participants' gender and age did not have an effect on the difference in the post-operative barriers to pain management. A statistically significant difference between groups in barriers to pain management was found after surgery in: physiological effects, communication, harmful effects, and the BQ-II total score. No significant between group mean difference was found in fatalism, suggesting that, despite teaching, patients believed that pain can not be relieved. Compared to the control group, the intervention group had a significant change in the BQ-II difference score, resulting in fewer barriers to pain management.

Research Hypothesis # 4: Patients who had pre-operative pain-education will have a higher level of satisfaction with pain management, measured with the Patient Outcome Questionnaire (POQ).

To examine the difference in the patients' satisfaction and attitude related to pain control between the control and the intervention groups, the Fisher's Exact statistical test was used. The three (yes/no) questions, # 1, # 10, and # 11, from the Patient Outcome Questionnaire (POQ) were analyzed. The results of the Fisher's Exact Test did not show significant differences between groups. All participants (N = 72) agreed (question # 1), that "the treatment of pain is very important and they should tell" the caregivers when they have pain (p = 1.000). When asked if "there was a time that the medication did not help" (question # 10), 13 (37.1 %) of 35 participants in the control and 9 (25.0 %) of 36 participants in the intervention group, would ask "for something more or different to relieve pain". Participants' responses were compared using Chi- Square. Although not statistically significant (Fisher's Exact Test, F = 0.312), participants in the control group were less comfortable and requested "something more or different to relieve pain" more often than those in the intervention group. The summary of the results is presented in Table # 42.

Table # 42

POQ Question # 10: Was there a time that the medication did not help and you asked for something more or different to relieve the pain

Question	Answer	Group		Total	*p*-value Fisher's Exact Test
		Treatment n (%)	Control n (%)	N (%)	
10. Was there a time that the medication did not help and you asked for something more or different to relieve the pain	Yes	9 (25.0)	13(37.1)	22(31.0)	.312
	No	27 (75.0)	22(62.9)	49(69.0)	
Total		36 (100)	35 (100)	71(100)	

When asked (question # 11), "if they still have pain" would they "like a stronger dose of pain medication", more participants in the intervention group (18 of 36 participants, 50.0 %) than in the control group (15 of 36 participants (41.7 %) said "yes", although the difference was not significant (Fisher's Exact Test, $F = 0.479$). The summary of the results is presented in Table # 43. Although not statistically significant, participants in the intervention group would ask for the "stronger dose of pain medication" if "they still have pain" more often than their counterparts.

Table # 43

POQ Question # 11: If you still have pain would you like a stronger dose of pain medication

Question	Answer	Group		Total N (%)	*p*-value Fisher's Exact Test
		Treatment n (%)	Control n (%)		
11. If you still have pain would you like a stronger dose of pain medication	Yes	18 (51.4)	15(41.7)	33(46.5)	.479
	No	17 (48.6)	21(58.3)	38(53.5)	
Total		35 (100)	36 (100)	71 (100)	

A non-parametric approach, the Mann-Whitney Test, was used (since the dependent variable was measured on an ordinal scale) to test differences in patient satisfaction by comparing ranks of scores between the control and intervention groups. The ranks of scores from the POQ (possible scores range from one-four and one-six), questions # 2, 3, 4, 5, 6, 7, and # 9, were compared. The summary of the results is presented in Table # 44.

Table # 44

POQ Questions: # 2, # 3, # 4, # 5, # 6, # 7, and # 9

Question	Group	N	Mean Rank	Mann Whitney U
2. How clear were the instructions about taking pain medication	Treatment	36	40.63	.053
	Control	36	32.38	
3. How clear were the instructions about how to change the amount and timing of the medication if there was no relief of pain or side effects	Treatment	36	41.18	.040
	Control	36	31.82	
4. How clear were the instructions about whom to ask about your pain if you had any questions	Treatment	35	37.60	.447
	Control	36	34.44	
5. How satisfied or dissatisfied you are with the results of your pain treatment overall	Treatment	36	39.85	.139
	Control	36	33.15	
6. How satisfied or dissatisfied you are with the way your nurses responded to your reports of pain	Treatment	36	38.46	.362
	Control	36	34.54	
7. How satisfied or dissatisfied you are with the way your physician responded to your reports of pain	Treatment	31	33.39	.034
	Control	27	25.04	
9. When you asked for pain medication what was the longest time you had to wait to get it ?	Treatment	36	35.76	.721
	Control	36	37.24	

Compared to the control group, the intervention group mean rank POQ scores were consistently higher with respect to questions of clarity and satisfaction and lower in terms of analgesic wait times. A statistically significant difference

was found between groups in question # 3 with the Mann-Whitney *U* value significance of 0.04. In the intervention group, 21 (58.3 %) of 36 (100.0 %) participants, and only 15 (41.7 %) of 36 (100.0 %) participants in the control group, reported the highest satisfaction with the "instructions about how to change the amount and timing of the medication if there was no relief of pain or the medication produced side effects".

A statistically significant ($p = 0.034$) difference between groups was also found for question # 7 (Table # 44). In the control group, only 12 (33.3 %) of 27 (75.0 %) participants, and in the intervention group 22 (61.1 %) of 31 (86.1 %) participants, were very satisfied with the way the "physician responded to the patient's reports of pain". In addition, it was noted that only 27 (75.0 %) of 36 (100.0 %) participants in the control, and 31 (86.1 %) of 36 (100.0 %) participants in the intervention group answered question # 7. Those who did not answer question # 7 stated that they were "never asked by the physician about their pain".

No significant between group mean rank difference scores were found for the following questions: # 2, # 4, # 5, # 6, and # 9 (Table # 44). Although not statistically significant, higher mean rank scores were consistently found in the intervention group, suggesting a higher satisfaction with pain management for participants in the intervention group.

When asked about dissatisfaction with pain treatment (question # 8), four participants from the control group (one was missing) and three from the treatment group wrote the following comments (Table # 45).

Table # 45

Question # 8: If you were not satisfied with your pain tx. in any way, explain why

Group	Comments	Frequency	Valid %
Treatment Valid		33	91.7
	" The nurses in Step Down were fairly swamped at times with people who needed help far more then I did. If I didn't get as much pain relief that I wanted, it was my fault more than theirs"	1	2.8
	" The doctor didn't, nurses handled it"	1	2.8
	" Just one nurse said, I need to learn to relax. Did not take complaint seriously"	1	2.8
	Total	36	100.00
Control Valid		31	86.1
	" The nurse in Step Down Unit told me to put pillow over my head and sleep".	1	2.8
	" Poor working conditions in Step Down Unit. The care provided to patients was excellent, but working conditions very unsatisfactory".	1	2.8
	" Medication was only given at set times and those times could not be changed unless a doctor was available".	1	2.8
	"...I was not told how often I might ask for pain relief. I was just told here is your Tylenol for pain each time they routinely brought it to the bedside. My general impression around pain treatment is that it is not applied on a personal patient need, but rather in an extremely superficial structured cold & sterile fashion ie: the standing order is this so this is what we do. I fear somewhere in the every evolving effective & efficient pain treatment protocols, the patient has been lost. That is sad because I believe the patient is the vital element pain control is all about".		
	" The doctor didn't talk to me about pain"	1	2.8
	Total	36	100.00

In summary, most participants were satisfied with their pain management. Although not statistically significant, higher mean rank scores were consistently found in the intervention group, suggesting higher satisfaction with pain management for participants in that group. Statistically significant differences between groups were found in the POQ questions # 3 and # 7. The majority of the participants in the intervention group, who answered question # 7, were very satisfied with the way in which the physicians responded to their "reports of pain". When approached, those who did not answer question # 7 stated that "they were never asked by the physicians, about their pain".

Research Hypothesis # 5: Patients who had pre-operative pain-education will have a shorter length of stay (LOS), measured by the number of days in the hospital following urgent CABG surgery.

The length of the hospital stay (LOS) was measured in days, from the urgent CABG surgery to discharge, as recorded in the patients' charts. On average, the patients in the intervention group had a shorter LOS (7.72 days, ± 2.88) than patients in the control group (8.52 days, ± 3.76), although this difference was not statistically significant ($p = 0.312$).

Table # 46

LOS After Surgery

Independent Samples t Test

		t	df	p-value	Mean
LOS after surgery-in days	Equal variances assumed	-1.019	70	.312	-.80556
	Equal variances not assumed	-1.019	65.534	.312	-.80556

Data was further analyzed for gender as a covariate, to test between group differences in the LOS by gender and group. After correcting for gender, there was no statistically significant ($p = 0.080$) difference found in the LOS by gender and group.

Table # 47

LOS After Surgery

Tests of Between-Subjects Effects

Dependent Variable: LOS after surgery-in days

Source	Type III Sum of Squares	df	Mean Square	*F- value*	*p*-value	Partial Eta Squared
Corrected Model	78.045(a)	3	26.015	2.451	.071	.098
Intercept	3303.284	1	3303.284	311.186	.000	.821
group	33.613	1	33.613	3.167	.080	.044
BQ6	48.233	1	48.233	4.544	.037	.063
group * BQ6	21.786	1	21.786	2.052	.157	.029
Error	721.830	68	10.615			
Total	5553.000	72				
Corrected Total	799.875	71				

a R Squared = .098 (Adjusted R Squared = .058)

The gender-adjusted post-operative LOS is presented in Table # 47. Although not statistically significant, the males in the intervention group had the shortest LOS in the hospital, which on average was 7.59 days. The females in the control group had the longest hospital stay which, on average, was over 3 days longer then for females in the treatment group and men.

Table # 48

LOS After Surgery by Group and Gender

group * gender

Dependent Variable: LOS after surgery-in days

Group	Gender	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
treatment	female	8.286	1.231	5.828	10.743
	male	7.586	.605	6.379	8.793
control	female	11.500	1.330	8.846	14.154
	male	7.933	.595	6.746	9.120

No significant difference in the post-operative LOS was found between groups by gender and group. The participants' gender did not have a significant effect on the post-operative LOS. However, men in general, and particularly those in an intervention group, had a shorter LOS than women from the intervention group. Women in the control group had the longest hospital stay. On average, it was 3 days longer than the men in the treatment and control groups, and the women in the treatment group.

To further explore the data for covariates, and test for post-operative between group differences in the LOS by age, the ANCOVA test was used. After correcting for age, there was no significant difference ($p = 0.366$) in the post-operative LOS by group. The patients' age did not have a significant effect on the participants' post-operative LOS.

To test whether there is a relationship between the total Morphine eq/kg and total Tylenol in mg/kg (over five days) consumed by patients, and the LOS after the surgery, the Spearman's rho statistical test was performed. The negative correlation of $r = -0.246$, and a significant $p = 0.038$, indicated that the total amount of Morphine eq/kg consumed by patients over the five days had a significant effect on the post-operative LOS. The more Morphine eq/kg the patients consumed, the shorter their LOS was.

In summary, although not statistically significant, on average, the patients in the intervention group had a shorter LOS than patients in the control group. The females in the control group had the longest hospital stay, on average, 3 days longer then females in the treatment group and men. Participants who consumed more Morphine eq/kg had a shorter LOS.

CHAPTER FIVE

Discussion

Introduction

To date, no evidence has been found in the literature that the effect of pre-operative pain-education on urgent CABG surgery patients' post-operative outcomes has been examined. Therefore, this study was designed to fill that gap in knowledge and to test how providing patients with pain-education, self-care skills and support impacts on their outcomes. To guide this research study and the development of the five study hypotheses, the SMM (UCSF, 1994) was used. The influence of the three domains of nursing science: person variables (gender and age), environment and health state, on the SMM's three dimensions: symptom experience, symptom management, and symptom outcome, will be presented. The interrelatedness of the SMM's components and the three domains of nursing will be discussed in relation to the symptom of acute pain and the effect of the pre-operative pain-intervention on the patients' post-operative outcomes. The results of this study will be discussed within the context of relevant literature, and the theoretical framework. The strengths and limitations of the study will be identified, along with implications for clinical nursing practice and future research recommendations.

Symptom Experience

Pain Experience in Urgent CABG Surgery Patients

Acute pain has been the subject of inquiry for several RCT research studies conducted on an elective CABG patient population (Watt-Watson et al., 2000; Watt-Watson et al., 2004). The exploration of this phenomenon has focused on

how to decrease the patients' pain level by increasing their pain management abilities through pre-operative pain-education. Only two research studies were found that were entirely dedicated to acute pain experience and pain management issues in an elective CABG surgery patient population (Watt-Watson et al., 2000; Watt-Watson et al., 2004). This study findings add to and extend the current body of knowledge by exploring pain experience in patients undergoing urgent CABG surgery, and by the execution of a randomized clinical trial of a pre-operative pain education targeted at the urgent CABG surgery population.

In this study, the symptom experience component of the SMM was used as an organizing framework to evaluate urgent CABG surgery patients' pain experience. To gather data, the BPI was used to measure the total pain intensity, including: pain location, pain at its least, average, at the time of completing the questionnaire, and at its worst.

As is the case with surgical procedures, most patients in this study experienced acute pain following surgery. Only three participants in each group (8.3 %) denied having pain at the time when the post-operative questionnaire was conducted. Further conversation with each of these participants revealed that they had great faith in the powers of higher spiritual beings or in the recommended pain treatment.

Most study participants reported pain at the primary surgical site, namely the chest incision, a finding consistent with two other studies of elective CABG surgery patients (Watt-Watson et al., 2004; Yorke et al., 2004). Patients with SVG or RAG experienced pain at the associated graft sites, such as the leg or arm (Watt-Watson et al., 2004; Yorke et al. 2004). Surprisingly, the majority of

participants of this study reported pain at multiple sites other than surgical ranging from the neck, scapulas, lower back, abdomen, rectum, ankles and shoulders. More than half of the sample (51%) in the Yorke and colleagues (2004) study also experienced "bad pain" sensation in the shoulder or shoulders. The origin of such pain, possibly related to the positioning of the patients on the operating room table, should be explored further to determine its possible causes, and ways to prevent it, as it will contribute to and heighten the severity of the urgent CABG surgery patients' total pain experience (AHA, 1991; Yorke et al., 2004).

A modified version of the BPI was used as a measure to assess the effect of the pre-operative education intervention compared to standard care. The original instrument questions, asking patients to rate their pain "over the past 5 days", were changed to rate the pain variability "over the past 24 hours" specifically for day five after surgery. By day five after surgery, patients are typically close to discharge, and are expected to be ambulatory and able to manage their pain without excessive support from the health professionals. The change in the original instrument question was done purposefully to capture a timeframe consistent with the expectation that the patients' have the ability to manage their pain nearly independently. However, this change presents limitations of generalizability due to instrument adaptation.

In this study, although not statistically significant, participants in the intervention group experienced lower pain intensity than those in the control group. This result is congruent with research conducted by Watt-Watson and colleagues (2000), and Watt-Watson and colleagues (2004). This study finding provides modest support for the positive impact of pre-operative pain education on

the reduction of pain following urgent CABG surgery. The symptom experience component of the SMM helped to illustrate the connection between symptom management interventions, namely standard care versus the evaluated pre-operative education intervention, and a positive change, such as decreased pain intensity, in their symptom experience.

In this study, variability in pain intensity over time (past 24 hours, on the average, at the time of the interview) experienced by cardiac surgical patients was identified. Variability in pain intensity following elective CABG surgery was reported in other studies (Meehan et al., 1995; Valdix, & Puntillo, 1995; Watt-Watson et al., 2004), and will be discussed in more detail further on in this section. To assure that each patient's pain is managed effectively at all times, its intensity should be assessed at different time points, considering the influence of the nursing domains of the person, environment, and health/illness, as suggested by the SMM.

Person Factors

The SMM identifies person factors as variables influencing the individual's symptom experience. In this study, person factors, such as gender and age, of individuals who underwent urgent CABG surgery have been explored in relation to their influence on the participants' pain experience.

Gender

One of the interesting findings of the present study concerned a significant interaction between group and gender in pain intensity "at its worst in the past 24 hours". There was a statistically significant difference in pain intensity "at its worst" for women. In the control group, the mean score for women was higher,

when compared with the intervention group. Women, especially those in the control group, experienced a higher pain intensity "at its worst" after surgery than did men. This result matches the studies of Watt-Watson and colleagues (2004), and Yorke and colleagues (2004), who also found that the pre-operative information provided to cardiac surgery patients is not adequately gender-specific to meet the essential recovery needs of women. Therefore, more emphasis must be placed on gender-specific pre-operative teaching, related to pain management. Further exploration into gender-specific strategies that improve the patients' pain-related status is needed. As the sample of women in this research study was small, gender differences in pain intensity must be examined further in a future work. To adequately power the statistical analysis, more women subjects must be included in the study.

Age

Within this study, the patients' age did not contribute significantly to a difference in the rating of the "pain at its worst". This finding does not support the concern noted by Watt-Watson and Stevens' (1998), that older patients undergoing an elective CABG surgery may be more reluctant to report pain, use analgesia, and consequently experience more pain. Zalon's (1997) study supported Watt-Watson and Stevens' (1998) trepidation and found that elders expected their nurses and doctors to take care of their post-operative pain without being told about the pain. Results obtained from the study conducted on orthopedic surgery patients suggest that teaching older adults basic pain management and pain communication skills reduced their pain over the course of hospitalization (McDonald, Freeland, Thomas, & Moore, 2001).

Since the research conducted on pain-related issues in elective CABG surgery patients has been limited, and, until now, studies on urgent CABG surgery patients have not been found, the relationship between age and pain should be explored in future research.

Environment

The SMM helped to identify the environment as a variable that influences the individual's symptom experience, his/her selection of management strategies, and outcomes. In this study, when the individual's information needs were met, he/she appeared to be able to understand the rationale underlying the pain-related practices. The pre-operative educational intervention provided the patients and their family members with the opportunity to talk directly to the health care provider and ask questions that were important to them. The open flow of communication appeared to provide them with reassurance, and reinforced the teaching.

Supportive environment, such as friendly and approachable staff, appeared to positively influence the patients' pain-related practices. When the environment appeared to be less supportive, the opposite happened. For example, despite experiencing pain, some of the patients admitted that they did not request analgesia because of their concern with "bothering" the nurses who were busy with other patients. This finding was echoed in other research studies (Carr et al., 1997; Gordon & Ward, 1995; Pargeon & Hailey, 1999; Ward et al, 1993).

Further conversations with several of the participants of this study revealed that they were very dissatisfied with the physical conditions present in the SDU, including a high temperature and a severe lack of space. There was not enough

room for the patients and their equipment (such as chest tubes), for the nurses to mobilize the patients, and to accommodate visitors. The limited space in the SDU negatively influenced the patients' right to privacy, and the noise level reduced their ability to rest and sleep. These environmental factors affected the patients' pain management practices, and consequent pain experience.

For example, some patients admitted to "being very scared" when they witnessed the staff "working" on a patient "who almost died", and who was eventually transferred back to the ICU. The SDU staff was perceived by some patients to be too busy with other patients to be "bothered" with requests for pain medication. The patients interpreted the provided pain-related information within the context of their particular environment, and modified their pain–related practices despite the teaching they received.

Health and Illness

The SMM recognizes the domain of health and illness as a variable that has an effect on the individual's symptom experience, his/her selection of management strategies, and the symptom outcomes (Dodd et al., 2000). The health/illness state within the context of this study was defined by the severity of the acute pain, and it motivated the patients to seek pain treatment. Prompt response to the acute pain led to more timely treatment, which, in turn, resulted in improved outcomes, such as a decreased pain level. To achieve positive patient outcomes, an understanding of the acute pain symptom proved to be important to the patients and the health care providers. This statement is supported by the data from the study by Watt-Watson and colleagues (2000). In their study, elective CABG surgery patients who received pain-education had fewer concerns about asking for analgesia, and tended

to be more satisfied with their pain treatment versus those in the control group. Several researchers have clearly documented the positive effect of communication on post-operative outcomes (Devine, 1992; Devine & Cook, 1983; Devine & Cook, 1986; Hataway, 1983; McDonald et al., 2001).

The teaching intervention was also associated with encouraging results in terms of analgesic relief. Although not significantly different, participants in the intervention group had a higher mean score than those in the control group, suggesting better "pain relief obtained" from analgesia in the intervention group. This improvement may be due to the participants in the intervention group having a better understanding of the importance of pain management, and having fewer concerns about requesting and taking analgesics. This result is consistent with previous studies (Anderson, 1987; Rice et al., 1992; Schindler et al., 1989; Watt-Watson et al., 2000; Watt-Watson et al., 2004; Yorke, 2004), where the pre-operative pain-education improved, but did not significantly change the participants' overall analgesic intake, and pain relief obtained from analgesia.

In this study, the patients in the treatment group consumed statistically more Morphine equivalents/kilogram over 5 days, compared to those in the control group. In contrast, the participants in the control group used significantly more Tylenol/kilogram over the same time period. A significant difference, by gender, was also observed between groups in the use of Tylenol/kilogram, with the female participants consuming more than the males did. This finding suggests that the participants in the intervention group used more narcotics for pain management and, therefore, did not require as much Tylenol to obtain relief from pain. As a consequence of pain teaching, the participants in the treatment group appear to be

less concerned about addiction, and used more narcotics than Tylenol for pain management. In the study by Watt-Watson and colleagues (2000), participants in the intervention group showed a significant decrease in concerns about addiction, and reported using Morphine equivalents closer to the therapeutic range. These results were not confirmed by another Watt-Watson and colleagues' (2004) study, which showed no impact of the educational–intervention on patients' concerns about taking analgesia, and analgesic use.

An analysis of pain-related interference with the patient's usual activities revealed a statistically significant difference between the group means. Differences were evident in pain-related interference with general activities, walking, and enjoyment of life, with the intervention group having lower scores. A statistically significant reduction in pain-related interference in general activities, for participants in the intervention group, lends support to the research hypothesis, suggesting more favorable outcomes for those who participated in pre-operative pain-education. This finding, consistent with the Watt-Watson and colleagues' (2000), and Watt-Watson and colleagues' (2004) studies, has an important clinical implication for post-operative urgent cardiac surgical patients. Those patients are expected to ambulate and participate in routine post-operative physiotherapy. That level of activity may be difficult to accomplish, given the higher pain interference score for those in the control group.

Pain-related interference was significantly different for deep breathing and coughing by gender, with the male participants in the control group having a higher score and experiencing more pain. No other significant differences were evident, in the pain-related interference with activities, by gender. This finding is

in contrast to those of Watt-Watson and colleagues (2004), who examined elective CABG surgery patients, and demonstrated that, compared to men, women overall had more interference with general activities, walking, mood, and deep breathing and coughing.

In summary, several positive outcomes were identified in the pain experience of urgent CABG surgery patients. Although not always statistically significant, a clinically important reduction in the pain level was demonstrated in the patients that received the pre-operative pain-education. These promising findings provide evidence to support the research hypothesis, which states that pre-operative pain-education leads to more favorable outcomes, such as a decreased level of pain, following urgent CABG surgery, and results in a positive pain experience. The SMM helped the researcher to identify a connection between the perception and evaluation of the acute pain in urgent CABG surgery patients. The participants in the intervention group had a better understanding of the importance of the acute pain management, had an accurate perception of the symptom, and had fewer concerns about requesting and taking analgesics.

The model was also able to reveal the impact of gender on differing acute pain experiences of patients who underwent urgent CABG surgery. As suggested in the model, a discussion of the patients' responses to the symptom of acute pain will follow.

Response to Symptom

Urgent CABG Surgery Patients' Responses to Pain

The SMM helped the researcher to understand the interaction among the components of the symptom experience including: perception of a symptom such

as chest pain and/or acute pain, evaluation of the meaning of a symptom and response to a symptom. This understanding is essential if symptoms are to be effectively managed. For example, if an individual experiencing chest pain believes that the symptom has threatening significance, the perception of its intensity may be heightened. The opposite happens if an individual experiencing acute pain perceives the symptom as insignificant. Patients experiencing pain may respond to the symptom by activating negative psychological responses such as increased anxiety and distress. They in turn, may activate other negative physiological responses. In this study, the SMM was used as an organizing structure to test how the pre-operative pain education influences the patients' psychological responses to acute pain, namely: anxiety and distress.

I. *Anxiety*

One of the psychological responses to acute pain is anxiety. As previously discussed, anxiety is an important variable that may affect the patients' pain experience. Many of the patients in this study revealed that facing a life-threatening surgery made them very anxious. A high level of anxiety has been reported to alter the response to, and the perception of, pain (Cupples, 1991; Ferguson, 1992; Kuivula et al., 2002; Lamarche et al., 1998; Meeker et al., 1992; Nelson et al., 1998). The influence of person variables (gender and age), environment, and health and illness state of the individual, on anxiety and the distress level, will be briefly discussed.

In this study, the pre-operative VAS anxiety rating for the standard care group and the intervention group did not demonstrate a statistically significant difference at baseline between the groups, by gender and age. Furthermore, the

VAS anxiety difference score (pre-post surgery) between groups was not significant ($p = 0.214$).

The results of this research did not show a significant difference ($p = 0.545$) in the VAS anxiety within the control group, when comparing pre to post-operative levels. However, there was a statistically significant difference within the intervention group ($p = 0.024$), when comparing pre to post-operative levels. Thus, while the two groups were comparable in terms of pre-operative anxiety levels, only the intervention group anxiety level decreased significantly post-operatively, supporting the therapeutic psychological effect of the trial treatment in urgent CABG surgery patients. As predicted by the SMM, the results support a strong association between the patients' pre-operative pain-education and their level of anxiety, reflecting a positive response to symptom management of acute pain.

The results of other studies in this area are inconsistent. Anderson (1987) believed that pre-operative education reduces anxiety and facilitates recovery. This finding was not supported by research results conducted on elective CABG patients by Lamarche et al. (1998). Their pre-admission telephone educational-intervention showed a higher level of anxiety, prior to the teaching session for the experimental group, which became significantly higher on admission. In contrast, Cupples' (1991) study found the patients in the experimental group significantly less anxious 5 to 14 days pre-admission following the pre-operative education. Lepczyk et al. (1990) did not lend support to Cupples' findings and found no significant difference in anxiety or knowledge between groups. Both groups reported moderate levels of anxiety prior to the educational intervention, which did

not change significantly either immediately after the intervention or prior to surgery. The researchers concluded that it makes no difference whether patients receive information up to a week before surgery or just the day before. Shuldham et al., (2002) did not lend support to any of the above studies. They reported findings that contradicted previous research and generally accepted beliefs on benefits of education. The results of their study showed no significant difference between the groups in the primary outcomes, namely anxiety, pain, depression, well-being, and the LOS, with the experimental patients having the longer stay. One possible explanation for these varied findings is that the content of the information provided was inconsistent and it may not have provided the patients with the support they needed to help them have some control over the events associated with their surgery.

Person Factors

In this study, person factors, such as the gender and age, of individuals who underwent urgent CABG surgery have been explored in relation to their influence on anxiety and the distress level.

Gender

One of the findings of this study involves gender as a covariate. Data analysis for covariates did not reveal a significant difference ($p = 0.187$) in anxiety by group and gender. However, when the effect of gender was controlled for, a statistically significant anxiety difference ($p = 0.044$) between groups was observed. Although representative of the clinical population, the current study included only 13 women, 18.1 % of the sample. This smaller number of women in the sample may account for the inconsistencies in the gender effect on this finding,

and may reflect a lack of adequate power for this analysis. As the urgent CABG surgery patient population has not been studied in this context before, the potential influence of gender on anxiety merits further exploration.

Perhaps the most striking finding of the present study was the difference in the pre-post surgery VAS anxiety score between groups, adjusted for age and gender. On average, the participants in the intervention group experienced lower anxiety. The anxiety difference score for the males in the intervention group was 10.97, and for the females 13.63. In the control group, the VAS anxiety difference score for the males was 8.00, and for the females it was – 18.60. The females in the control group experienced, on average, more anxiety after the surgery than pre-surgery, as indicated by the negative number for the estimated change. Women in the control group had higher anxiety after surgery, when compared to women in the intervention group. Although different from what the researcher had expected, this result, based on clinical observations, was not surprising.

As this patient population was not studied in this context before, findings of this study could be instrumental in designing future interventions, with a larger sample of women, for testing the relationship between pre-operative pain education and anxiety. Overall, the pre-operative pain-education had a positive impact on post-operative anxiety by reducing its level in the subjects in the intervention group. This supports the study hypothesis that pre-operative pain education decreased the post-operative anxiety level in urgent CABG surgery patients. This finding is consistent with research studies, which explored the effect of patient-education on the anxiety level of elective CABG surgery patients (AHA, 199; Beckie, 1989; Ferguson, 1992; Koivula et al., 2001).

Age

An additional interesting finding of this study was the strong negative relationship between a patient's age and the change in anxiety pre to post surgery ($r = -0.243$, $p = 0.039$). The negative sign of the relationship signifies a strong (inverse) relationship between a patient's age and the VAS anxiety difference. In this study, the younger participants had a bigger difference in their pre to post VAS anxiety rating, and lower anxiety after the surgery. One possible explanation for this finding is that younger participants may have a better ability to assimilate information provided to them during pre-operative teaching, enhancing their pain control and, consequently, reducing anxiety following surgery.

II. Pre-Operative Distress Related to Chest Pain

Another psychological response to acute pain is distress. Within this study, there was an insignificant ($p = 0.853$) difference between the groups in the pre-operative distress level related to chest pain. As suggested by the SMM, person factors, such as gender and age, of individuals who underwent urgent CABG surgery have been explored in relation to their influence on the distress level.

Gender

The SMM helped to reveal a statistically significant ($p = 0.032$) difference, by gender, between groups, in the pre-operative distress related to chest pain. The pre-operative rating of the VAS distress was higher for the males (67.83 for the control group and the intervention group 52.82), when compared to the females

(34.16 for the control group and 45.71 for the intervention group). After adjusting for gender and age, the difference between the groups, in distress related to chest pain, was not significant. One possible explanation is that this study may not have been adequately powered to demonstrate the gender differences between the groups. As no previous research was found that examined the relationship between gender and the pre-operative distress related to chest pain, this point should be examined in future research with a proportionally larger sample of women.

Age

The patients' age did not have a significant effect on their distress related to pre-operative chest pain. No statistically significant difference was found between groups in the pre-operative distress related to chest pain.

Intervention Impact

Within this study, no significant difference was found between groups in the distress related to post-operative pain. However, the difference in the VAS distress related to post-operative pain, within the groups, was highly significant. A paired samples *t* test yielded a $p < 0.001$ for the control group, and a $p = 0.010$ for the intervention group. The VAS distress related to post-operative pain, within the groups, was significantly lower for subjects in both groups when compared to the pre-operative distress related to chest-pain. The subjects in the treatment group experienced a lower average distress difference, 19.44 (± 42.96), when compared to subjects in the control group, 24.55 (± 37.33). However, although the difference in distress (pre-post) between the groups was not significant $p = 0.592$, the difference in the VAS distress within the groups was highly significant.

Although not statistically significant, the pre-operative pain education intervention had a larger positive impact on participants in the intervention group, who were less distressed following urgent CABG surgery than those in the control group. A positive association, supporting the study hypothesis, was found between the pre-operative teaching intervention and a decreased level of distress.

Gender

The impact of person variables, such as gender and age, on the difference in the symptom experience of distress related to chest pain and post-operative pain, was examined. The VAS distress difference (pre to post) by group and gender was statistically significant ($p = 0.03$). As previously discussed, the VAS scores indicated that the mean difference in distress between groups varied by gender. The higher mean distress difference for the males in both groups, control and intervention, demonstrates a significant reduction in the distress level after surgery. However, for the females in the control group, the distress actually increased after surgery suggesting that the generic pre-operative intervention have no impact on the immediate recovery needs of this group of women. The distress difference for the females in the intervention group also improved, on average, after surgery but the reduction was not statistically significant. In this study, the pre-operative symptom management strategy had a significant impact on the male participants' distress level, by reducing it, following surgery. This gender difference needs to be examined further in future studies.

Age

As predicted by the SMM, the patients' age is a demographic variable that may modify their symptom experience, in this instance, the distress related to

acute pain. The difference in the VAS distress, by age ($p = 0.860$), and group ($p = 0.586$), was insignificant. In the study conducted by Koivula and colleagues (2002), which measured fear in elective CABG surgery patients during different phases of care, the fear in patients younger than 55 years intensified slightly in the recovery period, compared to the pre-operative level. The researchers reported that the level of fear dropped slightly in the recovery period in the older age group. The impact of age on distress needs to be examined further in future studies.

In summary, based on the findings of this study, individuals experiencing psychological distress benefit from the pre-operative pain-education, which tends to reduce their anxiety and distress level related to pain. These findings lend support to the hypothesis that the pre-operative pain-education intervention decreases the anxiety and the distress level of patients undergoing urgent CABG surgery.

Perception of Symptoms

Perception of Pain in Urgent CABG Surgery Patients

In the SMM, the perception of the symptom is dependant on whether an individual notices a change in the way he or she feels or behaves (UCSF, 1994). In this study, the SMM helped the researcher to realize the connection between the

patients' perception of pain, its evaluation and the patients' response to it. Based on this study results and casual conversations with patients, it was clear to the researcher that the patients appropriately recognized that, unlike the life-threatening chest pain they experienced prior to surgery, the acute pain they experienced following surgery was not cardiac in origin.

Acute pain appeared to be evaluated by patients as non-threatening, and less significant when compared to angina related chest pain. As a result, some patients expressed to the researcher that they were less motivated to promptly respond to their post-operative pain. A less than prompt response to acute pain could lead to untimely treatment, which, in turn, could negatively affect pain related outcomes (AHCPR, 1992; APS, 1995; Miaskowski et al., 1994; Pellino & Ward, 1998; Watt-Watson & Stevens, 1998). Similar findings were echoed in work by Ferguson (1992), where the researcher explored the contributing factors related to pain after coronary bypass. The importance of accurate perception and recognition of angina pain in women was also studied, using the SMM, by Caldwell and Miaskowski (2000). The researchers concluded that, if women evaluated their angina symptoms as cardiac in origin, their response to angina pain would be more appropriate. Caldwell and Miaskowski (2000) also emphasized that it is "important to give higher priority to understanding and intervening in symptom perception and recognition because this must precede the appropriate evaluation of symptoms" (Caldwell & Miaskowski, 2000). In this study, results indicate that participants in the intervention group had a more accurate perception and better understanding of the symptom of acute pain as a result of the pain-related education. Although not always statistically significant, participants in the

intervention group had consistently better outcomes, such as: decreased pain, anxiety, and distress level.

Symptom Management Strategy

Pre-Operative Pain-Education

The framework for this study identifies symptom management strategies, such as pre-operative education, as an approach used by nurses, designed to promote patient self-care symptom management abilities (Dodd et al., 2001). Studies that have explored the patients' pain experience suggest that they often hamper their own pain management due to their misconceptions of pain and its treatment (AHCPR, 1992; Celia, 2000; Dillon McDonald, McNulty, Erickson & Weiskopf, 2000; Kuperberg & Grubbs, 1997; Pargeon, Hailey, 1999; Redeker, 1993; Watt-Watson et al., 1998; Watt-Watson et al., 2000). In the research literature, no information was found on the impact of education, as a symptom management strategy, on urgent CABG surgery patients' barriers to pain management. Patient misconceptions that may influence their pain experience and lead to ineffective pain management should be identified and corrected. The purpose of this investigation was to test how providing patients with education, aimed at addressing misconceptions, impacts on their perceived barriers to pain management and their outcomes. The discussion of the findings will be guided by the symptom management component of the SMM.

In this study, the participants had misconceptions and concerns about using analgesics, similar to those reported in the literature (Gordon & Ward, 1995; Pargeon & Hailey, 1999; Ward et al., 1993). The extent of those concerns was assessed by the BQ-II. The difference (pre and post-operative) within groups in

perceived barriers to pain management within the control group was statistically significant for fatalism ($p = 0.046$), and harmful effects ($p = 0.043$). The participants in the control group were fatalistic and believed that "post-operative pain can not be relieved" and that pain medication cannot effectively control or relieve post-operative pain. The mean score for fatalism (reverse scored) for participants in the control group actually increased significantly following surgery.

This finding suggests that patients were not optimistic about how much pain could be relieved after surgery. One possible explanation for this finding is that the content of the generic pre-operative education did not effectively address the patients' concerns to influence their beliefs. Therefore, it is quite likely that participants having those beliefs hesitated to use analgesics. This finding is consistent with those of other studies on post-operative pain (Gordon & Ward, 1995; Wilder-Smith & Schuler, 1992), and cancer patients experiencing pain (McCaffery & Rolling Ferrell, 1996; Pargeon & Hailey, 1999; Ward et al., 1993; Ward et al., 1993).

The participants in the control group were also concerned about the harmful effects of pain medication, including addiction, and the negative effect of the pain medication on their immune system. The mean score for harmful effects within the control group decreased significantly following surgery. The mean pre-operative scores for the control and intervention groups were equally high, indicating that the patients had exaggerated concerns about addiction to pain medication. Therefore, the subject of addiction to pain medication should be discussed with all patients pre-operatively to correct misconceptions and alleviate their concerns. The patients' fear of addiction has been consistently discussed in

the literature (Pargeon & Hailey, 1999; Ward et al., 1993; Watt-Watson et al., 2000; Watt-Watson et al., 2004; Wilder-Smith & Schuler, 1992; Winefield, Kasikitis, Hart, & Rounsefell, 1990), and is consistent with the findings of this study.

In this study, there was a highly statistically significant difference pre to post surgery within the intervention group for physiological effects ($p > 0.001$), communication ($p > 0.001$), harmful effects ($p > 0.001$), and the BQ-II total score difference ($p > 0.001$). These results demonstrate that the pain-management strategy was effective in addressing the patients' concerns related to using analgesics. This premise is supported by research conducted by other researchers who observed that patients receiving pain-education had fewer concerns about asking for help, less fear of addiction, and consequently received more adequate analgesia (Pargeon & Hailey, 1999; Ward et al., 1993; Watt-Watson et al., 2000; Watt-Watson et al., 2004; Wilder-Smith & Schuler, 1992; Winefield, Kasikitis, Hart, & Rounsefell, 1990).

Within this study, there was a statistically significant correlation within the control group for physiological effect, communication, harmful effects, and BQ-II total score. There was also a highly significant correlation in the intervention group for physiological effect, communication, harmful effects, and the BQ-II total score. No significant correlation was found in either group for fatalism. The pre-operative pain intervention had a positive impact on all barriers to pain management within groups, with the exception of fatalism. These findings lend support to the hypothesis that there is a positive relationship between pre-operative teaching and the number of barriers to pain management. However, further

exploration into why the intervention did not work for fatalism is needed. Fatalism was reported by Ward and colleagues (1993) as a belief contributing to the patients' hesitancy to report pain and taking analgesics. Therefore, clinicians should reassure patients that their pain could be controlled if it is reported.

In this study, a statistically significant between-group mean difference was found in all barriers, including: physiological effects ($p = 0.001$), fatalism ($p = 0.018$), communication ($p = 0.001$), harmful effects ($p = 0.005$), and the BQ-II total difference ($p > 0.000$) (Table # 39). There was a significantly larger difference (pre-operative minus post-operative) in the mean score in the intervention group, suggesting a larger, positive treatment effect for its participants. The findings support that patients in the intervention group had significantly fewer barriers to pain management, as a result of the pre-operative pain-education, compared to patients receiving standard care. The participants' gender and age did not have an effect on the difference in barriers to pain management. These findings support the hypothesis that pre-operative patients' pain-education leads to fewer barriers to pain management.

Symptom Outcomes

Pre-Operative Pain-Education Outcomes

According to the SMM, outcomes emerge from the symptom experience, and from the symptom management, as indicated by arrows in Figure # 1 (Dodd et al., 2001). Within this study, the patients' outcomes were evaluated through the

use of the POQ and the LOS. The discussion of the findings will be guided by the symptom outcomes component of the SMM.

The Patient Outcome Questionnaire

All participants (N = 72) in this study agreed that "the treatment of pain is very important and that they should tell" the caregivers when they have pain. However, despite experiencing pain when "the medication did not help" (question # 10), the participants in both groups admitted to not asking for "something more or different to relieve pain". Surprisingly, although not statistically significant ($p = 0.312$), a larger number of participants in the control group than in the intervention group indicated that they requested "something more or different" to obtain pain relief. One possible explanation is that the pain management of the participants in the control group was less effective, and therefore they needed "something more or different to relieve pain" more often than the participants in the intervention group, whose pain was better managed.

Within this study, a larger number of participants in the intervention group, compared to those in the control group, indicated that they would want additional or a "stronger dose of pain medication" if they were still in pain (question # 11). Although the difference between the groups was not statistically significant ($p = 0.479$), the cumulative number of participants, 38 (53.5 %), who indicated that they were still in pain but did not want additional pain relief was larger from those who did want analgesic 33 (46.5 %).

This result is different from what the researcher had expected. Further conversations with some of these participants revealed that they experienced "very scary", life threatening chest pain before surgery. The threat of such pain was

eliminated by surgery. As a result, the pain relating to the surgical procedure was perceived by the participants as none threatening, insignificant, expected, and easy to tolerate. This finding is congruent with what Ferguson (1992) said in relation to pain following CABG surgery. She stated that, "depending on the meaning given to the pain, its presence may have different effects on the individual" (Ferguson, 1992). However, this point should be explored further in qualitative studies to determine to what degree the patients' perception of pain may influence their pain-related decision making process.

An analysis of the data from the POQ, question # 3, found a statistically significant difference ($p = 0.04$) between the groups. In the intervention group, 21 (58.3 %) participants, compared to 15 (41.7 %) in the control group, reported the highest satisfaction with the clarity of instructions "about how to change the amount and timing of the medication if there was no relief of pain or the medication produced side effects". This finding indicates that the participants in the intervention group were more satisfied with the education provided, and felt more able to perform self-care in terms of adjusting pain medication, than those in the control group.

In this study, the participants were satisfied with their overall pain management, with no significant difference between groups. This finding is consistent with the literature, which suggests that while some patients experience moderate to severe pain, they still report satisfaction with their overall pain management (Miaskowski et al., 1994; Pellino, & Ward, 1998; Rocchi et al., 2002; Watt-Watson et al., 2000; Whelan et al., 2004).

Another component of satisfaction with pain management was the "physicians' response to the patients' reports of pain (question # 7). The result of this study showed a significant difference ($p = 0.034$) between groups, with the intervention group reporting a higher satisfaction. However, it was noted that not all participants answered that question; 5 (13.9 %) participants from the intervention group and 9 (25 .00 %) from the control group. There was one reason given for not wanting to answer that question: "I was never asked by the physician about my pain". Additional comments included: "I do not want to get anyone in trouble", "I am very grateful for what they did for me and I do not want to complain", "I have not seen the doctor after my surgery", "The nurses were the only ones who did everything". The issue of physicians not asking patients about satisfaction with their pain management after surgery has not been found in the literature. However, a common belief expressed in clinical practice has been that CABG surgery is not painful (Watt-Watson & Stevens, 1998).

Based on the patients' responses to the POQ, and their comments, there is evidence suggesting insufficient communication on pain related issues between patients and physicians following surgery. Therefore, physicians may not be fully aware of the acute pain issues that patients may have after surgery. It should be noted that in this study, following surgery, the patients were managed medically mostly by the CVT Associate nurses. The patients often mistook these nurses for physicians.

This study has demonstrated a statistically significant higher level of satisfaction for the intervention group with the physicians' responses to patients' reports of pain. However, the use of the self-report may have prompted the

patients to answer the question in a way they perceived to be socially acceptable. Further research is needed to clarify this point. In a study by Miaskowski and colleagues (1994), patients identified nurses, before physicians, as the most helpful health-care professionals with their pain management.

Participants in the current study were asked to explain why they were not satisfied with their pain treatment. The difference between groups was not statistically significant ($p = 0.193$). The participants commented on the nurses' negative attitude relating to the participants' pain management, the lack of physicians' involvement in pain treatment, and the poor environmental conditions in the SDU. This finding indicates that a supportive physical environment and an approachable and caring attitude of the staff may play an important role in the patients' satisfaction with pain management. This finding is consistent with those of other studies on post-operative pain, and patient satisfaction (Ferguson, 1992; Gordon & Ward, 1995; Valdix & Puntillo, 1995). In this study, the SMM helped to demonstrate how the attitude of the staff and the physical environment may play a role in the patients' satisfaction with pain management.

In addition, the model predicted that support for the positive relationship between the patients' pre-operative pain-teaching and symptom outcomes should be found. As previously discussed, although no significant between group mean rank difference scores were found for questions: # 2 ($p = 0.53$), # 4 ($p = 0.447$), # 5 ($p = 0.139$), # 6 ($p = 0.362$), and # 9 ($p = 0.721$), higher mean rank scores were consistently found in the intervention group. This result suggests that participants who received pain-education intervention prior to surgery were more satisfied with pain management than those in the control group.

In conclusion, most of the patients in this study were satisfied with their pain management, especially those in the intervention group, despite reports of unrelieved pain. However, interpretation of the data related to pain management needs to be done with caution, not to confuse gratitude with satisfaction that the individual may have felt for the care received.

The Length of Stay

In the SMM, symptom status is a central component of the symptom outcomes (Dodd et al., 2001). Symptom status, which in this study is the level of acute pain, may affect the patients' health care utilization and the LOS. In this study, there was no significant between group mean difference in the LOS ($p = 0.312$) following urgent CABG surgery. The mean LOS in the hospital was 8.52 (± 3.76) days for the control group, and 7.72 (± 2.88) days for the intervention group. Although not statistically significant, compared to the control group, the hospital stay of the participants in the intervention group was, on average, one day shorter. The difference in the mean LOS (8.52, ± 3.76 days compared to 7.72, ± 2.88 days) of urgent CABG patients' is consistent with research results conducted on elective CABG patients by Anderson (1987), Arthur et al., (2000), Mahler and Kulik (1998), and Schindler et al., (1989). However, the influence of pre-operative educational intervention on the participants' LOS is inconsistent. In studies by Rice et al., (1992), Watt-Watson et al., (2000), and Watt-Watson et al., (2004), no differences were found between groups in the LOS of elective CABG surgery patients. In contrast, a study by Shuldham, Fleming and Goodman (2002) demonstrated a significant difference in the LOS between groups, with the intervention group having a longer stay. This inconsistency may

be related to the differences in the content and the method of the teaching and their consequent impact on the patients' decision-making process. Providing patients with the information that can effectively contribute to their recovery needs and shorten their LOS must be explored further.

In this study there was no statistically significant effect of gender on the LOS. However, the average hospital stay of the women in the control group was three days longer than the stay of the women in the intervention group (11.50 days versus 8.28 days). It was also four days longer than the men's LOS (7.93 days for the control group and 7.58 days for the intervention group). This finding is consistent with the research conducted on the elective CABG patient population, where the women's LOS was 2 days longer, on average, than the men's (Watt-Watson et al., 2004). The present study underlines the potential problem of female patients not receiving gender-specific, pain-related information to support their immediate recovery needs. Therefore, the impact of gender on the LOS needs to be explored in further studies.

This study has not demonstrated a statistically significant ($p = 0.366$) effect of age on the LOS. This result was different from what the researcher had expected. One possible explanation is that in this study the majority of participants who underwent urgent CABG were previously "healthy" and well functioning individuals who unexpectedly developed acute cardiac symptoms. Therefore, age may not have had a significant effect on the LOS of patients who, prior to their admission, were leading active lifestyles.

In this study, there was a statistically significant relationship between the total Morphine eq/kg consumed by patients over the five days, and the LOS. The

patients who consumed more Morphine eq/kg had a shorter LOS. Those who participated in the teaching intervention had a better understanding of the importance of adequate pain management, requested more narcotics which decreased their suffering and resulted in more effective pain management, and shortened a costly LOS. Other research studies advocated the use of opioid analgesics in combination with non-opioid analgesics for a more effective, early post-operative pain management in elective CABG surgery patients (Hancock, 1996; Heye, 1991; Watt-Watson & Stevens, 1998).

In conclusion, the pain-education intervention had no significant impact on the participants' LOS by group, gender and age. Clinically, but not statistically significant, on average, the LOS for participants in the intervention group was one day shorter than the LOS in the control group. The total dose of Morphine eq/kg consumed by patients over the five days following surgery had a significant effect on the shorter LOS, with higher doses predicting earlier discharge.

Strengths of the Study

There are several strengths that can be identified in this study. They are primarily related to methodological issues, such as study design, recruitment and tools used.

One of the most important strengths of this study is its prospective design with the intent to treat, and the RCT approach used to test the research hypothesis.

The results of the prospective research are considered to be a "standard" for clinical efficacy trials. They are "stronger than retrospective studies, are more reliable, and lack bias (Polit & Hungler, 1999). In addition, the RCT is the strongest and most appropriate research design to obtain evidence about causation. It eliminates the researcher's bias and reduces the between-subject bias (Shuldham, 1999). The blinding of patients and staff minimized the potential for bias.

All consenting participants were randomized before completing the baseline questionnaires, using a computer-generated randomization table. The randomization of subjects decreased the potential for the occurrence of systemic bias, secured comparable groups, and prevented individual extraneous variables from affecting the dependent variable under inquiry (Polit & Hungler, 1999).

The homogeneity of the population added to the strength of the study by reducing the risk for sampling error (Polit & Hungler, 1999). At baseline, there was no statistically significant difference between groups with respect to the surgical procedure or patient characteristics.

The sufficient sample size also decreased the potential for the occurrence of sampling error and contributed to the strength of this study. According to Polit and Hungler (1999), "the larger the sample, the more representative of the population it is likely to be". The total number of subjects needed in the sample was obtained, including a 10 % over-sampling to account for attrition of subjects during the course of the study. The power of the study was maintained and the concept under investigation was measured using an 80 % confidence interval, a significance level of alpha = 0.05 and based on an effect size of 0.70.

Another approach used, referred to as blocking, added to the strength of this study. Blocking by sex controlled extraneous variables and maximized the number of women participants in this study. It helped to explore the impact of gender on the participants' post-operative outcomes.

Additionally, the researcher was the only person that collected all research data and who provided the educational pain-intervention to the participants in the intervention group. The use of only one researcher standardized the process of data collection and minimized the variation in the delivery of educational-intervention, further strengthening the study.

The concluding strength of this study is based on the selection of the tools used. Since this is a partial replication study, the reliability, validity, and usefulness of most of the tools was tested in previous research. This made the comparison of the research results much easier.

Limitations

In spite of adequate sample size and statistical power, this study has several limitations. The study population was derived from a single setting, which limits generalizability of the results to other cardiac surgical populations.

As is the case in many studies, the sample consisted predominately of males, despite blocking for sexes, which is an important limiting factor of this study. Male predominance is representative of patients undergoing CABG surgery. A small number of women in a sample limit the generalizability of the results.

Another limitation of the study was related to the urgent nature of the surgery, which severely limited the time available to locate and access potential

participants. The researcher attempted to be as available and flexible as possible to respond to the ever-changing surgical slate. Unfortunately, this did not prevent the loss of some potential participants. The lack of information about new admissions was especially problematic after hours, during holidays, and on weekends.

Most limitations of this study were primarily related to recruitment, the method used to collect data, introduction of a new surgical technique, and the exclusion criteria. Substantial staffing changes around Christmas and the spring break negatively affected recruitment. As well, recruitment for another research study added to the problem. Potential participants who were approached first by the other research team usually refused to participate in this study.

Another limitation of this study involves the use of a modified BPI to measure pain. Although the BPI is a reliable and valid instrument, due to its modification by the researcher, the results obtained in this study cannot be generalized to those from other studies. The original instrument questions, asking patients to rate their pain "over the past 5 days", were changed to rate the pain variability "over the past 24 hours" specifically for day five after surgery. Five days after the surgery, the patients are ambulatory and typically close to discharge. They are expected to be able to manage their pain without excessive support from the health professionals. The adaptation of the instrument was done purposefully to capture the patients' ability to manage their pain independently.

Another possible limitation of the study was the use of questionnaires and the self-report to measure the patients' responses. Although self-report is often used in research studies, participants in this study may have answered some questions in a socially desirable fashion. The researcher was a single person

delivering and evaluating the intervention, which could introduce limitations such as patients' over-estimation of satisfaction with pain management.

An additional limitation of this study was the introduction of a new, and less invasive, endoscopic vein harvesting (EVH) technique for the SVG harvesting, a month into this study's data collection. An endoscopic vein harvest results in a minimal incision (1.5-2.0 cm) at the site of a puncture, medially above or below the knee (Yun, Wu, Aharonian, Mansukhani, Pfeffer, Sintek, Kochamba, Grunkemeier, & Khonsari, 2005). The traditional method of vein harvesting requires an open incision along the greater saphenous vein, starting at the groin area, with the length dependent on the amount of vein needed for the operation. Therefore, in this study, pain experiences related to the leg-graft may vary, from participant to participant, depending on the harvest technique used. This change introduced limitations related to different surgical methods of vein harvesting, causing variations in patients' pain experiences, and surgical outcomes (much shorter incision, less redness, swelling, and irritation at the surgical site).

Finally, perhaps the most striking limitation of this study relates to the exclusion criteria which limited a certain type of, and the number of, potential participants. Surprisingly, approximately 20-25 % of potential participants approached, who seemed to be interested in participating, were not included in this research study. Further conversations with these patients revealed that they were illiterate. This result was very different from what the researcher expected. It should be noted that there was no mention found in the literature on the exclusion rates related to illiteracy in urgent CABG surgery patients. This point should be explored further to determine if illiteracy may be a factor contributing to

ineffective pain practices following surgery when pre-operative teaching is provided using a pain booklet alone.

As the rate of patient turnover rises due to the shorter hospital LOS, written information for cardiac patients is being recognized by nurses as an increasingly important form of communication (Walsh & Show, 2000). Therefore, as most patients are unwilling to admit that they are illiterate, the health care professionals should be aware of the literacy problem (Safeer & Keenan, 2005). According to the 1994 International Adult Literary Survey, almost half of Canadians experience difficulty using the print media (Smith & Haggerty, 2003). Therefore, illiteracy may have a significant impact on the patients' pain management, LOS and the cost of health care.

Implications for Practice

The SMM provided a suitable structure for characterizing the acute pain symptom. The model guided the researcher during implementation of the strategy to manage acute pain in the urgent CABG surgery patient population. Findings from this clinical nursing study are presented to demonstrate the applicability of the SMM to clinical practice. The SMM is based on a premise that three dimensions: the symptom experience, symptom management, and symptom outcomes, are interrelated. In this study, although the data are not always statistically significant, there appears to be a positive relationship between the pre-operative patient teaching and the acute pain experience, symptom management and outcomes.

The symptom experience involves the interaction among the patient's perception of a symptom, its evaluation, and response to it. Understanding this

interaction is essential for effective symptom management. In this study, there appears to be a difference in the patients' perception, evaluation, and response to pre-operative chest pain versus acute pain following urgent CABG surgery. Therefore, teaching interventions should address the issue of accurate perception of both symptoms (chest pain and acute pain) to improve the patients' experience, symptom management and outcomes.

In this study, pain-education intervention was selected as a symptom management strategy. The goal of this intervention was to provide the patients with the pain-related information that enabled them to make decisions concerning pain treatment during their recovery at the hospital, and at home after discharge. This can be accomplished through the use of different strategies, including the provision of written and verbal education for the patients.

However, it was realized that additional strategies beside the booklet are needed, such as video instructions and/or face-to-face teaching with the patients' family present, to meet pain-related educational needs of the illiterate. Health care professionals must attempt to identify patients who are unable to read in order to provide them, as suggested by the SMM, with appropriate pre-operative pain-education interventions. In addition, to meet educational needs of low-literate patients written materials should be provided at a sixth-grade or lower reading level.

In this study, the SMM helped to identify the important gender differences in the recovery process. Women experienced more anxiety after surgery and their hospital recovery was longer when compared to men. Therefore, gender-specific strategies that focus on women's post-operative pain need to be implemented. One

possible symptom management strategy that nurses can implement in a clinical setting is to frequently assess the patients' pain level, their emotional status and physical ability appropriate for each day following surgery. Nurses need to evaluate each patient's progress, and provide them with suitable information and support, such as reinforcement of pain-related teaching, encouragement, and praise to meet their recovery needs. The patients' family members should also be involved in pain management education, making them more active participants in the management of pain during hospital and home recovery, thus improving the patients' outcomes.

In addition, findings of this study suggest that some health care professionals could benefit from pain management teaching. Therefore, educational in-services on the importance of pain management, and the staff's role in this process, should be provided.

Future Research Recommendations

The SMM is a conceptual framework that has proven to be a useful organizing structure in this study. It is a relatively new model that needs to be tested further in interventions that could lead to better management of symptoms, such as acute pain. Although, even with limited testing, the SMM revealed meaningful associations between the relevant variables, further research is needed to develop and refine this model (Dodd et al., 2001). For example, the present model does not differentiate between acute and chronic symptoms experience and management (Dodd et al., 2001). The ramifications of acute versus chronic symptom management need to be explored if the model is to be a useful

framework for understanding symptoms, designing and testing management strategies, and for evaluating symptom management outcomes (Dodd et al., 2001).

While the present study lends insight into the problem of acute pain management in the urgent CABG surgery patient population, a deeper understanding of the problem requires further research with a larger sample size.

In this study, the SMM helped the researcher to realize that the perception of acute pain (part of the symptom experience component) in urgent CABG surgery patients is one area in which health care professionals need to conduct further studies. There appears to be a difference in perception, evaluation, and response to pre-operative chest pain and acute pain following urgent CABG surgery. Future research should examine a potential association between the accurate perception of acute pain and the patients' responses to it.

Furthermore, as suggested in the model, to aid patients to develop an accurate perception of acute pain, intervention studies need to be designed. Those studies should explore the essential information that is needed by patients to adhere to the intervention strategy, and to achieve positive symptom management outcomes.

The model was able to reveal important gender differences in the acute pain experience and post-operative outcomes. Women in the control group experienced more distress after surgery and a longer hospitalization than men did. Findings from this study suggest that women in the intervention group have not received enough pain-related information. Therefore, further studies are needed to explore specific pain-related information needs of women to facilitate their recovery, and positively affect symptom outcomes.

As previously identified, illiteracy may have an impact on the patients' pain management practices and their symptom outcomes. Illiterate patients are more likely to require non-standard pre-operative pain education. Further investigation is needed on the prevalence of illiteracy and its impact on the patients' pain management and outcomes.

In this study, despite reports of pain after surgery, patients continued to indicate overall satisfaction with pain management (the symptom outcome component), and the physicians' responses to the patients' reports of pain. Informal conversations with participants revealed that the patients' gratitude to the surgeons, who performed the "life-saving" procedure, could explain why their level of satisfaction with the physicians' was higher than with the nurses. Further research, using open-ended questions, could be beneficial to expand and clarify inconsistencies obtained from the quantitative data.

According to the SMM, adherence (illustrated in figure # 1) is a critical factor that affects the outcome of the symptom management strategy. Adherence is under the control of the patient who is the target of the symptom management intervention. If the prescribed strategy is applied inconsistently, or not at all, its integrity and the internal validity are negatively affected. Therefore, it would be important to know whether the patients actually used the pain teachings, and what impact the teaching intervention had on their quality of life after their discharge. Specifically, what was the long-term effect of the pain teaching on the patients' overall pain management, on their analgesic use and on their concerns regarding taking of analgesics?

Lastly, despite research in the area of acute pain management, to date, no other study was found that addressed this issue in the urgent CABG patient population. This is definitely an area for further study, which may provide additional insight into the relationship between different strategies of pre-operative pain-education and patients' pain-related outcomes prior to and post discharge. Future research with this target group should include an examination of other outcomes, such as pain-related emergency department visits and/or hospital readmissions, complication and mortality rates.

Conclusion

This study has provided the first known prospective RCT of a pre-operative pain education intervention targeted at urgent CABG surgery patients. Findings were discussed in the context of the SMM, the proposed research hypothesis and previous research in pain management, pain education, and elective CABG surgery. The SMM was the theoretical framework guiding this study. The strengths and limitations of the current study, implications for practice, and future research recommendations were discussed.

In conclusion, this study used quantitative methodology to examine the effect of pre-operative pain-education on selected post-operative outcomes in patients undergoing urgent coronary bypass surgery. It demonstrated that pre-operative pain-related education had a beneficial effect on patients' outcomes, such as a decreased pain and anxiety level, and that the participants had fewer barriers to taking analgesics, had an increased satisfaction with pain management, and a shorter LOS.

The findings of this study provoke recommendations for further research. Longitudinal studies could provide insight into the effect of pain-intervention on long-term outcomes and adherence behaviors. Although the number of women in the sample was proportionately smaller, gender differences were revealed in an acute pain experience following surgery. Women experienced more anxiety and had a longer hospital stay than men. Further exploration of the impact of gender on the health trajectory in urgent CAGB patients is required.

The nursing implications emerging from this study suggest the development of gender-specific teaching strategies to provide support and reinforcement, and to meet the immediate pain-related recovery needs of the patients. In addition to the booklet for pre-operative pain education, other strategies are needed to improve the pain practices of the illiterate and those with an inadequate ability to read English. Health care professionals must attempt to identify patients who are unable to read in order to provide them with the appropriate pre-operative pain-education interventions.

This study has contributed to the body of knowledge on the effect of pain-education on patients' post-operative outcomes. It is the first study to date that has examined the effect of pre-operative pain-education on urgent coronary bypass surgery patients' outcomes and the first known study of CABG patients using the SMM as a theoretical framework. This study provides evidence to support the health care professionals' efforts in pre-operative pain-related urgent CABG surgery patient education.

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Appendix

Letter of Permission

UNIVERSITY OF MANITOBA

RESEARCH SERVICES & PROGRAMS
Office of the Vice-President (Research)

244 Engineering Bldg.
Winnipeg, MB R3T 5V6
Telephone: (204) 474-8418
Fax: (204) 261-0325
www.umanitoba.ca/research

APPROVAL CERTIFICATE

17 November 2004

TO: **Anna Fedorowicz** (Advisor D. McMillan)
Principal Investigator

FROM: **Stan Straw, Chair**
Education/Nursing Research ~~Ethics Board~~ (ENREB)

Re: **Protocol #E2004:092**
"The Effect of Pre-operative Pain-education on Selected Post-operative Outcomes in Patients undergoing Urgent Coronary Bypass Graft Surgery"

Please be advised that your above-referenced protocol has received human ethics approval by the **Education/Nursing Research Ethics Board**, which is organized and operates according to the Tri-Council Policy Statement. This approval is valid until November 17, 2005.

The following are approved for use:

- Protocol, dated November 17, 2004
- Informed Consent Form, November 10, 2004

Any significant changes of the protocol and/or informed consent form should be reported to the Human Ethics Secretariat in advance of implementation of such changes.

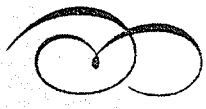
Please note that, if you have received multi-year funding for this research, responsibility lies with you to apply for and obtain Renewal Approval at the expiry of the initial one-year approval; otherwise the account will be locked.

Get to know Research ...at your University.

Appendix A

The Booklet

PAIN *relief*



After Your Surgery

Important to your recovery

This booklet discusses why pain relief is important, how and when to ask for help with pain, concerns patients have about seeking help with pain, and examples of pain relief methods.

If you have questions please contact
Judy Watt-Watson RN, PhD at 416-978-2850.

PAIN RELIEF AFTER SURGERY

What is pain?

Pain is an unpleasant feeling, such as soreness or discomfort, that is different for every person. Pain can tell you when something is wrong with your body and when you need to ask for help.

Surgery causes pain for most people because tissues are moved and/or cut. Pain that is not treated can be severe. It is important for your recovery not to have severe pain.

People feel pain differently, even if they have the same surgery. After surgery, nurses and doctors will ask you to rate your pain. They want you to tell them when you are hurting and how much the treatments relieve your pain. You are the only one who knows how your pain feels. Your help is very important to getting the best pain relief possible.

Why is pain relief so important?

People usually have some pain after surgery. Severe pain can prevent you from moving and breathing properly and ***can cause complications that make your hospital stay longer***. It is important for you to have as little pain as possible to get well faster.

Good treatments are available to help relieve pain, especially medications after surgery. Other methods such as massage, deep breathing, and relaxation exercises also may help. Everyone's pain experience is different and you need to choose what works for you. You can use several methods at the same time.

People used to think that they had to "be strong" and "put up with severe pain." Now, doctors and nurses do not want you to do this because ***unrelieved pain can slow your recovery***. Good pain relief is possible with your help.

How and when do I ask for help with pain?

It is very important for you to tell the nurses and doctors how much pain you are having, what it feels like, and whether treatments are working. ***If your pain rating is 4 or more, please tell the nurse.***

1. A rating scale helps to tell us how much you hurt.

0	1	2	3	4	5	6	7	8	9	10
No Pain	Mild Pain			Moderate Pain			Severe Pain			Worst Pain

2. To ask for help, say to your nurse and/or doctor:

   "My pain is 4 - I need something for pain"

How often should I ask for pain medication?

Medication usually relieves pain for about 4 hours. Therefore, to keep your pain rating below 4 when you are moving and/or doing your deep breathing exercises, you need to take your pain medication every 4 hours. ***You need less pain medication if you take it regularly*** than if you wait until your pain is severe. If you take the medication regularly and your pain is not below 4, ask for a stronger pill.

What drug treatments are available for pain relief?

A. Type: Strong medications to relieve moderate to severe pain can be taken orally such as morphine or Percocet™. Weaker medications such as Tylenol™ and/or codeine help if pain is mild. Is your medication in not working, please ask for a stronger one.

B. Method: Your medication will be given first by intravenous (IV) into the vein. Some patients may be told by the nurse to use a special pump that gives you medication when you press a button.

Pills are used when you are allowed to drink. They can be as strong as IV or needles.

If pain comes back before the next dose, ask for more pain relief.

All methods require that you take the medication regularly for pain relief.

What are patients' concerns?

Many patients have concerns that stop them from telling someone about their pain and/or using pain medications. There are some responses to these concerns.

Concern: **I am not a "good" patient if I tell someone about my pain.**

Response: 1. *"Good" patients DO tell when they hurt.*

You are a very important member of the pain management team and your help is needed. Please tell the nurse when you hurt and whether the pain treatment is working.

2. *Nurses EXPECT you to tell them when you hurt. They do not want you to "handle it" by yourself.*

You are helping by telling nurses when you hurt and if your medication is not working. They want you to have as little pain as possible. Tell them anything that has helped you with pain in the past.

3. *Pain does NOT mean you are healing.*

Unrelieved pain may slow healing and cause complications. People whose pain is well-controlled after surgery recover faster.

Concern: **I don't have pain, I have "discomfort" or "soreness".**

Response: *Pain can be called other names.* Use the pain scale to rate your word for pain such as "discomfort" or "soreness". If your rating is 4 or greater, discuss with your nurse about taking a pain medication. Not every person uses the word "pain".

Concern: **I am afraid to take pain medication because of addiction and/or side effects.**

Response: 1. *Addiction is not a problem.* It is rare (<0.01%) for people taking medication for pain unless they already have a drug abuse problem.

2. *Constipation is preventable.* Constipation can happen with pain medications. To prevent a problem, most patients need to take a stool softener and/or laxative while on medication. Talk to the nurse if you are not being given these.

3. *Nausea is treatable.* Do not refuse to take pain medication because of nausea. Nausea may happen when you first take pain pills. The doctor has ordered medication that usually takes the nausea away. Ask your nurse for this.

Concern: **I don't want to have a needle.**

Response: ***Strong pain medication does NOT have to be given by a needle.***

Needles hurt and are usually not used if you are allowed to drink. Pain medications such as Percocet™ work as well as morphine.

What non-drug treatments are available for pain relief?

There are several non-drug treatments that you can use to relieve your pain after surgery. Tell the nurse if there are methods that have helped you in the past. Patients have found the following helpful in addition to medications.

- pillow(s) to support incisions during movement, breathing, and/or coughing
- advice on how to turn in bed and sit up
- massage
- music, reading, TV or other distracting activities.
- application of heat

Remember

- **pain relief is important to your recovery**
- **every person's pain is different**
- **you are expected to tell us about your pain**
- **good methods are available to control pain**

YOU ARE A VERY IMPORTANT MEMBER OF THE PAIN MANAGEMENT TEAM.

Comments or Questions

Record of Effective Pain Relief Methods

Appendix B

Letter to The Cardiac Surgeons (Explanation of the Study)

Research Project Title: The effect of pre-operative pain-education on selected post-operative outcomes in patients undergoing urgent coronary bypass graft surgery

Researcher: **Anna Fedorowicz, graduate student, University of** Manitoba. Master of Nursing Program

Providing effective pain management after surgery is an important part of our jobs as health care providers. Despite our efforts, there have been reports in research literature that patients do not ask for analgesia and continue to experience moderate to severe pain after surgery. Poorly managed acute pain has important physiologic consequences, which may increase morbidity and lengthen hospital stay. There are many factors contributing to inadequate pain control, including gaps in the patient's knowledge on pain management, existing misconceptions and controversies. One solution to the problem of inadequate pain management may be patient pain-education. Since there is no evidence in the literature of research that examined the effect of pre-operative pain-education on urgent CABG surgery patients' outcomes, I intend to use a booklet developed specifically for pain management in CABG patients coupled with patient-education session with the nurse researcher prior to surgery. It is anticipated that this study will help improve acute pain management of urgent CABG surgery patients and its results will be used to formulate recommendations for clinical practice regarding changes in current pre-operative patients' education programs.

If you have any questions about this study, call Anna at 787-3396 or you may contact the Chair of my thesis committee, Dr. Diana McMillan at 474-7295.

Appendix C

Explanation of the study (for staff)

Research Project Title: The effect of pre-operative pain-education on selected post-operative outcomes in patients undergoing urgent coronary bypass graft surgery

Researcher: Anna Fedorowicz, graduate student, University of Manitoba. Master of Nursing Program

The main focus of my study is the impact of pre-operative pain-education on patient's post-operative pain experience, anxiety, satisfaction and the length of stay. After obtaining informed consent, I will begin to work with the patient as soon as possible after admission to the unit, and continue for up to five days following surgery. I will gather information from the patients' charts regarding the patient's general condition. At times I will be spending time at the bedside, for approximately 30- 45 minutes each time, asking patients questions, filling out questionnaires. On the evening prior to surgery I will collect data on all patients' anxiety and chest pain distress level, which should take approximately 20-30 minutes. At that time the pre-operative pain-education intervention will be provided to subjects in the experimental group only, which may take 60-90 minutes. Post treatment assessment will take place on post-operative day # 5. Total assessment of time to complete post-treatment forms is 20 to 45 minutes. All health information collected from the patient chart will be done according to the Personal Health Act Guidelines.

Your direct participation in the study is not required. You should be able to provide care as per your normal practice.

If you have any questions about this study, call Anna at 787-3396 or you may contact the Chair of my thesis committee, Dr. Diana McMillan at 474-7295.

Appendix D

Consent Form (for CVT Nurse)

Research Project Title: The effect of pre-operative pain-education on selected post-operative outcomes in patients undergoing urgent coronary bypass graft surgery

Researcher: Anna Fedorowicz, graduate student, University of Manitoba. Master of Nursing Program

The goal of this project is to explore the relationship between urgent CABG surgery patient pain-education and their surgical outcomes. The participants will be randomized to experimental and control groups. All participants will be asked to fill put forms on two occasions prior to surgery: upon agreement to participate in the study and on the evening prior to surgery. Both the experimental and control group, will receive the standard pre-operative education. The experimental group, in addition to the standard pre-operative education, will receive the pain education booklet "Pain relief after surgery" by Judy Watt-Watson, plus an interview/education session with the principal investigator.

On the evening prior to surgery, the primary investigator will collect data on all patients' anxiety and distress level related to chest pain. At that time the pre-operative pain-education intervention will be provided to subjects in the experimental group only. Post treatment assessment will take place on post-operative day (POD) # 5. The primary investigator will collect data on all the participants' post-operative pain, anxiety and pain distress level, barriers to pain management, and satisfaction with pain management by asking them to fill out questionnaires.

As a CVT Associate nurse you are invited to participate in this research study. Your participation in the study will involve identification of potential participants, informing them about the study and notifying the principal investigator.

Your identity is confidential, and will not be revealed in reporting results of the study. Information presented at conferences and published will maintain confidentiality through use of summarized data. Your participation in the study is voluntary. You may withdraw from the study at any time without penalty by informing Anna Fedorowicz of your wishes.

There may be no direct benefit to your participation. It is anticipated that the study will provide useful information about management of acute pain in urgent CABG surgery patients to facilitate care giving to this population.

This consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. It should give you the basic idea of what the study is all about and what your participation will involve. If you would like more details about something mentioned here, or not included here, you should feel free to ask. Please take time to read this information carefully and to understand any accompanying information. Once all your questions have been answered to your satisfaction you will be asked to sign this consent form.

I recognize the importance of your participation. Thank you.

I agree to participate in this study.

CVT Associate Nurse signature _____ Date _____

Researcher signature _____

Research Project Title: The effect of pre-operative pain-education on selected post-operative outcomes in patients undergoing urgent coronary bypass graft surgery

If you would like a copy of the summary of the research report please notify the investigator by filling in the section below.

Please send me a copy of the summary of the research report.

Send to:

Name: _____

Address: _____

_____

_____

Appendix E

Introduction to Study (Guidelines for CVT Nurse)

Research Project Title: The effect of pre-operative pain-education on selected post-operative outcomes in patients undergoing urgent coronary bypass graft surgery

Researcher: Anna Fedorowicz, graduate student, University of Manitoba. Master of Nursing Program

My name is _____ . I am the Cardiovascular Associate (CVT) nurse and I work with cardiac surgeons. The study mentioned in the title of the research is being conducted at St. Boniface Hospital and is about pain management after urgent cardiac surgery like yours. Would you be interested in hearing more about this study?

The researcher is an experienced nurse who works with cardiac surgical patients at the Health Sciences Centre.

If Yes ____ May I give your name to Anna and she will contact you.

If No ____ Thank you for your time.

Appendix F

Research Participation Information and Consent Form

Research Project Title: The effect of pre-operative pain-education on selected post-operative outcomes in patients undergoing urgent coronary bypass graft surgery

Researcher: **Anna Fedorowicz, graduate student, University of Manitoba. Master of Nursing Program**

Sponsor: **Health Sciences Centre Foundation**
MS7- 820 Sherbrook Street
Winnipeg, MB R3A 1R9

You are being asked to participate in a research study conducted by Anna Fedorowicz. Please take your time to review this Information and Consent Form and discuss any questions you may have with the Investigator. You may take your time to make your decision about participating in this study and you may discuss it with your regular doctor, friends and family. **However, please do not discuss this study or any information provided to you with other patients.**

This consent form may contain words that you do not understand. Please ask the study doctor or study staff to explain any words that you do not understand.

Purpose of Study

The purpose of this study is to determine the effect of pre-operative pain-education based on your experience after having urgent Coronary Artery Bypass Graft (CABG) surgery. There is limited research on how useful it may be to provide pain-education to patients and how it may help in dealing with the pain

management outcomes. This study will look at the relationship between pain-education and the post-operative outcomes. We will look at the pain experience, patient anxiety, satisfaction with treatment of pain and the length of stay in hospital. The study will help the nurses and other health-professionals to better understand the effect of pain-education on patients' experiences after the surgery. The study will involve approximately 72 patients from the St. Boniface Hospital.

Study Procedures

If you agree to take part in this study, you will be required to sign this consent form. A copy will be will be given to you for your records. This form will explain what the study is about and what your participation will involve. If you would like more detail about something relating to the study, you should feel free to ask. Once all your questions have been answered to your satisfaction you will be asked to sign this consent form.

You may be instructed about how and when to ask for medication to help relieve your pain as part of your standard care. The Investigator will see you a total of three times for about 20-45 minutes each time. Some participants may have additional teaching done by the investigator that will take approximately 60-90 minutes.

The first visit will be done shortly after your admission to the hospital. You will be asked by the investigator to complete two questionnaires and you may receive a booklet to read.

You will be asked questions related to your care and some questions will require more lengthy answers. There are no right or wrong answers to any of the questions

you will be asked. It will be necessary for you to answer each question based on your personal experience.

The second meeting with the investigator will be on the evening before surgery. At that time you will be asked more questions, about your anxiety and your distress level associated with chest pain, which should take no longer than 20-45 minutes. You may also receive additional teaching associated with the research study for approximately 60-90 minutes.

Your final meeting with the investigator will be on your post-operative day # 5. The investigator will ask you to fill out four questionnaires. The last set of questionnaires should take you 20 to 45 minutes to complete.

Information will be collected from your medical chart that will include your age, gender, marital status, occupation, current employment status, angina severity etc. All health information collected from your chart will be kept strictly confidential. All health information will immediately be assigned a code number and your identity will be protected.

The information collected may be shared in confidence between the study staff, Anna Fedorowicz, Dr. McMillan- U of M- Thesis Chair, Dr. Naimark- U of M- Internal Member, and Dr. Kowalski- Intensivist- Surgical Intensive Care (HSC)- External Member.

Risks and Discomforts

This study only involves reading, answering questions related to your condition, discussing information provided and data collection from your chart. Therefore, there are no added risks or discomforts expected by participating in the study.

However, if you become upset and /or experience stress at any time the process will be stopped and resumed at a later time, at your convenience.

Benefits

You may not personally benefit from participation in this research; however, the study should contribute to a better understanding of care for patients like yourself in the future. Results of the study will be presented to the nurses and physicians at the St. Boniface Hospital. The findings of the study may be presented at conferences or published but you will not be identified in anyway.

Costs

This study is being done at no cost to you.

Payment for Participation

You will not be paid for your participation in this study.

Alternatives

You do not have to participate in this study to receive treatment for coronary heart disease. You can withdraw from this study at any time without penalty or effect to your care. In order to withdraw all you have to do is to tell the principal investigator of your wishes.

Confidentiality

Medical records that contain your identity will be treated as confidential in accordance with the Personal Health Information Act of Manitoba. All health information collected from your chart will be kept confidential for seven years and will then be destroyed using confidential shredding. The St. Boniface General Hospital staff involved with your care, will review/copy medical information that may reveal your identity. The Education/Nursing Research Ethics Board at the may also review/copy your medical records in accordance with the applicable laws and regulatory requirements. The Health Research Ethics Board at the University

of Manitoba and St. Boniface General Hospital may also review your research-related records for quality assurance purposes. The results of the study presented at conferences or published will maintain your confidentiality. Personal information such as your name, address, telephone number and/or any other identifying information will not leave St. Boniface General Hospital. By signing the attached Informed Consent Form you consent to direct access to your medical records.

Voluntary Participation/Withdrawal From the Study

Your decision to take part in this study is voluntary. You may choose not to answer some of the questions. You may refuse to participate or you may withdraw from the study at any time. Your decision not to participate or to withdraw from the study will not affect your other medical care at this site. Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in this research and agree to participate as a subject. You are not waiving any of your legal rights by signing this consent form nor releasing the investigator from their legal and professional responsibilities.

Feedback

You may receive a copy of the summary of the research report if you request it (written or verbal/telephone) from the investigator listed on the first page of this form.

Questions

You are free to ask any questions that you have about your treatment and your rights as a research subject. If any questions come up during or after the study, or if you have a research-related injury, contact the investigator:

Investigator: Anna Fedorowicz, RN, BN, MN (student) Tel No. 787-3396

Thesis Supervisor: Diana McMillan, RN, PhD Tel No. 474-7295

For questions about your rights as a research subject, you may contact:

The Education/ Nursing Research Ethics Board, University of Manitoba at 474-7122.

Do not sign this consent form unless you have a chance to ask questions and have received satisfactory answers to all of your questions.

Consent

1. I have read and understood this Information and Consent Form, and I freely and voluntarily agree to take part in the research study entitled Impact of pre-operative patient pain-education on coronary artery bypass graft (CABG) surgery outcomes.
2. I understand that I will be given a copy of the signed and dated Information and Consent Form. I have received an explanation of the purpose and duration of the study, and the potential risks and direct benefits that I might expect. Alternative treatments have been described to me. I was given sufficient time and opportunity to ask questions and to reflect back my understanding of the study to study personnel. My questions were answered to my satisfaction.

3. I agree to cooperate fully with the study nurse and will tell her if I experience any side effects, symptoms or changes in my health.
4. I am free to withdraw from the study at any time, for any reason, and without prejudice to my future medical treatment.
5. I understand that representatives of the hospital or other regulatory authorities may wish to review my medical records. I have been assured that my name, address and telephone number will be kept confidential to the extent permitted by applicable laws and/or regulations. By signing this document, I give permission for such review and data collection, and grant direct access to my medical records.
6. By signing and dating this document, I am aware that none of my legal rights are being waived.

Signature:_____

Date/Time: _____

Printed name of above:

_____

I confirm that I have explained the purpose, duration etc of this research study, as well as any potential risks and benefits, to the subject whose name and signature appears above. I confirm that I believe that the subject has understood and has knowingly given their consent to participate by his/her personally dated signature.

Signature: _____Date time _____

Printed name of above: _____Study role: _____

Research Project Title: The effect of pre-operative pain-education on selected post-operative outcomes in patients undergoing urgent coronary bypass graft surgery

Please send me a copy of the summary of the research report.

Send to:

Name: _____

Address: _____

_____

_____

_____

Phone # : _____

Appendix G

CABG Surgery Patients Pain-Educational Criteria and Sources

Educational Criteria	Criteria Source
1. Explain that pain is expected and should be treated after surgery.	Heye, 1991.
e.g. "It is normal to experience some pain after surgery. However severe pain may cause complications and slow down your recovery."	
2. Emphasize the uniqueness of pain experience.	McCaffery, 1968.
e.g. "You are the only one who knows how your pain feels and where it occurs."	
3. Encourage communication of pain to care providers.	Watt-Watson & Stevens, 1998.
e.g. "To help you with your pain or discomfort after surgery the nurses or doctors must know that you are experiencing pain. They want you to report pain that you are experiencing and how much relief you are getting from your treatment."	
4. Instruct patients how and when to ask for help.	Watt-Watson, Stevens, Castello, Katz, &Reid (2000).
e.g. "If your pain rating is 4/10 or more please tell the nurse that your pain rating is 4 and you need medication to relieve your pain."	
5. Inform patients that pain medication usually relieves pain for approximately 4 hours and needs to be taken regularly as soon as the pain begins.	Agency for Health Care Policy and Research, 1992.
e.g. "It is easier to control your pain if your pain medication is taken regularly, usually every 4 hours."	

Educational Criteria	Criteria Source
6. Convey that pain medication may cause side effects such as constipation and nausea, which can be prevented with stool softeners and anti-emetics.	Reimer-Kent (2003).
e.g. "Pain medication may cause constipation and nausea. The doctor can order medication to help prevent these side effects, take them as needed."	
7. Acknowledge that some patients are reluctant to take pain medication because they are concerned about addiction.	Watt-Watson, Stevens, Castello, Katz, & Reid (2000).
e.g. "Some patients are afraid to take pain medication because they are not aware that addiction is a rare problem affecting less than 0.01% of patients taking pain medication.	
8. Identify pharmacological and non-pharmacological pain-management methods.	Agency for Health Care Policy and Research, 1992.
e.g. "In addition to medication there are several methods to relieve pain such as application of heat, massage, or distracting activities.	

Appendix H

The Baseline Questionnaire

Research Project Title: The effect of pre-operative pain-education on selected post-operative outcomes in patients undergoing urgent coronary bypass graft surgery

Researcher: Anna Fedorowicz, graduate student, University of Manitoba. Master of Nursing Program

1. ID # _____date _____ time _____
2. What is your date of birth? day / month / year
3. Which cultural group do you associate yourself with ? _____
4. What is your height? _____
5. What is your weight? _____
6. What is your gender? 1) female___ 2) male _____
7. What is your current marital status?
   1) single_____
   2) married _____
   3) common law _____
   4) widowed _____
   5) separated _____
   6) divorced _____

8. What is your living situation?

1) live alone ___

2) with spouse ___

3) with spouse and children ___

4) other ___

9. What is your education (circle last year of education completed)

Grade school through high school

1 2 3 4 5 6 7 8 9 10 11 12 13

Vocational of community college

1 2 3 4

University

1 2 3 4 5 6 7 8 9

10. What is/ was your occupation?

1) professional/ executive ___

2) manager/business owner _

3) clerk/sales _____

4) laborer/ craftsman _

1) other _____

11. What is your work status

1) full time __

2) part time __

3) stopped because of health status __

4) retired __

5) other __

12. What is your family annual income?

1) less than 25,000 ___

2) between 25,000 and 44,000

3) between 45,000 and 64,000

4) between 65, 000 and 84,000

5) greater than 84,000

13. Do you routinely use any tranquilizer medication at home? 1) Yes _ 2) No ___

14. Do you routinely use any pain medication at home? 1) Yes ____ 2) No _____

15. If the answer to the two previous question was YES specify

1) the type of the medication used _____

2) the dose of the medication used _____

3) dose frequency _____

16. Have you had previous anesthesia?

1) Yes ___ 2) No ___

17. Have you had a bad anesthetic experience?

1) Yes ___ 2) No ___

18. How much pain do you expect to have after your operation?

1) no pain _____

2) mild pain _____

3) moderate pain ____

4) unbearable _____

5) don't know _____

19. If you were given medicine after your operation, do you want it to give you:

1) little relief _____

2) moderate relief ___

3) a lot of relief _____

4) complete relief ___

20. If you have pain after surgery, when would you ask for pain relieving medicine?

1) when having some pain _____

2) when pain becomes severe _____

3) not ask, wait until is offered _____

4) ask, regardless of the amount of pain _____

5) put up with the pain rather than have medicine ___

21. If you ask for pain relieving medication when would you expect it to be given?

1) immediately, having put up with the pain for as long as possible .

2) immediately, unless the nurse was interrupted by an emergency _

3) when the nurse isn't busy _____

4)the next time the nurse is giving medication _____

Appendix I

The Barriers Questionnaire II (BQ-II)

Research Project Title: The effect of pre-operative pain-education on selected post-operative outcomes in patients undergoing urgent coronary bypass graft surgery

Researcher: Anna Fedorowicz, graduate student, University of Manitoba. Master of Nursing Program

We are interested in learning more about your attitudes toward treatment of pain. We want to know what do you think. Some of the questions may seem similar to others, but please answer all of the questions. For each of the items below, please circle the number (0, 1, 2, 3, 4, or 5) that comes closest to how much you agree with that item.

1. Post-operative pain can be relieved.

0 1 2 3 4 5

Do not agree at all Agree very much

2. There is a danger of becoming addicted to pain medicine.

0 1 2 3 4 5

Do not agree at all Agree very much

3. Drowsiness from pain medicine is difficult to control.

0 1 2 3 4 5

Do not agree at all Agree very much

4. Pain medicine weakens the immune system.

0 1 2 3 4 5

Do not agree at all Agree very much

5. Confusion from pain medicine can not be controlled.

0 1 2 3 4 5

Do not agree at all Agree very much

6. When you use pain medicine your body becomes used to its effects and pretty soon it won't work any more.

0 1 2 3 4 5

Do not agree at all Agree very much

7. Using pain medicine blocks your ability to know if you have any new pain.

0 1 2 3 4 5

Do not agree at all Agree very much

8. Pain medication can effectively control post-operative pain.

0 1 2 3 4 5

Do not agree at all Agree very much

9. Many people get addicted to pain medicine.

0 1 2 3 4 5

Do not agree at all Agree very much

10. Nausea from pain medicine cannot be relieved.

0 1 2 3 4 5

Do not agree at all Agree very much

11. It is important to be strong by not talking about pain.

0 1 2 3 4 5

Do not agree at all Agree very much

12. It is important for the doctor to focus on curing illness, and not waste time controlling pain.

0 1 2 3 4 5

Do not agree at all Agree very much

13. Using pain medicine can harm your immune system.

0 1 2 3 4 5

Do not agree at all Agree very much

14. Pain medicine makes you say or do embarrassing things.

0 1 2 3 4 5

Do not agree at all Agree very much

15. If you take pain medicine when you have some pain, then it may not work as well if the pain becomes worse.

0 1 2 3 4 5

Do not agree at all Agree very much

16. Pain medicine can keep you from knowing what's going on in your body.

0 1 2 3 4 5

Do not agree at all Agree very much

17. Constipation from pain medicine can not be relieved.

0 1 2 3 4 5

Do not agree at all Agree very much

18. If doctors have to deal with pain they won't concentrate on curing the disease.

0 1 2 3 4 5

Do not agree at all Agree very much

19. Pain medicine can hurt your immune system.

0 1 2 3 4 5

Do not agree at all Agree very much

20. It is easier to put up with pain than with the side effects that come from pain medicine.

0 1 2 3 4 5

Do not agree at all Agree very much

21. If you use pain medicine now, it won't work as well if you need it later.

0 1 2 3 4 5

Do not agree at all Agree very much

22. Pain medicine can mask changes in your health.

0 1 2 3 4 5

Do not agree at all Agree very much

23. Pain medicine is very addictive.

0 1 2 3 4 5

Do not agree at all Agree very much

24. Medicine can relieve post-operative pain.

0 1 2 3 4 5

Do not agree at all Agree very much

25. Doctors might find it annoying to be told about pain.

0 1 2 3 4 5

Do not agree at all Agree very much

26. Reports of pain could distract a doctor from curing the disease.

0 1 2 3 4 5

Do not agree at all Agree very much

27. If I talk about pain, people will think I'm a complainer.

0 1 2 3 4 5

Do not agree at all Agree very much

Appendix J

The Visual Analog Scale (VAS)

Research Project Title: The effect of pre-operative pain-education on selected post-operative outcomes in patients undergoing urgent coronary bypass graft surgery

Researcher: Anna Fedorowicz, graduate student, University of Manitoba. Master of Nursing Program

ID # _____ Date _____ Time _____

I would like to show you a tool that helps me understand your anxiety. The scale represents the anxiety levels. A "0" anxiety rating means that you have "no anxiety" and a "10" rating means that you have "maximum anxiety. The middle of the scale shows moderate anxiety. Please indicate your anxiety level by marking a point on a line".

I_____I

0 — No anxiety

10 — Maximum anxiety

ID # _____ Date _____ Time _____

The same tool can be used to help me understand the distress that the chest pain/post-operative pain is causing you. A “0” distress rating means that the chest pain is causing you "no distress " and a “10” rating means that the chest pain is causing you "maximum distress". Please indicate how much distress is your chest pain causing you by marking a point on a line”.

I_____I

0 10

No Maximum

distress distress

Appendix K

The Brief Pain Inventory (BPI)

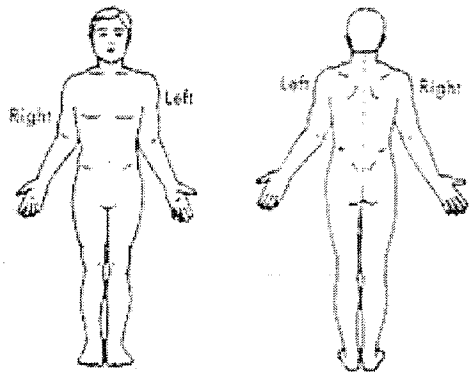
Research Project Title: The effect of pre-operative pain-education on selected post-operative outcomes in patients undergoing urgent coronary bypass graft surgery

Researcher: Anna Fedorowicz, graduate student, University of Manitoba. Master of Nursing Program

Date ___ / ___/ ___ Time: ____

ID # _____

1. Throughout our lives, most of us have had pain from time to time (such as minor headaches, sprains, and toothaches). Have you had pain other than these everyday kinds of pain today? 1. Yes ___ 2. No ___
2. On the diagram, shade in the areas where you feel pain. Put an X on the area that hurts the most.



3. Please rate your pain by circling the one number that best describes your pain at its **worst** in the past 24 hours.

0	1	2	3	4	5	6	7	8	9	10
No pain										Pain as bad as you can imagine

4. Please rate your pain by circling the one number that best describes your pain at its **least** in the past 24 hours.

0	1	2	3	4	5	6	7	8	9	10
No pain										Pain as bad as you can imagine

5. Please rate your pain by circling the one number that best describes your pain on the **average** in the past 24 hours.

0	1	2	3	4	5	6	7	8	9	10
No pain										Pain as bad as you can imagine

6. Please rate your pain by circling the one number that tells how much pain you have **right** now.

0	1	2	3	4	5	6	7	8	9	10
No pain										Pain as bad as you can imagine

7. What treatment or medicine are you receiving for your pain?

---

8. In the past 24 hours, how much **relief** have pain treatment or medications provided ? Please circle the one percentage that most shows how much relief you have received.

0%	20	30	40	50	60	70	80	90	100%
No relief									Complete relief

9. Circle the one number that describes how, during the past 24 hours, pain has **interfered** with your:

A. General activity

0	1	2	3	4	5	6	7	8	9	10
Does not interfere										Completely interferes

B. Mood

0	1	2	3	4	5	6	7	8	9	10
Does not interfere										Completely interferes

C. Walking ability

0 1 2 3 4 5 6 7 8 9 10

Does not interfere — Completely interferes

D. Deep breathing and coughing

0 1 2 3 4 5 6 7 8 9 10

Does not interfere — Completely interferes

E. Relations with other people

0 1 2 3 4 5 6 7 8 9 10

Does not interfere — Completely interferes

F. Sleep

0 1 2 3 4 5 6 7 8 9 10

Does not interfere — Completely interferes

G. Enjoyment of life

0 1 2 3 4 5 6 7 8 9 10

Does not interfere — Completely interferes

Appendix L

The Post-Operative Data Collection Form

Research Project Title: The effect of pre-operative pain-education on selected post-operative outcomes in patients undergoing urgent coronary bypass graft surgery

Researcher: Anna Fedorowicz, graduate student, University of Manitoba. Master of Nursing Program

1. Patient's ID # _____ Date _____ Time _____

2. Age _____

3. Gender

1) female____ 2) male ____

4. Height _____ 5. Weight _____

6. Waiting time for operation ____

7. Angina severity

1) Class I ____ 2) Class II ___

3) Class III ___ 4) Class IV __

8. Previous MI

1) yes _____ how many ____ 2) no____

9. Number of diseased coronary artery(s)

1) one _____ 2) two _____ 3) three ____ 4) > three __

10. Left main disease

Yes ____ No ____

11. Left ventricular ejection fraction (LVEF)

1) < 20% ____ 2) 20-34% ____ 3) 35-49% ___ 4) > 50% _____

5) not recorded _____

12. Comorbidities:

Yes ____ No ____

13. Number of bypasses completed

1) one _____ 2) two _____ 3) three ____ 4) > three __

14. Type of graft used

1) internal mammary artery (IMG)

2) saphenous vein graft (SVG)

3) radial artery graft (RAG)

4) other

15. Duration of the surgery in hr/min _____

16. Intra-operative complications: NO _____ YES _____ TYPE ____

17. VAS for anxiety score POD # 5 _____/ 10

18. VAS for pain level score POD # 5 _____/10

19. Pain intervention strategies pre-op or intra-op _____

20. Use of local analgesia/ anesthesia: NO ____ YES _____ TYPE __

21.Use of spinal analgesia/ anesthesia: NO ____ YES _____ TYPE ____

22. Use of non-opioid analgesia pre-op or intra-op: NO ____ YES _____

TYPE ____

23. Analgesic type:

1) Morphine 2) Fentanyl 3) Demerol 4) Codeine 5) Tylenol #3

6) Tylenol #2 7) Tylenol Plain 8) NSAIDS 9) Dilaudid 10) other

___

24. Analgesic route:

1) IV 2) Oral 3) Epidural/Spinal

4) PCA 5) IM 6) Rectal

25. Opioid dose prescribed (total): _____

26. Opioid dose administered (total): ____

27. Length of stay in the Intensive Care Unit (ICU) _____

28. Length of stay in the Step Down Unit (SDU) _____

Appendix M

The Patient Outcome Questionnaire (POQ)

Research Project Title: The effect of pre-operative pain-education on selected post-operative outcomes in patients undergoing urgent coronary bypass graft surgery

Researcher: Anna Fedorowicz, graduate student, University of Manitoba. Master of Nursing Program

ID # _____ Date _____ Time _____

1. Earlier in your care, did a physician or nurse make it clear to you that the treatment of your pain is very important and that you should be sure to tell them when you have pain?

1) Yes ____ **2) No ____**

2. How clear were the instructions about taking pain medications (when to ask, who to ask)?

1) No instructions were given.

2) Instructions were unclear to me, or I forgot them.

3) Instructions are somewhat clear.

5) Instructions are absolutely clear.

3. How clear were your instructions about how to change the amount and timing of the medication if there was no relief of pain or the medication produced side effects?

1) No instructions were given.

2) Instructions were unclear to me, or I forgot them.

3) Instructions are somewhat clear.

4)Instructions are absolutely clear.

4. How clear were your instructions about whom to ask about your pain if you had any questions?

1) No instructions were given.

2) Instructions were unclear to me, or I forgot them.

3) Instructions are somewhat clear.

4) Instructions are absolutely clear.

5. Select the phrase that indicates how satisfied or dissatisfied you are with the results of your pain treatment overall.

1) very dissatisfied

2) dissatisfied

3) slightly dissatisfied

4) slightly satisfied

5) satisfied

6) very satisfied

6. Select the phrase that indicates how satisfied or dissatisfied you are with the way your nurses responded to your reports of pain.

1) very dissatisfied
2) dissatisfied
3) slightly dissatisfied
4) slightly satisfied
5) satisfied
6) very satisfied

7. Select the phrase that indicates how satisfied or dissatisfied you are with the way your physician responded to your reports of pain.

1) very dissatisfied
2) dissatisfied
3) slightly dissatisfied
4) slightly satisfied
5) satisfied
6) very satisfied

8.If you were not satisfied with your pain treatment in any way, please explain why.

9. When you asked for pain medication, what was the longest time you had to wait to get it?

1) less than 10 minutes
2) 10- 20 minutes
3) 20- 30 minutes
4) 30- 60 minutes
5) more than 60 minutes
6) asked for medication but never received it
7) never asked for pain medication

10. Was there a time that the medication you were given for pain didn't help and you asked for something more or different to relieve the pain?

1) Yes _____ 2) No _____

If you answered yes, how long did it take before your physician or nurse changed your treatment to a stronger or different medication and gave it to you?

1) less than 1 hour
2) 1-2 hours
3) 3-4 hours
4) 5-8 hours
5) 9-24 hours
6) more than 24 hours

11. If you still have pain, would you like a stronger dose of pain medication?

1) Yes ____ 2) No ____

If you answered no, please indicate why not.

Appendix N

New York Heart Association Functional Classification

Class	New York Heart Association Functional Classification
I	Patients with cardiac disease but without resulting limitations of physical activity. Ordinary physical activity does not cause undue fatigue, palpitations, dyspnea or anginal pain.
II	Patients with cardiac disease resulting in slight limitations of physical activity. They are comfortable at rest. Ordinary physical activity results in fatigue, palpitations, dyspnea or anginal pain.
III	Patients with cardiac disease resulting in marked limitations of physical activity. They are comfortable at rest. Less than ordinary physical activity cause fatigue, palpitations, dyspnea, or anginal pain.
IV	Patients with cardiac disease resulting in inability to carry on any physical activity without discomfort. Symptoms of cardiac insufficiency or of the anginal syndrome may be present event at rest. If any physical activity is undertaken, discomfort is increased.

Golman, L., Hashimoto, B., Cook, E. F., & Loscalzo, A. (1981). Comparative reproducibility and validity of systems for assessing cardiovascular functional class: Advantages of a new specific activity scale. Circulation, 64, 1227.