THE EFFECT OF A PREOPERATIVE EDUCATION PROGRAM ON THE QUALITY OF LIFE AND THE REDUCTION OF SYMPTOMS OF ANXIETY AND DEPRESSION IN PATIENTS UNDERGOING A CORONARY ARTERY BYPASS GRAFT SURGERY – A QUASI-EXPERIMENTAL STUDY

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ABSTRACT

Introduction: Patients scheduled for coronary artery bypass graft (CABG) surgery tend to have persistent symptoms of anxiety and depression and low quality of life. Dedicated educational programs preparing patients for the operation can improve the quality of life and reduce the intensity of stress and anxiety.
The study aims to assess the impact of the education program implemented in the preoperative period on quality of life and symptoms of depression and anxiety among coronary artery bypass graft surgery patients during the operation period in comparison to the control group.
Material and methods: This study was designed as a quasi-experimental study. The study group comprised 189 patients (96 in the intervention group, 93 in the control group). The educational program was the independent variable in the study, while the dependent variables were quality of life, symptoms of depression, and anxiety. Data were collected before the intervention, CABG, and 3 months after the operation using the WHOQOL-BREF questionnaire and the HADS.
Results: In the preoperative period, the worst was the physical domain in the intervention and control groups (13 vs. 14, respectively). When the intervention program was implemented, the intervention group's quality of life improved compared to the control group regarding the perception of health and physical health domain ($p < 0.05$). Before surgery, both groups showed mild anxiety (7.91 vs. 7.22), and no depressive symptoms were observed. The results of the intensity of anxiety and depression in both groups were significantly lower postoperatively than preoperatively.
Conclusions: The education program provided to CABG patients in the intervention group positively impacted QoL among these patients and reduced their anxiety. Structured preoperative education in patients undergoing cardiac surgery is one of the essential nursing interventions and a fundamental part of preoperative and postoperative patient care.
Key words: CABG, education, quality of life, anxiety, depression.

INTRODUCTION

Coronary artery disease is presently the leading cause of morbidity, disability, and premature mortality in developed countries [1]. Coronary artery bypass graft (CABG) is one of the surgical treatment options for patients with advanced coronary artery disease [2]. Preoperative education has improved patients' experiences by providing them with relevant healthcare information, coping skills, and psychosocial support before surgery. Many studies have highlighted preoperative education's effects on improving physical and psychosocial recovery for coronary artery bypass surgery. Patient education on pre- and post-coronary artery bypass graft surgery is essential to nursing care. The role of nurses in the perioperative care of patients undergoing open heart surgery is beneficial for obtaining a positive outcome for them. Nurses play an essential role in preventing postoperative complications and promoting the health of individuals by providing education regarding postoperative care and possible risk factors [3-7].

Quality of life constitutes an important aspect considered in the context of diseases and their consequences, primarily when they directly impact health conditions, thus often necessitating a lifestyle change. The CABG surgery aims not only to extend patients' lifespans but, most of all, to improve quality of life in the physical, psychological, and social domains. The findings from the research demonstrate that health education enhances the quality of life for patients with CABG [8].

Anxiety is a vague and disturbing feeling of discomfort or fear that affects cardiac surgery patients psychologically and physically. Typically, patients awaiting cardiac surgery experience increased anxiety related to surgery, surgical outcomes, complications following surgery, pain or discomfort, and their ability to return to everyday life and work. In addition, preoperative anxiety can be caused by a fear of unfamiliar procedures during hospital admission, preoperative preparation, surgery, and postoperative care [9-11]. Also, different studies have shown that preoperative depression increases anginal pain, occurrence of delirium, and prolonged postoperative length of stay and decreases quality of life [12].

Early and adequate education dedicated to patients undergoing CABG surgery will help ensure optimal recovery. There is no existing study concerning nursing educational programs on recovery following CABG surgery in Poland. Therefore, the scientists designed this study considering the original educational program to study its effect on the acceleration of postoperative recovery.

Given the consideration mentioned above, the main aim of this study was to assess the influence of the education program executed in the preoperative period on the quality of life and symptoms of depression and anxiety in post-CABG patients in the recovery period and the factors related to the quality of life of patients.

MATERIAL AND METHODS

The study, conducted at Poland's adult cardiovascular surgery department between July 2014 and December 2016, included adult patients qualified for elective CABG procedures.

This study was quasi-experimental in design. Convenience sampling was used to recruit 240 patients after meeting the inclusion criteria. Inclusion criteria for the study were age 45-75 years, elective CABG, and formal qualification by a Heart-Team for the CABG. The exclusion criteria were age up to 45 years and above 75 years old, no informed and voluntary consent to the surgery given, disqualified for CABG, and urgent admission for CABG. In this study, no blinding was performed for participants due to the apparent type of educational intervention and discharge program in the intervention group. Finally, 189 patients were selected for the study and were divided into experimental (n = 96) and control (n = 93) groups.

Intervention

The educational intervention was conducted individually in 2 one-hour sessions by a nurse (principal researcher) before the surgery at the time of admission to the hospital and reinforced on the day of the discharge. In addition, on the day of hospital discharge, a self-care training booklet was delivered to the patients in the intervention group. The educational intervention was based on the Guide for Patients in the Perioperative Period of Coronary Artery Bypass Graft Surgery and Late Recovery [13]. The education program included the following modules: Knowledge of the CABG surgery; Postoperative anticoagulation treatment; Tasks of the therapeutic team (cardiac surgeon, anaesthesiologist, psychologist, nurse, rehabilitator) in the preoperative and postoperative period; General recommendations after the surgery (Table 1).

Control

The control group received nurses' unstructured verbal information on the preparation for the procedure and the course of the surgical procedure on the day of admission before surgery. Different nursing staff informed patients about the surgery and interventions following discharge. Patients had 2 visits

Table 1. The educational content

Topic	Detailed information
Knowledge of the CABG surgery (session before surgery)	General information on what is coronary bypass graft surgery The description of coronary artery bypass graft surgery – on-pump procedure
Tasks of the therapeutic team (cardiac surgeon, anaesthesiologist, psychologist, nurse, physiotherapist) in the preoperative and postoperative period (session before surgery)	The responsibility of the therapeutic team: cardiac surgeon, anaesthesiologist, psychologist, nurse, and physiotherapist before and after the operation. Explanation of the process from admission, preoperative care, operation time, postoperative recovery, discharge, and complete recovery
Postoperative anticoagulation treatment (session on the day of discharge)	Explanation of the postoperative anticoagulation therapy, including medicines, their indications, and side effects
General recommendations after the surgery (session on the day of discharge)	General information about rehabilitation, lifestyle (diet, activity, smoking, coping with stress), adherence to treatment

from the surgeon and anaesthetist one day before the surgery. They passed the general information and risks about the surgery and anaesthesia and obtained informed consent.

All patients received regular preoperative nursing care, clipping of the surgical field, shaving, blood test, and enema and were informed to be 'nil by mouth' after midnight.

Outcome measures

All participants completed self-reported questionnaires 2 times: a pre-test – before the operation and education intervention and a post-test – 3 months after the operation.

Pre-test/post-test included general characteristics and standardised tools. Analysed variables included quality of life (primary outcome) and anxiety and depression (secondary outcomes).

The Polish WHOQOL-BREF questionnaire allows one to assess the quality of life in 4 dimensions. The assessed areas of quality of life include the physical area, the psychological area, social relations, and the environment. Higher scores stand for a better quality of life. Two questions assessed the overall perception of quality of life and general health [14]. The Cronbach α values for the 4 domain scores ranged from 0.75 to 0.84 for all tests 0.86.

The Hospital Anxiety Depression Scale (HADS) questionnaire assesses the occurrence of anxiety and depressive disorders. The scale contains 14 items on a 4-point Likert scale (range 0-3). It is designed to measure anxiety and depression (7 items for each subscale). The total score is the sum of the 14 items, and for each subscale, the score is the sum of the respective 7 items (ranging from 0-21). A score between 0 and 7 indicates a standard value, a score between 8 and 10 points suggests the ceiling, whereas a score between 11 and 21 is considered abnormal [15, 16]. Cronbach's α coefficient is 0.77 for the HADS anxiety sub-scale and 0.85 for the HADS depression subscale.

The author's original questionnaire comprised 24 questions containing demographic variables, risk factors (body mass index – BMI, smoking, physical activity), and an education program assessment.

Statistical analysis and sample size

On average, 850 patients undergo CABG at the hospital each year. A sample size of 95 or more per group is needed to compare with the required margin of error (7%) and confidence level (95%) [17].

Statistical analysis was conducted using the Polish version of the Statistica 9.0 software package. Categorial variables were presented as absolute numbers and percentages. The Shapiro-Wilk test was used to determine the data's normality distribution. The distribution of quantitative variables that deviated from normal distribution was presented as medians (Me) and upper and lower quartiles (Q25; Q75). The HADS results were normally distributed and presented as mean and SD. The chi-square test or the Fisher exact test evaluated intergroup differences between categorical variables. Wilcoxon probability tests were used to measure the continuous data.

Logistic regression was used to assess the factors affecting the quality of life. The results are presented as parameters OR values with a 95% confidence interval. The analysis was performed using R software, version 4.1.1. Nutritional status (BMI) was calculated according to the WHO recommendations. The adopted significance level was $p < 0.05$.

Ethical considerations

The study was carried out according to the ethical principles of the Helsinki Declaration. Participation in the study was voluntary, and all patients sought written informed consent to participate in the study. This study was approved by the Institutional Review Board (No. KBET/168/B/2013).

RESULTS

Baseline characteristics

The patients' mean age in both these groups was 63 years. The dominant sex was male ($n = 79$ intervention group and $n = 74$ control group). Most of the study group resided in a town (69.79%). The respondents' education was predominantly secondary school education and vocational education. More than half of the respondents were married or living together. No statistically significant differences were identified between these groups. Patients in the intervention group more often than in the control group declared their situation to be good and very good then unsatisfactory and bad. Detailed characteristics are presented in Table 2.

Quality of life

Quality of life assessment in the intervention and control groups before and after CABG.

In the preoperative period, quality of life was assessed as the best in the psychological domain (Me 15 for both intervention and control group), social domain (Me 15 [intervention] and 16 [control]), and environmental (Me 15 [intervention] and 15 [control]), and the worst in the physical domain in both groups (Me 13 [intervention] and 14 [control]). No statistically significant difference was shown between the groups in any domain of quality of life ($p > 0.05$) before operation. In the postoperative period, it was determined that the perception of general health and quality of

Table 2. Demographic characteristics of the study population

Variables	Preoperative education (intervention) *n* = 96	Usual care (control) *n* = 93	*p*
Age (years), mean (SD)	63.74 (7.43)	63.86 (6.8)	0.907*
Sex (male), *n* (%)	79 (82.29)	74 (79.57)	0.769**
Place of living (town), *n* (%)	67 (69.79)	65 (69.89)	1**
Educational level, *n* (%)			0.513***
Primary school	3 (3.12)	7 (7.53)	
High school	33 (34.38)	32 (34.41)	
Vocational education	42 (43.75)	41 (44.09)	
University	18 (18.75)	13 (13.98)	
Marital status, *n* (%)			0.863***
Married	63 (65.62)	60 (64.52)	
Living together	5 (5.21)	3 (3.23)	
Single	2 (2.08)	3 (3.23)	
Widow/widower	16 (16.67)	19 (20.43)	
Divorced	6 (6.25)	8 (8.60)	
Source of income, *n* (%)			0.313**
Pensioner/Retired	57 (59.37)	51 (54.84)	
Professional work	29 (30.21)	24 (25.81)	
Economic activity	4 (4.17)	9 (9.68)	
Farming	4 (4.17)	9 (68)	
Unemployed	2 (2.08)	1 (1.08)	
Financial situation, *n* (%)			0.014***
Very good	1 (1.04)	5 (5.38)	
Good	70 (72.92)	48 (51.61)	
Unsatisfactory	23 (23.96)	36 (38.71)	
Poor	2 (2.08)	4 (3.18)	
BMI, *n* (%)			0.437***
Underweight (< 18.5)	2 (2.08)	0 (0)	
Normal weight (18.5-25)	17 (17.71)	18 (19.35)	
Overweight (25-30)	47 (48.96)	51 (54.84)	
Obesity class 1 (30-35)	25 (26.04)	21 (22.58)	
Obesity class 2 (35-40)	4 (4.17)	1 (1.08)	
No answer	1 (1.04)	2 (2.15)	

**Student's t-test, **chi-square test, ***Fisher test*

life in the physical health domain was significantly better in the intervention group than in the control group (Table 3).

In a subsequent analysis, the scores of the domain of quality of life were compared separately in the intervention and control groups. Comparing the size of changes in the intervention and control group, it was shown that in the intervention group, the quality of life in the physical, psychological, and social domains and the perception of their health increased more ($p < 0.05$). The most significant increase was recorded in the physical domain (2.46 points), and the lowest was in the environmental domain, where we did not observe the changes. In the control group, only in the physical and psychological domains, the general health perception was significantly better after the operation ($p < 0.05$). The most significant increase was recorded in the physical domain (1.23 points) and the lowest in the social domain, where we observed a decreased quality of life.

Intensification of anxiety and depression (HADS)

The mean anxiety level in the intervention and control groups was 7.91 vs. 7.22, respectively, in the preoperative period. No depressive symptoms were identified (5.78 vs. 5.5, respectively) in either group.

Table 3. Comparison of the mean score of quality of life

WHOQOL-BREF	Before operation			After operation		
	Intervention (*n* = 96) Me [Q25; Q75] Mean ±SD	Control (*n* = 93) Me [Q25; Q75] Mean ±SD	*p*	Intervention (*n* = 96) Me [Q25; Q75] Mean ±SD	Control (*n* = 93) Me [Q25; Q75] Mean ±SD	*p*
Overall quality of life	4 [3; 4] 3.66 ±0.65	4 [3; 4] 3.76 ±0.71	0.204	4 [4 ;4] 3.91 ±0.48	4 [4; 4] 3.87 ±0.47	0.365
General health	3 [2; 4] 2.95 ±0.93	3 [2; 4] 3.05 ±0.94	0.415	4 [4; 4] 3.84 ±0.57	4 [3; 4] 3.65 ±0.65	0.009*
Physical health domain	13 [11; 14] 12.59 ±2.4	14 [11; 15] 12.88 ±2.6	0.226	16 [14,75; 16] 15.05 ±1.94	14 [13; 15] 14.11 ±2.07	< 0.001*
Psychological domain	15 [14; 17] 15.3 ±2.11	15 [15; 17] 15.52 ±2.12	0.374	16 [15; 17] 16.15 ±1.55	16 [15; 17] 15.81 ±2.14	0.38
Social relationships domain	15 [13; 16.5] 14.96 ±2.54	16 [13; 16] 15.15 ±2.57	0.781	16 [15; 16] 15.29 ±2.21	16 [13; 16] 14.98 ±2.54	0.364
Environment domain	15 [14; 16] 14.92 ±1.83	15 [14; 16] 15 ±2.11	0.784	15 [14; 16] 14.9 ±1.76	15 [14; 16] 14.93 ±2.17	1

*Me = median, Q25; Q75 = upper and lower quartile, *p < 0.05, p-value Mann-Whitney test*

Table 4. Comparison of the mean score for depression and anxiety disorders

HADS	Before operation			After operation		
	Study (*n* = 96)	Control (*n* = 93)	*p*	Study (*n* = 96)	Control (*n* = 93)	*p*
Level of anxiety, mean ±SD	7.91 ±4.0	7.22 ±4.63	0.183	3.3 ±3.46	3.45 ±3.3	0.671
Depression, mean ±SD	5.78 ±3.65	5.5 ±4.05	0.501	3.41 ±2.94	3.82 ±3.5	0.577

SD – standard deviation, p-value – Mann-Whitney test

No statistically significant differences were identified between the groups. Both groups were identified with significantly reduced anxiety and depression after the surgery. The mean anxiety level in the intervention and control groups after the operation was 3.3 vs. 3.54, whereas depression was 3.41 vs. 3.82, respectively (Table 4).

In subsequent analyses, it was shown that in the intervention group, education in the preoperative period had a beneficial impact on the reduction of perioperative stress by reducing its level (77.08% of the answers in intervention vs. 53.76% of the answers in control), reducing the fear of the unknown (81.25% of the answers in the intervention vs. 40.86% of the answers in control), and depreciating the fear of death (69.71% of the answers in the intervention vs. 45.86% of the answers in control).

Factors determining the quality of life in the physical health domain in an intervention group are presented in Table 5. Respondents in old age (OR = 1.11, 95% CI: 1.13-1.217) residing in a town (OR = 3.3, 95% CI: 1.387-7.846) would have a better quality of life. In turn, in the area of environment, the respondents residing in a town (OR = 0.3, 95% CI: 0.109-0.813) would have a worse quality of life in this domain (Table 5).

DISCUSSION

Due to the nature of the disease and surgery, many patients undergoing CABG surgery face problems such as anxiety, depression, and a severe decline in quality of life. Effective educational interventions provided by nurses can reduce many of these patients' concerns. According to the results of our study, structured, planned educational intervention may increase patients' quality of life and reduce anxiety. In this regard, our findings are consistent with the results obtained by other authors [18-21].

The results of this study showed that there was no significant difference between groups before surgery in all domains of quality of life. The study revealed significant improvement in quality of life in both the intervention and control groups as measured using the WHOQOL-BREF after operation. Also, the results of our analysis showed that the intervention group had benefited from the educational program by improving the perception of general health and physical domain, where the statistical difference was observed ($p < 0.05$).

Improved quality of life in the physical domain was also shown by Kim *et al.* in the systematic review and meta-analysis assessing the effectiveness of the PRECEDE-PROCEED educational model [22]. The study performed by Bsharat *et al.* showed no significant difference between groups observed ($p > 0.05$) in the mean quality of life scores between patients in the control and intervention groups before surgery in all subcategories. After the operation, the physical functioning domain showed a statistically significant difference ($p < 0.05$) [23]. Another study by Majlessi

Table 5. Factors determining the quality of life in the physical health domain in an experimental group

Variables	OR	95% CI		*p*
Age (years)	1.11	1.013	1.217	0.026*
Gender				
Male	1	Ref.		
Female	0.613	0.2	1.877	0.391
BMI				
Normal weight	1	Ref.		
Underweight	–	–	–	–
Overweight	1.68	0.619	4.563	0.308
Obesity	3.215	0.99	10.439	0.052
Place of living				
Village	1	Ref.		
Town	3.298	1.387	7.846	0.007*
Source of income				
Retired	1	Ref.		
Pensioner	4.24	0.823	21.843	0.084
Professional work	3.438	0.845	13.983	0.085
Economic activity	6.814	0.864	53.745	0.069
Farming	5.563	0.768	40.326	0.089
Unemployed	–	–	–	–
Financial situation				
Good	1	Ref.		
Very good	0.139	0.015	1.302	0.084
Unsatisfactory	1.054	0.408	2.72	0.914
Poor	0.291	0.02	4.191	0.364
Level of education				
University	1	Ref.		
Vocational education	2.62	0.843	8.139	0.096
High school	2.718	0.841	8.786	0.095
Primary school	3.432	0.413	28.548	0.254
Marital status				
Married	1	Ref.		
Single	1.283	0.088	18.802	0.856
Widower/widow	2.22	0.706	6.986	0.173
Divorced	–	–	–	–
Living together	4.014	0.399	40.347	0.238

p value – multivariate logistic regression

et al. demonstrated that the different structures of quality of life significantly changed in 3 periods, including before, 3, and 6 months after the educational intervention [24]. Our study found that age and living in a town are predictors of increasing the quality of life in the physical domain. Gierszewska *et al.* also reported that place of living influenced the improved quality of life in CABG and hybrid coronary revascularization patients. On the contrary to our study, in their study living in the village improved the quality of life [25]. In summary, the main results of a Cochrane systematic review, which aimed to investigate the specific impact of the educational component of cardiac rehabilitation, showed some evidence that education based interventions improve quality of life [26].

The intervention and control groups determined the medium anxiety level in the preoperative period. In the period before the surgery, depressive disorders were identified in 12.5% and 12.9% of the respondents, respectively. In the postoperative period, significantly lower anxiety and depressive symptom levels were determined in both groups, and there was no significant difference between groups. In their study, Ramesh *et al.* found that most patients (84%) experienced preoperative anxiety before CABG, with females scoring higher on anxiety than males [9]. The systematic review and meta-analysis that investigated the prevalence of depression in patients before and after CABG showed that depending on different measurement tools, the prevalence of pre-CABG depression ranged from 19% to 37% [27]. In the Polish study assessing anxiety levels among patients who had undergone cardiac surgery, the anxiety level median was 6 points, and the depression median was 4.5 points, according to the HAD scale [28]. In additional questions, the respondents indicated that education contributed to reducing anxiety. Similar findings were obtained by Ali *et al.* [29] and Kalogianni *et al.* [30]. In turn, the systematic review included an update of the evidence of the efficiency of preoperative education in post-op cardiac patients. The authors concluded that preoperative education improved patients' physical and psychosocial recovery, whereas others provided no evidence of reduced anxiety among patients [5]. The systematic review and meta-analysis performed by Ng *et al.* showed that preoperative education significantly lowered post-intervention preoperative anxiety and length of ICU stay, and improved knowledge [3]. In our study, the patients stated that education during the preoperative period had a beneficial impact on the reduction of perioperative stress by reducing its level, reducing the fear of the unknown, and depreciating the fear of death. So, education improves the patients' knowledge. Future studies need to explore knowledge outcomes in depth and more innovative technologies in preoperative education delivery; also, the education provided by professionals should be implemented during the prehabilita

STRENGTHS AND LIMITATIONS

This study is the first to report on implementing a structured education program before cardiac surgery in Poland. Although the study was conducted in 2014-2016, no similar studies have been conducted for patients undergoing cardiac surgery in Poland. It is worth noting that the educational guide is available

to patients and is currently used as an educational aid for patients in the perioperative period. Other study limitations apply to the small number of participants, and generalising across populations would not be warranted. The multicentre study allows quicker recruitment of the necessary number of patients, and more precise results that are more convincing and whose acceptance is higher; also, the patient sample of the multicentre is supposed to be representative.

On the other hand, the randomised control trial study design is comparative and minimises the bias. Secondly, the data collection was limited to one cardiac surgery clinic. Also, there are potential preoperative modifiable risk factors of health-related quality of life after cardiac surgery, which include alcohol use, BMI/weight, depression, preoperative quality of life, and smoking while in the postoperative period pain and strategies to reduce postoperative complications and hospital length of stay [32]. Our study did not analyse these factors, only the impact of educational programs.

CONCLUSIONS

Structured preoperative education in patients undergoing cardiac surgery is one of the essential nursing interventions and a fundamental part of preoperative and postoperative patient care. Meeting the educational needs of patients is also an indication of quality patient care outcomes. Implementing the education program Guide for Patients in the Perioperative Period of the Coronary Artery Bypass Graft Surgery and Late Recovery should be a routine element of a patient's preparation for the surgery. Therefore, it is recommended that nurses use this educational approach in the cardiac surgery ward.

Disclosures

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References

1. Visseren FLJ, Mach F, Smulders YM, et al. 2021 ESC Guidelines on cardiovascular disease prevention in clinical practice. Eur Heart J 2021; 42: 3227-3337.
2. Sadowski J, Kędziora A, Piątek J, et al. Pomostowanie aortalno-wieńcowe. In: Gajewski P (Ed.). Choroba niedokrwienna serca. Interna Szczeklika 2021. Medycyna Praktyczna, Polski Instytut Evidence Based Medicine, Kraków 2021; 229-233.
3. Ng SX, Wang W, Shen Q, et al. The effectiveness of preoperative education interventions on improving perioperative outcomes of adult patients undergoing cardiac surgery: a systematic review and meta-analysis. Eur J Cardiovasc Nurs 2022; 21: 521-536.
4. Zhuo Q, Liang H, Bai Y, et al. Perceptions of patients undergoing percutaneous coronary intervention on preoperative education in China: A qualitative study. Health Expect 2021; 24: 121-130.
5. Guo P. Preoperative education interventions to reduce anxiety and improve recovery among cardiac surgery patients: a review of randomised controlled trials. J Clin Nurs 2015; 24: 34-46.
6. Boga MS. The healing power of preoperative education in patients undergoing cardiac surgery. J Clin Nurs Pract 2020; 2: 1-3.
7. Ramesh C, Nayak BS, Pai VB, et al. Effect of preoperative education on postoperative outcomes among patients undergoing cardiac surgery: a systematic review and meta-analysis. J Perianesth Nurs 2017; 32: 518-529.e2.
8. Qadir DO, Younis YM. Effectiveness of a health educational program on quality life and nutrition of coronary artery bypass graft patients. J Popul Ther Clin Pharmacol 2023; 30: e111-e122.
9. Ramesh C, Nayak BS, Pai VB, et al. Preoperative anxiety in patients undergoing coronary artery bypass graft surgery – A cross-sectional study. Int J Afr Nurs Sci 2017; 7: 31-36.
10. Heilmann C, Stotz U, Burbaum C, et al. Short-term intervention to reduce anxiety before coronary artery bypass surgery – a randomised controlled trial. J Clin Nurs 2016; 25: 351-361.
11. Mousavi Malek N, Zakerimoghadam M, Esmaeili M, et al. Effects of nurse-led intervention on patients' anxiety and sleep before coronary artery bypass grafting. Crit Care Nurs Q 2018; 41: 161-169.
12. Kidd T, Poole L, Leigh E, et al. Health-related personal control predicts depression symptoms and quality of life but not health behaviour following coronary artery bypass graft surgery. J Behav Med 2016; 39: 120-127.
13. Cygnarowicz B. Poradnik edukacyjny dla pacjentów w okresie okołooperacyjnym pomostowania aortalno-wieńcowego oraz później rekonwalescencji. Wydawnictwo Uniwersytetu Jagiellońskiego, Kraków 2019.
14. Wołowicka L, Jaracz K. Polska wersja WHOQOL 100 i WHOQOL Bref. In: Wołowicka L (Ed.). Jakość życia w naukach medycznych. Wydawnictwo Uczelniane AM, Poznań 2001; 233-301.
15. Bjelland I, Dahl AA, Haug TT, et al. The validity of the Hospital Anxiety and Depression Scale. An updated literature reviews. J Psychosom Res 2002; 52: 69-77.
16. de Walden-Gałuszko K, Majkowicz M. Ocena jakości opieki paliatywnej w teorii i praktyce. Akademia Medyczna. Gdańsk 2000.
17. Wang, Chow SC. Sample size calculation for comparing proportions. Wiley Encyclopedia of Clinical Trials 2007; 10: 9781118445112.
18. Majlessi F, Ghaffari R, Mohsenipouya H, et al. Effect of self-care education on patients' quality of life after coronary artery bypass graft based on pender's health promotion model. Health Education and Health Promotion 2019; 7: 15-20.
19. Ghavidel A, Farokhnezhad-Afshar P, Bakhshandeh H, et al. Effect of family-centered education on the quality-of-life patients after coronary artery bypass graft surgery. Cardiovasc Nurs J 2015; 4: 6-13.
20. Akbari M, Celik SS. The effects of discharge training and postdischarge counseling on quality of life after coronary artery bypass graft surgery. Nurs Midwifery Stud 2018; 7: 105-110.
21. Özdemir B, Önler E. The effect of a structured patient education intervention on the quality of life for coronary artery bypass grafting patients: A prospective randomised controlled study. J Perioper Pract 2021; 31: 124-131.

22. Kim J, Jang J, Kim B, et al. Effect of the PRECEDE-PROCEED model on health programs: a systematic review and meta-analysis. Syst Rev 2022; 11: 213.
23. Bsharat R, Karadag M. The impact of patient education on quality of life of patients undergoing coronary artery bypass grafting (CABG) in the West Bank of Palestine. EC Nurs Healthcare 2019; 1: 11-23.
24. Majlessi F, Ghaffari R, Mohsenipouya H et al. Effect of self-care education on patients' quality of life after coronary artery bypass graft based on pender's health promotion model. Health Educ Health Promot 2019; 7: 15-20.
25. Gierszewska K, Jaworska I, Skrzypek M, et al. Quality of life in patients with coronary artery disease treated with coronary artery bypass grafting and hybrid coronary revascularization. Cardiol J 2018; 25: 621-627.
26. Dibben G, Faulkner J, Oldridge N, et al. Exercise-based cardiac rehabilitation for coronary heart disease. Cochrane Database Syst Rev 2021; 11: CD001800.
27. Correa-Rodríguez M, Abu Ejheisheh M, Suleiman-Martos N, et al. Prevalence of depression in coronary artery bypass surgery: A systematic review and meta-analysis. J Clin Med 2020; 9: 909.
28. Nowicka-Sauer K, Beta S, Nowak R, et al. Anxiety following cardiac surgery – an important aspect of health status assessment. Family Med Prim Care Rev 2016; 18: 317-320.
29. Ali A, Masih S, Rabbi F, et al. Effect of nurse led education on anxiety level among coronary artery bypass grafting preoperative patients. J Pak Med Assoc 2021; 71 (1(B)): 238-242.
30. Kalogianni A, Almpani P, Vastardis L, et al. Can nurse-led preoperative education reduce anxiety and postoperative complications of patients undergoing cardiac surgery? Eur J 1Cardiovasc Nurs 2016; 15: 447-458.
31. Olsen DB, Pedersen PU, Noergaard MW. Prehabilitation before elective coronary artery bypass grafting surgery: a scoping review protocol. JBI Evid Synth 2021; 19: 469-476.
32. Sanders J, Bowden T, Woolfe-Loftus N, et al. Predictors of health-related quality of life after cardiac surgery: a systematic review. Health Qual Life Outcomes 2022; 20: 79.