

Title of Article:

Timing for delivering individualized patient education intervention to Coronary Artery

Bypass Graft patients: A RCT

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Abstract

Background: The primary focus of this study is on the timing of the delivery of education to patients who had CABG surgery.

Aim: To determine the efficacy of an individualized telephone patient education intervention, delivered at two different points in time (1- 2 days pre-discharge versus 1-2 days post-discharge) in enhancing the CABG patient's knowledge of self-care behaviours, performance of self-care behaviours, and symptom frequency.

Method: A randomized clinical trial that included a convenience sample of first time CABG patients. Individuals who received education pre-discharge were compared to individuals who received education post-discharge on the outcomes.

Results: Results indicated no statistically significant difference in outcomes between the two time points. As well, anxiety levels were found to be significantly higher in the pre-discharge group than the post-discharge group.

Conclusions: The individualized nature of the educational intervention may have accounted for non-significant findings reported in outcomes between the two time points.

Practice Implications: Nurses may consider assessing anxiety levels prior to delivery of educational interventions, implement interventions aimed at reducing anxiety levels, and provide individualized teaching.

Key words for indexing:

Anxiety, Timing, Patient Education, Knowledge, CABG

1. Introduction

Following Coronary Artery Bypass Graft (CABG) surgery patients receive educational interventions to promote knowledge and performance of self-care behaviours, while decreasing the frequency of symptoms. This education tends to be in the form of standardized teaching delivered within 24 hours prior to hospital discharge. The effectiveness of patient education provided during this time interval is questionable however, as this period has been characterized by heightened levels of anxiety (1) which can serve to impede the achievement of the desired effects of teaching (2). The primary focus of this study was on the timing of the delivery of education to patients who had CABG surgery. Patients who received an individualized telephone education intervention 1- 2 days pre-discharge were compared to patients who received the same intervention 1- 2 days post-discharge on the outcomes of knowledge of self-care behaviours, performance of self-care behaviours, and symptom frequency.

The delivery of education to patients following CABG surgery occurs 24 hours pre-discharge (1, 3, 4, 5, 6). Studies have investigated CABG patient education interventions in producing changes in knowledge and performance of self-care behaviours and symptom frequency (1, 3, 4, 5, 6). Results indicated minimal or non-significant effects of education on self-care knowledge and compliance with self-care instructions (5), physical functioning (4), specifically, mobility, ambulation, and body care/movement, and symptom frequency (3).

The non-significant findings associated with the effectiveness of educational interventions on self-care knowledge and behaviour performance, and symptom frequency can be attributed to the time at which the education was provided. The

education was delivered prior to hospital discharge. This time interval has been characterized by moderate to high levels of anxiety (1, 3, 4). The presence of moderate to high levels of anxiety in patients may have confounded the effects of the patient education intervention, thus accounting for the non-significant findings related to the outcomes measured (1, 3, 4). Despite differences in design, target population, and setting, the findings of these studies are consistent and indicate that anxiety interferes with learning. Furthermore, results indicate cardiac and CABG patients have moderate levels of anxiety prior to their hospital discharge (1, 3, 4). Since moderate to high levels of anxiety have been shown to mitigate the beneficial effects of patient education, an alternative time, when anxiety levels are lower, is required for the delivery of patient education interventions.

The purpose of this study was to determine the most appropriate time (1 – 2 days pre-discharge versus 1 – 2 days post-discharge) for delivering individualized education to patients who had CABG surgery in enhancing knowledge of self-care behaviours, performance of self-care behaviours, and symptom experience.

2. Methods

A randomized clinical trial design was used to evaluate the most appropriate time for the delivery of education to patients who had CABG surgery. Eligible patients, who consented to the study, were randomly assigned to two groups. The groups represented alternate times for delivering education. The first group of participants received education within 24 hours, prior to discharge while in hospital (referred to as pre-discharge group), which is the usual time for providing education to post-CABG patients (5, 6). The second group of participants received education within 24 hours

following discharge, while at home (referred to as post-discharge group), when anxiety levels were posited to be lower than pre-discharge. Data were obtained at three occasions: pretest, within 2-3 days prior to intervention; post-test, within one week following delivery of the educational intervention, and follow-up, within three weeks post-discharge. Participants' group allocation was concealed in an opaque envelope. Group assignment was revealed to the study participant and the researcher after consent was obtained. Pretest data were obtained in a face-to-face interview done by the researcher. To minimize response bias associated with the researcher's presence, during post-test and follow-up data collection, participants were mailed the questionnaires and requested to return the completed questionnaires within the specified time interval.

2.1. Participants

The setting for this study was a Cardiovascular Surgical unit at an university-affiliated teaching hospital in a large Canadian urban center. 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 both in the hospital and at home.

2.2. Intervention

The same intervention was given to the two study groups to ensure consistency of content and therefore its potential confounding with the time of intervention delivery, which was

the focus of this study. The intervention, which was given above and beyond usual teaching, consisted of an individualized patient education intervention. The intervention was geared towards the self-care needs during the first 3 weeks of the CABG post-operative patients' recovery. The content of the intervention was based on a comprehensive review of the literature of the identified learning needs of CABG patients. The content was assessed by 3 experts in the field of Cardiovascular Nursing and was found to be valid and congruent with best practice guidelines. The use of an intervention protocol for assessing learning needs and delivering patient education was followed to maintain consistency in the implementation of the intervention. A research nurse trained in the delivery of the intervention administered the patient education to both groups. The research nurse provided the intervention to the two groups (hospitalized pre-discharge patients and post-discharge patients) via telephone to maintain consistency in the way in which the education was delivered, thereby avoiding the potential threat of inconsistent implementation of the treatment (14).

The individualized patient education telephone session began with an assessment of the individual CABG patient's learning needs. Topics included: complications, activities, medication, symptom management, and psychological symptoms. Any topic identified by the patient as being important or very important for learning was discussed with the patient. For each topic identified, the nurse used the education material contained in the self-care CABG post-discharge patient teaching intervention (developed for this study based on available empirical evidence and best practice guidelines) to discuss the related self-care behaviours that the patient need to perform to enhance their recovery experience. The intervention was delivered in one session. 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 was 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.

In addition to the individualized intervention, all patients received usual teaching which consisted of a 20 minute discharge video. The content of the video included: salt intake, fluid restrictions, an overview of the function of common medications along with an overview of strategies that patients can use to remember to take medication, activity performance, and follow-up appointments. Patients were encouraged to view the video, in small groups, 24 hours prior to their discharge.

2.4. Data collection procedure

Approval was received from the Research Ethics Boards at the participating institution. As well, the investigation conforms with the principles outlined in the Declaration of Helsinki. Patients who met the eligibility criteria were approached for study participation within 24-48 hours of 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.

2.5. Outcomes

Data were collected using relevant instruments following a data collection

protocol. Demographic data related to age, sex, educational level, marital status, and co-morbidity were collected to describe the sample at pretest. As well, patients' identified learning needs were collected prior to the intervention delivery. The outcomes of interest for this study were self-care knowledge, performance of self-care behaviours, and symptom frequency. Level of anxiety was assessed immediately before the delivery of the intervention.

The Patient Learning Needs Scale (15) (PLNS) was used to assess the topic areas that patients want to learn about. This tool was designed for use with surgical inpatients and outpatients. Patients were asked to rate how important each item is to know about before going home in order to manage their care at home using a Likert scale with scores ranging from 1 (not important) to 5 (extremely important). The scale demonstrated convergent validity evidenced by its correlation ($r = 0.78$) with a similar instrument that assesses patient's learning needs (15), and internal consistency reliability (Cronbach's alpha: 0.80 to 0.90) in a sample of patients who had CABG (15).

Self-care knowledge was measured with the 15-item Knowledge Inventory (16), which assessed the patient's understanding of self-care strategies to manage post-operative CABG complications. The self-care strategies related to post-operative CABG complications, medication administration, and symptom management. All strategies were covered in the educational intervention. A multiple choice response format was used. The total score represented the number of correct responses to the items with higher scores indicating increased knowledge of self-care behaviours. The Inventory was reviewed by three cardiac rehabilitation professionals (nurses and exercise physiologists) for clarity, content, and face validity and were administered to 10

rehabilitation patients to establish clarity, adequacy, and freedom from bias (15). Prior to this study, the scale was pilot tested for clarity and relevance with a sample of 10 patients who had CABG surgery. It demonstrated acceptable internal consistency reliability (Cronbach's alpha = 0.63) in this study. This rather low reliability value is related to restricted score range on the items.

Self-care behaviours were measured using the Revised Heart Failure Self-Care Behaviour scale (RSCB), a 29-item, self-report, Likert-type scale that described behaviours patients with heart failure must perform, to some degree, in order to regulate their own functioning (17, 18). The behaviours entailed management of post-operative CABG complications, medication administration, and symptom management.

Respondents were asked to indicate how often they performed each of these behaviours in the past couple of days, on a scale ranging from "none of the time" [0] to "all of the time" [5] (17). The total scale score was calculated by summing the scores across items and ranged from 0 to 145 (17). Higher scores indicated more frequent performance of self-care behaviours (17). Content validity was demonstrated through evaluations made by a panel of experts, including two nurse practitioners and two self-care experts. A content validity index of 0.86 was obtained (17). The internal consistency reliability coefficient of 0.80 was found in this study.

Symptoms were assessed using the Symptom Inventory (19) which is a 19-item self-report checklist of symptoms specific to CABG surgery recovery such as 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 (frequency ranged from 1 = not at all to 7 = always). A total score was calculated by summing the item scores. Scores ranged from 20 to 140, with higher numbers indicating a higher frequency of symptom experience in the past couple of days. The scale items were internally consistent (Cronbach's alpha = 0.92) in this study.

Anxiety was assessed prior to the delivery of the telephone educational intervention to determine the level of anxiety at the time of education delivery. The State Anxiety Scale (2) was used to measure state anxiety. It consists of 20 statements describing feelings to which the participants respond using a four point scale ranging from "not at all" (1) to "very much so" (4). A total score is obtained by summing the scores of the 20 items after reverse-coding the negatively worded items. The range of possible total scores is 20 to 80, with high scores representing high levels of state anxiety (2). The scale was reliable (Cronbach's alpha = 0.83 to 0.92; test-retest reliability: 0.16 to 0.54) in a CABG population. The low test-retest reliability coefficient was expected for this scale as it reflects changes in state-anxiety over time (2). It showed acceptable internal consistency reliability (Cronbach's alpha = 0.85) in this study.

2.6. Sample Size

A convenience sampling technique was used in which available consenting patients were entered into the study until the desired sample size was reached. The sample size was determined using Cohen's (20) criteria. The sample size calculation was based on the number of groups to be compared [2], an alpha level of 0.05 (attempting to avoid a

type II error) (12, 22), a pre-set B or power of 0.8 (12, 23), and a moderate effect size of 0.6 for knowledge acquisition (which was the primary outcome) that is based on theoretical (21, 22) and empirical (1, 21, 22) evidence. The required sample size was 128. However, loss to follow-up was anticipated in this study, as previous studies that have assessed patient education interventions in a CABG population have reported attrition rates of 10% (1, 3, 4, 5, 6). Additional 10 % of the required number of patients was recruited for this study to address attrition. The total sample size adjusting for attrition was 142 equally divided between the two groups.

2.9. 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, level of anxiety immediately before receiving the intervention, as well as to describe the outcomes measured at each point in time. Repeated measures analysis of covariance (RM-ANCOVA) was used to determine differences in the outcomes in the groups of participants who received education pre-discharge and post-discharge, after controlling for level of anxiety assessed just prior to intervention delivery.

3. Results

3.1. Participant flow

A total of 172 patients who met the eligibility criteria were approached upon admission to the cardiovascular surgical unit, to participate in the study. Twenty-two individuals did not provide written consent (Figure 1). Of the 150 patients who provided written consent, 75 participants were randomly assigned to either the pre- or post-discharge groups. Nine (12 %) participants in the pre-discharge group dropped out over

the course of the study, while eleven (14 %) in the post-discharge group were lost to follow-up (Figure 1). In total, 130 (87 %) patients provided data at the three points in time, 66 participants in the pre-discharge group and 64 in the post-discharge group. Differential attrition bias was examined by comparing attrition rates between the two groups. No difference was noted. As well, attrition bias was examined by comparing participants who completed the study to those who dropped out on baseline characteristics using t-test and chi-square test. No difference was noted.

3.2. Baseline data

On average, participants were predominantly older married educated men (Table 1). They 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 (co-morbid conditions are as defined in the medical chart).

Independent sample t-tests and chi-square tests were performed to compare the two groups on variables measured at pre-test. A statistically significant between-group difference was found in level of education only. More participants in the post-discharge group than in the pre-discharge group had a graduate university degree (Table 1). There were no significant differences between the groups on outcomes measured at pre-test; knowledge ($t(128) = 0.74, p > 0.05$), self-care ($t(128) = 0.04, p > 0.05$), and symptom ($t(128) = 0.72, p > 0.05$).

3.3. Level of anxiety prior to education

The two groups differed on the level of anxiety assessed just prior to delivery of

the education ($t(128) = 0.062, p < 0.001$). Participants in the pre-discharge group had, on average, high levels of anxiety (mean = 69, SD = 15). In contrast, participants in the post-discharge group reported lower levels of anxiety (mean = 32, SD = 15).

3.4. Effects of time for education

The mean scores on the outcome variables for the two groups over time are presented in Table 2. When controlling for the influence of education level and of anxiety assessed just prior to the delivery of the educational intervention no differences in the outcomes were observed between the pre- and post-discharge groups. No statistically significant differences in knowledge were found between the two groups and over time [group: ($F(1, 127) = 1.51, p > 0.05$), time: ($F(1, 127) = 1.52, p > 0.05$), group X time interaction ($F(1, 127) = 1.29, p > 0.05$)]. Similarly, the group ($F(1, 127) = 0.41, p > 0.05$), time ($F(1, 127) = 3.01, p > 0.05$), and group X time interaction ($F(1, 127) = 0.001, p > 0.05$) effects were not significant for the performance of self-care behaviours. No statistically significant differences in symptom frequency were found between the two groups and over time, [group ($F(1, 127) = 0.08, p > 0.05$), time ($F(1, 127) = 0.12, p > 0.05$), and group X time interaction ($F(1, 127) = 0.09, p > 0.05$)]. Within each group however, the mean scores on the outcomes changed in the hypothesized direction, where the level of knowledge and performance of self-care behaviours increased, while the reported frequency of symptom experience decreased over time (Table 2). Although the pre-discharge group had slightly higher mean score on self-care behaviours than the post-discharge group, this difference was not statistically or clinically significant.

4. Discussion

4.1. Interpretation

Results indicated no difference in CABG patients' knowledge of self-care behaviours, performance of self-care behaviours, and symptom frequency between study participants who received the individualized CABG patient education prior to and after discharge after controlling for relevant covariates. This finding implies that timing may not be important however it should be interpreted with caution due to the nature of the educational intervention and the content of its delivery. Furthermore, this finding could be a result of both groups having received the same individualized educational intervention, which has been demonstrated in previous studies to be effective in producing significant changes in knowledge, self-care behaviour performance, and symptom frequency (1, 3, 4, 5, 6). Thus, the individualized nature of the educational intervention may have mitigated the influence of anxiety on the outcomes. Furthermore, the intervention was given in addition to usual teaching and no restrictions on access to additional educational resources were imposed, all of which may have influenced the effects of the individualized education intervention over time. The change in outcomes within each group could be attributed to the individualized nature of the intervention (24). The teaching content that was delivered to CABG patients was relevant and applicable to their recovery experience, as it was selected by them for discussion during the teaching learning interaction. Researchers have suggested that the more relevant the teaching content is to the individual needs, the more likely they will retain and apply the information (24). As well, the level of anxiety assessed immediately prior to the delivery of the education was significantly lower in the post-discharge group than in the pre-discharge group. The time at which assessment was performed accounts for the difference in anxiety scores noted, as stress related to the hospitalization process can

result in increased levels of anxiety (23), thus confirming the premise of this study. The hospitalization process for the CABG patient 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, and the constant adaptation to frequent changes in physiological state (7). As well, patients may not be motivated to change even though they have knowledge to do so. Increasing knowledge may not be associated with changes in behaviour, hence there is a need for behavioural, in addition to, educational interventions.

4.2. Limitations

The potential for investigator bias is a possibility as the same researcher enrolled the study participants, assigned the participants to the groups, and delivered the educational intervention. However, the use of randomization, participants' group allocation using a concealment technique, and mailing out post-test and follow-up questionnaires are considered strengths of this study and served to minimize the effects of investigator bias.

4.3. Generalizability

The general characteristics of the sample were similar to those of the accessible (University Health Network Department of Cardiovascular Surgery, August 2007, verbal communication) and target population (1,3). As well, the outcome scores obtained at baseline were comparable to those in other education intervention studies using CABG populations, thereby supporting the representativeness of the sample (1, 5, 6).

4.4. Practice and research implications

The results of this study have implications for nurses caring for CABG patients. Specifically, the findings indicated that the time at which the education was provided did

not result in changes in outcomes between the group that received the teaching during hospitalization and the group that received the teaching at home. Hence, education can be given at any time without significant influence to the outcomes of interest. However, to be effective in producing changes in outcome, the educational intervention should be individualized, addressing the patients' identified learning needs. Nurses may consider incorporating individualized patient education into their plan of care. In order to be able to effectively deliver individualized educational interventions nurses will need to have an understanding of how to assess patient's learning needs and how to individualize educational content to meet these needs. The individualization process includes assessing the CABG patient's learning needs prior to the delivery of patient teaching interventions and discussing information pertinent to the identified learning needs. This process enhances relevance of the information to patients and reduces information overload, which could limit knowledge retention (1).

Furthermore, findings indicated that hospitalized patients experience moderate to heightened levels of anxiety 24 hours prior to discharge. Thus, nurses may consider assessing anxiety levels prior to delivering educational interventions. If anxiety levels are deemed too high to allow for acquisition and retention of information, then psychological interventions can be employed to reduce anxiety prior to delivering educational interventions. Finally, continued evaluation of the most appropriate time to teach patients post CABG is needed, in which the outlined methodological limitations identified throughout this study are addressed.

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