

## Impact of a Designed Teaching Protocol about Nursing Management of Coronary Artery Bypass Grafting on Nurse's Knowledge, Practices and Patient's Outcome

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### Abstract

**Background:** Coronary artery bypass grafting (CABG) is a common surgery to treat coronary artery disease. It involves a section of a vein or an artery to create a connection (or bypass) between the aorta and the coronary artery beyond the obstruction.

**Aim:** Was to examine the impact of a designed teaching protocol about nursing management of coronary artery bypass grafting on nurse's knowledge, practices and patient's outcomes at Benha University Hospital.

**Research design:** Quasi-experimental design utilized to carry out this study; the study was carried out at cardiothoracic surgery department, post operative intensive care unit, and operating room at Benha University Hospital. **Sample:** A convenient sample included (50 ) nurses and (60) patients who had CABG and admitted to these units were included in the current study. The study subjects were randomly assigned into two equally homogeneous groups (control and study) (30 subjects each).

**Tools:** a) pre/post structured interview sheet. b) pre/post observation checklist sheet. c) Patient assessment sheet d) Construction of a designed teaching protocol.

**Results:** All research hypotheses were supported, the present study revealed that (a) the mean total and subtotal knowledge scores of nurses were increased immediately after implementation of a designed teaching protocol with statistical significant difference compared to pre implementation. (b) the mean total and subtotal practice scores of nurses were higher immediately after a designed teaching protocol with a high statistical significant difference compared to pre implementation.(c) there were a positive correlation between nurses knowledge and practices with a statistical significant difference.(d)there were a positive patients outcomes as evidence by less incidence of complications among study group compared by control group subjects.

**Conclusion:** Improving nurses` knowledge and practice can positive influence the occurrence of coronary artery bypass graft surgery patient's complications.

**Recommendations:** Conduction of further studies in order to assess the effectiveness of the designed teaching protocol on nurses knowledge, practice and patients' outcome regarding nursing management of CABG surgery with replication of this study on a larger probability sample from different geographical locations at the Arab Republic of Egypt.

**Keywords:** Coronary artery bypass grafting, designed teaching protocol, knowledge, practices, outcomes.

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### I. Introduction

Coronary artery bypass surgery (CABG) is technique have been performed for approximately 35 years. CABG is a surgical procedure in which a blood vessel from another part of the body is grafted to the occluded coronary artery so that blood can flow beyond the occlusion; it is also called a bypass graft (1).

Coronary artery bypass graft surgery is indicated for patients with coronary artery disease to relieve symptoms, improve quality of life, and/or prolong life. More than 300,000 patients undergo CABG surgery annually in the United States with an initial hospital cost of approximately \$30,000 per patient (2). CABG surgery has proved effective in relieving angina and improving exercise tolerance, and it prolongs life in patients with left main CAD and three-vessel disease with poor left ventricular function (3). It is estimated that 571,000 cardiac bypass surgeries are performed on 355,000 people annually in the USA. Of the people who undergo bypass surgery, 238,000 are men, 117,000 are women, and 27,000 are over 65 years of age (4).

Common complications associated with CABG surgery include renal failure, respiratory failure, perioperative myocardial infarction (MI), vein graft closure, hemorrhage, microemboli, dysrhythmias, pericarditis, post pericardiotomy syndrome, embolism, pneumonia, atelectasis, hemothorax, stroke, and postcardiotomy delirium. Other complications that are seen less often include stress ulcer, endocarditis,

gastrointestinal bleeding, mediastinitis, and paralytic ileus (5). The management of the CABG patient is intense, complex, and worthwhile. The patient is admitted to the intensive care unit unconscious, intubated, and completely reliant on advanced technology as well as the proficient care of the health team is very important. Nurses are a component of the team that makes this return to health a possibility for the patient (6).

The role of the professional nurse regarding care of the patient undergoing open heart surgery is beneficial for obtaining a positive outcome for the patient. This role stressed on the preoperative and postoperative nursing care of patients undergoing coronary artery bypass graft surgery. Threat assessment, preoperative preparation, current operative techniques, application of the nursing process immediately after surgery, and common postoperative complications will be explored (7).

### **Significance of the study**

In recent years, a rapid emergence of cardiovascular disease has been reported as a clinical and public concern in many economically developing countries. (8) say his study conducted a retrospective review of Egyptian who underwent coronary artery bypass graft surgery the sample are 290 Egyptian patients who underwent surgery, 262 underwent CABG alone, and the other 28 patients had Concomitant cardiovascular surgical procedures. The higher number of bypass grafts per patient (3.9%) in the Egyptian group was most likely due to the severity of coronary artery disease among these patients.

From clinical observation in the cardiac care and critical care units, it was observed that the number of patients with CABG has increased over the last years and these patients require intensive collaborative care to save their lives and they are at risk for several consequences. These consequences in turn may have negative impact on the patient's physical and psychological condition, and will prolong patient's hospital stay, and increase hospital costs, that is why there is an interest to conduct such type of research which might safeguard this category of patients against these serious consequences, In addition, scattered researches were done in this area especially on the national level. Also it is hoped that findings of this study might help in improving quality of patient care and establish evidence based data that can promote nursing practice and research.

### **Aim of the study**

This study aimed to evaluate the impact of a designed teaching protocol about nursing management of coronary artery bypass grafting on nurse's knowledge, practices and patient outcomes at Benha University Hospital.

### **Research Hypotheses:**

To fulfill the aim of the study, the following research hypotheses were formulated:

**H1:**The post mean knowledge scores of nurses will be higher than pre mean knowledge scores.

**H2:**The post mean practice scores of nurses will be higher than pre mean practice scores.

**H3:**A positive relationship will exist between knowledge and practice scores obtained by nurses receiving a designed teaching protocol.

**H4:**The incidence of postoperative patient's complications cared by nurses post designed teaching protocol implementation will be lesser than that pre-designed teaching protocol implementation.

## **II. Subjects And Methods**

**Research design:** Quasi-experimental research was used in this study

### **Variables:**

The independent variable is a designed teaching protocol while the dependant variables are nurse's knowledge, practices and patient outcomes.

### **Setting of the study:**

The study was conducted in cardiothoracic surgery department, intensive care unit, and operating room at Benha University Hospital.

### **Study Subjects:**

A convenient sample of 50 nurses with different educational background who are willing to participate in the study working; (15) nurses working in cardiothoracic surgery department, (20) nurses working in intensive care unit, and (15) nurses working in operating room and who are willing to participate in the study. And 60 male and female patients admitted to selected areas were included in the current study. Patients were randomly assigned into two equally homogeneous groups (control and study) (30 subjects each). Matching was done according to age, education, gender, co morbidity diseases (diabetes& hypertension) and diagnosis.

**Inclusion criteria for patients:**

- Both sexes (male and female).
- Able to communicate with others
- Diagnosed with needed to CABG
- Patients free from mental handicapped and comatose patients

**Inclusion criteria for nurses**

- Have different levels of education in nursing.
- With different years of experiences.
- Caring for patients on cardiac units

**Tools for data collection:**

**1. Structured interview questionnaire sheet (pre / post tests)**, which was developed in a simple clear Arabic language by the researchers based on literature review (9); (10); (11) and (12) and experts' opinions in the light of relevant references to assess nurses' knowledge regarding patients undergoing coronary artery bypass grafting. It included the following parts:

- **The first part:** related to socio-demographic characteristics of the study subjects such as age, marital status, qualification, years of experiences, and attendances of training program.
- **The second part:** related to nurses' knowledge about heart and coronary arteries: definition of heart, coronary arteries, coronary artery bypass grafting, indications of coronary artery bypass grafting, types of coronary arteries, investigations after the heart surgery, and nursing care for patient undergoing coronary artery bypass grafting.

**Scoring system:** The total score for all items was 150. For the knowledge items, a correct response was scored 1 and the incorrect zero. For each area of knowledge, the scores of the items were summed-up and the total divided by the number of the items, giving a mean score for the part. These scores were converted into a percent score, means and standard deviations were computed. The nurse's knowledge was considered satisfactory if the percent score was 60% or more and unsatisfactory if less than 60%.

**2. Observation checklist sheet (pre/post tests):** These checklists aimed at assessment of actual nurses' practice regarding nursing care provided to coronary artery bypass grafting patients. It was developed by the research based on related literature (13); (14); (15); (16); (17); (18) and (19). They included most procedure carried out in the study such as vital signs, arterial blood gases, suction, chest x ray, electro cardiogram, mechanical ventilator, urinary catheter, oxygen therapy, chest tube, central venous pressure, intravenous infusion, sterile dressing and cardiopulmonary resuscitation.

**Scoring system:**

The total score for all items was 236, the practice items observed to be done correctly were scored (1) and the items not done or incorrectly done were scored (0). For each area, the scores of the items were summed-up and the total divided by the number of the items, giving a mean score for the part. These scores were converted into a percent score, means and standard deviations were computed. The practice was considered adequate if the percent score was 70% or more and inadequate if less than 70%.

**3- Patient assessment sheet:** It was divided into the following parts:

**The first part:** Related to socio-demographic characteristics of study sample (e.g., age, sex, marital status, level of education, and occupation).

**The second part:** Medical data that determine physical and psychological patient status.

**Third part:** Related to patient's complications; It was developed and filled by the researcher based on literature reviews (20); (21) and (22) to assess expected complications that might develop among patients of coronary artery bypass grafting. It includes six main areas;

- a) Local complications: defined in this study as presence of: infection at the insertion site and any allergic reaction.
- b) Respiratory as pneumonia and atelectasis.
- c) Cardiac as arrhythmias, chest pain, discomfort / readmitted to CCU.
- d) Urinary complications as urinary retention, urinary tract infection and kidney failure.
- e) Gastrointestinal as nausea& vomiting, paralytic ileus.
- f) Late complications included in this study as presence of:
  - Fever and/or chills.
  - Increased pain, redness, swelling, or bleeding or other drainage from the insertion site.
  - Coolness, numbness and/or tingling.

- Recurrent surgery.

**Scoring system:** Each item was observed, categorized, and scored as follow: a complication that implies response with **(No)** scored as “0” and **(Yes)** for complication that occurred had scored as “1”.

**4- A designed teaching protocol about nursing management of CABG surgery:** It was developed by the researcher based on nurses and patients need assessment, literature review, researcher experience and opinions of the medical and nursing expertise. The teaching protocol booklet was revised and modified based on the expertise comments; it was written in Arabic using simple language with illustrations.

**Tools validity and reliability:** The data collection tools were revised for comprehensiveness, appropriateness, and legibility by a panel of five experts in the field of medicine and nursing to test the face and content validity. According to their revision, few modifications in the face validity were carried out. Reliability was tested by Cranach's Alpha coefficient test which revealed that each item consisted of relatively homogenous items (0.9553).

**Ethical considerations:** The present study was conducted under the approval of the Faculty of Nursing Ethical Committee, Benha University. An official permission to conduct the study was obtained by the researcher from the head of the cardiothoracic surgery, post operative intensive care unit at Benha University Hospital as well as from head nurses of each unit. Nurses and patients were informed on the purpose and nature of the study. The researcher emphasized that the participation is voluntary and confidentiality and anonymity of the subjects will be assured through coding all of data.

**Pilot study:** A pilot study was implemented on 10% of the total study subjects to test the tools. This was done to test clarity, applicability, feasibility & relevance of the tools used, to estimate the length of the required time for data collection. A modification on tools was made based on the results of the pilot study. Therefore, pilot study sample was excluded from the final sample.

**Procedure:** The study was conducted on 3 phases (preparatory phase, implementation phase and evaluation phase).

#### **1- The Preparatory phase:**

The researcher reviewed the related materials and literature extensively. Assessment of the nurse's knowledge and practical skills were made. A designed coronary artery bypass grafting protocol was developed by the researcher: detected needs, requirements and deficiencies were translated to aims and objectives of the program. Moreover, teaching materials were prepared i.e. audiovisual materials on heart and coronary artery anatomy, areas that are susceptible to block by blood clotting, atherosclerosis, treatment modalities.

#### **The Implementation & evaluation phase:**

Data were collected at cardiothoracic department, operating room unit, and post operative intensive care unit at Benha University Hospital during the period from June, 2016 to November, 2016.

The researcher approached the responsible nursing supervisors as well as the responsible physician of determined areas daily, to identify the number of newly admitted patients who were suspected to have CABG. Then, patients were randomly assigned to either control group or study group (30 patients in each group).selecting the patients was done according to their arrival to the above mentioned areas. Those who arrived first and carried odd numbers constituted the control group subjects and who carry the even numbers comprised the study group. Selected patients were met on daily bases for monitoring. In addition to the allocated assessment times before and after a designed teaching protocol. After that, the socio-demographic and medical data sheet was completed for all patients of both study and control groups. The designed teaching protocol was utilized for the study group subjects only by the trained nurses who used on daily bases from time of admission till patient discharge. Complications assessment sheet was completed before and after a designed teaching protocol implementation.

- The tools filled through interviewing. The purpose of the study was explained to the nurses prior to answering the questions. The study was carried out at morning, and after noon shifts.
- At initial interview the researcher introduce herself to initiate line of communication, explain the purpose of a designed teaching protocol and fill out the structured interview sheet (tool I) to assess nurse's knowledge pre implementation of a designed teaching protocol and the researcher fill out the observation checklist sheet (tool II) to assess nurse's practice pre implementation of a designed teaching protocol.
- The researcher scheduled with them the teaching sessions for both theory and practice and the nurses were divided into small groups, each group contains 3-4 nurses. Teaching has been implemented for nurses in terms of sessions and teaching on the spot during their official working hours. There were a total of 10 sessions. The duration of each session was 30-40 minutes, including 10 minutes for discussion and feedback.

- The effect of a designed teaching protocol on patient's outcome was reached through comparing level of nurse's knowledge and practice pre and post implementing of a designed teaching protocol has been evaluated by the researcher through filling the study tools (I,II) and complications assessment sheet (III).

**A designed teaching protocol consisted of two parts:**

**-The first part: Theoretical part:**

It included data related to anatomy of the heart and blood vessels, coronary arteries, functions of the heart, artificial heart and lung, open heart surgery, heart diseases, CABG, angina, atherosclerosis, important drugs related to heart diseases. **For theoretical contents**, teaching sessions were conducted; each session takes from 30-40 minutes. The number of sessions (10) sessions for each group (3-4 nurses) to acquire the related information. Each nurse was supplemented with the knowledge booklet, a head and utilized each session to assure understanding and clear any misconception or misunderstanding. The researcher continued to reinforce the gained information, answer any raised questions and gave feedback. Communication channel was kept open between the researcher and the study group subjects. Then, immediately post knowledge tests was carried out.

**-The second part: The practical part:**

It included items related to how to prepare patient for surgery, assessment patient condition, ongoing care, ventilator, how to record neurological signs, endotracheal suctioning, oxygen therapy, intravenous (I.V) therapy, under water seal drainage, care of chest tube, central venous pressure (CVP) reading and monitoring, Cardiopulmonary resuscitation (CPR), wound dressing, urinary catheterizations. **For practical contents**, each nurse's performance as regards the pre determined procedure was evaluated before provision of any information (pre-test) utilizing the formulated checklists (second tool). Then subjects were divided into the small groups (3-4) nurses in each group). Demonstrations and redemonstration were carried on (10) sessions for each nurse. Practical booklet was given to each nurse and the immediate post practice test was done. Theoretical part was achieved in the head of the department office and practical part in clinical area. Teaching methods were lectures, small group discussion, and problem solving situations. Teaching aids were utilized, posters, videotape, handouts, pen & paper test. The setting was equipped and prepared to be used.

### III. Results

Table (1) describes the socio-demographic data of the study nurses. Their age ranged between 20 and 42 years, with a mean  $\pm$  SD  $27.24 \pm 6.938$  years. The majority of the nurses (80 %) were married. As regards nurses' job, more than two thirds of them (78% & 78%, respectively) had work as nurse, and had nursing school diploma, and only (22%) a bachelor degree in nursing, nearly two thirds (60%) had less than ten years of experience, with a mean  $\pm$  SD  $7.4 \pm 6.675$  years. As regards to attending training courses only (24%) of them had attended such courses.

Table (2) Documented that an unsatisfactory knowledge level among the studied sample pre designed teaching protocol implementation. However, immediately post a designed teaching protocol implementation, a general improvement in nurse's knowledge. A highly statistical significant differences were observed at p-value  $\leq 0.001$ . As regards to nurses' total knowledge about care for patients undergo CABG surgery throughout teaching protocol phases. It indicates that the majority of nurses immediately post a designed teaching protocol implementation had satisfactory knowledge with mean of  $(118.18 \pm 13.655$  SD) as compared to pre designed teaching protocol implementation ( $83.58 \pm 12.992$  SD) and t test=12.983, with a statistically significant improvement at ( $p < 0.001$ ).

Fig (1) Demonstrated that pre designed teaching protocol more than half (52%) of the study subjects had unsatisfactory knowledge scores which decreased to (8%) post designed teaching protocol. As well, less than half (48%) of the study subjects had satisfactory knowledge score pre designed teaching protocol which increased to (92%) post a designed teaching protocol.

Table (3) Demonstrated that an unsatisfactory practice level among the studied sample pre designed teaching protocol implementation. However, immediately post a designed teaching protocol implementation, a general improvement in nurses' practices with highly statistical significant differences observed at p-value  $\leq 0.001$ . Also, this table demonstrate nurses' total practices about care for patients undergo CABG surgery throughout teaching protocol phases. It indicates that the majority of nurses immediately post a designed teaching protocol implementation had satisfactory practices with mean of  $(189.32 \pm 19.361$  SD) as compared to pre designed teaching protocol implementation ( $151.82 \pm 18.072$  SD) and t test=10.013, with a statistically significant improvement ( $p < 0.001$ ). Fig (2) reveals that pre - designed teaching protocol three quarters (76%) of the study subjects had inadequate practice scores which decreased to (10%) post designed teaching protocol. As well, (24%) of the study subjects had adequate practice scores pre designed teaching protocol which increased to (90%) post designed teaching protocol.

Table (4) The relation between nurses knowledge before the study intervention and their socio-demographic characteristics .It delineated that, the diploma nurse, less than 30 years old, married, with less than 10 years of experience and without any previous training courses obtained unsatisfactory knowledge scores. No significant statistical differences observed except at marital status with p-value at <0.05.

Table (5) The relation between nurse's practice before the study intervention and their socio-demographic characteristics. It demonstrates a highly statistically significant differences observed in which there is increasing trend of practice scores with increasing nurses' age ( $p < 0.001$ ), job ( $p < 0.001$ ), nursing qualification and attended training courses ( $p < 0.001$ ). Without statistical significant differences for years of experience (fisher test =0.016). Table (6) shows that, there was a positive correlation between pre, post designed teaching protocol implementation and study group subjects knowledge, practice and years of experience. With significant statistical difference at p values of <0.001 except between age, years of experience and knowledge. Thus hypothesis (III) was supported. Table (7) indicates that, nearly two thirds and more than half ( 60% & 53.3%,respectively) of both study and control group subjects within the age group of  $\geq 50$  year and were residents of rural areas (60% & 56.7%,respectively). Regarding to marital status, more than fifty percent (53.3% & 56.7%,respectively) of both study and control group subjects were married. As regards to educational level , less than half (40%& 46.7%,respectively ) of them were illiterate. In relation to gender, the majority of them (83.3% & 80%,respectively) were males and the income was insufficient (70% & 66.7%) respectively. No significant statistical differences were seen between the two groups in relation to the above mentioned demographic variables which indicates that the two groups were nearly homogenous. The table (8) shows that, (40% & 33.3%, respectively) of both study and control group were having history of hypertension and less than half (43.3% & 46.7%,respectively) of both study and control group were having history of diabetes. Also,(36.7%&40%,respectively) of both study and control group, the disease started with them from 5 to less than 10 years ago. While the majority (83.3%&80%,respectively) of both study and control group hadn't have family's history of heart' diseases. Chi-square test shows that there was no statistical significance difference between both groups with p value  $> 0.05$ . Table (9) delineated that pre-designed teaching protocol implementation (43.3%,43.3%,23.3%,23.3%,16.6%,13.3) of the study group subjects as compared by (36.6%, 33.3%, 26.6%,26.6%,10%,16.6%) of the control group subjects developed complications related to deep sternal wound infection, pneumonia,nausea & vomiting, pain, constipation and myocardial infarction. While, post designed teaching protocol implementation. It was observed that (16.6%,10.0%,10.0%,10.0%,6.6%) of the study group subjects as compared to (36.6%,33.3%,26.6%,26.6%,16.6%) of the control group subjects developed complications related to deep sternal wound infection, pneumonia, nausea & vomiting, pain, constipation and myocardial infarction). Table (10) demonstrates that ,as regards to types of complications developed pre-designed teaching protocol implementation (66.6%,50%,43.3%,40%) of the study group subjects as compared to (63.3%,53.3%,33.3%,36.6%) of the control group subjects developed local, cardiac, respiratory, and gastrointestinal complications. While, post designed teaching protocol implementation (26.6%, 13.3%,10.0%,16.6%) of the study group subjects compared to (73.3%,53.3%,40%,40%) of the control group subjects developed local, circulatory, respiratory, and gastrointestinal complications. With a significant statistical differences between them ( $X^2=13.0667$  at  $p = 0.0003$ ,  $X^2=7.2$  at  $p= 0.0072$ ,  $X^2= 10.8$  at  $p= 0.001$ ,  $X^2 = 4.0219$  at  $p= 0.0449$  .So hypothesis ( 3) was supported partially.

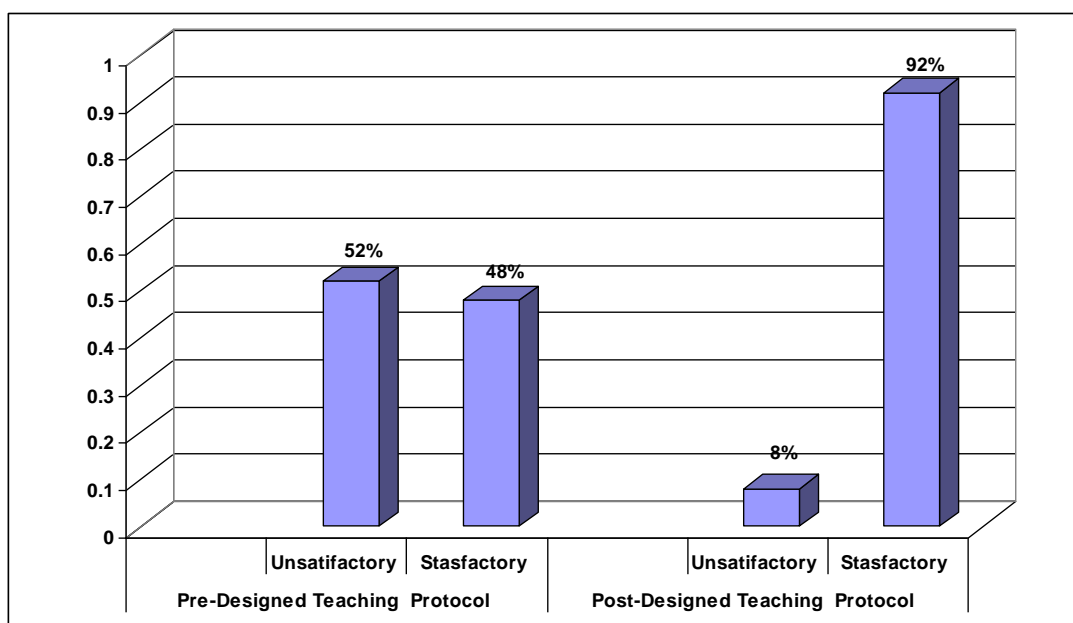
**Table(1):** Distribution of socio-demographic characteristics of the studied nurses (N=50)

Socio-demographic Items	Frequency	Percent (%)
<b>Age ( years )</b>		
< 30	36	72
30 +	14	28
Range	20.0-40.0	
Mean $\pm$ SD	27.24 $\pm$ 6.938	
<b>Job</b>		
Nurse	39	78
Head nurse	11	22
<b>Marital status</b>		
Single	10	20
Married	40	80
<b>Nursing Qualification</b>		
Diploma nurse	39	78
Baccalaureate nurse	11	22
<b>Experience (years)</b>		
< 10	30	60
10 +	20	40
Range	2.0-22.0	
Means $\pm$ SD	7.4 $\pm$ 6.675	
Attended training courses	12	24

**Table (2):** The mean total & subtotal knowledge scores of study group subjects all through the study periods (N= 50).

Knowledge items	Time				T- Test	P- Value
	Pre (n=50)		Post (n=50)			
	X	SD	X	SD		
Anatomy of heart and coronary artery	6.38	1.468	9.72	1.357	11.843	<0.001***
Cardiac arrest	15.9	1.920	21.24	3.438	9.604	<0.001***
Coronary artery bypass grafting	4.26	1.073	5.7	0.922	7.200	<0.001***
Central venous pressure (CVP)	13.12	1.850	17.18	1.424	12.378	<0.001***
Wound care and dressing	7.12	1.557	9.86	1.183	10.036	<0.001***
Intravenous therapy	6.9	1.5	11.08	1.397	14.463	<0.001***
Care of Laryngeal tube	10.24	1.871	15.42	2.367	12.159	<0.001***
Patient Preparation for coronary artery bypass graft	5.54	1.431	8.04	1.232	9.469	<0.001***
Cardiac surgery(CABG)	5.52	1.153	7.86	1.428	9.140	<0.001***
Medications	4.3	0.943	6.26	1.016	10.208	<0.001***
Nursing care for Ventilator	4.28	0.96	5.78	0.900	8.152	<0.001***
Total Knowledge	83.58	12.992	118.18	13.655	12.983	<0.001***

(\*) Statistically significant at  $p < 0.05$  (\*\*\*) Highly statistically significant at  $p < 0.001$



**Fig (1):** Total respondents knowledge levels distribution regarding coronary artery bypass graft (CABG)(N=50)

**Table (3):** The mean total & subtotal practice scores of study group subjects all through the study periods (N= 50).

Practice items	Time				T- Test	P- Value
	Pre(n=50)		Post(n=50)			
	X	SD	X	SD		
Preparation	8.08	0.934	10.44	1.538	9.365	<0.001***
Assessment	5.58	0.850	8.12	1.142	12.700	<0.001***
Ongoing care	15.36	1.195	20.48	1.615	18.156	<0.001***
Ventilator care	13.5	1.486	18.66	1.828	15.589	<0.001***
Neurologic Signs	2.2	0.692	3.54	0.753	9.503	<0.001***
Oxygen therapy	2.26	0.844	3.38	0.561	7.943	<0.001***
Suctioning techniques	6.92	1.324	10.08	1.647	10.604	<0.001***
Underwater seal drainage	13.14	1.183	16.48	1.646	11.760	<0.001***
Removal of chest tube	12.2	1.356	15.78	1.466	12.831	<0.001***
Reading CVP	7.7	1.746	10.44	0.852	10.073	<0.001***
Removal of CVP	12.8	1.058	16.74	2.504	10.287	<0.001***
Monitoring IV infusion	10.34	1.069	13.08	1.44	10.960	<0.001***
Urinary catheter care	12.28	1.523	16	1.886	10.877	<0.001***
Removal of urinary catheter	6.18	1.125	9.28	1.04	14.622	<0.001***
Dry sterile dressing	10.96	1.281	15.24	1.087	18.290	<0.001***
Cardiopulmonary resuscitation (CPR)	12.52	1.374	16.36	1.705	12.467	<0.001***
Total Practice	151.82	18.072	189.32	19.361	10.013	<0.001***

(\*) Statistically significant at  $p < 0.05$  (\*\*\*) Highly statistically significant at  $p < 0.001$

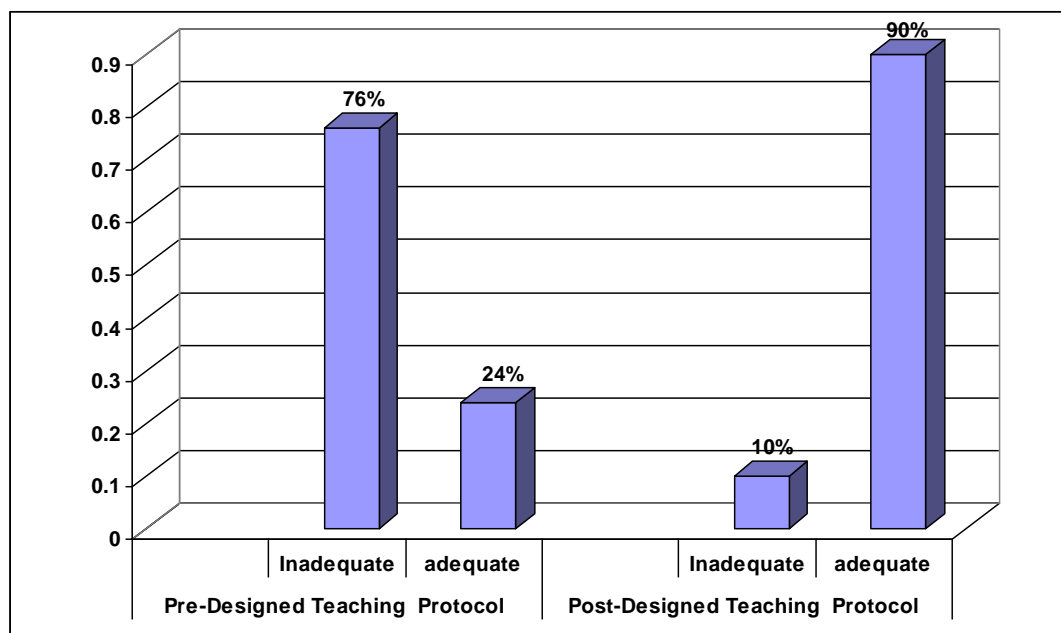


Fig (2): Total respondents practice levels distribution regarding coronary artery bypass graft (CABG)(N=50)

Table (4): Relation between nurses' knowledge before the study intervention and their socio demographic characteristics (N= 50).

Socio demographic items	Knowledge				X <sup>2</sup> Test	P- Value
	satisfactory		unsatisfactory			
	No	%	No	%		
<b>Age (years)</b>						
< 30	15	30	21	42	Fisher	0.21087
30 +	9	18	5	10		
<b>Job</b>						
Nurse	17	34	22	44	Fisher	0.31388
Head nurse	7	14	4	8		
<b>Marital status</b>						
Single	8	16	2	4	Fisher	<0.05*
Married	16	32	24	48		
<b>Nurses Qualification</b>						
Diploma nurse	19	38	20	40	Fisher	1.00
Baccalaureate nurse	5	10	6	12		
<b>Experience ( years )</b>						
< 10	13	26	17	34	Fisher	.5646
10+	11	22	9	18		
<b>Attended training courses</b>						
No	18	36	20	40	Fisher	1.00
Yes	6	12	6	12		

(\*) Statistically significant at p < 0.05

Table (5): Relation between nurses' practice before the study intervention and their socio demographic characteristics(N= 50).

Socio demographic Items	Practice				X2 Test	P- Value
	Adequate		Inadequate			
	No	%	No	%		
<b>Age (years)</b>						
< 30	4	8	32	64	Fisher	<0.001* **
30 +	8	16	6	12		
<b>Job</b>						
Nurse	5	10	34	68	Fisher	<0.001* **
Head nurse	7	14	4	8		
<b>Marital status</b>						
Single	6	12	4	8	Fisher	<0.001* **
Married	6	12	34	68		



Table (5)Cont.

Nursing Qualification						
Diploma nurse	5	10	34	68	Fisher	<0.001* **
Baccalaureate nurse	7	14	4	8		
Experience (years )						
< 10	7	14	23	46	Fisher	0.016
10+	5	10	15	30		
Attended training courses						
No	4	8	34	68	Fisher	<0.001* **
Yes	8	16	4	8		

(\* \*\*) Highly statistically significant at p < 0.001

Table (6): Correlation coefficient for nurses' knowledge, practice and years of experience.

r-p value	r	p
Age with knowledge		
pre	0.0059	> 0.05 n.s
post	0.15967	> 0.05 n.s
Age with practice		
pre	0.71797	< 0.001***
post	0.66916	< 0.001***
years of experience with knowledge		
pre	0.0108158	> 0.05 n.s
post	0.15258	> 0.05 n.s
years of experience with practice		
pre	0.68325	< 0.001***
post	0.626789	< 0.001***

Part II: Demographic characteristics of the studied patients

Table (7): Number and percentage distribution of the studied patients regarding to demographic characteristics (N=60).

Characteristics	Study group		Control group		X2	p-value
	N	%	N	%		
Age						
- 20<30	0	0.00	0	0.00	0.272	>0.05 n.s
- 30<40	5	16.7	6	20		
- 40<50	7	23.3	8	26.7		
- ≥50	18	60	16	53.3		
<b>X±SD</b>	52.7± 5.339		52 ± 9.154			
Gender						
-Male	25	83.3	24	80	0.11	>0.05 n.s
-Female	5	16.7	6	20		

Table(7)Cont.

Residence						
-Rural	18	60	17	56.7	0.068	>0.05 n.s
-urban	12	40	13	43.3		
Level of education						
-Illiterate	12	40	14	46.7	0.636	>0.05 n.s
-Primary	6	20	5	16.7		
-Secondary	8	26.7	6	20		
-University	4	13.3	5	16.7		
Occupation						
-Free work	17	56.7	15	50	0.266	>0.05 n.s
-Employment	6	20	7	23.3		
-Not work	7	23.3	8	26.7		
Marital status						
-Single	2	6.7	1	3.3	0.602	>0.05 n.s
-Married	16	53.3	17	56.7		
-Divorced	2	6.7	3	10		
-Widow	10	33.3	9	30		
Income						
-Insufficient	21	70	20	66.7	0.076	>0.05 n.s
-Enough	9	30	10	33.3		
-Enough/Saving	0	0.00	0.0	0.00		

n.s = no statistical significance

**Table (8):** Differences in present medical history among study and control group subjects (N= 60).

Items	Study group		Control group		X2	p-value
	N	%	N	%		
<b>- Suffering from-Circulatory system Problems</b>						
-Yes	5	16.7	4	13.3	0.128	>0.05 n.s
-No	25	83.3	26	86.7		
<b>-Hypertension</b>						
-Yes	12	40	10	33.3	0.284	>0.05 n.s
-No	18	60	20	66.7		
<b>- Diabetes</b>						
-Yes	13	43.3	14	46.7	0.066	>0.05 n.s
-No	17	56.7	16	53.3		
<b>- Renal problems</b>						
-Yes	2	6.7	3	10	0.218	>0.05 n.s
-No	28	93.3	27	90		
<b>- Liver disease</b>						
-Yes	0	0.0	0	0.0	0.00	>0.05 n.s
-No	30	100.0	30	100.0		

**Table (8) Cont.**

<b>-Rheumatic heart disease</b>						
-Yes	0	0.0	0	0.0	0.00	>0.05 n.s
-No	30	100.0	30	100.0		
<b>-Previous cerebral stroke</b>						
-Yes	0	0.0	0	0.0	0.00	>0.05 n.s
-No	30	100.0	30	100.0		
<b>- Psychological stress</b>						
-Yes	2	6.7	3	10.0	0.218	>0.05 n.s
-No	28	93.3	27	90.0		
<b>- Onset of the disease</b>						
- <1 (Year)	2	6.7	3	10.0	0.37	>0.05 n.s
- 1<5	7	23.3	6	20.0		
- 5<10	11	36.7	12	40.0		
- ≥10	10	33.3	9	30.0		
<b>-Any family's member is suffering from heart disease</b>						
-Yes	5	16.6	6	20	0.11	>0.05 n.s
-No	25	83.3	24	80		
<b>- Type of smoker</b>						
- Smoker	8	26.7	6	20	0.416	>0.05 n.s
-Previous smoker	4	13.3	5	16.7		
-Non smoker	18	60	19	63.3		
<b>-Use of stimulants</b>						
-Yes	25	83.3	23	76.7	0.412	>0.05 n.s
-No	5	16.7	7	23.3		
<b>-Number of cubs</b>						
-Tea(2-4)	18	60	17	56.7	0.019	>0.05 n.s
-Coffee(1-3)	7	23.3	6	20		

n.s = indicate not significant

**Table (9):** Number and percentage distribution of study sample related to postoperative complications ( n= 60).

Variables	Study group				Control group			
	Pre		Post		Pre		Post	
	N	%	N	%	N	%	N	%
<b>-Local complications</b>								
- Deep sternal wound infection	13	43.3	5	16.6	11	36.6	13	43.3
- Pain	7	23.3	3	10.0	8	26.6	9	30.0
<b>-Respiratory complications</b>								
- Pneumonia	13	43.3	3	10.00	10	33.3	12	40
-Atelectasis	0	0.00	0	0.0	0	0.00	0	0.00
<b>-Cardiac complications</b>								
-Hemorrhage	3	10	0	0.00	2	6.6	2	6.7
-Stroke	2	6.6	0	0.00	3	10	3	10
-Myocardial infarction	4	13.3	2	6.6	5	16.6	5	16.6
-Pericardial tamponade	0	0.00	0	0.00	0	0	0	0.00
-Pericardial effusion	2	6.7	0	0.00	3	10	3	10
-Pleural effusion	0	0.00	0	0.00	0	0.00	0	0.00
-Atrial fibrillation	4	13.3	2	6.6	3	10	3	10

Table (9)Cont.

<b>-Renal complications</b>								
-Acute renal impairment	2	6.6	1	3.3	2	6.6	2	6.6
<b>-Gastrointestinal complications</b>								
-Nausea& vomiting	7	23.3	3	10.0	8	26.6	9	30
-Constipation	5	16.6	2	6.6	3	10.0	3	10.0
-Paralytic ileus	0	0.00	0	0.00	0	0.00	0	0.00
<b>-Late complications</b>								
	3	10.0	1	3.3	2	6.6	2	6.6

Table (10): Comparison between the two studied groups as regards to types of complications developed throughout the study periods (n=60) .

	Study		Control		X <sup>2</sup>	P- value
	N	%	N	%		
<b>Local complications</b>						
Pre	20	66.6	19	63.3	0.0733	0.786
Post	8	26.6	22	73.3	13.0667	0.0003*
<b>Respiratory Complications</b>						
Pre	13	43.3	10	33.3	0.634	0.4256
Post	3	10.0	12	40.0	7.2	0.0072*
<b>Cardiac complications</b>						
Pre	15	50.0	16	53.3	0.0667	0.796
Post	4	13.3	16	53.3	10.8	0.0010*
<b>Renal complications</b>						
Pre	2	6.6	2	6.6	0.00	1.00
Post	1	3.3	2	6.6	0.350	0.5536
<b>Gastrointestinal complications</b>						
Pre	12	40.0	11	36.6	0.0705	0.790
Post	5	16.6	12	40.0	4.0219	0.0449*
<b>Late Complications</b>						
Pre	3	10.0	2	6.6	0.2182	0.64042
Post	1	3.3	2	6.6	0.350	0.5536

\*Significant at the  $\leq 0.05$  probability level

#### IV. Discussion

Nursing management of the cardiac patients undergoing surgery are encounters rapidly changing interventions, techniques and technology. Coronary artery bypass grafting (CABG) surgery is indicated for patients with coronary artery disease to relieve symptoms, improve quality of life, and prolong life. The CABG surgery significantly improves symptoms in more than 90% of the patients (2).

Cardiothoracic surgery nurse should be competent enough to care for patients because those patients need special nursing care to recover the patient's conditions and to help in preventing or reducing potential postoperative complications that leading to improve patient outcomes. Nurses should develop their own nursing management. Nurses are planned, systematic and focused on mutually agreed goals in which designed teaching protocol influence nursing practice, education and management (23).

The care of the CABG patient is intense, complex, and rewarding. The patient is admitted to the intensive care unit unconscious, intubated, and completely dependent on advanced technology as well as the expert care of the health team is very important. Nurses are a part of the team that makes this return to health a possibility for the patient (6). It is very important to know that developing of a designed teaching protocol in critical care nursing is the acquisition of a specialized body of knowledge and the application of this knowledge to practice, so this study was carried out to improve the nurse knowledge and practice which impact on patients outcomes.

#### As regards to Socio-demographic data:

The results of the present study showed; that the greater part of nurses their age ranged from 20 - 40 years old ; married. Also, more than three quarters of them had work as nurse; nursing school diploma was the highest proportion. Also, more than half of them, their experiences less than 10 years and the majority of them have no in service training courses related to coronary artery bypass graft surgery. This result is in agreement with (24) who studied " Effect of educational program on the performance of nurses working with coronary artery bypass grafting patients at cardiac care unit at Nasser Institute Hospital " on 30 nurses, Unpublished doctorate thesis, and found that their age ranged between 20 and 40 years, married and more than three quarters of them had a diploma of secondary nursing school, most of the nurses had five to ten years of experience. As for attending training courses in caring for patients with CABG surgery, more than two thirds of them had

attended such courses. (25); in the same line with the current study findings conducted a study in neurosurgery department at Assiut University Hospital entitled "Developing nursing care standards for patients post discectomy at Assiut University Hospital". Reported that, the majority of nurses were female, nursing diploma was the highest proportion and all of them have no in service training courses related to standards of nursing care for patients with discectomy. Supporting to this findings (26) who studied "Nurse's performance during cardiopulmonary resuscitation in intensive care unit and cardiac care unit at Benha University Hospital", master thesis, Benha University. Revealed that less than half of nurses were in the age group 20–38 years old. Also, the majority of nurses in both units had secondary diploma degree and most of nurses in both units had not trained.

On the same line (27) in a study entitled as "Effect of an educational program on the performance of nurses working with cardiac patients at Benha University Hospital". Revealed that, the majority of nurses were a secondary diploma nurse, there age group between 20 – 40 years, with years of experience nearly three quarter were 5 to more than 7 years and the majority of nurses had no training programs. This finding disagree with (26) who stated that less than half of nurses had year of experience ranged from 2- 4 years.

**As regards to nurses' knowledge,** the current study showed that, pre implementing a designed teaching protocol showed unsatisfactory level of nurse's knowledge about anatomy of heart, coronary arteries and nursing management of patients undergoing coronary artery bypass graft surgery. This deficiency in knowledge is due to one or more of the following reasons, lack of orientation program prior to work as well lack care conferences during work in availability of procedure book specially prepared for the critical care areas and lack of direction and nurse's appraisal about patient's care. In agreement with these study findings (28), stated that many continuing education program evaluations use a comparison of the participant's pretest and post test scores as an indicator of that program's effectiveness. This in line with (29) mentioned that, cardio surgical nursing requires nurses with particular knowledge and attributes. In addition it is no longer possible to function effectively in these areas without updated knowledge and expertise and without acceptable personal and professional attitudes. This is supported with (30) mentioned that, educational programs provide nurses with necessary attitude and behavioral skills basic to efficient performance of work and help in developing their leadership management abilities.

Supporting to these study findings by (24) who stated that, nurses' assessment prior to the program revealed that their knowledge are inadequate to work efficiently and safely with such group of patients. Inadequacy nurses knowledge indicates poor quality of the care given the major requirement for quality of service delivery is having effective service personnel in place.

**The findings of the present study supported hypothesis (I),** in which the mean knowledge scores of the study group subjects improved significantly immediately post implementing a designed teaching protocol guidelines. In this respect (31); mentioned that nurses must be able to expand their knowledge of this area through ongoing education, Journal, and seminars. Consequently, teaching programs for nursing staff constitute an important part. These programs are urgently designed to assess nursing staff in developing and enhancing the skills needed to provide high standards of care to their patients.

**As regards to nurses' practice;** The findings of the present study supported hypothesis (II), in which the practice scores of the study group subjects immediately post implementing a designed teaching protocol guidelines improved significantly. These results may be explained that preparation of a designed protocol was successful in achieving better information and practice levels between nurses. Therefore, the course was successful in improving nurses' knowledge and practice, which could be attributed to the structure, content and process of the program. On the same line (32) who studied " Coronary artery bypass grafting, Effect of developing and implementing Nursing Care Standards on patient's outcome at Assiut University Hospital " revealed a great improvement in the level of nurse's practice post implementing nursing care standards in all items. This has been concluded by the presence of significant differences between results of pre and post implementing nursing care standards. This finding indicated that skills can be easily improved, especially if linked with their relevant scientific base of knowledge. Also, this result agrees with (24) who stated that most of nurses had inadequate practice at the pre-program phase. This deficient practice revealed among the present study nurses before implementation of the program is certainly linked to the previously mentioned low level of satisfactory knowledge among them. This is agreement with (33) who have indicated that practical procedures are best learned by instruction and closely supervised repeated practice whilst treating critical ill patients. After implementation of the study training program, statistically significant improvements were revealed in nurses' practice at the post program phase. Overall, all the participating nurses had adequate practice at the post-program. In this respect (21); reported an improvement in nurses' practice after the attendance at continuing nursing education sessions. Research findings indicated that continued nursing education programs increase both knowledge and performance and can also improve attitudes. As well, (34) have mentioned that critical nurses should being their training by becoming registered nurses and continue their education by earning a masters' degree in critical care nursing.

**Correlation between nurse's knowledge, practice, age and years of experience;** findings of the present study showed that, knowledge was correlated with practice scores among nurses. Thus hypothesis III was supported. Also, age was positively correlated with knowledge before and immediately after implementing a designed teaching protocol. And, age was positively correlated with practice of nurses with a highly statistical significant. Thus, it was shown knowledge scores tended to rise with increasing nurses' age and experience year's. Moreover, the scores were higher among bachelor degree nurses'. These results emphasize the importance of educational preparation of the nurse, in addition to ongoing enhancement of the knowledge all the way through preparation and training courses, in addition to through accumulation of years of experience. In agreement with these present study findings (35) have emphasized that nursing having no adequate training and those with no or low experience years are more liable to misunderstanding of physician instructions about care management. This may indirectly affect the health status of patients under their care.

This agrees with (36); documented that the in-service training program has a beneficial effect in improving the nurses' knowledge and skills. They also recommended that educational programs should be organized according to the needs of nurses with continuous evaluation. In this respect (31); mentioned that, teaching programs for nursing staff represent a significant part. These programs are immediately designed to assess nursing staff in developing and pretty the skills needed to provide high principles of care to their patients.

#### **Patient's outcomes post implementing a designed teaching protocol**

The present study findings demonstrated that the majority of both group were male within the age group of  $\geq 50$  years old. This can be explained to the higher exposure to life stress, and female hormones protect female from coronary artery disease. This result comes in agreement with (37); who stated that fewer of participated patients with open heart surgery were females (female: male ratio = 1: 4.4). As well, (38); mentioned that, sixty seven percent of the studied patients were male.

This in line with (39) who studied "early sheath removal and ambulation in patients submitted to PCI: A randomized clinical trial", found that 64% of the study sample was males, and their mean age were 59.7% years old. As well, (40), who studied "impact of designed nursing educational protocol on health promotion for patients undergoing coronary artery stent outcome", reported that the majority of both groups in PCI with coronary stent were in age group 50 to 60 years old and most patient were males. This finding was in contrast with (41), who found that the percentage of female patients undergoing CABG was higher than the percentage of male patients. In addition (42) emphasized that, women appear to be at increased risk for coronary artery disease(CAD), re-infarction, and death are more than men because the risk of women increases significantly at menopause, as the CAD rates in women after menopause are two to three times more than women before menopause. In relation to educational level, less than half of the patients were illiterate and from rural areas, This would be attributed to the fact that the mainstream of the sample were from rural areas and not responding easily to the knowledge given to them to prevent postoperative complications. This result was supported by (43); who mentioned that the patients with low education had decreased awareness toward the surgery and the importance of follow up routine. Regarding marital status, the present study illustrated that, more than half of both groups were married. This may be due to the married people were more liable to CAD more than single related to social and psychological stress in their life and their families responsibility. This finding goes in the same line with (44) who found that married patients who have CAD represent the higher percentage of their study subject than single and widow patients. This is in line with (45), study about ""the effect of position changing post coronary angiography on patient's outcomes", which revealed that the majority of the studied sample was married. Regarding disease history, the present study demonstrated that, less than half of both study and control group subjects had history of hypertension, diabetes mellitus, and their disease started from period of five to less than ten years ago. In agreement with these findings (5) who found that the majority of the cardiovascular patients were having diabetes and hypertension.

**Findings of this study supported hypothesis 4** that, the incidence of postoperative patient's complications cared by nurses post designed teaching protocol implementation will be lesser than that pre-designed teaching protocol implementation. The most common complications which occurred pre implementing a designed teaching protocol were deep sternal wound infection, pneumonia, pain, constipation and myocardial infarction. This finding supported with (46); who documented that one of the most important complications after CABG surgery is deep sternal wound infection (DSWI) which is an infection of the anterior mediastinal space involving muscle, bone and/or mediastinum, the incidence of DSWI varies from 0.6–3%.

In agreement with these study findings (47), who supposed that different physiological and psychological problems are going to be seen in the patients after coronary artery surgery, which are basically due to immobility, fear and anxiety which will be distorted in these patients. As well, (48),found that, the 30-day operative death and major complication rates for CABG procedures were 3.05% and 13.40%,respectively,including stroke (1.63%),renal failure (3.53%), re-operation (5.17%),pneumonia (5.96%) and sternal infection(0.63%).

The present study findings reported that less than half of both study and control group developed pneumonia before implementing a designed teaching protocol which decreased for study group post implementation. This is consistent with (49); who reported that, the incidence of pneumonia following CABG surgery was 33%. This may be attributing to interventions such as breathing and coughing exercises, early ambulating, and pulmonary clearing techniques often are used by physical therapists to prevent pulmonary complications after coronary artery bypass graft (CABG) surgery.

These results are in agreement with (50) who has shown that knowledge of nurses who received an education program about their role of nursing care provided to patients with CABG surgery will put a positive effect on patient outcomes.

In contradiction to these study findings, (51), who studied "The impact of pre-operative education on recovery following coronary artery bypass surgery, A randomized controlled clinical trial" on Three hundred and fifty-six people were randomized into the study, with 188 in the experimental and 168 in the control groups. Showed that no significant statistical differences between both groups in related to the expected outcomes from the educational program.

As regard the incidence of nausea and vomiting, the current study was found that (10%) of the study group compared to 30% of the control group after implementing of a designed teaching protocol. This result disagree with (52); who confirmed that, nausea and vomiting, is experienced by a great number of patients after cardiac surgery (67%), with the majority suffering on the first day after surgery. The period of nausea and vomiting for the majority is little, but for a considerable number (7%) it can last up to one quarter of their early post-operative track. This may point to the frequency of postoperative nausea and vomiting (PONV) can be exaggerated by surgical practice, and utilize of anaesthesia.

## V. Conclusions

Considering the results of the present study, it can be concluded that, nurses' knowledge and practices were improved significantly post a designed teaching protocol concerning one of the most important areas of nursing care provided for the CABG patients at the critical care areas which leading to improvement of patient outcomes in form of lowering the occurrence of coronary artery bypass graft surgery complications among study group as compared by the control group subjects.

## VI. Recommendations

Based on the findings of the current study, the following recommendations are proposed.

### Recommendations related to patients

- Regular follow up for all patients with CABG to evaluate their health conditions and to detect any complications early.
- Establishment of patients' educational centers in hospitals equipped by suitable related materials, medias and audio-visual aids for teaching all CABG patients' how to live with their medical condition

### Recommendations for furthers researches

- Replication of the study on a larger probability sample selected from different geographical areas in Egypt is recommended to obtain more generalizable data.
- Standardized nursing procedures should be used to guide the nurses in dealing with patients with heart surgery.
- Further research is suggested to evaluate the long-term effect of such protocols, and how much of the gained benefits in terms of improved knowledge and skills is retained over time.
- During academic studies, the students should have course outline about CABG surgery involving updating knowledge and guidance for what to know and how to do.

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