Abstract

Over a quarter of all heart surgery patients are readmitted to hospitals across Canada with post-operative complications experienced during the first 3 months of recovery. This may be due to the quality of existing patient education intervention. Specifically, the mode, episode, and timing of delivery of standard education programs may not be optimal in promoting self-care behaviours, resulting in the development of complications leading to increased hospital readmissions. The **objectives** of this preliminary descriptive study were twofold: 1) to describe the most consistent mode, episode, and timing in which education is provided to patients following heart surgery; and 2) to identify the degree to which the current educational mode and episode are correlated to readmission rates following hospital discharge. A non-experimental preliminary descriptive **design** was used to address the study objectives. **Setting:** Thirty-three patients were recruited from a cardiovascular surgical unit located within a large tertiary hospital. **Method:** Patients were included if they underwent heart surgery for the first time; were literate in English; cognitively oriented; and had access to a working phone at home. Point-biserial correlation**s** were performed to identify the degree to which the characteristics of existing patient education were correlated to hospital readmission rates. **Results:** A statistically significant inverse relationship between episode and hospital readmission (r_{pb} = - .49, p = .001) was noted suggesting that with reduced exposure to patient education, there is an increased likelihood for hospital readmissions. **Conclusion:** Increasing the number of times education is provided may reduce the number of hospital readmissions.

Keywords: hospital readmission, heart surgery, patient education, self-care, descriptive design

1.0. Introduction

Coronary artery bypass grafting (CABG) and valve replacement (VR) are the most common surgical treatments for cardiovascular disease (Cebeci and Celik 2008). Despite their advantages, CABG and VR result in substantial changes in the physical and psychological functioning of individuals within the first three weeks following surgery (Cebeci and Celik 2008). These changes include an increase in fluid retention; fluctuations in heart rate and rhythm; increase in feelings of nervousness; and the presence of symptoms such as fatigue, dyspnea, pain, and muscle soreness (Barnason *et al.* 2000). The functional changes are of significance, as patients now spend considerably less time in hospital due to the gradual decrease in the length of hospitalization (Cardiac Care Network of Ontario 2007). This leads to reduced access to healthcare providers, requiring patients to become more engaged in the self-management of their condition throughout all stages of their recovery.

Within the current in-patient cardiovascular surgical (CVS) setting, education is provided for all patients who have had CABG and/or VR (Jaarsma *et al.* 2000). The intended outcome of these education programs is the increased performance of self-care behaviours following discharge. The delivery of education generally occurs during the post-operative hospitalization period (Moore and Dolansky 2001; Fredericks 2009) and involves presenting standardized information that addresses: medication management, healthy heart diet, activity, signs and symptoms of infection, incision care, and complications (Public Health Agency of Canada 2012) in a variety of formats that include written and video.

Although resources to promote recovery are made available, over a quarter of all CABG and/or VR patients are being readmitted to hospitals across Canada with post-operative complications experienced during the first 3 months of recovery (Public Health Agency of Canada 2012). The most common causes of readmissions are post-operative infections (28%) and heart failure (22 %) (Hannan *et al.* 2003). The rate of hospital readmission for CABG and/or VR has significant implications for health care resource utilization, continuity of care across the system, and exacerbation of underlying cardiac condition. A possible reason for the high rate of readmission is the quality of the patient education intervention. Specifically, the mode, episode, and timing of delivery of the educational intervention may not be optimal in promoting self-care behaviours, resulting in the development of complications and hospital readmissions.

2.0 Literature Review

Studies (Barnason *et al.* 2003; Gortner & Jenkins, 1990; Guru *et al.* 2006; Hannan *et al.* 2003; Roebuck, 1999; Statistics Canada, 2013; Tranmer & Perry, 2004) examined post-operative individualized patient education interventions but did not evaluate impact on or relationship with hospital readmission rates. These studies yielded inconclusive findings, as they did not attempt to control for biases.

In addition, Brown et al. (2011) systematic review assessed the effect of patient education on total number of cardiac related and non-cardiac related readmissions during the follow-up period following the intervention. Findings indicate a statistically significant inverse relationship between the number of times patient education is delivered and the total hospital readmissions. This review was limited in scope, as it included trials that enrolled study participants who had suffered a myocardial infarction

(MI), underwent revascularization, or who had angina pectoris or coronary heart disease. Individuals who underwent CABG, VR, or CABG and VR were underrepresented.

2.0. Objectives

The objectives of this preliminary descriptive study were twofold: 1) to identify the degree to which the current educational mode and episode are correlated to readmission rates following hospital discharge; and 2) to describe the most consistent mode (booklet/video/booklet and video), episode (zero/once/twice/multiple times), and timing in which education is provided to patients following heart surgery.

3.0. Method

3.1. Design

A non-experimental preliminary descriptive design was used to address the study objectives. The results from this study will provide a preliminary indication as to the potential relationship between specific characteristics of patient education, in particular the mode and episode; and hospital readmission rates. As this relationship does not appear to have been examined previously, the use of a descriptive design is appropriate to provide introductory data into the potential relationship between these variables of interest. Approval for the conduct of this study was received from the Research Ethics Boards at participating institutions.

3.2. Procedure

Baseline data were collected by a trained research assistant (RA) through face-to-face interaction following acquisition of written informed consent. Outcome data were collect by the same RA at 3 weeks post-hospital discharge, by telephone.

Prior to commencing the study, the research assistant received a 2 week intensive training session on patient recruitment, consent acquisition, data collection, and data entry. Simulation scenarios involving actors were used to reenact a patient-researcher scenario. The development of interpersonal and communication skills, consistency in recruitment and data collection procedures, and enhancement of problem solving abilities were the focus of this training.

3.3. Setting

This study occurred on a cardiovascular surgical unit, at a university-affiliated teaching hospital in a large Canadian urban centre. The site admits approximately 1300 CABG and/or VR surgical patients a year. The average length of stay is 4.1 days on this unit, while the average age is 69.3 years old. The male/female ratio is 3:1. Approximately 70 % of the accessible population met the eligibility criteria.

3.4. Inclusion criteria and sample size

To be included in the study, patient had to have undergone CABG and/or VR surgery for the first time; be literate in English; oriented to time, place, and person; and had access to a working phone at home.

Available consenting patients were entered into the study until the desired sample size was reached. Sample size for this study was determined based on Burns and Grove's (2009) interpretation of sample size for preliminary studies. Based on the number of groups, 1; an established alpha level of .05, the estimated sample size was identified at 30 patients. As data was collected at 3 weeks following hospital discharge, it was anticipated that a 10% dropout rate would occur based on studies that have used a CABG and/or VR

sample and assessed outcomes of interest during the home recovery period (Jaarsma *et al.* 2000; Fredericks *et al.* 2010). The adjusted sample size was revised to 33.

3.5. Instruments

A standard demographic questionnaire was used to collect information related to the patient's age, sex, educational level, marital status, type of surgery, culture, and co-morbid condition. Data related to mode (i.e. who provided the education and how was it given), episode (i.e. how many times was education provided), and timing of education delivery (when did you receive the education) were collected via self-report. As well, questions were asked related to whether or not the patient was readmitted to a hospital; if they needed to visit an emergency room; and the reason for the readmission and/or emergency room visit.

3.6. Procedure for patient screening and recruitment

Patients were screen for study eligibility, by unit staff, within 24-48 hours of admission to the CVS unit. A trained research assistant approached patients, who expressed interest in hearing about the project, to explain the study in detail, answer any questions that they may have, and obtain written consent to participate.

3.7. Data analysis

Descriptive statistics (i.e. measures of central tendency and dispersion) were used to 1) characterize the sample on demographic and illness characteristics and 2) describe post CABG and/or VR educational intervention characteristics. Point-biserial correlation analyses were performed to identify the degree to which the mode (booklet/video/booklet and video) and episode (zero/once/twice/multiple times) of patient education interventions were correlated to hospital readmission rates.

4.0. Results

Thirty-five patients who met the eligibility criteria were approached for participation in the study. Thirty-three individuals signed the consent form, 29 patients completed the study, with two declining to participate due to feeling unwell. Four (12.1%) patients were identified as loss to follow-up.

The participants had an average age of 65.5 years (SD = 12.0), were predominantly married (77.1 %) men (57.1 %), with high school level education (31.4 %). Just over a quarter (25.7 %) of the study participants had three bypass grafts and three co-morbid conditions (28.6%). The most frequently reported co-morbid conditions were high blood pressure (86.2 %), high cholesterol (68.9 %), diabetes (37.9 %), and arthritis (24.1%). Approximately a half (51.4 %) of the study participants had an isolated CABG procedure, with over a quarter (27.6 %) having CABG and VR.

Over half (51.7%) of the study participants were first generation Canadians, with Irish/Scottish/English (48.3 %), Indian (24.1 %), Jamaican (13.7%), and Chinese (10.3 %) being the most common cultures represented in the sample. Irish, Scottish, English were clustered as a single culture because all of the study participants who identified themselves within this category had mixed backgrounds that included: Irish and Scottish, Irish and English, English and Irish, and English and Scottish.

As identified in the patient charts, all (100%) study participants received post-discharge teaching in the form of an educational booklet. As well, patients were encouraged to view a discharge education video that could be accessed free of charge from their in-room television sets. Data related to the number of times, patients read the

booklet and/or viewed the video was not identified in the chart. The educational materials were made available to patients within 24 hours of their admission to the in-patient unit.

Study participants (48.6%) recalled having received some form of patient education during their hospitalization. Three (10.3%) patients stated that they did not receive the education, while 41.3% of the study participants stated that they could not remember receiving any education while they were in the hospital. Of the patients that did remember receiving the patient education provided in the hospital, 71.4% stated that they received the teaching at one point in time, in a one-on-one format (71.4%), with content presented in an educational booklet (78.6%). Approximately fourteen percent of the sample stated that they received the education in the form of a video.

Approximately 37.9 % (n = 11) of the study sample reported using the services of an emergency room, as well as being readmitted to a hospital. Of the number of study participants readmitted to hospital, 72.7 % (n = 8) could not remember receiving education during their hospitalization. The most common reasons for hospital readmissions included: chest pain (81.8 %), bleeding (54.5%), and pneumonia (81.8 %).

Point biserial correlation analyses were performed to identify the degree to which the mode and episode were correlated to hospital readmission rates. A statistically significant correlation between episode and hospital readmission rates (r_{pb} = -.49, p = .001) was noted. No statistically significant correlation between mode (booklet/video/booklet and video) and hospital readmission rate (p > .05) was found.

5.0. Discussion and Implications

The general characteristics of the sample were similar to those of the accessible and target population. A diverse cultural representation was reported in this sample. This

is significant as a patient's cultural background has a considerable impact on how they will access and respond to health care information (Kleinman, 2004; Kleinman *et al.* 2006; Spector 2003). An individual will draw on personal experiences and traditions to learn from their own culture how to be healthy, how to recognize illness, and how to be ill (Kleinman *et al.* 2006). Thus, the meanings attached to the notions of health and illness is related to the culture bound values; which shape how experiences are defined and perceived (Kleinman, 2004). The findings indicate close to half of the individuals who underwent heart surgery were non-white. The content used to design the existing patient education booklet and video was obtained from empirical evidence that was generated from studies conducted using mainly white, homogenous samples (Moore and Dolansky 2001; Weaver and Doran 2001; Moore 1994; Marshall *et al.* 1986; Beckie 1989; Steele and Ruzicki 1987). Thus, as a result of the diverse cultural representation of the sample, the entire educational content presented in the booklet and on the video may not have been applicable to all study participants. Individualizing the content found in existing patient education interventions may serve to address the specific learning needs of individuals from culturally diverse backgrounds.

Eleven study participants stated that they were readmitted to a hospital during the first 3 weeks of home recovery. Chest pain, complications, and infection were noted as the main reasons for hospital readmissions. These findings are concerning as patients appear to be stable during their hospital discharge and then develop an infection or exacerbation of an existing complication during their home recovery. This may be due to not having the necessary knowledge to engage in self-care behaviours to avoid or prevent the onset of complications and/or infections. Educating patients following their hospital

discharge may serve to provide them with the necessary information needed to be able to engage in self-care behaviours to avoid or decrease the onset of infections and/or complications. Thus, reducing the overall use of health care services during the home recovery period.

Furthermore, approximately 2/3 of study participants readmitted could not remember receiving any form of patient education. This may be due to a combination of hypoperfusion during the surgical procedure resulting in memory loss (Bhimji *et al.* 2006). Approximately half of all cardiovascular surgical patients experience some form of cognitive impairment following surgery, which is most commonly manifested in the form of memory loss (Newman *et al.* 2001). The memory loss can last anywhere between a single day to a year following surgery; however, the majority of patients usually regain their memory within the first couple of weeks of recovery (Newman *et al.* 1995). Providing patients with education beyond the immediate post-operative period will allow them to have access to information that they may not have been able to process immediately following their surgery.

Finally, a statistically significant inverse relationship was noted between episode and hospital readmissions suggesting that with reduced exposure to patient education, there is an increased likelihood for hospital readmissions. During the post-operative hospitalization, patients are typically not exposed to repeated one-on-one education sessions (Fredericks 2008). This is mainly due to a number of factors that may include nurses' workload, patient's health status, and availability of resources (Cebeci and Celik 2008). Thus, increasing the number of times education is provided may reduce the number of hospital readmissions.

6.0. Conclusion

Even though the sample size was small, this study does provide preliminary evidence to suggest patients need continued support during their home recovery period, as existing educational interventions may not be effective in promoting adequate recovery. Nurses may wish to consider providing education in the form of a telephone based teaching session offered at multiple times during patients' post-discharge recovery. These interventions can be patient centered, in that the content of the education is tailored to reflect the learning needs of the individual (Lauver *et al.* 2002). This may serve to decrease the number of health care services (i.e. hospital readmissions, emergency room visits, etc…) patients are accessing during their home recovery.

Furthermore, continued examination into the relationship between episode of patient education and hospital readmission is needed. In particular, future research studies should be designed to replicate study findings using a larger, culturally diverse sample. As well, additional studies should evaluate the effectiveness of patient centered education programs delivered over the telephone during the home recovery period, in reducing the onset and/or exacerbation of complications and use of additional health services across culturally diverse samples following CABG and/or VR.

7.0. Acknowledgements

The authors wish to acknowledge the funding received from the Canadian Institute of Health Research, Randomized Controlled Trial Mentoring Program.

8.0. References

Barnason, S., Zimmerman, L., Anderson, A., Mohr-Burt, S., Nieveen, J., 2000. Functional status outcomes of patients with a coronary artery bypass graft over time. *Heart and Lung*, 29 (1), 33-46.

Barnason, S., Zimmerman, L., Nieveen, J., Schmaderer, M., Carranza, B., Reilly, S., 2003. Impact of a home communication intervention for coronary artery bypass graft patients with ischemic heart failure on self-efficacy, coronary disease risk factor modification, and functioning. *Heart and Lung*, 32 (3), 147-158.

Beckie, T. A., 1989. supportive-educative telephone program: Impact on knowledge and anxiety after coronary artery bypass graft surgery. *Heart and Lung*, 18, 1-15.

Bhimji, Z., Estabrooks, L., Price, P., 2006. Neurocognitive dysfunction post-cardiac surgery and the neuroprotective effects of erythropoietin. *Canadian Journal of Cardiovascular Nursing*, 17 (2), 5-9.

Brown, J. P. R., Clark, A., Dalal, H., Welch K., Taylor, R. S., 2011. Patient education in the management of coronary heart disease. *Cochrane Review*, 12, 1-73.

Burns, N. and Grove, S., 2009. *Understanding Nursing Research*, 6th edition. Toronto: Saunders.

Cardiac Care Network of Ontario., 2007. *Trends in heart surgery* [online]. Available from: http://www.ccn.on.ca/ [Accessed 3 January 2013].

Cebeci, F. and Çelik, S., 2008. Discharge training and counseling increase self-care ability and decrease post-discharge problems in CABG patients. *Journal of Clinical Nursing*, 17, 412-420.

Fredericks, S., 2009. Timing for delivering individualized patient education intervention to Coronary Artery Bypass Graft patients: A RCT. *European Journal of Cardiovascular Nursing*, 8, 144-150.

Fredericks, S., Guruge, S., Sidani, S., Wan, T., 2010. Post-operative patient education: A systematic review. *Clinical Nursing Research: An International Journal*, 19(2), 144-164.

Gortner, S., Jenkins., 1990. Self-efficacy and activity level following cardiac surgery. *Journal of Advanced Nursing*. 15, 1132-1138. doi: 10.1111/j.1365-2648.1990.tb01704.x.

Guru, V., Fremes, S., Austin, P., Blackstone, E., Tu, J., 2006. Gender differences in outcomes after hospital discharge from coronary artery bypass grafting. *Circulation*, 113, 4, 507-516.

Hannan, E.L., Racz, M.J., Walford, G., et al., 2003. Predictors of readmission for complications of coronary artery bypass graft surgery. *JAMA*, 290, 773-780.

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), 319-330.

Klienman, A., 2004. Culture and depression. *New England Journal of Medicine,* 351(10), 951-953.

Kleinman, A., Eisenberg, L., & Good, B., 2006. Culture, illness, and care: clinical lessons from anthropologic and cross-cultural research. *FOCUS: The Journal of Lifelong Learning in Psychiatry*, 4(1), 140-149.

Lauver, D.R., Ward, S.E., Heidrich, S.M., 2002. Patient centered interventions. *Research in Nursing and Health*, 25, 246-255.

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*, 15, 76-82.

Moore, S.M., 1994. Development of discharge information for recovery after coronary artery bypass surgery. *Applied Nursing Research*, 74(4), 170-177.

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

Newman, M.F., Kirchner, J.L., Phillips-Bute, B., Gaver, V., et al., 2001. Longitudinal assessment of neurocognitive function after coronary artery bypass surgery. *New England Journal of Medicine*, 344, 399-402.

Newman, M.F., Croughwell, N.D., Blumenthal, J.A., et al., 1995. Predictors of cognitive decline after cardiac operation. *Annals of Thoracic Surgery*, 5, 326-1335.

Public Health Agency of Canada., 2008. *Managing Cardiovascular Disease* [online]. Available from http://www.phac-aspc.gc.ca/cd-mc/cvd-mcv/index-eng.php [Accessed 3 January 2013].

Roebuck A. Telephone support in the early post-discharge period following elective cardiac surgery: does it reduce anxiety and depression levels?. 1999. *Intensive Critical Care Nursing*, 15(3): 142–6.

Spector, R.E., 2003. *Cultural diversity in health and illness*, 6th edition. New Jersey: Prentice Hall Health.

Statistics Canada., 2013. *Health Profile* [online]. Available from: http://www12.statcan.gc.ca/health-sante/82-228/details/page_Download-Telecharger.cfm?Lang=E&Tab=2&Geo1=PR&Code1=01&Geo2=PR&Code2=01&Data

=Rate&SearchText=Canada&SearchType=Contains&SearchPR=01&B1=All&Custom=. [Accessed 8 June 2013].

Steele, J.M., Ruzicki, D., 1987. An evaluation of the effectiveness of cardiac teaching during hospitalization. *Heart and Lung*, 16, 306-311.

Tranmer, J., Parry, M., 2004. Enhancing postoperative recovery of cardiac surgery patients: a randomized clinical trial of an advanced practice nursing intervention. *Western Journal of Nursing Research*. 26(5): 515-532.

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

This manuscript was published by Taylor and Francis Online; Fredericks, S. & Yau, T. (2013). Relationship between post-operative patient education and hospital readmission: A preliminary examination. International Journal of Health Promotion and Education, vol. 51, no. 4, 228-234. Available at: http://www.tandfonline.com/doi/pdf/10.1080/14635240.2013.818299