IOSR Journal of Nursing and Health Science (IOSR-JNHS)
e-ISSN: 2320–1959.p- ISSN: 2320–1940 Volume 9, Issue 1 Ser. II. (Jan - Feb. 2020), PP 24-39
www.iosrjournals.org

The Impact of Pre and Postoperative Education on Recovery Period Following Cardiothoracic Surgery

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Abstract: *Cardiothoracic surgery is the second leading cause of mortality. Pre and post operative teaching was shown to be effective in reducing stress, pain and anxiety. The nurse needs to educate the patient pre and postoperative, and share their knowledge with other patients.* ***Aim of the stud****y: was to evaluate the impact of pre and postoperative education on recovery period following cardiothoracic surgery.* ***Design:*** *A quasi-experimental design was utilized to conduct this study.* ***Setting*** *the study was conducted at the cardiothoracic intensive care unit (ICU) and cardiothoracic surgery department at Mansoura University hospital.* ***Subjects****: A purposive sample of 100 patients was included in the study divided into study & control groups.* ***Tool:*** *Four main tools were used; Socio-demographic characteristics & Patient's' health history, pre/post knowledge assessment questionnaire, Pre & post-operative patients' condition observational checklist, and finally pain assessment sheet (12hrs post-operative, four weeks post- discharge)* ***Results:*** *The study group had significant improvement in the level of knowledge score post education (71.4 %) compared to (100%) of control group with unsatisfactory level of knowledge score. (100%) of the study group had good level of practice score post education compared to (100%) of control group with unsatisfactory level. there were highly statistical significant regard feeling of pain between two group12hr post-operative and 2weeks post discharge. This study revealed that the total mean score of SF-36 domains health related quality of life, in study and control groups were (27.02 ± 6.27& 26.32 ± 6.43) respectively post- education compared to (21.52 ± 4.31 & 23.13 ± 5.18) respectively pre education with highly statistically significant difference where P =(0.000).* ***Conclusion:*** *The study group showed a positive effect of education evidenced by an improvement in their knowledge and practice scores, & improvement in their health outcomes after education compared to control group.* ***The study recommended*** *that all patients scheduled for cardiothoracic surgery and their families are in need to adequate knowledge and skills. Further studies have to be carried out to assess nurse's knowledge and practices regarding the care of cardiothoracic surgery patients and update information about post-operative care.*

Keywords*: Recovery period, Cardiothoracic Surgery, Pre and postoperative education.*

Date of Submission: 26-12-2019 Date of Acceptance: 11-01-2020

I. Introduction

Cardiothoracic surgeries are the third most wide-spread surgery globally, consecutive to transplant surgery, mainly in developed countries. It correlates with old age especially the fifties and so forth [1,2,3].In the UK, cardiothoracic surgery is one of the most corporate surgeries and it also considered the second leading cause of mortality. Major advances have occurred in its treatment in the last two decades. Increasing and also often incorporating surgical management [4]. Cardiothoracic surgery nurses play a vital part in helping to coordinate care as well as to offer psychological support at the time of diagnosis, information and support through treatment decision making, preparation for treatment; ongoing assessment and care during and after treatment to beyond treatment [5] . Fixed factors such as age or sex have only a marginal role in quality of life and others are potentially modifiable. Therefore, the quality of life in cardiothoracic surgery survivors improved through a wide range of interventions as reducing psychological morbidity, facilitating crisis adaptation with educational programs, self-help groups, psychosocial interventions, cognitive behavioral therapy, coping, and certain drugs. For symptoms reduction as fatigue, chest pain and insomnia, anxiety a moderate physical activity should be suggested when possible [6].

Critical care nurses with specific expertise in cardiothoracic surgery and excellent communication skills should be available for delivering high-quality continuous care to patients since diagnosis, through and beyond treatment as the primary source of information for these patients. Clinical nurse specialists who has definite expertise in cardiothoracic surgery as well as skills for communication providing up-to- date and comprehensive patient information, they becomes a vital point for contact between patients as well as multidisciplinary team members [7].

II. Significant of Study

In Egypt, cardiothoracic surgery was (2.91% and 2.31% in 100,000 populations) in male and female respectively cardiothoracic surgery. Most of the developing countries are lower than that of developed countries with western lifestyle. Approximately 39% of cardiothoracic surgery patients will have advanced disease and 19% will be diagnosed with late complications [8]. It's important for nurse to be educated patient pre-operative, because it gives nurses a possibility to share their knowledge with patients, and provide them with psychological and emotional support when they are facing a difficult situation post operation. It is important for nurses to have reliable information about cardiothoracic surgeries [9]. Therefore it is very important to evaluate the impact of pre and postoperative education on recovery period following cardiothoracic surgery

III. Methodology

3.1 Aim

This study aimed to evaluate the impact of pre and postoperative education on recovery period following cardiothoracic surgery.

3.2 Research hypothesis

Implementation of pre and postoperative education may have a positive effect on recovery period following cardiothoracic surgery through:

- H 1: Patients undergoing cardiothoracic surgery who exposed to pre and postoperative education will exhibit no complications following cardiothoracic surgery than those groups who are receiving routine hospital care (control group).
- H 2: Patients undergoing cardiothoracic surgery who exposed to pre and postoperative education will have pain levels less than those groups who are receiving routine hospital care (control group).
- H 3: Patients undergoing cardiothoracic surgery who exposed to pre and postoperative education will have higher knowledge than those groups who are receiving routine hospital care (control group).
- H4: Patients undergoing cardiothoracic surgery who exposed to pre and postoperative education will return to normal activity faster than those groups who are receiving routine hospital care (control group).

3.3 Research design

Quasi-experimental research design was used in this study.

3.4 Setting

The study was conducted in the cardiothoracic ICU and cardiothoracic surgery department at Mansoura University Hospital. It located in delta region. Cardiothoracic surgeries were performed regularly daily with an average number of four cases weekly.

3.5 Study subjects

A purposive sample of subjects was selected in this study. Each patient was interviewed two times, preoperative, and four weeks post-operative in outpatient clinic at Mansoura University Hospital.

The subjects of the study were consisted of (100) patients and divided into two main groups as following:

Group I (Control group): A consisted of (50) patient who was received routine hospital care.

Group II (Study group): A consisted of (50) patient who was received hospital care in addition to pre and postoperative education.

Inclusion criteria:

1- Patients are conscious and able to communicate.
2- Patients' age is between 21 and 59 years old.
3- Accept to participate in the study.
4- Patients with a Euro score of (less than 10 Euro score)[10].

Exclusion criteria:

1- Patients with emergency operations.
2- The patients with a left ventricular ejection fraction of less than 40%.
3- High –risk Patients with Euro score >10 will be excluded from the study.

3.6 Tools
Data were collected by using the following four tools:

Tool I: Socio-demographic characteristics and patient's health relevant data which was consisted of two parts.
Part (1): Socio demographic characteristics:
It was developed by the researcher, and composed of **(seven)** multiple choice questions including age, sex, marital status, residence, level of education, occupation, and nature of work.

Part (2): Patient's health relevant data:
It was developed by the researcher based on reviewing literatures, and scientific references, to assess the past, present and family history for studied subjects, as follows:

a) Past and present health history, which were composed of **(eight)** closed - ended questions including; type of chronic illness, drugs used before the operation, any past operations, smoking habits, knowledge of disease, signs and symptoms appear
b) Family health history, which was composed of **(three)** closed - ended questions including; family health history of cardiothoracic surgeries and degree of relativity

Tool II: Patient's knowledge questionnaire sheet

This tool was developed by the investigator based on up to date works of literature review and constructed by the investigator in an Arabic form. It used to assess the patient's knowledge about pre and post-operative care. It consists of (34 questions) in the form of multiple choices divided into 9 parts such as knowledge about heart function, dealing with chest pain, breathing and coughing exercise, diet regimen, wound care, activity of daily living, complication and finally knowledge about follow up, it is used two times first one before operation and second time two weeks post discharge through phone call or in outpatients clinics**.**

Scoring Design:

Regarding the scoring system for the questionnaire sheets, all choices in each question is correct so each answer or choice is given score one. The answers of patients evaluated using model answer, for each part, the score of the items were summed up. These scores were converted into a percent score as follows:
Total scores of knowledge (130) grades, (100%).Then score % was transferred into **categories as follow**:

Knowledge categories:

- Poor: < 50% of total knowledge.
- Fair: 50<75% of total knowledge.
- Good: > 75% of total knowledge.

Tool III: Pain assessment sheet

This tool was adapted from **(Carr & Wittink , 2016**)[11] to assess several features of pain level including location, intensity and pattern of pain. The indices used are the total Pain Rating Index (PRI-T) the investigator modified tool based on reviewing recent literature and used after operation twice times, first time 12 hour postoperative and second time 4 weeks post- discharge (follow up).

Scoring system of pain assessment sheet:

Pain assessment sheet consists of seven multiple-choice questions, each choice is scored one and the total score allows measurement of several features of pain experience including location, intensity and pattern of pain over time.

Tool IV: Post-operative patient's assessment sheet:
It included two main parts as follows:

Part (1): Complications assessment sheet:

It was designed by the researcher based on reviewing of literature [12,13,14] to assess the presence of complications included 4 selected complication; respiratory complications, wound complications, lower limb complications, and others (fever, bedsores, diarrhea, urinary tract infection, respiratory problems, and cardiac problems).

Part (2): Quality of life assessment sheet (using SF-36 Scale):

It was adopted from **Manzarbieitia,2019)** [15] **and Mohamed, 2018**[16] which derived from **War &Sherbourne,1992**[17]. It consisted of 36 questions to assess eight health status dimensions: physical functioning questions (3:12); role limitation due to physical health problems questions(13- 16); role limitations due to emotional problems questions:(17:19) energy / fatigue questions: (23-27-29-31); emotional well-being questions: (24-25-26-28-30); bodily pain questions: (21& 22); social functioning questions: (20 &32) and general health perception questions:(1,2,33,34,35,36).

Scoring system of SF- 36 Scale questionnaire:

All questions were scored on a scale ranged from 0 to 100. Score 100 representing the highest level of functioning possible. The scores of the items were summed up and the total scores divided by the number of items, giving a mean score. These scores were expressed in means and standard deviations.

Validity and reliability of the instruments

The validity was conducted to test the tool for appropriateness, comprehensiveness, relevance, correction and clearance through seven experts in field of medical - surgical , critical care and emergency nursing, faculty of nursing at Alexandria and Mansoura university and faculty of medicine at Mansoura university. Their opinions were elicited regarding the tool format, layout, and consistency of the tool and necessary modifications were done accordingly. Tool was tested for its reliability by test – retest measurement and Cronbach,s alpha. Reliability of cardiothoracic surgery knowledge questionnaire is ranged from r = (Test 0.84 -- Retest 0.87) and Cronbach,s alpha (r. alpha) = 0.89.

Cronbach's Alpha equation: $= \frac{K(1-\sum \sigma i^2)}{(K-1)\sigma y^2}$

Where:

R = estimated reliability.

k = total number of items in test.

σi^2 = variance of each item.

σy^2= variance of the total test scores.

$\sum$ = sum of.

3.7 Pilot study

A pilot study was carried out on 10% of patients who underwent cardiothoracic surgery at the intensive care unit and cardiothoracic department at Mansoura University hospital to assess the clarity and applicability of the tool, and the necessary modifications was done before data collection. Those patients were excluded from the study sample.

3.8 Ethical considerations

In order to undertake this research, the proposal was submitted for acceptance from the research ethical committee, Faculty of Nursing, Mansoura University. It was also accepted by the authorities and directors of cardiothoracic surgery department and cardiothoracic ICU of Mansoura University. All participants were informed clearly about the aims, benefits of the study as well as the procedure of data collection. Each participant was volunteered to participate in this study and could withdraw at any time without penalty or loss of medical care. Involvement in the study does nothing harmful to the participants. Then, verbal and written consent was obtained from each patient enrolled in the study. The participant's anonymity and confidentiality were protected. All the forms were anonymous.

3.9 Field work:

The study was implemented through the following four phases.

Phase I: Assessment Phase (prior health education program development):

Based on the information obtained from the pilot study, in addition to literature, the researcher designed the instruction program under the guidance of the supervisors. Its main aim was to improve performance and health outcomes regarding surgery. A simple booklet was developed for patients, which covered all information related to surgery. It's included the following items:

- Brief description of cardiothoracic surgery (definition, causes, complication, and drugs needed)
- Health instructions needed for operation related to respiration and keeping the chest clear, taking medications, infection control measures, general health care and daily routine, nutrition, daily activates, sun ray exposure, sex, and birth control.

The instructional booklet was written in simple Arabic language with different illustrated colored pictures to enhance the learning process and facilitate patients' understanding.

Phase II: Planning Phase:

After preparing the tool, the study sample was recruited according to the set criteria. This was followed by collecting baseline data. Pre- test questionnaire was administered to the study sample to examine their existing level of knowledge and performance regarding surgery. The researcher interviewed the patients after introducing herself, took the consent of them to be recruited in the study after explaining the aim of the study, and then distributed the questionnaire sheet after clear explaining the way to fill out. The researcher used tool 1, and tool II to assess health state before operation. In the second day 12 hours post-operative the investigator fill out pain assessment sheet (Toll III) to assess degree of pain, how patient deal with pain after conducting of educational program, this sheet take about 10 minutes to complete then the investigator scored the responses and compiled them for data analysis. During the interview, the researcher read each items on data collection sheet and explained its meaning to the patients.

Phase III: Implementation phase

- The instructional program implementation has been carried out in previous mentioned settings.
- The instructional program given for each patient alone considering time table for their operation.
- The program was conducted with three sessions; through three days (1 session /day), each session took about 45- 60 minute for study group. Collecting data from control group took about 25-35minute.
- First session about (definitions, causes, complication, and drugs needed), second session about (health instructions needed for operation related to respiration and keeping the chest clear, drugs taking, infection control measures), third session about (health instructions needed for operation related to general health care and daily routine, nutrition, daily activates, sex, and birth control).
- Different teaching and learning methods were used during the sessions which included; interactive lecture, discussion, demonstration & re demonstration, instructional media include pictures, printed handout and video programs. Which was presented in clear and concise form to be used as memorial reference?
- Patients were allowed to ask any questions, interpretation, elaboration or explanation of any item included in the session.
- The duration of program implementation was 8 months which beginning with January 2019 to the end of August2019.

Phase IV: Evaluation phase (follow-up tests)

Effect of the program through patient's health outcomes used tool(IV), (patient knowledge questionnaire used (Tool II) after implementing the education program and this done four weeks post discharge at outpatient clinic , Also in this phase investigator re assess pain level through pain assessment sheet used (Tool III) four weeks post discharge . The results were compared to the immediate post-operative results to evaluate the impact of the program on dealing with pain knowledge and outcomes on the patients through save recovery period without complications.

3.10 Statistical analysis:

Data were analyzed using Statistical Package for the Social Sciences (SPSS) Version 20. Qualitative variables were presented as numbers and percentages. Quantitative variables were presented as mean ± SD. To check the difference between two groups independent t-test was used. $P \leq .05$ was considered statistically significant.

IV. Results

Table (I) shows that the mean age of study and control groups were (46.31 ± 10.28 & 47.57 ± 11.70) respectively. The males were more prevalent than females in study group (57.1%), while, in control group females were more prevalent than males (53.1%). The majority of study group (87.8%) was married, while (73.5%) of control group were married. The table also shows that (67%) and (89.8%) of study and control groups respectively were living in rural area. (40.8%) of study group had secondary education while, (38.8%) of control group not able to read and write. Finally, (73.5%) and (61.2%) of study and control group respectively were working. In relation to work nature (30.6%) of study group had mild effort, while, (28.6%) of control group had moderate effort.

Table (1): Percentage distribution of Control & study group according to socio-demographic characteristic (N=100)

Items	Study (n=50)		Control (n=50)	
	No	%	No	%
Age (in years)				
20-29	2	4.1%	5	10.2%
30-39	12	24.5%	9	18.4%
40-49	10	20.4%	9	18.4%
50-59	19	36.7%	16	30.6%
60-00	7	14.3%	11	22.4%
Mean ± SD =	46.31 ± 10.28		47.57 ± 11.70	
Gender				
Male	29	57.1%	23	46.9%
Female	21	42.9%	27	53.1%
Marital status				
Single	1	2.0%	26	6.1%
Married	44	87.8%	3	73.5%
Divorced	0	0.0%	37	2.0%
Widowed	5	10.2%	1	18.4%
Residence				
Urban	16	32.7%	5	10.2%
Rural	34	67.3%	45	89.8%
Educational level				
Not read & write	10	20.4%	20	38.8%
Read & write	7	14.3%	13	26.5%
Secondary	21	40.8%	14	28.6%
Universal	12	24.5%	3	6.1%
Job / occupation				
Working	37	73.5%	31	61.2%
Not working	13	26.5%	19	38.8%
Work nature				
Mild	16	30.6%	7	14.3%
Moderate	14	28.6%	15	28.6%
Strong	7	14.3%	11	22.4%

Table (II) shows that, (30.6%) and (34.7%) of study and control groups respectively have had chronic diseases. The majority of study and control groups (71.4%) and (75.5%) respectively wasn't smoker. The majority of study group (53.1%) knew their diseases. The majority of study and control groups (38.8%) and (71.4%) respectively were diagnosed 1-3 months. Also, (89.8%) and (100%) of study and control groups respectively were not knowing disease stage. The table also shows that (77.6%) and (89.8%) of study and control groups respectively didn't have family history of cardiothoracic surgery. While, (20.4%) and (6.1%) of study and control groups respectively had first degree relative.

Table II: Percentage distribution of Control & study group's regarding to their health history (N=100)

Items	Study (n=50)		Control (n=50)	
	No	%	No	%
Chronic diseases				
Yes	15	30.6%	17	34.7%
No	35	69.4%	33	65.3%
Medication taking				
Yes	16	32.7%	18	36.7%
No	34	67.3%	32	63.3%

History of operation				
Yes	9	18.4%	4	8.2%
No	41	81.6%	46	91.8%
Smoking				
current smoking	11	22.4%	7	14.3%
previous	3	6.1%	5	10.2%
No	36	71.4%	38	75.5%
knowing disease				
Yes	27	53.1%	13	26.5%
No	23	46.9%	37	73.5%
Current diagnosis				
<1 month	15	30.6%	7	14.3%
1- 3month	20	38.8%	36	71.4%
>3months	15	30.6%	7	14.3%
signs and symptoms appeared Mean ± SD =	**3.49 ± 1.45**		**3.20 ± 1.24**	
Knowing disease stage				
Yes	5	10.2%	0	0.0%
No	45	89.8%	50	100.0%
Family history				
Yes	11	22.4%	5	10.2%
No	39	77.6%	45	89.8%
Degree of relativity				
1st degree	11	20.4%	4	6.1%
2nd degree	1	2.0%	2	4.1%
Relative history of cardiothoracic				
Yes	8	14.3%	5	8.2%
No	3	6.1%	1	2.0%
I don't know	1	2.0%	0	0.0%

Table (III) shows the effect of pre and post education on studied patients knowledge score level, it revealed that, there was a significant improvement about patient knowledge regarding dealing with pain from poor to fair knowledge level after education (52%& 74%) so there were highly statistical significant. In relation to deep breathing exercises there was improvement from poor to good knowledge level (90% &58%), as regard dietary pattern , daily activities , post-operative complications and follow up knowledge before education was (82%,68%,98%,6%) respectively which improved after education to (92%,82%,72%,56%) respectively.

Table (III): Distribution of the study group according to their knowledge pre and post education (n = 50)

Knowledge items		**Study Group**				**MHP**
		Pre		**Post**		
		No =50	**%**	**No= 50**	**%**	
General knowledge	▪ Poor	12	24.0	0	0.0	0.001*
	▪ Fair	38	76.0	50	100	
Dealing with pain	▪ Poor	26	52.0	1	2.0	0.001**
	▪ Fair	24	48.0	37	74.0	
	▪ Good	0	0.0	12	24.0	
Deep breathing exercises	▪ Poor	45	90.0	7	14.0	0.001*
	▪ Fair	4	8.0	14	28.0	
	▪ Good	1	2.0	29	58.0	
	▪ Fair	14	28.0	40	80.0	
Dietary pattern	▪ Poor	41	82.0	4	8.0	0.001*
	▪ Fair	9	18.0	46	92.0	
Post operative wound care	▪ Poor	0	0.0	3	6.0	0.210
	▪ Fair	38	76.0	35	70.0	
	▪ Good	12	24.0	12	24.0	

Daily activities	▪ Poor	34	68.0	0	0.0	0.001*
	▪ Fair	16	32.0	41	82.0	
	▪ Good	0	0.0	9	18.0	
Post-operative complications	▪ Poor	49	98.0	14	28.0	0.001*
	▪ Fair	1	2.0	36	72.0	
Follow-up knowledge	▪ Poor	3	6.0	2	4.0	0.001*
	▪ Fair	47	94.0	20	40.0	
	▪ Good	0	0.0	28	56.0	
Knowledge total	▪ Poor	40	80.0	0	0.0	0.001*
	▪ Fair	10	20.0	9	18.0	
	▪ Good	0	0.0	41	82.0	

MH: Test for Marginal Homogeneity Poor score <33.3% * P < 0.05 (significant)
Fair score 33.3%-66.6% Good score > 66.6%

Table (IV) comparison between the study group and control group regarding to their knowledge post education (n=50)

Knowledge items		**Study group**		**Control group**		**MHP**
		Post		**Post**		
		No=50	**%**	**No =50**	**%**	
General knowledge	Poor	0	0.0	8	16.0	0.564
	Fair	50	100	42	84.0	
Dealing with pain	Poor	1	2.0	13	26.0	0.042*
	Fair	37	74.0	35	70.0	
	Good	12	24.0	2	4.0	
Deep breathing exercises	Poor	7	14.0	43	86.0	0.846
	Fair	14	28.0	6	12.0	
	Good	29	58.0	1	2.0	
Dietary pattern	Poor	4	8.0	14	28.0	0.001*
	Fair	46	92.0	36	72.0	
Post operative wound care	Poor	3	6.0	4	8.0	0.029*
	Fair	35	70.0	42	84.0	
	Good	12	24.0	4	8.0	
Daily activities	Poor	0	0.0	7	14.0	0.014*
	Fair	41	82.0	37	74.0	
	Good	9	18.0	6	12.0	
Post-operative complications	Poor	14	28.0	49	98.0	0.315
	Fair	36	72.0	1	2.0	
Follow-up knowledge	Poor	2	4.0	0	0.0	0.001*
	Fair	20	40.0	39	78.0	
	Good	28	56.0	11	22.0	
Knowledge total	Poor	1	2.0	14	28.0	0.001*
	Fair	48	96.0	36	72.0	
	Good	1	2.0	0	0.0	

MH: Test for Marginal Homogeneity. Poor score <33.3% * P < 0.05(significant)
Fair score 33.3%-66.6% Good score > 66.6%

Table (IV): Revealed that pre and post education effect on patient's knowledge level varied from poor to good post education. As regard to questions about dealing with pain , deep breathing exercises, dietary pattern, wound care, daily activities, follow up post-operative after implementing education was (24%,58%,92%,24%,18%,56%) between fair and good level in study group, while in control group it was (4%,2.0%,72%,8%,12%,22%) which reveals that there were statistical differences in regard to knowledge items between two group post education (P 0.05) and a significant improvement in studied patients knowledge total (96%) while in control group (72%) .On other hand some items non-significant difference between study and control group as regard to deep breathing exercises and post-operative complications.

Table (V)Distribution of the study group according to their pain level 12 hr postoperative and 4week post discharge (n = 50)

Pain assessment	Study group				MH P
	12 hr postoperative		4 weeks post discharge		
	No	%	No	%	
Feel of pain					
No	0	0.0	36	72.0	0.001*
Yes	50	100.0	14	28.0	
Nature of pain					
Pricking	35	70.0	17	51.5	
Burning	8	16.0	14	42.4	0.033*
Stabbing	5	10.0	1	3.0	
Cramp	0	0.0	1	3.0	
Squeezing	2	4.0	0	0.0	
Degree of pain					
Mild	14	28.0	31	62.0	0.001*
Moderate	34	68.0	19	38.0	
Severe	2	4.0	0	0.0	
Place of pain					
Chest	29	58.0	23	69.7	0.527
Abdomen	7	14.0	4	12.1	
Left Side	14	28.0	6	18.2	
Duration of pain					—
Intermittent	50	100.0	33	100.0	
Factors aggravates pain					
Sudden movement	37	74.0	10	30.3	
Cough	3	6.0	8	24.2	0.001*
Constipation	1	2.0	0	0.0	
Pressure on the wound	9	18.0	14	42.4	
During dressing	0	0.0	1	3.0	
Factors suppress pain					
Relaxation	21	42.0	27	81.8	
Hot compress	0	0.0	1	3.0	0.001*
Walking	3	6.0	0	0.0	
Analgesic	26	52.0	5	15.2	

MHP: Test of Marginal Homogeneity * P < 0.05 (significant)

Table V: Illustrated that all studied patients feeling from pain 12 hr postoperative (100%) while less than half of them complain of pain 4 weeks post discharge (28%). Regarding to nature of pain more than half of studied patients describe their pain like stabbing pain (70%) compared with (17%) of them with same description post discharge ,In relation to degree of pain most of patients have moderate degree 12 hr postoperative (68%) which improved post discharge to (38%) .There is also significant difference regarding to factors suppress pain as (52%) of studied patients prefer taking analgesic 12 hr postoperative while (81%) of patients prefer using relaxation technique post discharge .On other hand (74%)of patients report that the most factors aggravates their pain postoperative was sudden movement while (42%) report that pressure on the wound was the most aggravating factor post discharge , the differences observed were statistical significant where (P-value=0.001).

Figure (I) Percentage distribution of feeling of pain among patients in control and study group (12 hr postoperative, 4 weeks postoperative).

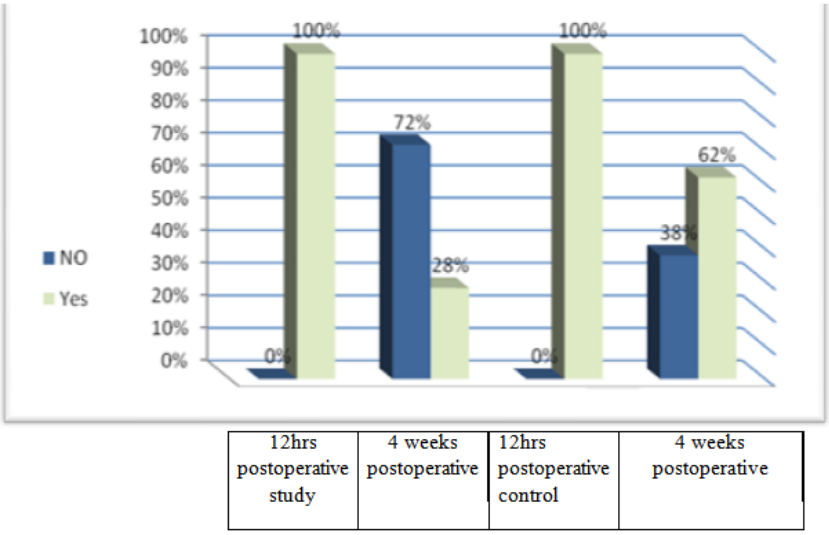

Figure (II) Distribution of study group according to knowledge total pre and post education phase.

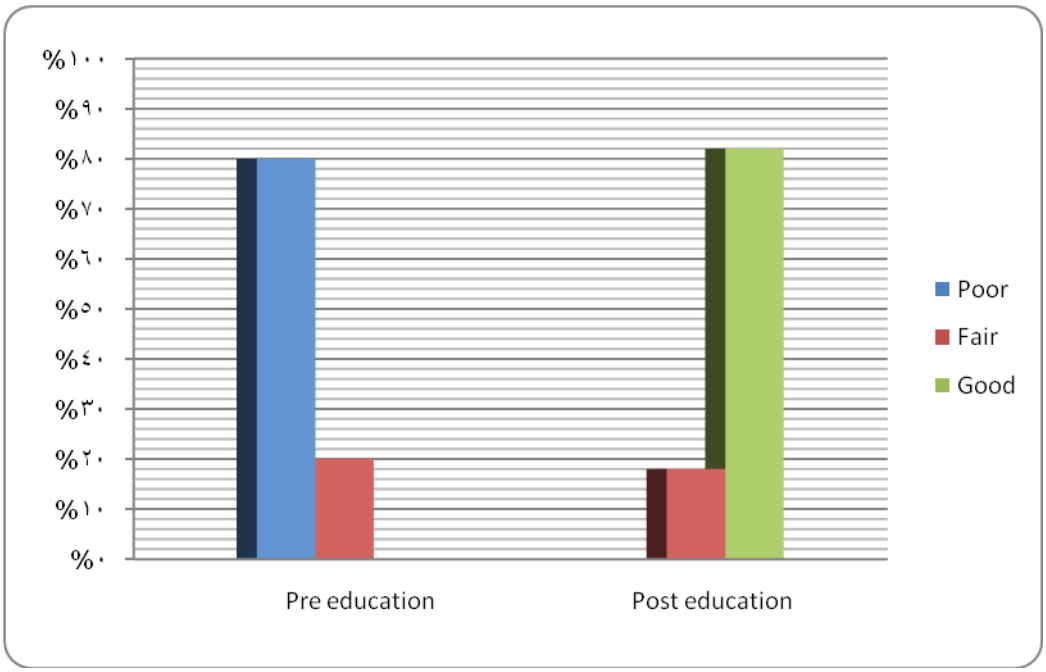

Figure (II) shows that the percentage of patient who had poor knowledge in pre education was 80% and improved to 82% good knowledge in post-education phase in study group.

Table (V) shows that, statistically significant difference wasn't present between two groups regarding to occurrence of complications after 4weeks postoperatively.

Table (V): Comparison between the control and study groups according to occurrence of complications after 4 weeks from operation (n= 100)

Items	Study (n=50)		Control (n=50)		Significance test
	No	%	No	%	
Pleural effusion	3	4.1%	2	2.0%	$\chi2(0.344)$ p (0.558)
Chest infection	11	20.4%	10	18.4%	$\chi2(0.065)$ p(0.798)
Dyspnea	3	4.1%	2	2.0%	$\chi2(0.344)$ p(0.558)
Wound infection	13	24.5%	17	32.7%	$\chi2(0.800)$ p (0.371)
Wound hematoma	2	2.0%	4	6.1%	$\chi2(1.043)$ p(0.307)
Wound dehiscence	3	4.1%	5	8.2%	$\chi2(0.710)$ p(0.399)
Fistula	2	2.0%	0	0.0%	$\chi2(1.010)$ p(0.315)
DVT	2	2.0%	0	0.0%	$\chi2(1.010)$ p (0.315)
LL edema	5	8.2%	6	10.2%	$\chi2(0.122)$ p (0.727)
Joints' problems	2	2.0%	0	0.0%	$\chi2(1.010)$ p (0.315)
Muscles' problem	2	2.0%	0	0.0%	$\chi2(1.010)$ p(0.315)
Hernia	3	4.1%	2	2.0%	$\chi2(0.344)$ p (0.558)
Infection	5	8.2%	7	12.2%	$\chi2(0.445)$ p(0.505)
Retraction	4	6.1%	0	0.0%	$\chi2(3.095)$ p (0.079)
Obstruction	3	4.1%	0	0.0%	$\chi2(2.042)$ p (0.153)
Fever	20	38.8%	16	30.6%	$\chi2(2.042)$ p(0.153
Bed sores	2	2.0%	2	2.0%	$\chi2(0.721)$ p(0.396)
Diarrhea	2	2.0%	3	4.1%	$\chi2(0.344)$ p (0.558)

Table (VI): Comparison between the control and study groups according to the total score of SF-36 Domains pre and post education program (n=100)

SF-36Domains	Pre		Post		Significant test
	Study n=50	Control n=50	Study n=50	Control n=50	
	Mean ± SD=	Mean ± SD=	Mean ± SD=	Mean ± SD=	
General health	3.88 ± 0.93 Min 3 - Max 5	3.90 ± 0.94 Min 3- Max 5	2.95 ± 0.68 Min 2 - Max 5	3.48 ± 0.85 Min 1- Max 5	t (8.34) p (0.000)*
Physical function	2.80 ± 0.40 Min 2 - Max 3	2.75 ± 0.46 Min 1- Max 3	1.51 ± 0.57 Min 1- Max 3	1.16 ± 0.45 Min 1- Max 3	t (10.50) p (0.000)*
Role limitations due to physical health problem	1.92 ± 0.27 Min1 - Max 2	1.80 ± 0.40 Min 1- Max 2	1.04 ± 0.19 Min1 – Max 2	1.01 ± 0.10 Min1 – Max 2	t (1.69) p (0.09)
Role limitations due to emotional problem	1.92 ± 0.27 Min1 - Max 2	1.80 ± 0.40 Min 1 - Max 2	1.03 ± 0.18 Min1 – Max 2	1.01 ± 0.08 Min1 – Max 2	t(1.65) p(0.10)
Social function	4.12 ± 0.90 Min 2 - Max 5	3.92 ± 1.05 Min 2 - Max 5	2.83 ± 0.54 Min 2 - Max 4	3.88 ± 0.58 Min 2 - Max 5	t (13.17) p (0.000)*
Body pain	4.55 ± 0.89 Min 2 - Max 5	4.47 ± 0.98 Min 2 - Max 5	3.23 ± 0.73 Min 1- Max 5	4.27 ± 0.73 Min 3- Max 6	t (9.92) p (0.000)*
Energy and fatigue	4.01 ± 1.30 Min 2 - Max 6	3.93 ± 1.11 Min 2 - Max 6	4.42 ± 0.69 Min 2 - Max 6	4.32 ± 1.24 Min 2 - Max 6	t(1.00) p(0.32)
Emotional well-being	3.82 ± 1.31 Min 2 - Max 6	3.75 ± 1.09 Min 2 - Max 6	4.51 ± 0.73 Min 2 - Max 6	4.00 ± 1.15 Min 2 - Max 6	t (5.87) p (0.000)*
Total	**3.26 ± 1.19 Min 1- Max 6**	**2.57 ± 1.44 Min 1- Max 6**	**2.57 ± 1.44 Min 1- Max 6**	**2.59 ± 1.62 Min 1- Max 6**	**t (0.41) p (0.000)**

Table (VI) shows that, the mean score of SF-36 domains health related quality of life (HR QoL) between the control and study groups post education were (2.95 ± 0.68 & 3.48 ± 0.85) respectively regarding general health, (1.51 ± 0.57 &1.16 ± 0.45) respectively regarding physical function, (2.83± 0.54 & 3.88 ± 0.58) respectively regarding social function (3.23 ± 0.73& 4.27 ± 0.73) respectively regarding bodily pain and (4.51 ± 0.73 & 4.00 ± 1.15) respectively regarding emotional well-being, statistically significant difference was high as P value = (0.000, 0.000, 0.000, 0.000 & 0.000) respectively. Regarding the total score of SF-36 domains HR QoL,
the table demonstrates that, the total mean score of the study and control groups were (2.57 ± 1.44 & 2.59 ± 1.62) respectively post education compared to (3.26 ± 1.19& 2.57 ± 1.44) respectively pre education program with high statistical significant difference where P = (0.000).

IV. Discussion

Cardiothoracic surgery represents 38% of worldwide and it's the third cause of death. Around one million of new cases and 500000 deaths followed the cardiothoracic surgery found worldwide every year [18].

As regards age, the study revealed that the majority mean age was (46.31 ± 10.28 & 47.57± 11.70) in study and control group respectively in the age group (50 -59) years old. These findings come in accordance with **Gado et al., (2019)** [19]&**Zammit et al., (2017)** [20]who reported that, the majority of the studied subjects aged more than forty years old with the mean age (51 ± 15). These results may be due to increased risk for cardiac disease with this age. The result also comes inconsistent with **Corley, et al., (2017)** [21], who mentioned that the incidence of cardiothoracic surgery increases with age, in (50-60) years of age, according to the (United States Preventive Services Task Force), more than eighty percent of diagnosed cases of cardiothoracic surgery occur in the age fifty five years. The findings disagreed with **Abou-Zeid et al., (2017)** [22], who mentioned that, the cardiothoracic surgery had no tendency to a specific age group, thirty-eight percent of the tumors occurred in patients aged less than forty years, and only fifteen percent of patients were aged above sixty years according to Alexandria data . **Downing, et al., (2019)** [23], also noted that, the mean respondent age was 67.4 years. While, **Tawk et al., (2017)** [24], come in contrast with the current result whose study noted that, study population was older (80.33% more than fifty years old). **Ali et al., (2019)** [25]&**Hokkam et al., (2019)** [26] also disagreed with the current findings who revealed that, the mean age of the studied elderly was (65.92±6.42 and 67.08±7.08) in the study and control group respectively in the age group (60 - 83) years old.

In relation to gender, the study represented that, the majority of the study group were male. This result supported by the study done by **Murphy et al., (2019)** [27] & **Siegel et al., (2017)** [28] who mentioned that the majority of the respondents were male as approximately thirty percent higher in men than in women. This may be due to exposures sex hormones and smoking. This findings also agree with **Majeketal., (2018)**[29],who notedthatslightlymorethanhalfofthepatientsweremales,andalsoagreewith**Glaseretal.,(2017)**[30],who noted that, study population more in males than females were surveyed. The findings also come in contrast with a study done in England by **Downing, et al., (2019)** [23], who found that, 113 of 171 cardiothoracic surgery survivors evaluated, were females.

Concerning the marital status, the study represented that, the majority of the study and control groups were married. This finding was supported by the finding of **Ali et al., (2019)** [25], & **Mayeret al., (2017)** [31], who reported that more than half of the study and control groups were married. The findings of the current study may be due to the majority of the study and control group were at the age more than 30 years old. Also, this result agrees with **Downing, et al., (2019)** [23] & **Tawk et al., (2017)** [24], who noted that study population was married about (53.3%& 59%) respectively.

As regards education, the result of the present study showed that, the majority of the study group had secondary school. This agrees with **Davis et al., (2018)** [32], who mentioned that, the majority of the study subjects had a diplomat degree. This also supported by **Downing, et al., (2019)** [23], who reported that, about forty six percent of 171 cardiothoracic surgery survivors evaluated, had less than higher education.

About occupation the finding of the present study represented that, more than half of patients have had moderate nature of work. These findings come in disagreed with **Gonzalez-Saenz et al., (2017)** [33] & **Downing, et al., (2019)** [23], who found that, the majority of the study was retired and didn't work.

Concerning to the occurrence of complication after four weeks of operation, the current study revealed that the development of fever, wound infection and chest infection complications were equal in the study and control groups, these findings come in the same line with **Kirchhoff et al., (2018)** [34], who stated that the most common surgical complications, affecting health outcomes, are wound infection (fever), intra pleural bleeding and pneumothorax.

The study results clarify that before implementing the planned education; more than half of the study subjects have poor knowledge levels as general and in certain items.

Regarding to dealing with pain before the education, results of this study reveals that more than half of studied patients have poor level of knowledge related to dealing with pain and their knowledge improve after education, this is in agreement with **Henderson.,et al.,(2018)** [35] who stated that information related to wound care and pain management is the most important information need to maximum wellbeing of patients after discharge . Generally, patients who received information related to the pain relief and how to deal with pain they feel that it was sufficient for them before discharge and it remind with them 1 to 3 weeks after discharge.

In the current study there is a great improvement in patients knowledge about deep breathing exercises after receive planed education and this proved the importance of preoperative education in raising knowledge of patients about importance of this exercise and this is supported with **Zeena.,et al.,(2017)** [36] who stated that educating patients preoperatively about postoperative exercises can be beneficial in reducing the risk of postsurgical complications following thoracic surgery ,coughing and deep breathing exercises reduce the risk of pulmonary complications (e.g., atelectasis, pneumonia). Also **Surla, (2019)** [37] found that there was an improvement in knowledge of patients post education program, follow-up, and post –hospital discharge follow – up call.

The significant improvements demonstrated at the post-education indicate that these patients were in real need of such information and education pre and postoperative to help them in recovery period.

Regarding to feeling of pain among studied patients 12 hr post operative and 4 weeks post- discharge, the study revealed that the majority of the studied patients complain of pain 12hr postoperative while less than half of them complain of pain 4 weeks post discharge. This results are on the same line with **Mitra,et al.,(2018)** [38] mentioned that Pain after thoracic surgery is often not effectively treated. This pain is usually managed with parenteral and oral opioids . Therefore, alternative means of pain relief have been studied over time to limit the hospital stay with improved patient satisfaction.

Also **Patricia,et al.,(2017)** [39] stated that patients' anxiety level controlled by nursing care. A lot of patients in their study complain of less pain 4 hours after surgery which gradually decreases during first 24 hours post-surgery, they also can change position more comfortable and able to perform deep respiration and coughing exercises effectively postoperative.

In relation to degree of pain, most of the patients have a moderate degree 12 hr postoperative more than half. This is supported with **Mitra, et al,.(2018)** [38] who stated that incision pain is usually mild to moderate in intensity, and maximal immediately postoperatively, subsiding with time often the pain following LC can arise from the incision site (incision pain), visceral structures (abdominal pain), or referred from the subdiaphragmatic region as shoulder pain. In the same line **Mary Pat, et al,.(2019)** [40] revealed that one third of ambulatory surgery patients experience moderate to severe pain in spite of postoperative analgesic interventions in contrast **Akm-persson, et al,.(2018)** [41] mentioned that the individual dose of opiate analgesia required for postoperative analgesia varies significantly with a quarter of patients reporting no significant pain after cardiothoracic surgery. Also **Padmaja, et al,.(2018)** [42] stated that after cardiac surgeries, the most frequent complaint is pain and the most common cause for postoperative morbidity.

Regarding to factors suppress pain, the present study revealed that there is significant difference in the study group as half of patients prefer taking analgesic while nearly two half prefer using relaxation technique, this was in agreement with **Topcu et al., (2019)** [43] who mentioned that thoracic surgery often results in moderate to severe postoperative pain that can interfere with the muscles used for deep breathing. In addition to pharmacologic pain relief methods, non-pharmacologic pain relief methods can be used to focus attention, facilitate breathing, and promote relaxation. Relaxation exercises can be performed to reduce postoperative pain. This non pharmacologic strategy can be used independently or in conjunction with pain medication to increase the effectiveness of the analgesic.

As regarding general health dimensions of SF-36 domains, the current study argued that the study & control groups were discriminated statistically post-implementation of general health perception dimensions of SF 36 domains compared to pre-implementation. These findings come in accordance with **Hupkens et al., (2018)** [44], who measured that QoL and pelvic functional outcome were measured with the SF-36 health survey for cardiothoracic surgery patients and stated that the study group reported significantly better general health compared with the control group.

As regarding physical function of SF-36 domains, the current study disseminates that there was a statistically significant difference between the study & control groups post-implementation of physical function dimensions of SF-36 domains compared to pre-implementation. These findings come in the same line with **Krouse et al., (2017)** [45], &**Hupkens et al., (2018)** **[44]**, who mentioned that physical QoL subscale was highly statistically significant differences for cardiothoracic surgery patients postoperatively, with (P= 0.0008).

While this result coming in contrast with **Vallance et al., (2018)** [46], who reported that a significant difference in HRQoL scores was detected in two groups (P =0 .038) for physical function, that did not associate with sedentary time with physical function statistically.

As regarding role limitations due to physical health problems of SF-36 domains, the current study revealed that there was a statistically significant difference within the study group post-implementation of role limitations due to physical health problems dimensions of SF-36 domains compared to pre-implementation.

These findings come in the same line with **Moseholm et al., (2019)** [47], who mentioned that qualitative study elucidated HRQoL in the diagnostic phase. HRQoL domains affected the respondents, and statistically significant differences of studied sample regarding to role limitations due to physical health problems.

As regarding to role limitations due to the emotional problems of SF-36 domains, the current study showed that there was statistically significant difference within the study group post-implementation of role limitations due to emotional problems dimensions of SF-36 domains compared to pre-implementation. The finding reflects that the work status of patient post implementation has been affected due to physical function and has been affected due emotional function. These findings come in accordance with **Moseholm et al., (2019)** [47], who found that statistically significant differences of studied sample regarding role limitations due to emotional problems.

As regarding social function of SF-36 domains, the current study showed that there was statistically significant difference between the study and control groups post-implementation of social function dimensions of SF-36 domains compared to pre- implementation, these results agree with **Costa et al., (2017)** [48], who stated that social support had positively correlated with QoL (i.e., social, physical, and emotional) and found that statistically significant difference to social function dimensions through Brazilian ambulatory oncological clinic carried out cross-sectional study (144 respondents of cardiothoracic surgery).

As regarding bodily pain (pain intensity) of SF-36 domains, the study in hand elucidated statistically significant difference among the study and control groups post-implementation of bodily pain dimensions of SF-36 domains compared to pre-implementation. This agreed with **Hisae et al., (2018)** [49], &**Weeks et al., (2018)** [50], whose study compared short-term QoL outcomes after laparoscopy-assisted cardiothoracic (LAC) versus colon surgery for cardiothoracic surgery and found that, statistically significant differences were noticed among groups was the global rating scale score for two weeks post-surgery regarding to pain intensity.

As regarding energy and fatigue of SF-36 domains, the current study showed that, there was a statistically significant difference within the study group post- implementation of energy and fatigue dimensions of SF-36 domains compared to pre- implementation. These findings come in agree with **Costa et al., (2017)** [48], who found that a highly statistically significant difference in study group regarding to energy and fatigue dimensions of SF-36 domains compared to control group post implementation of rehabilitation program among cardiothoracic surgery patients undergoing surgery. These findings come in contrast with **Vallance et al., (2018)** [48], whose study reported that, didn't associate with sedentary time with fatigue dimension between two groups statistically. Regarding emotional well-being of SF-36 domains, the current study elucidated statistically significant difference among the study and control groups post-implementation of emotional well-being dimensions of SF-36 domains compared to pre-implementation. This agrees with **Hupkens et al., (2018)** [44], who reported statistically significant differences regarding emotional dimension (p = 0.003) compared to the control group, according to the SF-36 questionnaire. On the other hand, the findings come in contrast with **Vallance et al., (2018)** [46], who reported that didn't associate with sedentary time with HRQoL, emotional well-being between two groups statistically.

As regarding total score of SF-36 domains, the current study revealed that there was statistically significant differences between the study & control groups related to total mean score of SF-36 domains HRQoL post- implementation of SF-36 domains compared to pre-implementation, which reflect an improvement of HRQoL which, may be attributed to the effect of implementation of health education program. The findings come in the same line with **Mayer et al., (2017)** [31]& **Rattanajarana, (2018)** [51], who showed that the presence of satisfaction with HRQoL, that the presence of positive influence of rehabilitation program on HRQoL among cardiothoracic surgery undergoing surgery.

On the other hand, the findings disagree with **Brunet et al., (2017)** [52], who found that, regarding to QoL, there was no proof that variation in pain, fatigue, mental health perceptions, insomnia and physical health perceptions, with p = (0 .67, 0.10, 0.90, 0 .89, 0.34,) respectively, observed from before & after intervention program and there was not statistically significant difference among intervention group & control group. That reflects the presence of negative influence of rehabilitation program on HRQoL among cardiothoracic surgery patients undergoing surgery.

V. Conclusion

The findings of the present study concluded that, the study group showed an improvement in their knowledge and health condition outcomes post-education program compared to control group.

VI. Recommendation

1. All patients scheduled for cardiothoracic and their families are in need of adequate knowledge and skills to help them to adapt to their life after the operation.
2. Establishment of a web site, including all information pertaining to cardiothoracic surgeries and all aspects of health education such as different educational materials, Medias, and audiovisual aids.
3. The psychological rehabilitation program should be held to meet the cardiothoracic surgery patient's needs.
4. National strategies are highly required to support cardiothoracic surgery patients and their families.
5. Provision of seminars to raise health team personnel awareness about the benefits of cardiothoracic surgery patient's education for their provision of care.
6. Further studies have to be carried out to assess nurse's knowledge and practices regarding the care of cardiothoracic surgery patients.

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Rasha Hassan Abass Shady, et.al. "The Impact of Pre and Postoperative Education on Recovery Period Following Cardiothoracic Surgery".*IOSR Journal of Nursing and Health Science (IOSR-JNHS)*, 9(1), 2020, pp. 24-39.