Title: An examination of patients experience following hospital discharge post-CABG and/or VR: A systematic review

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Key Messages:

- The type of post-operative complication identified during the first 3 months of recovery following Coronary Artery Bypass Graft (CABG) and Valve Replacement (VR) was either cognitive or cardiac in nature. The first three weeks following surgery is a critical time in which symptoms such as pain, infections, nausea, vomiting, and edema tend to occur. If patients are experiencing short term memory loss, then they will not be able to apply any of the strategies suggested to them during health care teaching sessions to manage symptoms present.

- Findings also point to patients spending on average 2 days in the ICU and 8.6 days on the CVS unit, while having just over 5 infections during their hospitalization. The average number of days spent on the CVS unit as reported in this study, is higher than the average number of days cardiovascular patients spend on a CVS unit in Canada. Finding may be due to the large number of studies that were conducted in the United States in which individuals are required to pay for health care. The average bypass-procedure costs $20,673 in the U.S. and $10,373 in Canada. Medical treatment costs Canadian patients less because the government manages the health-care system, keeping costs lower. Therefore, in the US, wealthier individuals tend to undergo CABG and/or VR and thus, can afford to have an extended length of hospitalizations.

- Increased length of hospitalizations can result in higher rates of infection

- The number of self-care behaviours patients engage in during their hospital discharge was slightly less than the number of behaviours patients performed while in hospital.

Background:

Coronary Artery Bypass Graft and Valve Replacement are the most common surgical treatments for cardiovascular disease. In Ontario, on average one in every one thousand individuals annually undergoes CABG and/or VR (Ministry of Health and Long Term Care, (MHLTC), 2007). Despite their advantages, CABG and VR result in changes in the physical and psychological functioning of individuals within the first three weeks following surgery (Cebeci & Celik, 2007). 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, Zimmerman, Anderson, Mohr-Burt, & Nieveen, 2000).

These functional changes are of significance, as patients are spending less time in hospital due to the gradual decrease in the length of hospitalization (Cardiac Care Network (CCN), 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 Cardiovascular Surgical (CVS) setting, patient education is provided for all patients who have had CABG and/or VR, during their hospitalization (Jaarsma et al., 2000). The intended outcome of these education programs is the increased performance of self-management behaviours following discharge. The delivery of education generally occurs 24-48 hours pre-hospital discharge (Beckie, 1989; Moore & Dolansky, 2001; Moore, 1996; Fredericks, 2009) and involves presenting standardized information that addresses: medication management, healthy heart diet, activity, signs and symptoms of infection, incision care, and complications (Winslow, 1986; Public Health Agency of Canada, 2008). As well, approximately half of all CABG and/or VR patients are referred to Cardiac Rehabilitative programs across Canada (Grace et al., 2006). The average length of time for involvement in these programs is 2 weeks. The intended outcome for Cardiac Rehabilitation is lifestyle modification following heart surgery (Grace et al.).

Although resources to promote recovery are made available, over a quarter of all CABG and/or VR individuals are being readmitted to hospitals with post-operative complications experienced during the first 3 months of recovery. The most common causes of readmissions are post-operative infections (28%) and heart failure (18%) (Hannan et al., 2003). The rate of hospital readmission for CABG and/or VR is one of the highest across the nation and has significant implications for health care resource utilization following heart surgery and continuity of care across the system. The specific behaviours patients who have had CABG and/or VR engage in during their recovery may be impacting on the development of infections and heart failure. Thus, a need exists to identify the specific behaviours patients who have had CABG and/or VR surgery engage in, during their recovery, in order to guide efforts at developing a targeted self-management intervention that will reduce post-operative infections and the onset of heart failure resulting in a decline in hospital readmission rates.

This systematic review was conducted to address the clinically relevant question: What is the post-operative recovery experience of the individual who has had CABG and/or VR surgery? The specific objectives were: 1) to determine the type of behaviour post-operative CABG and/or VR patients engage in during their recovery; 2) to describe the type and number of post-operative infections, onset of heart failure, and rate of hospital readmissions experienced during the recovery period, and 3) to examine the relationship between number of behaviours performed, number of post-operative infections, and rate of hospital readmissions during the recovery period. The target population included adult patients undergoing CABG and/or VR surgery.

Methods

A systematic review of studies that examined the post-operative recovery experience of patients who had CABG and/or VR surgery was conducted to address the study objectives. These objectives were used to guide the specification of key terms to search databases, the specification of criteria for selecting studies, and the extraction of pertinent data. As this was systematic review, there were no anticipated ethical issues.

Studies were included in the systematic review if they met the following selection criteria: 1) the sample represented adult (≥ 18 years) patients who underwent CABG and/or VR surgery, 2) the outcomes assessed were related to type of behaviour performed during recovery period, 3) contained data related to the development of post-operative infections, heart failure, and hospital readmission rates; and 4) the study report was...
published in English between 2000 and 2010. Studies that used non-experimental, experimental or randomized clinical trial (RCT), and quasi-experimental designs involving two groups (experimental and comparison) were included in the systematic review.

The search for relevant studies was performed using the following databases: CINAHL, MEDLINE, PUBMED, EMBASE, COCHRANE, and HEALTH STAR. The keywords used in the search included: recovery phase, post-operative, CABG, VR, postsurgical, post-operative infections, heart failure, and behaviour performance. Reference lists of studies retrieved were examined for additional studies that addressed the post-operative recovery period of patients who had a CABG and/or VR.

The following information was gathered about each study: year of publication, country in which the study was conducted, study design (non-experimental, quasi-experimental, or experimental), sample size (total, and for each study group), and number and type of study groups (control or comparison and treatment, or two treatment groups). With regards to behaviour performed, the type and number of behaviour was extracted. As well, the following data was also extracted: the type and number of post-operative infections (sternal wound or donor site), presence of heart failure (yes/no), and hospital readmission rates (number of patients readmitted and length of time between hospital discharge and readmission). These data were used for descriptive purposes.

Descriptive statistics was used to 1) delineate the characteristics of the studies included in this systematic review, 2) determine the type and number of behaviours patients post-CABG and/or VR engage in during their recovery, 3) determine the type and number of post-operative infections, presence of heart failure, and rate of hospital readmissions experienced during the recovery period, and 4) examine the relationship between behaviours performed and the number of post-operative infections and rate of hospital readmissions.

Results

The 92 studies that met the inclusion criteria involved 54,367 participants. The studies were conducted in the United States (63.8 %), Europe (31.3 %), and Canada (4.9 %). Approximately three quarters (73.8 %) of the studies used descriptive designs to identify the type of behaviours performed, the number of post-operative infections, presence of heart failure, and rate of hospital readmissions experienced during the recovery period, while 18.1 % of the studies used quasi-experimental designs, and 8.1 % used experimental designs.

Across the studies, the average age of the study participants was 64.9 (SD = 3.5) years. In the majority of the studies, the sample was mainly white (86.9 %), married (73.9 %), male (92.3 %), with at least a high school diploma (75 %). In 94.5 % of the studies, the sample had less than or equal to high school education. Over half (67.4 %) of the study participants were retired. Over three quarters (78.2 %) of the study participants reported having at least 5 co-morbid conditions. The most frequently reported co-morbid conditions were diabetes (89.1 %), hypertension (79.3 %), hyperlipidemia (76.1 %), peripheral vascular disease (34.8 %), and Chronic Obstructive Pulmonary Disease (33.7 %).

Among the studies, post-operative complications were reported. The most common complications include delirium (33.7 %), short term (last up to 2 weeks) memory loss (32.9 %), atrial fibrillation (32.8 %), depression (26.0 %), anxiety and stress
(28.9%), heart failure (16.3%), pain (14.1%), myocardial infarct (12.7%), and respiratory problems (11.0%). On average, post-operative complications lasted between 2 (SD = 1.1) to 45 (4.1) days.

Participants, as identified across studies, had an average length of stay in intensive care of 49.1 (SD = 51.48) hours and an average length of stay on the post-operative recovery unit of 8.6 (SD = 3.9) days. The average number of infections during the hospitalization period was 5.4 (SD = 4.0).

Hospital readmission rates were 16% (SD = 7.1%), with an average of 30 (SD = 3.9) days at home before readmission. The majority (90.2%) of readmissions were to hospitals, while 4.3% of study participants were readmitted to a rehabilitation facility. Across the studies, the reason for readmission related to stroke (16.5%), heart failure (13.3%), and respiratory problems (12.9%). The average number of infections during the home recovery experience was 7.2 (SD = 3.1).

On average patients performed 4 (SD = 1.4) self-care behaviours during their hospitalization and 3 (SD = 1.9) self-care behaviours following hospital discharge. The three most frequently performed self-care behaviours patients engage in during their hospitalization include deep breathing and coughing exercises (98.4%), use of incentive spirometer (96.7%), and complying with physicians orders (76.2%). The three most common self-care behaviours patient engage in after their hospital discharge were deep breathing and coughing exercises (89.0%), medication administration (85.0%), and medication management, in particular refilling prescriptions on time (63.7%).

Statistically significant relationships were identified between the number of self-care behaviours performed and number of post-operative infections ($r = -0.185$, $p = 0.04$), the number of self-care behaviours performed and the rate of hospital readmission ($r = -0.198$, $p = 0.00$), post-operative infections and rate of hospital readmission ($r = 0.150$, $p = 0.02$). Additional findings include statistically significant results related to length of stay in hospital and number of infections ($r = 0.909$, $p = 0.03$) and length of stay in intensive care units and length of stay in hospital ($r = 0.982$, $p = 0.00$).

**Implications for primary health care**

This study focused on the experience of the surgical patient following hospital discharge. Due to the increase in readmission rates within 3 months of hospital discharge, there appears to be a relative lack in continuity of care from the time of hospital discharge, to the first 12 weeks of recovery. This lack of continuity of care has resulted in the onset (e.g. heart failure) and/or exacerbation (e.g. infections) of preventable illness and disease. The goal of “primary health care is to coordinate functions to ensure continuity and ease of movement across the system” ([http://www.hc-sc.gc.ca/hcs-sss/prim/about-apropos-eng.php](http://www.hc-sc.gc.ca/hcs-sss/prim/about-apropos-eng.php)).

In particular, patients need to have continued access to health information from the institution in which they received their surgical procedure. This access should be made available to the patient during the first 12 weeks of their recovery and should be tailored to reflect the individual needs of the patient and their specific recovery status. Thus, the provision of health resources could be delivered by an advanced nurse practitioner (APN), whose area of specialty is cardiovascular surgery. A telephone advice line can be established that focuses only on recovery related issues following cardiovascular surgery and managed on an individual basis by each institution that has a CVS program. Prior to hospital discharge, patients and their families can be informed of
the telephone advice line and encouraged to use this resource if any challenges are encountered during the first 12 weeks of recovery. The APN would have access to patient’s files to be able to assist in the delivery of health information.

References


