

# The Importance of Nurse-led Preoperative Education on the Anxiety of Patients After Coronary Artery Bypass Grafting

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**Key Words:** anxiety, coronary artery bypass grafting, cardiac patients, nursing, preoperative education.

**Summary.** The aim of this study was to assess the importance of nurse-led preoperative education for helping patients to reduce their anxiety after coronary artery bypass grafting.

**Methods.** The interventional study was performed at the Hospital of Lithuanian University of Health Sciences Kauno klinikos, the Department of Cardiac, Thoracic and Vascular Surgery and the Department of Cardiology. The data were collected between June 2019 and February 2020. The intervention group ( $n = 109$ ) received nurse-led preoperative education 1–3 days before the surgery. The patients in the control group ( $n = 109$ ) received ordinary education provided by the staff of the hospital: surgeons, anaesthesiologists and nurses. The patients' anxiety level was assessed with Cardiac Anxiety Questionnaire (CAQ) developed by Eifert (2000).

**Results.** Postoperative CAQ-Fear, CAQ-Avoidance, CAQ-Attention and CAQ-Total Score decreased significantly in the patients of the intervention group who participated in preoperative nurse-led education ( $P < 0.05$ ). There was no significant decrease of scores of any anxiety subscale in the patients of the control group ( $P > 0.05$ ); moreover, the scores of anxiety subscale CAQ-Attention significantly increased after surgery among the control group patients ( $P = 0.007$ ). It was found that gender, smoking habit and the average duration of smoking experience did not associate with the level of postoperative anxiety in the patients after coronary artery bypass grafting; age and education had a very weak correlation with the anxiety level of the study sample ( $r < 0.2$ ;  $P < 0.05$ ).

**Conclusions.** Nurse-led preoperative education reduced anxiety in the patients after coronary artery bypass grafting significantly. Gender, smoking habits and smoking duration of the participants were not associated with the level of postoperative anxiety but age and education had a very weak significant (positive and negative) correlation with the patients' anxiety domains. Before surgery, the patients felt moderate anxiety and, in reference to our study results, preoperative education has to be necessarily included in clinical practice.

## Introduction

Anxiety is described as a reaction manifesting itself via cognitive, behavioural and emotional changes of a person towards a presupposed threat such as underlying disease, impending anaesthesia and surgery. Elevated anxiety increases the probability to aggravate the postoperative period (1). Preoperative anxiety is often related to physical reactions in the body, such as tachycardia, hypertension, elevated temperature, sweating, nausea, increased sensitivity to smells, touching or sounds (2). One likely factor of unpleasant cardiac-related sensations is heart-focused anxiety. Patients with a higher level of heart-focused anxiety tend to check their heart beats, avoid physical activities and seek reassurance from healthcare professionals or their relatives (3). Patients feel anxious before surgery because they have not received enough information

concerning pain control, postoperative complications management and recovery period peculiarities (2, 4, 5). It has been established that approximately 94% of all patients feel anxiety before surgery and patients demonstrating significant anxiety levels range between 20% and 35% according to different authors (1).

The main risk factors for postoperative anxiety development include female gender, preoperative anxiety and lower education level (6, 7). Moreover, the results of a few studies show that there is a relation between smoking and anxiety (8, 9). However, it is hard to state that smoking history has influence on perioperative anxiety (10).

Anxiety and fear experienced by patients during the preoperative period are directly connected to postoperative recovery after major cardiac surgeries (1, 11). Optimal management of these problems during both preoperative and postoperative periods may improve operative proficiency, reduce the frequency of postoperative complications and

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shorten the length of hospitalization. A high level of anxiety may induce symptoms of prolonged stress or cause the post-traumatic stress disorder, which also makes a significant influence on a postoperative recovery flow (6).

Preoperative education seems to be one of the most effective methods for anxiety reduction in patients undergoing operations (2, 4, 6, 12). Nurse-led patient education before surgery is an important part of nursing care that can improve patients' self-care after the operation (12–14). During the educational process, the nurse provides patients with information, helping them to reveal important aspects concerning surgery, and thus reducing the level of anxiety and agitation (2, 6, 14, 15). Nurse-led preoperative education and training involve an explanation regarding the need for surgery and giving behavioural instructions, possible uncomfortable feelings and negative experience that may appear after surgery, as well as introduction of possible postoperative outcomes (6, 13). There is evidence that information, obtained during preoperational education process, makes a positive impact on the patients' length of hospitalization and costs, recovery, pain control, emotional state, need for analgesia and overall patient's satisfaction level (1, 16).

Patients' education and its relationship with the anxiety reduction has been analyzed by Lithuanian researchers. It has been found that more than half of the patients experienced preoperative anxiety (17–18). During the preoperative period, patients try to reduce it via searching the information about surgery on the internet, consulting with doctors and relatives. The nurses' role in the reduction of patients'

preoperative anxiety is minor (17). It confirms that nurses in Lithuania do not always provide patients with an adequate amount of information, and the need for preoperative education of patients remains high. Another study has reported that nurses (57.6%) usually report their educational activity for patients, but only slightly more than 17% of patients could agree with this fact (19). However, it has been found that the information about anaesthesia, preoperative education and possible postoperative analgesia ways provided before surgery reduced anxiety of patients undergoing elective surgery (20).

The aim of this study was to assess the importance of nurse-led preoperative education for helping patients to reduce their anxiety after coronary artery bypass grafting.

### Methods

**Study Design.** The interventional study was performed at the Hospital of Lithuanian University of Health Sciences Kaunas Clinics, the Department of Cardiac, Thoracic and Vascular Surgery and the Department of Cardiology. The data were collected between June 2019 and February 2020. The inclusion criteria for respondents were as follows: the patient experienced coronary artery bypass grafting surgery for the first time; cognitive and comprehension functions were not impaired; the patient received scheduled surgery; the patient agreed to take part in the study.

**Study Sample.** A sample size was calculated according to the statistical data on patients in the hospital during 2018. In total, 218 patients took part in the study after excluding 11 patients due to objective reasons such as refusing to participate, urgent

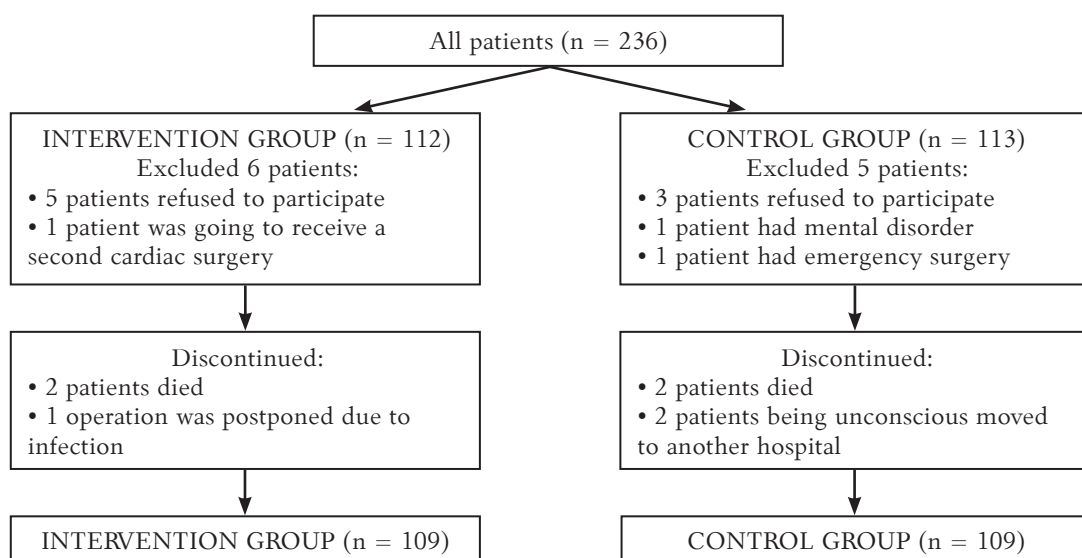


Fig 1. Sample of the study

surgery, etc. (Fig. 1). During June and October, additional nurse-led preoperative education was performed on the respondents who were included into the intervention group. The respondents who arrived at the hospital from November through February were included into the control group and received ordinary informal education provided by the staff of the hospital. Such distribution of the patients (in accordance with the month of their arrival to the hospital) was performed in order to avoid communication between the patients of both groups.

*Education.* Only patients awaiting coronary artery bypass grafting were included in the study data, but patients awaiting for another type of cardiac surgery, such as valve replacement, etc., could participate in education as well. The education course was led by a registered nurse who was specially trained.

The intervention group received a compiled preoperative education 1–3 days before the surgery after they were admitted to the hospital. The duration of education ranged from 40 to 90 minutes depending on the active participation of the patients. The education took place in wards where patients stayed before their surgeries. Relatives of patients could attend the teaching procedure if patients consented. The number of patients in one educational session varied from 1 to 4.

The education included 6 topics: patient's preparation for the surgery; postoperative pain control; technique and importance of breathing exercises; technique and importance of moving; intensive care unit and its equipment; nutrition recommen-

dations during early postoperative stage (Table 1). Even though usually breathing training devices are provided to patients after their surgery, the interventional group was provided with devices before surgery. During the education session, the patients were taught how to train breathing muscles, how to move and cough safely after heart surgery, how to preserve their breastbone during the move and gradually return to daily activities.

Possible postoperative complications were also introduced to the patients of the intervention group. In addition to verbal instructions, the patients were provided with informative leaflets, containing all important information that was delivered during the preoperative education period. The patients of the intervention group were also informally instructed by the surgeon, the anaesthesiologist and the nurse of that department the day before surgery.

The control group was also informally instructed by the same staff of the hospital. The patients of the control group received breathing training devices only after surgery in the intensive care unit, as it is usually done. Unlike the interventional group, the patients of the control group did not participate in the educational session led by a trained registered nurse. They received standard information provided by the staff of the hospital, which was unstructured and verbal only.

*Instruments.* The anxiety level in both groups of the patients before and after surgery was assessed by the standardized Cardiac Anxiety Questionnaire (CAQ) developed by Eifert (2000) (21). The ques-

Table 1. List with Educational Interventions

Patient's preparation for the surgery	Body wash Oral hygiene Hair removal (chest, leg) Restriction of eating and drinking
Postoperative pain control	Pain rating scale Possible ways of reducing pain Importance of not feeling pain
Technique and importance of breathing exercises	Use of breathing training device Coughing exercises with incision support
Technique and importance of moving	Prevention of sternum split Early mobilization techniques Restriction on arm movements Avoidance of weightlifting
Intensive care unit and its equipment	Breathing tube Monitoring Chest drains Urinary catheter Noises and alarms
Nutrition recommendations during early postoperative stage	Restriction on drinking after extubation Importance of early eating Possible nausea and vomiting

tionnaire encompassed 18 items and 3 subscales with the items included: CAQ-Fear (for example, *If tests come out normal, I still worry about my heart*); CAQ-Avoidance (for example, *I avoid activities that make my heart beat faster*) and CAQ-Attention (for example, *I check my pulse*). The patients rated every item on a 5-point Likert scale ranging from 0 (never) to 4 (always). The mean scores were calculated according to author's recommendations. Higher scores indicated greater anxiety. In Lithuania, this questionnaire was used for the first time, after receiving written permission of the author. The questionnaire was translated to Lithuanian following the guidelines (22). Internal consistency scores (Cronbach's  $\alpha$ ) were satisfactory: 0.85 for CAQ-Total Score, 0.64 for CAQ-Fear, 0.77 for CAQ-Avoidance, and 0.63 for CAQ-Attention.

**Ethical Consideration.** The study protocol was approved by the Lithuanian Regional Biomedical Research Ethics Committee (No. BE-2-62).

**Statistical Analysis.** The data were recorded and analyzed using the Statistical Package for Social Sciences (IBM SPSS Statistics) version 23.0. Continuous variables were presented including mean and standard deviations; the chi-squared test was used for the comparison of proportions, and the Student t test was used in order to compare the continuous study variables between the intervention and control groups. The paired samples t test was used to compare scores on two different variables for the same group of cases. Pearson correlations between CAQ measures and characteristics of the study participants were calculated. Absolute values of correlation coefficient  $r < 0.20$  were regarded as no or very weak correlation, between 0.20 and 0.29 as

weak correlation, between 0.30 and 0.50 as moderate and  $> 0.5$  as strong. The statistical significance level was set at 0.05.

### Results

The number of men and women was almost the same in the intervention group: 47.7% of men and 52.3% women. Meanwhile, in the control group, the number of women was higher (68.8%) than that of men (31.2%) and the statistically significant difference between genders ( $P = 0.018$ ) was obtained. The distribution of the participants by education and age, number of non-smokers and smokers, and duration of smoking in both groups was similar (Table 2).

Preoperative and postoperative anxiety, experienced by the patients, was assessed by calculating the mean of various subscales and the mean of total scores (Table 3).

The results presented in Table 3 show that postoperative CAQ-Fear, CAQ-Avoidance, CAQ-Attention and CAQ-Total Score decreased significantly in the patients of the intervention group who participated in preoperative nurse-led education ( $P < 0.05$ ). Different dynamics were observed in the control group: there was no significant decrease of scores of any anxiety subscale ( $P > 0.05$ ). Moreover, the paired samples test showed that scores of the anxiety subscale CAQ-Attention significantly increased after surgery among patients of the control group ( $P = 0.007$ ). It was also found that CAQ-Total Score of anxiety significantly decreased in the intervention group ( $P < 0.001$ ) and did not differ in the control group patients ( $P > 0.05$ ).

There were no significant correlations between gender, smoking habit, mean of smoking duration

Table 2. Characteristics of the Study Participants

Characteristics		Intervention Group		Control Group		$\chi^2$	<i>P</i>
		n	%	n	%		
Gender	Men	52	47.7	34	31.2	6.223	0.018
	Women	57	52.3	75	68.8		
Education	Primary/basic	8	7.3	20	18.3	6.124	0.108
	Secondary	38	34.9	31	28.4		
	Professional	34	31.2	30	27.5		
	High	29	26.6	28	25.7		
Smoking	Yes	12	11.0	24	22.0	4.791	0.051
	No	97	89.0	85	78.0		
		Mean value	SD	Mean value	SD	t	<i>P</i>
Age		67.47	8.91	69.51	9.07	-1.683	0.094
Smoking duration (years)		4.59	13.70	7.19	14.54	-1.364	0.175

n – number of participants; SD – standard deviation; t – Student t test value;  $\chi^2$  – chi-squared test; *P* – level of significance; bolded values –  $P < 0.05$ .

Table 3. Measures of Anxiety of the Patients Before and After Surgery

Measures	Group	Before Surgery		After Surgery		t	P
		Mean value	SD	Mean value	SD		
CAQ-Fear	Intervention	2.12	± 0.76	1.83	± 0.82	3.397	<b>0.001</b>
	Control	2.27	± 0.68	2.14	± 0.68	1.596	0.113
CAQ-Avoidance	Intervention	1.74	± 0.85	1.54	± 0.78	2.584	<b>0.011</b>
	Control	2.51	± 0.90	2.63	± 0.76	-1.300	0.196
CAQ-Attention	Intervention	1.73	± 0.83	1.31	± 0.90	5.038	< <b>0.001</b>
	Control	1.52	± 0.60	1.75	± 0.78	-2.735	<b>0.007</b>
CAQ-Total Score	Intervention	1.90	± 0.66	1.60	± 0.70	4.634	< <b>0.001</b>
	Control	2.13	± 0.59	2.17	± 0.57	-0.644	0.521

SD – standard deviation; t – Student t test value; P – level of significance; bolded values –  $P < 0.05$ .

Table 4. Correlation Between Participants' Characteristics and CAQ Measures After Surgery

Measures	Gender	Education	Age	Smoking	Smoking Duration
CAQ-Fear	0.043	-0.176**	0.091	0.082	-0.059
CAQ-Avoidance	0.069	-0.129	0.143*	-0.026	-0.016
CAQ-Attention	0.043	-0.078	0.154*	-0.087	-0.063
CAQ-Total Score	0.059	-0.155*	0.153*	0.062	-0.057

CAQ – Cardiac Anxiety Questionnaire.

\* $P < 0.05$ ; \*\* $P < 0.01$ , Pearson correlation.

and postoperative level of CAQ-Fear, CAQ-Avoidance, CAQ-Attention and the total score of anxiety ( $P > 0.05$ ) (Table 4).

Significant correlations were determined between the patients' CAQ scores and CAQ-Total Score after surgery and the age and education level. The age was very weakly positively related to the anxiety scores CAQ-Avoidance and CAQ-Attention: the older the patients are, the more postoperative anxiety they tend to experience. Very weakly negative associations between education and anxiety score CAQ-Fear and CAQ-Total Score show the tendency that the more patients are educated, the less anxiety level they may experience (Table 4).

### Discussion

Our study showed that the patients who received preoperative education felt a lower anxiety level after coronary artery bypass grafting compared with those who did not take part in additional learning. After surgery, the patients of the control group rated their anxiety almost at the same level as before surgery. Many studies have reported (23, 24) that preoperative education, provided by nurses or other members of the health care system, reduced postoperative anxiety, and the results of our study confirm these findings. There was a similar study

performed in Greece (23) where preoperative education intervention was delivered on patients. The results revealed that the decrease in the score of anxiety during the follow-up period was greater in the intervention group as compared with the control group, similarly to the results of our study. On the other hand, there were studies showing opposite results (25), when preoperative education did not help to decrease the level of anxiety, but significantly decreased symptoms of depression.

Results of Hoyer et al. (2008) showed that two of three subscales of the CAQ (CAQ-Fear and CAQ-Avoidance) had significantly reduced scores on follow-up but there was no effect for CAQ-Attention (26). Our results showed that the level of attention on heart-related symptoms did not reduce and even increased in the patients of the control group. Thus, as mentioned by Hoyer et al. (2008), it could be considered functional in the early postoperative period to facilitate adherence with the change of daily activities or ongoing medical interventions (26). Despite that, our study showed that the level of CAQ-Attention was significantly lower in the patients of the intervention group after surgery compared with the results before surgery. Because of that, we could say that preoperative nurse-led education helps to improve patients' psychological health after surgery.

Our results revealed that the level of the total score of preoperative anxiety in both the control and the intervention group was 2.13 and 1.90 of 4 points, respectively, meaning that the patients felt moderate level anxiety. The anxiety level of the patients in the intervention group (the ones who received preoperative education) decreased to 1.60 points, whereas that of the control group, on the contrary, remained almost the same as during the preoperative period, i.e., 2.17 points. Based on our study and the results of other researchers (19, 20), we recognize the great need for preoperative education as it is a significant tool in reduction of postoperative anxiety.

As mentioned earlier, one of the factors of postoperative anxiety development is gender (6, 7). Other authors (5–7, 10) have stated that female gender is a risk factor for postoperative anxiety development but we were not able to confirm this as anxiety was similar between both gender groups in our study. Some studies have revealed that (6, 7) lower education has influence on patients' anxiety because such patients usually are not very interested in their health condition and thus are worried about possible negative outcomes of any intervention. Our results, in agreement with the results of Eberhart et al. (2020), showed that education had a very weak association with anxiety development in patients (10). Age had a very weak significant correlation with some of the patients' postoperative anxiety scores, the same as reported by other authors who did not confirm the influence of age on postoperative anxiety (1, 7, 10, 27).

To sum up, our results demonstrated that preoperative education intervention consisting of an informative leaflet and verbal information could improve psychological outcomes of patients after coronary artery bypass grafting. According to this, preoperative education should be continued in the most of the healthcare centres. The main task for applying our results in hospital practice

further is to train healthcare staff to assess patients' education needs and better prepare them for surgeries by teaching and developing patients' self-care skills.

### Conclusions

Preoperative education, performed by a registered nurse for patients awaiting coronary artery bypass grafting, reduced the level of anxiety during the postoperative period. The lower level of anxiety (in different subscales and in total) was established in the patients after surgery who participated in preoperative nurse-led education compared with the control group. After surgery, the patients of the control group felt an even greater level of CAQ-Attention than before surgery.

Gender and smoking habits did not make difference in postoperative anxiety although there is a tendency that education and age may be associated with the separate domains of patients' anxiety. Before surgery, all patients awaiting coronary artery bypass grafting felt moderate anxiety, which proves that preoperative education has to be necessarily included in clinical practice.

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### Statement of Conflict of Interest

The authors declare no conflict of interest.

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