

Title of Manuscript: The effect of anxiety on learning outcomes post-CABG

Authors:

First Author:

Suzanne Fredericks RN, PhD * **please contact this author with all correspondence**

Assistant Professor

School of Nursing, Ryerson University

350 Victoria Street

Toronto, ONT; M5B 2K3

CANADA

(office): 416-979-5000 ext. 7978; (fax): 416-979-5332; Email: sfrederi@ryerson.ca

Second Author:

Souraya Sidani RN, PhD

Professor and Canada Research Chair

School of Nursing, Ryerson University

Toronto, ONT; M5B 2K3

CANADA

(office): 416-979-5000 ext. 2572; (fax): 416-979-5332; Email: ssidani@ryerson.ca

Third Author:

Daniel Shugurensky PhD

Associate Professor

Department of Adult Education and Counseling Psychology

Ontario Institute for Studies in Education

University of Toronto

252 Bloor St. West, 7th Floor

Toronto, ON M5S 1V6

Telephone: (416) 978-0812, Fax: (416) 926-4749; Email:

dschugurensky@oise.utoronto.ca

Acknowledgements:

The authors wish to acknowledge the financial support received from the University of Toronto, and to thank the Nursing and Medical staff from the University Health Network for their ongoing assistance throughout the entire data collection process and to thank Dr. Judy Watt-Watson her invaluable feedback and comments which are reflected throughout the design and conduct of the main study.

Abstract

Post-operative Coronary Artery Bypass Graft (CABG) patients require educational interventions to assist with recovery and prevention of surgical complications. However, the effectiveness of these interventions is questionable as the stress related to the hospitalization process can result in increased levels of anxiety which may impact on the success of the education. The purpose of this study was to examine the relationship between anxiety and the achievement of knowledge, performance of self-care behaviours, and the management of symptoms. A descriptive correlation design was used that included a convenience sample. Results indicated statistically significant correlations between anxiety and the outcomes of interest. Implications for practice include provision of educational interventions at times when anxiety levels are low.

Key words for indexing:

Anxiety
Descriptive design
CABG patient education
Self-care behaviour
Symptom management

INTRODUCTION

Cardiovascular diseases (CV) are defined as diseases and injuries of the cardiovascular system, which include the heart and the blood vessels (veins and arteries) throughout the body and within the brain. Coronary Artery Bypass Graft (CABG) is a common surgical treatment for cardiovascular disease. In Canada, on average one in every one thousand individuals annually undergoes a CABG procedure (Canadian Institute for Health Information, 2001). Usually, patient education programs are provided to patients just prior to their hospital discharge to assist with recovery and prevention of surgical complications. However, the effectiveness of these programs is questionable as the stress related to the hospitalization process can result in increased levels of anxiety which may impact on the success of the education.

During hospitalization, the CABG patient is inundated with laboratory tests and procedures, the introduction of numerous caregivers, and the constant adaptation to frequent changes in physiological state following surgery (Wheby & Brenner, 1999). These stressful events, along with the environmental factors associated with hospitalization, such as increased noise, unfamiliar surroundings, and lack of privacy can result in increased levels of anxiety in these patients (House & Stark, 2000). Anxiety can interfere with the effectiveness of education by altering one's ability to be attentive and retain information (Grayson, 2000). Grayson reasoned that if patients are unable to retain educational content, they will not have any stored information upon which to draw to assist with the performance of desired self-care behaviours or therapies after discharge. Yet performance of these self-care behaviours is critical for the patients' successful recovery and symptom management. The effect of anxiety on knowledge, self-care, and

symptom experience has not been extensively examined in a CABG population. In view of the potential impact of anxiety on learning, the need to continue to examine anxiety and its relationship to CABG patients' knowledge of self-care behaviours, performance of self-care behaviours, and symptoms experience is required. Knowledge of the extent to which anxiety influences learning has implications for the design of educational intervention and the timing at which such interventions are to be given following CABG surgery. The purpose of this study was to examine the relationship between anxiety and the achievement of outcomes expected of educational intervention in patients who underwent CABG surgery.

LITERATURE REVIEW

Usual patient teaching occurs during the patient's hospitalization, 24-48 hours prior to discharge (Moore & Dolansky, 2001; Marshall, Penckoffer, & Llewellyn, 1986; Moore, 1996; Steele & Ruzicki, 1987). Moore and Dolansky (2001), Weaver and Doran (2001), and Moore (1996), and Beckie (1989) reported moderate levels of anxiety in all hospitalized patients, assessed 24-48 hours pre-discharge. The authors argued that the presence of anxiety just prior to discharge may interfere with learning, as suggested in a few studies (Beckie, 1989; Rosenstein, 2003; Feshbach & Loeb, 2003).

Beckie (1989) (n=74) investigated the relationship between CABG patients' level of knowledge of self-care behaviours and state-anxiety during the first 6 weeks after hospital discharge. Anxiety was assessed using Spielberger's (1995) State-Anxiety Scale. She reported a statistically significant inverse relationship between participants' level of knowledge, assessed after exposure to educational intervention and anxiety scores was found in the control ($r = -0.61$, $p < 0.05$) and the experimental ($r = -0.31$, $p < 0.05$)

group. Beckie stated that the findings support the theoretical proposition that anxiety has a negative impact on knowledge acquisition.

The effect of anxiety on learning has also been assessed in university students. Rosenstein (2003) ($n = 400$) evaluated the effects of anxiety in first year university psychology students on learning outcomes (specifically, knowledge of content covered in-class). The author began by administering the Mandler-Sarason Test Anxiety Questionnaire (TAQ) to subjects as a means of anxiety arousal. Anxiety was assessed via the Palmer Sweat Index. The subjects were then provided with an education intervention that consisted of lectures from their first year university psychology class. Post-teaching, the subjects were tested to assess their level of knowledge and anxiety. Relevant results indicated that higher levels of anxiety were related to lower levels of knowledge ($r = -0.79$, $p < 0.01$).

Feshbach and Loeb (2003) also assessed the effect of anxiety on knowledge retention in first year university psychology students ($n = 45$). A design similar to that of Rosenstein's was used, in that anxiety was aroused through the use of the Mandler-Sarason TAQ and evaluated using the Taylor Scale, then a teaching intervention was delivered, followed by the assessment of knowledge and anxiety. Similar results were reported in that higher levels of anxiety were inversely related to lower levels of knowledge ($r = -0.68$, $p < 0.01$).

Although the studies differed in context, target population, design, and measures, the results were consistent. They indicate that anxiety interferes with learning, where highly anxious persons gain minimal knowledge following an educational intervention. The extent to which this inverse relationship between anxiety and knowledge is

applicable to patients who had CABG surgery is not known and is investigated in this study.

STUDY FRAMEWORK

The concepts of interest for this study include: patient education, self-care knowledge, self-care behaviours, symptom experience, and anxiety. The conceptual definitions of each concept and the proposed relationships among them are presented based on the results of an integrative review of theoretical and empirical literature.

Rankin (2001) defines patient education as the “communication of information to enact change in knowledge, performance of self-care behaviours, and physical functioning” (pp. iv - v). Patient education provides the patient with information that can be used to enhance self-care knowledge, promote performance of self-care behaviours, and enhance symptom experiences (Orem, 2001; Rankin; UCSMG, 1994). In this study, patient education was given to patients who underwent surgery. The content of the educational intervention covered information patients need to manage their condition following discharge from the hospital. The specific topics addressed included: complications, activities, medication, symptom management and control, and psychological symptoms.

The expected outcomes of the educational intervention were self-care knowledge, performance of self-care behaviours, and symptom experience. Rankin (2001) defines knowledge as a body of facts and principles that is learned through life experiences or is taught. Knowledge is enhanced through education interventions, and is made visible through cognitive indicators, such as recall or self-report of information (Rankin). In this study, knowledge pertained to self-care such as knowledge of how to prevent

complications, perform of appropriate activities, prevention of the onset of symptoms, and proper nutrition. It was hypothesized that patients would demonstrate an increase in self-care knowledge following exposure to the educational intervention, as reported in previous studies (Beckie, 1989; Moore, 2001; Moore and Dolansky, 2001).

Orem (2001) describes self-care as “the practice of behaviours that individuals initiate and perform on their own behalf in maintaining or enhancing their health” (p. 35). Orem states that self-care encompasses self-reported actions that “contribute in specific ways to human development and health” (p. 37). Self-care is a process involving selection and performance of appropriate treatment strategies to enhance or maintain functioning, or to alleviate or prevent the onset of symptoms, and evaluation of treatment strategies to determine if to continue with the intervention, stop treatment, or implement a new strategy (Orem, 2001). As well, Orem states that before patients can perform these behaviours, they must have the necessary knowledge of how to engage in these behaviours. The length of time for an individual to transform the information obtained through self-care instruction into deliberate action varies between immediately and one week post-teaching (Orem). In this study, performance of the following self-care behaviours was of interest: deep breathing and coughing exercises, walking and climbing stairs, care of surgical incisions, medication administration, interaction with physician, salt and fluid restriction, and symptom management. A small increase in the performance of these behaviours was expected after patients’ receipt of the educational intervention.

The University of California Symptom Management Group (UCSMG) (1994) defines symptoms as the “subjective experiences reflecting changes in a person’s biopsychosocial function, sensation, or cognition” (p. 272). The way in which symptoms are

experienced is influenced by how the patient perceives them and the frequency of symptom experience (UCSMG). Perception of symptoms is described as whether an individual notices a change from the way he or she usually feels or behaves which usually occurs over the course of one to two weeks (UCSMG). Patients who had CABG surgery often report fatigue, trouble sleeping, shortness of breath, chest and body pain, constipation, edema, nausea, and dizziness within one week post discharge. However, it was proposed that the severity of the experienced symptoms would be low-to-moderate after the educational intervention which focuses on informing patients on strategies to manage symptoms.

Anxiety is defined as “a state characterized by subjective, consciously perceived feelings of apprehension and tension, accompanied by activation of cognitive impulses that block judgment of various situations” (Spielberger, 1995, p. 17). This blocked judgment serves to impede the process of learning and performance of specific behaviours (Orem, 2001). Patients’ level of anxiety varies across settings and experiences. The individual’s perception of anxiety is assessed with self-report (Spielberger, Rankin, 2001). Anxiety has been assessed at various points in time throughout the course of the individual’s recovery. Moore & Dolansky (2001), Weaver and Doran (2001), Moore (1996), Beckie (1989) reported moderate levels of anxiety in CABG patients, 24-48 hours prior to their discharge. In addition, Rankin states that knowledge levels are significantly reduced in the presence of heightened levels of anxiety. This proposition has been supported empirically by three studies that have assessed the effects of anxiety on learning, specifically knowledge retention (Rosenstein, 2003; Feshbach & Loeb, 2003; Beckie).

Based on relevant literature, it was proposed that patients' level of anxiety, reported prior to exposure to the educational intervention, is 1) negatively associated with low level of self-care knowledge and performance of self-care behaviours, and 2) positively related with symptom experience following the intervention.

METHODS

Design

This study was part of a large randomized clinical trial that evaluated the effectiveness of an individualized telephone patient education intervention, delivered 1- 2 days pre or post discharge, in enhancing the CABG patient's knowledge of self-care behaviours, their actual performance of self-care behaviours, and symptoms experienced (Fredericks, 2006). Institutional Review Board Approval was received by the following institutions: University of Toronto, University Health Network, and Ryerson University.

For this study, data obtained at pretest and posttest were analyzed. At pretest, which took place 1-2 days prior to the delivery of the educational intervention, data were collected on anxiety and the three outcomes of self-care knowledge, performance of self-care behaviours, and symptoms. Post-test data on the outcomes were collected within one-week after implementation of the intervention. The change scores from pre-test to post test were used to represent achievement of the outcomes. The change scores were then correlated to the anxiety scores measured just prior to the intervention delivery.

Intervention

The intervention that was used in the larger study consisted of an individualized patient education program. The delivery of this intervention began with an assessment of the individual CABG patient's learning needs that addressed topics such as:

complications, activities, medication, symptom management, and psychological symptoms. The assessment started with the client being contacted by the research nurse, via telephone, at a pre-arranged time. The nurse researcher introduced herself to the client, by identifying her name, position (research nurse), name of study, and purpose for call. The nurse researcher then asked the patient if they have any questions regarding the intent of the call. If questions arose, the nurse researcher responded to these questions as appropriate. The nurse researcher then proceeded by reading the instructions of the learning needs assessment questionnaire selected for use in the study. This was followed by the completion of the questionnaire over the phone by the patients. Patients were asked to rate the degree to which they perceived the topics contained on the learning needs questionnaire to be important for learning. Any topic identified as being important or very important for learning was discussed with the patient. Depending on the topic identified, the nurse used the education material contained in the self-care CABG post-discharge patient teaching intervention (developed for the study based on an extensive and critical review of available evidence) to discuss the related self-care behaviours that the patient need to perform to enhance their symptom experience and recovery. If all topics were identified by the patient as being important or very important to learn, then all content areas within the CABG post-discharge teaching intervention were discussed with the patient. The average length of time for delivery of the patient education intervention, if all topics were identified as being important or very important to learn, was 20- 30 minutes. The education was provided verbally, over the phone, by a research nurse trained in the delivery of this intervention, using one-on-one nurse-patient interactions.

Setting and Patient Population

The setting for this study was a CVS unit at a university-affiliated teaching hospital in a large Canadian urban center. The accessible population included approximately 1500 CABG patients a year (University Health Network, Department of Cardiovascular Surgery, September 2003). These individuals undergo CABG surgery accompanied by 1 – 4 grafts. Patients also undergo combined surgeries in which a CABG procedure is performed in unison with a ventricle repair. The average length of stay was 5 days on this unit. The average age was 68 years old. The male/female ratio is 3:1. The patients were ethnically diverse. Approximately 70 % of the accessible population met the eligibility criteria (University Health Network, Department of Cardiovascular Surgery, September 2003).

Sample Inclusion Criteria, Sampling Technique, Sample Size

Participants who met the following eligibility criteria were included in the study.

1. Underwent CABG surgery for the first time, with no additional surgical interventions (such as valve replacement or repair, Maze procedure, pacemaker insertion, stent insertion, stem cell related procedures, or any other surgical procedures)
2. Literate in English
3. Oriented to time, place, and person
4. Have access to a working phone

Dunstan and Riddle (1997) and Wang (2003) state that the more an individual has experienced an event or treatment, the more likely they will have been exposed to patient teaching interventions related to this topic. Hence second or third time CABG patients

will have additional self-care knowledge, obtained through experience and previous hospitalization, which will confound the effects of the educational intervention under investigation in this study. Selecting individuals who have experienced first-time CABG, reduces random heterogeneity of the respondents on the outcomes of knowledge, thereby increasing the power to detect significant intervention effects (Cook & Campbell, 1979). The identification of patients who have recently undergone CABG surgery for the first time was determined in consultation with the unit nurse or physician or manager.

Individuals who are unable to speak the language in which the education is being provided and are cognitively not oriented to person, place, or time, will not benefit from educational interventions, as they will not be able to understand the information being presented. Hence, patients literate in English, and who are cognitively alert and oriented, were considered for inclusion in the study. The identification of these characteristics were determined in consultation with the unit nurse, physician, or manager. The participants should have access to a working phone, to deliver the intervention.

A convenience sampling technique was used in which available consenting patients were entered into the study until the desired sample size was reached. The number of patients who consented to take part in the large randomized clinical trial was 150. Of these, 20 dropped out of the study, yielding a 13.3% attrition rate. In total, 130 patients completed the pretest and posttest data collection. this sample size was adequate to detect a moderate-to-high correlation (≥ 0.60) between anxiety and self-care knowledge, setting the alpha at 0.05 and beta at 0.80 (Cohen, 1988). A moderate-to-high correlation was anticipated based on theoretical (Redman, 1997) and empirical (Colagiuri, Colagiuri,

deBlieck, & Naidu, 1994; Jaarsma, Halfens, Abu-Saad, Dracup, Diederiks, & Tan, 2000; Wright, Kravitz, Kaplan, & Meyers, 2001; Beckie, 1989) evidence.

Measurements

Demographic data were obtained using standard questions. Established instruments were used to measure the concepts of interest. However, since these instruments were used for the first time in the CABG patient population, their content validity and reliability were evaluated as part of the large randomized clinical trial. Self-care knowledge was measured using the 15-item Knowledge Inventory developed by McHugh Schuster, Wright, and Tomich (1995). The Inventory assesses patient's knowledge of self-care strategies to be implemented at home, to manage incision and chest pain, nausea, vomiting, fatigue, sleep disturbance, constipation, and edema/water retention; as well as to take medications and perform usual activity. The total score represented the number of correct responses to the 15 items. A maximum total score of 15 indicates knowledge in all areas of self-care. The higher the score on the knowledge inventory, the higher the CABG patient's knowledge of self-care behaviours. McHugh Schuster and colleagues stated that this Inventory was reviewed by three cardiac rehabilitation professionals (nurses and exercise physiologists) for clarity, content, and face validity. They reported an internal consistency reliability coefficient of 0.71. In this study with CABG patients, the content validity index (CVI), representing the percentage of items rated as relevant or very relevant by at least 80% of the participants, was 100% for the Knowledge Inventory. The internal consistency reliability coefficient was 0.64 at pretest. The rather low coefficient is due to minimal variability of participants' responses to the item.

Self-care behaviours were measured using the Revised Heart Failure Self-Care Behaviour scale (RSCB) developed by Artinian (2002). This scale is a 29-item, self-report, Likert-type scale that describe behaviours patients with heart failure must perform, to some degree, in order to regulate their own functioning. The behaviours relate to management of post-operative CABG complications, incision and chest pain, nausea, vomiting, fatigue, sleep disturbance, constipation, edema/water retention, and emotional reactions; and self-care strategies for medication administration. Respondents were asked to indicate how often they performed each of these behaviours in the past few days on a scale ranging from “none of the time” (0) to “all of the time” (5). The total scale score was calculated by summing the scores across items and ranged from 0 to 145. Higher scores indicate more frequent performance of self-care behaviours. Artinian reported that content validity ($CVI = 0.86$) was demonstrated through evaluations made by a panel of experts, including two nurse practitioners and two self-care experts. In addition, Artinian stated that the tool demonstrated convergent validity, as evidenced by a positive correlation between a tool that assessed self-care behaviours and the RSCB, and internal consistency reliability (Cronbach’s alpha coefficient = 0.8).

In this study with CABG patients, the RSCB showed content validity ($CVI = 100\%$) and internal consistency reliability (Cronbach’s alpha coefficient = 0.79)

Symptoms were assessed using the Symptom Inventory developed by Artinian (1993) which is a 19-item self-report checklist that measures symptoms commonly experienced during the post-CABG recovery period. These symptoms included: tiredness, trouble sleeping, trouble breathing or shortness of breath, chest pain, chest incision pain or discomfort, leg incision pain or discomfort, shoulder back, neck, or

abdominal pain/discomfort, incision redness, increased tenderness at incision site, constipation, edema or swelling in arms and legs, nausea (sick to the stomach), anxiety, emotionally drained, vomiting, shortness of breath, dizziness, and irregular heart beat. Participants were asked to describe the frequency with which a given symptom occurred during the previous week (1 = not at all, 2 = once, 3 = rarely, 4 = sometimes, 5 = often, 6 = usually, 7 = always). A total score was calculated by summing the item scores. Scores ranged from 20 to 140, with higher scores indicating a higher frequency of symptoms experience. Artinian et al. reported an internal consistency reliability coefficient of 0.78. The authors reported that content validity for this tool had been demonstrated; however the process through which the instrument's content validation was conducted was not described. In addition, the authors identified that construct validity had been supported by positive correlation between the symptom inventory and another tool that assesses symptoms similar to those experienced by CABG patients.

In this study, CABG patients rated the Symptom Inventory as content valid (CVI = 100%). This instrument also demonstrated high internal consistency reliability (Cronbach's alpha coefficient = 0.92).

Anxiety was assessed using the State Anxiety Scale developed by Spielberger (1995) which is a 20 statement scale that identifies feelings to which subjects responded using a four point scale ranging from "not at all" (1) to "very much so" (4). The total scale score ranges from 20 to 80, with high scores representing high levels of state anxiety (Spielberger, 1995). The scale is reliable (internal consistency reliability coefficient ranging from 0.83 to 0.92 and a test-retest reliability co-efficient ranging from 0.16 to 0.54) in a CABG population (Beckie, 1989; Spielberger). The low test-retest

reliability coefficient was expected for this scale as it reflects the changes in state-anxiety over time (Spielberger). Beckie reported acceptable content validity, using a panel of cardiovascular experts to assess the relevance of each item to the CABG population; however she did not provide specific data to support this claim. Furthermore, Beckie reported convergent validity (Pearson $r = 0.81$) with a similar unidentified instrument that assesses state anxiety for this tool when used in a CABG population.

This instrument demonstrated acceptable internal consistency reliability (Cronbach's alpha coefficient = 0.84) in CABG patients who participated in this study.

Procedures and Data Collection

Patients who met the eligibility criteria were approached for study participation within 24-48 hours of the admission to the cardiovascular surgical (CVS) unit. The unit staff were provided with the study inclusion criteria and asked to use these criteria in identifying eligible patients. The staff members used a standardized script, to inform eligible patients of the study and ask if they would like to hear more about it. The researcher approached patients who expressed interest in hearing about the study, to explain the study in detail, answer any questions that the patient may have, and obtain written consent.

Pre-test data related to the outcomes were collected once consent was obtained (24-48 hours on admission to CVS) via face-to-face interaction. Data related to number of bypasses and co-morbidity were acquired from the patient's chart. Completion of the pre-test instruments took between 20-30 minutes. Anxiety data were collected at pre-test. Three weeks after the delivery of the intervention, patients received the post-test instruments that assessed the outcomes by mail.

Data Analysis

Descriptive statistics (i.e. measures of central tendency and dispersion) were used to characterize the sample in terms of demographic and illness-related characteristics. The Pearson correlation coefficient was used to examine the relationships between anxiety levels measured at pre-test and the change score reflecting changes in self-care knowledge, performance of self-care behaviours, and symptom experience between pretest and posttest. Change scores were computed as the difference between the data collected at time 2 (1 week post intervention delivery) and time 3 (3 weeks post intervention delivery).

RESULTS

Demographic Profile and Health Status

The participants had an average age of 63.4 years (SD=9.3), were predominantly married (84.0%) men (80.0%) and high school graduates (58%). Most participants had three bypass grafts and three co-morbid conditions. The most frequently reported co-morbid conditions were: high blood pressure, high cholesterol, diabetes, arthritis, and visual impairment.

Outcomes Measured at Posttest

Anxiety scores were found to be moderately high at pre-test (mean = 34.78; SD = 19.80). Results indicated a statistically significant inverse correlation between anxiety and change in knowledge [$r = -0.185$, $p = 0.033$] and self-care [$r = -0.275$, $p = 0.001$], and a statistically positive correlation between anxiety and change in symptom frequency [$r = 0.498$, $p = 0.000$]. These change scores were correlated with the pre-test anxiety scores.

DISCUSSION

The general characteristics of the sample were similar to those of the accessible (UHN, 2005) and target population (Moore & Dolansky, 2001; Moore, 1996; Beckie, 1989; Marshall et al., 1986; Weaver & Doran, 2001; Steele & Ruzicki, 1987). Moderate levels of anxiety were reported at pre-test. The hospitalization process for the CABG patient which is characterized by the influx of laboratory and diagnostic tests and procedures (routine chest x-rays and daily blood work); the introduction of numerous caregivers; the constant adaptation to frequent changes in physiological state; and the environmental factors associated with hospitalization; such as increased noise, unfamiliar surroundings, and lack of privacy are possible explanations for the moderate anxiety scores reported at pre-test (House & Stark, 2000). Hence, the moderate levels of anxiety were consistent with expectations and with previous findings in similar and different patient populations (House & Stark).

As well, self-care knowledge scores and performance of self-care behaviours increased from pre-test to post-test, while symptoms decreased over time. Further reinforcing the notion that increased levels of anxiety impact on knowledge acquired, behaviours performed, and symptoms experienced.

Inverse moderate correlations between anxiety at pre-test and self-care knowledge and self-care behavioural change scores, and a moderate positive correlation with symptoms experienced were also identified. Therefore, with increased anxiety there is minimal gain in knowledge after education delivery, minimal performance of appropriate self-care behaviours, and an increase in the presence of symptoms at 3 weeks after discharge. These findings are consistent with those of studies conducted by Moore and

Dolansky (2001), Weaver and Doran (2001), Moore (1996), and Beckie (1989) who reported similar correlations between anxiety and knowledge, self-care, and symptoms.

PRACTICE AND RESEARCH IMPLICATIONS

Moderate to high levels of anxiety were present at pre-test and influenced outcome achievement. Health educators are encouraged to be cognizant of the presence of anxiety prior to teaching, and the potential negative effect of anxiety on knowledge retention, self-care behaviour performance, and symptom experience. Specifically, nurses are encouraged to assess patients' anxiety levels prior to conducting teaching sessions. If moderate or high levels of anxiety are evident prior to teaching, then implementation of the educational session could be postponed until anxiety has been reassessed and deemed appropriate (anxiety levels are low). Alternatively, psychoeducational interventions could be implemented where the psychological/emotional (i.e. anxiety) status of patients is assessed and addressed appropriately prior to teaching. This type of interventions encompasses the delivery of health education combined with behavioral counseling (Rankin, 2001). The health education portion of this intervention could focus on the nature of anxiety, while the counseling component of the psychoeducational teaching could focus on behaviours tailored to manage anxiety. Specific behaviours to manage anxiety include: breathing activities, exercise, and meditation (Rankin). This type of intervention can help decrease the presence of anxiety prior to self-care education, and improve the patient's gain of relevant knowledge (Rankin).

Future research could focus on evaluating the most appropriate time to provide CABG patient educational interventions. Usual CABG educational interventions are delivered prior to hospital discharge (Beckie, 1989; Moore & Dolansky, 2001; Wheby &

Brenner, 1999). Since the hospitalization process has been found to be characterized by moderate levels of anxiety, which serves to impede knowledge acquisition, behavioural change, and the management of symptoms; then an alternative time for the delivery of CABG educational interventions should be evaluated to determine the effectiveness in producing outcomes of interest. A randomized clinical trial can be conducted to compare the effectiveness of a CABG educational intervention delivered at two different time intervals (e.g. 48 hours pre-discharge and 48 hours post-discharge). The findings can be used to assist with the creation of Best Practice Guidelines (BPG) focusing on the timing of CABG patient education initiatives.

REFERENCES

- Artinian, N. T., Duggan, C., & Miller, P. (1993). Age differences in patient recovery patterns following Coronary Artery Bypass Surgery. *American Journal of Critical Care*, 2, 6, pp.453-461.
- Artinian, N. T., Magnan, M., Sloan, M., & Lange, M. P. (2002). Self-care behaviors among patients with heart failure. *Heart and Lung: The Journal of Acute and Critical Care*, 31, 3, pp. 161-172.
- Beckie, T. (1989). A supportive-educative telephone program: Impact on knowledge and anxiety after coronary artery bypass graft surgery. *Heart and Lung*, 18, 1, pp.1-55.
- Canadian Institute for Health Information. (2001). *Cardiovascular Surgery* [Online]. Available: <http://secure.cihi.ca/cihiweb/splash.html>.
- Cohen, J. (1988). Statistical power analysis for the behavioral sciences. Hillsdale, NJ : L. Erlbaum Associates.
- Colagiuri, R., Colagiuri, S., deBlieck, C., & Naidu, V. (1994). Quality Assurance of Individual Diabetes Patient Education. *Diabetes Educator*, 20, 6, pp. 521-525.
- Cook, T.D. & Campbell, D.T. (1979). *Quasi-Experimentation: Design and Analysis Issues for Field Settings*. Boston: Houghton-Mifflin.
- Dunstan, J. L. & Riddle, M. M. (1997). Rapid recovery management: The effects on the patient who has undergone heart surgery. *Heart and Lung: The Journal of Acute and Critical Care*, 26, 4, pp.289-298.

Fredericks, S., Sidani, S., Watt-Watson, J., & Shugurensky, D. (2006, under review). Determining the most appropriate time for delivering education. *Clinical Nursing Research Journal*.

Feshbach, S. & Loeb, A. (2003). A further experimental study of a response-interference vs. a drive-facilitation theory of the effect of anxiety upon learning. *Journal of Personality*, 27, pp. 497-503

Grayson, C. (2000). What are negative effects of stress? *Well connected report: Stress* [On-line]. Available: <http://mywebmd.com/content/articles/1680.51974>.

House, A. & Stark, D. (2002). Anxiety in medical patients. *British Medical Journal*, 325, 7357, pp. 207 – 209.

Jaarsma, T., Halfens, R., Abu-Saad, H., Dracup, K., Diederiks, J., & Tan, F. (2000). Self-care and quality of life in patients with advanced heart failure: The effect of a supportive educational intervention. *Heart and Lung: The Journal of Acute and Critical Care*, 29, 5, pp. 319-330.

Marshall, J., Penckofer, S., & Llewellyn, J. (1986). Structured post-operative teaching and knowledge and compliance of patients who had coronary artery bypass surgery. *Heart and Lung: The Journal of Acute and Critical Care*, 15, pp.76-82.

McHugh-Schuster, P. M., Wright, C., & Tomich, P. (1995). Gender differences in the outcomes of participants in home programs compared to those in structured cardiac rehabilitation programs. *Rehabilitation Nursing*, 20, pp. 93- 101.

Moore, S. (1996). A comparison of women's and men's symptoms during home recovery after coronary artery bypass surgery. *Heart and Lung*, 24, 6, pp.495-501.

Moore, S., & Dolansky, M. (2001). Randomized Trial of a home recovery intervention following Coronary Artery Bypass Surgery. *Research in Nursing and Health*, 24, pp 93-104.

Orem, D. E. (2001). *Nursing: Concepts of Practice*. (5th Ed.). St. Louis: Mosby.

Rankin, S. (2001). *Patient education: Issues, principles and practice*. New York: Lippincott Williams and Wilkins.

Rosenstein, A. J. (2003). Psychometric vs. physiological anxiety and serial learning. *Journal of Personality*, 28, 3, pp. 279-284.

Spielberger, C. D. (1995). *Test Anxiety: Theory, Assessment, and Treatment*. Washington, D. C.: Taylor & Francis.

Steele, J. M. & Ruzicki, D. (1987). An evaluation of the effectiveness of cardiac teaching during hospitalization. *Heart and Lung: The Journal of Acute and Critical Care*, 16, 5, pp. 306-311.

The University of California, San Francisco School of Nursing Symptom Management Faculty Group. (1994). A Model for Symptom Management. *IMAGE: Journal of Nursing Scholarship*, 26, 4, pp. 272-276.

Wang, H., Fennie, K., He, G., Burgess, J., & Williams, A. (2003). A training programme for prevention of occupational exposure to bloodborne pathogens: Impact on knowledge, behaviour, and incidence of needle stick injuries among student nurses in Changsha, People's Republic of China. *Journal of Advanced Nursing*, 41, 2, pp. 187 – 194.

Weaver, L. A. & Doran, C. (2001). Telephone follow-up after cardiac surgery: Facilitating the transition from hospital to home. *American Journal of Nursing*, 3, pp. 84-96.

Wheby, D. & Brenner, P. (1999). Perceived learning needs of patients with heart failure. *Heart and Lung: The Journal of Acute and Critical Care*, 28, 1, pp. 31-40.

Wright, O., Kravitz, R., Kaplan, S., & Meyers, F. (2001). Individualized patient education and coaching to improve pain control among cancer outpatients. *Journal of Clinical Oncology*, 19, 8. pp. 2206-2212.

This manuscript has been published by Publishing Technology Inc; Fredericks, S., Sidani, S., & Shugurensky, D. (2008). The effect of anxiety on learning outcomes post-CABG. *Canadian Journal of Nursing Research*, 40, 1 pp. 127 - 140.