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Nurses' performance Regarding Care of Patients Undergoing Coronary Artery Bypass Graft

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ABSTRACT

Background*:** Coronary Artery Bypass Graft (CABG) is one of the most commonly performed cardiac surgeries worldwide. The role of nurses varies in different units, but it plays a key role in patients undergoing coronary artery bypass surgery, and they are often the first point of care for the patient. Patient problems may emerge due to nurses' lack of knowledge or their poor practice regarding caring or outdated management methods. So, nurses should have adequate knowledge and practices to be able to manage patients undergoing Coronary Artery Bypass Graft. ***The study aimed was to assess nurses' performance regarding care of patients undergoing CABG. ***Research design*:** a descriptive exploratory research design was utilized to conduct the aim of the study. ***Tool of data collection*:** two tools were used to collect data: **Tool I:** A structured interview questionnaire for nurses **Tool II:** Nurses practice observational checklist tool. ***Setting:*** The study was conducted in Cardio-thoracic Intensive Care Unit, at Zagazig University Hospitals. ***Study subjects*:** All available nurses (40) who provide direct care to patients with coronary artery bypass graft at least one year of experience in intensive care units and accept to participate in the study. ***Result*:** Two third 65% of studied nurses aged were from 20 to 30 years old, 77.5% of the studied nurses were females and 67.5% were married, 50% of the studied nurses had technician diploma degree and did not have enough income (57.5%), and from rural area (65%). More than half of studied nurses (52.5%) attended training about care of patients. Highest percent of studied nurses had less than twenty years of experience in nursing (90%) and less than ten years of experience in intensive care unit (80%).The total mean knowledge score of 77.5% staff nurses regarding care of patient undergoing coronary artery bypass graft was low. As well, 62.5% the nurses' practice regarding care of patient undergoing coronary artery bypass graft was satisfactory. Additionally, there was no a significant correlation between knowledge and practice of studied nurses *(P= 0.635).* ***Conclusion***: the study finding concluded that nurses had unsatisfactory level of knowledge and inadequate practice regarding the care of patients undergoing CABG. ***Recommendation:*** study recommended development of educational program for nurses to improve their knowledge and skills regarding care of patient undergoing CABG to improve their performance and enhancing the patient care level and the quality of care.

Keywords: Nurses' Performance, Knowledge & practice, coronary artery bypass graft, post-operative care

INTRODUCTION

Cardiovascular diseases encompass a group of diseases that affect the structure and function of the blood vessels and heart **(Zhou,et al., 2021).** Examples of cardiovascular diseases include coronary heart disease, stroke, aortic disease, peripheral artery disease, rheumatic heart disease, and others **(Bansal , 2020)**. These conditions are the most common cause of death globally, with over 17.3 million deaths per year **(The Heart and Stroke Foundation South Africa, 2016)**. Much is known about the risk factors that contribute to the development and exacerbation of cardiovascular diseases, and many of these risks are entirely preventable **Magnussen,et al.,(2023).**

By assessing and controlling these risks, death and disability from heart disease can often be delayed or prevented. This datum primarily focuses on preventive interventions that can be implemented in the clinical setting but also touches on public health initiatives and relevant studies. Coronary artery bypass grafts (CABG) are the most commonly performed cardiac procedures in the world. Nurses are involved in the care of patients undergoing CABG, in the intensive care, ward and also in the home. They play key roles in the postoperative recovery of CABG patients through continuous monitoring, health education, wound management and physical care. Adequate nursing interventions can promote quick relief from the chest wound pain, reduce postoperative cough, sputum retention and promote effective breathing . Nurses have a critical role in successful recovery and the wellbeing of the patient **Ahmed, (2025).**

Inadequate nursing knowledge and practice will have a negative impact on the patient, leading to severe health problems, increased physical discomfort, and unrest, and a decreased capacity to perform lifestyle modifications **Molina and Gallo, (2020).** Most coronary artery bypass graft (CABG) patients become aware of their disease and health needs only after a heart attack and undergoing surgical related treatment. Patients are frequently unaware of their disease modifications and are dissatisfied or unwilling to adopt the required lifestyle changes **said,et al.,(2022).** Inadequate knowledge on the part of nurses and less willingness to put new evidence into practice will result in poor nursing care and reduce the intervention effectiveness in patient outcome. Furthermore, health professionals must conduct most of the postoperative patient follow-up activities and provide patients with correct treatment advice and support **Welish ,(2018).**

However, broad research in recent days has highlighted the poor information given to patients on numerous health issues by health professionals. Staff and insufficient nursing care after CABG may exacerbate the patient's poor quality of life. Three-quarters of CABG care needs are unmet in the home care setting because of inadequate professional care **Abo-El-Ata,et al.,(2021)**. There are significant knowledge deficits in conditions relevant to overall care of the patient in the acute-care scenario. The patient education manual could enhance home care of the caregiver by addressing the knowledge deficit. This medical and nursing treatment-related knowledge deficit accounts for half of the unmet needs for home-based care. A home care management knowledge manual should be developed and provided to the nurse **Raines &Dickey, (2019)**.

The need for nurse specialist support in the home care set up calls for service policy development. Across the globe, nurses in the practice field have been confronting changes at work owing to drainage. The classic care model has been replaced by advanced care models, creating a necessity for use of expertise on the part of the nurse **Abou Malham,et al,(2020)**. Moreover, state-of-the-art healthcare has improved in terms of technology and medication, and as a result of this, there has been an increase in the level of care required in patient management. The nurses are required to possess comprehensive practical understanding, insight and competence regarding their role. The reports on charge-reducing nursing interventions in, and unsatisfactory knowledge and practice of the nurse given CABG care in diverse situations **stoumpos,et al,(2023)**.

The patient group of CABGs is generally elderly population group. Due to the growing elderly population, CABG now has become a common procedure. Furthermore, due to the developments and technical possibilities in cardiology, various methods have been developed in the surgical field for the treatment of coronary artery disease, but none of these surgical methods reached the success rate of CABG **Melly,et al,(2018).**

Undoubtedly, CABG is a challenging surgical technique and requires detailed theoretical knowledge along with technical surgical skills. As nurses are a group of healthcare providers who are most often involved in the care of these patients, they should have the knowledge including complications and prevention, necessary assessment and aspects of nursing care, as well as clinical competencies required to provide holistic care such as critical thinking ability, nursing skills, hand hygiene practice and isolation measures practice. In taking care of patients undergoing a CABG, the nursing process is seen as the most efficient way to plan and evaluate care, considering unique outcomes that correspond to each patient **Flaubert,et al,(2021).**

The overall nursing process including assessment, nursing diagnosis, planning, implementation and evaluation should be necessary for providing wholistic quality patient care, prevent complication and enhance selfcare ability of patients. In taking care of patients undergoing a CABG, preoperative, intraoperative and postoperative assessments will be most likely necessary **Elsawy,et al,(2019).** It is important of patient's concern about professionals' knowledge in the first time of being admitted in the recovery room than in other settings. Special attention to the hand hygiene with rub in the 9th thing to do **(Amudha, 2017)**. The attention on monitoring is usually between the 12th to the 24th.

Significance of the study: In adequate compliance with recommended postoperative care after CABG remains an important problem that facing health care providers in all settings and populations. Based on previous researches, it was noted that noncompliance with postoperative care creates a threat to satisfactory outcome. If the nurse is unable to maintain compliance with postoperative care, these will lead to complications to the patients; increasing their patient length of hospital stays, morbidity and mortality, raising the costs of treatment and effort of the care providers **El Desouky, Taha, & Hafez, (2020)**.

AIM OF THE STUDY

The aim of this study was to assess nurses' knowledge and practice regarding care of patients undergoing CABG.

RESEARCH QUESTIONS:

- **H1:** What is nurses' level of knowledge regarding care of patient undergoing coronary artery bypass graft?
- **H2:** What is nurses' practice regarding care of patient undergoing coronary artery bypass graft?
- **H3:** Is there a relation between the nurses' level of knowledge and their practice regarding care of patient undergoing coronary artery bypass graft?

SUBJECTS AND METHODS

A descriptive exploratory research design was utilized to conduct the aim of the study. The study was conducted in Cardio-thoracic Intensive Care Unit, at Zagazig University Hospitals. All available nurses (40) who provide direct care to patients with coronary artery bypass graft at least one year of experience in intensive care units and accept to participate in the study.

TOOLS OF DATA COLLECTION:

- **Tool I:** An Interviewing questionnaire: An Interviewing questionnaire was written in a simple Arabic language to avoid misunderstanding. It was designed by the researcher after reviewing of related literature **(Poser et al., 2024; Alaa et al., 2023; Linton and Matteson, 2023; Lewis et al., 2016)** to assess nurses` knowledge regarding care for patient undergoing coronary artery bypass graft, and **composed of two part as the following :**
- **Part I: Demographic characteri-stics of the nurses:** It was composed of 8 closed ended questions including age, sex, and marital status, level of education, years of experience, attendance of training program, presence of continuing training centers in hospital for nurses, and presence of open-heart guidelines for nurses **(Amin, et al., 2021).**
- **Part II: Nurses knowledge about coronary artery bypass graft:** It was developed by the researcher to assess nurses' knowledge regarding care of patient undergoing coronary artery bypass graft. It composed of two parts include:

A. N**urses' knowledge about assess-ments of coronary artery by bass graft:** It was composed of 6 main questions as multiple choice questions MCQ such as (Definition of coronary artery bypasses surgery, Indications for surgery, Common arteries used for grafting, immediate post-operative complications, Causes of bleeding after surgery, Duration antibiotic after surgery).

B. **Nurses' of knowledge about postoperative care for patient on mechanical ventilation:** it was composed of 62 questions , as multiple choice questions MCQ, yes or no.it concerned with assessment of the following:

- **Nurses' knowledge regarding to: the Care of patients with endotracheal tube.** It was composed of 5 questions (sign of exit of endotracheal tube, Care of patients with endotracheal tube and so on…)
- **Nurses' knowledge regarding to: the care of airway:** It was composed of 4 questions (best methods for keeping patent airway, fixation of airway tube and so on…).
- **Nurses knowledge regarding to: the Care of patients during suction.** It was composed of 8 questions (to avoid decreasing oxygen level, precaution before suction patient on ventilator and so on…).

- **Nurses knowledge regarding to: nursing care of central venous catheter:** It was composed of 5questions (routine change of central venous catheter, advice to use ACVC and so on…).
- **Nurses knowledge regarding to: the Care of patients mouth and airway:** It was composed of 2 questions (routine removal& clean of airway tube, to avoid ventilator associated pneumonia).
- **Nurses' knowledge regarding to: nursing care during analysis of blood gases:** It was composed of 7 questions (evidence of efficient nursing care to patient with failure of gas exchange, nursing role to patient with failure of gas exchange and so on…).
- **Nurses knowledge regarding to: nursing care toward moisture:** It was composed of 3 questions (benefits of ventilators, using lubricants in temperature of fluids putted in lubricant and moisturant filled with)
- **Nurses' knowledge regarding to: nursing care toward respiratory exercise:** It was composed of 8 questions (best position of the patient, change position exercise and so on…).
- **Nurses' knowledge about nursing care as regard diet and fluid:** It is composed of four questions as MCQ. It concerned with to prevent thickness of respiratory discharge, Importance of feeding to patient on ventilator, Measures used at insertion of Ryle and Disadvantage of improper feeding of patients on ventilator.
- **Nurses knowledge regarding to: nursing care toward infection control:** It was composed of 3 questions(time of changing tube of ventilator, time of sterilization of ambo bag and time of change saline used for cleaning tubes)
- **Nurses' knowledge regarding to: the Care of patients with chest tube:** It was composed of 7 questions (indication of using chest tube, usually insertion of chest tube under general anesthesia and so on…).
- **Nurses' knowledge regarding to: nursing care of urinary catheter:** It was composed of 10 questions (small catheter is preferred, urinary catheter used when necessary and removed when patient discharged and so on…).

The scoring system for nurses' knowledge regarding the care for patients underwent coronary artery bypass graft: 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. Knowledge was considered satisfactory if the percent score was 70% or more and unsatisfactory if less than 70%.

Tool II: Observational checklist of nurses' practices for patients with CABG: It was developed by the researcher to assess nurses' practice during caring for patients undergoing CABG. The tool covered all procedures about nursing for patients with CABG, which was divided into two parts as the following and the answer with done or not done.

1- Check list about primary assessment:-It consists of twelve items.

- **Part 1:** consisted of 4 items about assessment of vital signs.
- **Part 2:** consisted of 4 items about respiratory assessment
- **Part 3:** consisted of 3 items about cardiovascular assessment
- **Part 4:** consisted of 6 items about neurological assessment
- **Part 5:** consisted of 3 items about fluid/electrolyte assessment
- **Part 6:** consisted of 6 items about Circulation
- **Part 7:** consisted of 5 items about Digestive system
- **Part 8:** consisted of 5 items about Urinary system
- **Part 9:** consisted of 6 items about medication administered as ordered
- **Part 10:** consisted of 3 items about Patient position
- **Part 11:** consisted of 6 items about Wound assessment
- **Part 12:** consisted of 5 items about Pain assessment

2- Check list about secondary assessment: it consists of seven items.

- **Part 1:** consisted of 6 items about Maintain patent airway
- **Part 2:** consisted of 42 items about Care of endotracheal tube
- **Part 3:** consisted of 37 items about ABG
- **Part 4:** consisted of 32 items about Ventilator weaning and safe extubation
- **Part 5:** consisted of 25 items about measuring central venous pressure (CVP)
- **Part 6:** consisted of 22 items about Routine care for chest tube.
- **Part 7:** consisted of 14 items about Measuring Intake and Output.

Scoring system for nurses' Practice:

In the observation checklists, the items "not done" were scored zero. For each procedure, 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 percent scores. The practice was considered satisfactory if the percent score was 70 % or more and unsatisfactory if less than 70% based on data collection.

Administrative and ethical consideration:

The necessary approvals were obtained from the dean of the Faculty of nursing and submitted to general director of Zagazig University Hospitals. Then Permission to carry out the study was obtained from the head of mentioned setting after explaining the purpose of the study and a verbal consent was obtained from nurses for participation in the study and they were assured that the information would be used for research purposes only. After explaining its purpose, they were given an opportunity to refuse the participation, and they were assured that the information would be used for research purposes only. All ethical issues were taken into consideration during all phases of the study. The ethical research considerations in this study included the following: The research approval was obtained. The objectives and the aims of the study were explained to the participants, Confidentiality and anonymity of the subjects were also assured through coding of all data, and subjects were allowed to choose to participate or not and they had the right to withdraw from the study at any time without penalty. The researcher assured that the data collected will be confidential and would be used only to improve their knowledge and practice for the purpose of the study.

A pilot study

A pilot study for tools of data collection was carried out prior to data collection in order to test the clarity, applicability, feasibility, relevance of the data collection, and to identify any possible obstacles that may hinder the data collection. For this study, the researcher selected 10% of the study subjects (4 nurses) random to participate in the pilot testing of the questionnaire and checklist from CCU. Nurses involved in the pilot study were included in the study sample because of no modifications in the tools.

Field work:

The study was implemented in six months started from June 2023 to the end of October 2023. An official permission was taken from the director of Zagazig university hospital after explanation of the purpose of the study. Once the researcher has gained the approval; the researcher visited the setting and met with the nursing director of cardio-thoracic Intensive Care Unit, at Zagazig University Hospitals for scheduling the fieldwork activities. The researcher explained the aim and nature of the study in order to gain their cooperation during data collection. Eligible ones were recruited after being informed about their ethical rights and after providing their oral informed consent. The information obtained served as baseline data or pretest, and guided the researcher in the preparation to instructional module booklet.

The staff nurses` practice was assessed by the researcher using the observational checklist. The observation was done at morning and afternoon shifts while the nurse was providing care to patients.

The researcher then collected baseline data by distributing structured interviewing questionnaire to each nurse with clear instructions about its filling. The sheet was completed by each nurse in the presence of the researcher to ensure homogeneity and validity of responses. This was carried out in the clinical area where the nurses were providing the care for patients. It took about thirty-five minutes by each staff nurse to fill the sheet.

Content validity and reliability:

Content validity was conducted to determine whether the content of the tool cover the aim of the study. This stage developed by a jury of five experts, who reviewed the tool`s content for clarity, relevance, comprehensiveness, understand-ding and ease for implementation. All recommended modifications were done.

Cronbach alpha coefficient was calculated to assess the reliability of the scales through their internal consistency.

Scale	Cronbach's Alpha
Knowledge	0.832
Practice	0.791

STATISTICAL ANUALYSIS:

All data were collected, tabulated and statistically analyzed using **SPSS** 20.0 for windows (SPSS Inc., Chicago, IL, USA 2011)). Quantitative data were expressed as the mean ± SD and qualitative data were expressed as absolute frequencies (number) & relative frequencies (percentage). **Mc nemar** test was used to compare between two dependent groups of categorical data. **Paired t-test** was used to compare between two dependent groups of normally distributed variables. Wilcoxon Signed Ranks Test was used to compare between two dependent groups of not normally distributed variables. Percent of categorical variables were compared using Chi-square test or **Fisher's exact** test when appropriate. **Spearman correlation coefficient** was calculated to assess relationship between study variables, (+) sign indicate direct correlation & (-) sign indicate inverse correlation. Multiple linear regression (step-wise) was also used to predict factors which affect practice score. Cronbach alpha coefficient was calculated to assess the reliability of the scales through their internal consistency. P-value < 0.05 was considered statistically significant, p-value < 0.001 was considered highly statistically significant, and p-value ≥ 0.05 was considered statistically non-significant (NS).

RESULTS:

Table 1 represents frequency and percent distribution of demographic characteristics of studied nurses. It was found that about two third of studied nurses (65%) were from 20 to 30 years old with mean of age (31.22± 8.05). Furthermore, most of them were females (77.5%), married (67.5%), had technician diploma (50%), did not have enough income (57.5%), and from rural area (65%). More than half of studied nurses (52.5%) attended training about care of patients. Highest percent of studied nurses had less than twenty years of experience in nursing (90%) and less than ten years of experience in intensive care unit (80%).

Table 2 demonstrates total mean scores of knowledges and its domains about post-operative care of patient with coronary artery bypass as reported by the studied nurses throughout study phases. It was found that the total mean±SD was 28.85±3.27, and the highest score was for their knowledge about "nursing care of urinary catheter" = (7.82±0.74) followed by "care of patients with chest tube" = (***1.23±4.35***). However, the lowest mean score was found for "Nursing care toward moisture" = (0.25±0.54).

Table 3 represents distribution of total score of satisfactory practice and its domains about post-operative care of patient with coronary artery bypass. It was observed that the total mean±SD was 274.90±39.02. The highest score was for their practice on "maintain patent airway" = (52.87±12.01) followed by "Measuring central venous pressure (CVP)" = (37.67±7.04) in the secondary assessment. However, the lowest mean score was found for "Cardiovascular assessment" = (2.05±0.87) in the primary assessment.

Table 4 demonstrates Relation between demographic characteristics of studied nurses and their satisfactory knowledge score throughout study phases is revealed in table 4. It was found that there is no a significant relation between demographic characteristics of studied nurses and their satisfactory knowledge score in pre-phase.

Table 5 displays relation between demographic characteristics of studied nurses and their satisfactory practice score throughout study phases. It was found that there is no a significant relation between demographic characteristics of studied nurses and their satisfactory practice score in pre-phase.

Table 6 declares the relation between knowledge and practice of studied nurses throughout study phases. It was observed that there was no a significant relation between knowledge and practice of studied nurses (P= 0.635).

Table 1: Frequency and Percent distribution of Demographic Characteristics of studied nurses (n=40).

Demographic Characteristics	Frequency	Percent (%)
Age:		

20-<30	26	65.0
30-<40	8	20.0
40-50	6	15.0
Range	21-50	
Mean± SD	31.22± 8.05	
Gender		
Male	9	22.5
Female	31	77.5
Nursing qualification:		
Diploma	20	50.0
Technician diploma	20	50.0
Bachelor	0	0.0
Marital status:		
Single	11	27.5
Married	27	67.5
Widow	2	5.0
Income		
Not enough	23	57.5
Enough	17	42.5
Residence		
Rural	26	65.0
Urban	14	35.0
Attended training about care of patients:		
Yes	21	52.5
No	19	47.5
Experience years in nursing		
<20	36	90.0
≥ 20	4	10.0
Range	1-30	
Mean± SD	9.42 ± 8.54	
Experience years (ICU)		
<10	32	80.0
≥10	8	20.0
Range	1-20	
Mean± SD	6.72± 5.81	

Table 2: Total mean scores of knowledges and its domains about post-operative care of patient with coronary artery bypass as reported by the studied nurses throughout study phases (n=40)

Nurse knowledge	Satisfactory knowledge	W	p. value
	Pre		
	Mean± SD		
Nurses' knowledge about CABG operation	2.82±1.29	-5.199	0.001**
Nurses' knowledge about nursing care after operation: Care of patients with endotracheal tube	1.70±0.88	-5.498	0.001**
Care of airway	0.32±0.57	-5.558	0.001**
Care of patients during suction	3.32±1.71	-5.470	0.001**
Nursing care of central venous catheter	1.65±1.05	-5.335	0.001**
Care of patients mouth and airway	0.87±0.64	-4.537	0.001**
Nursing care during analysis of blood gases	2.67±1.07	-5.542	0.001**
Nursing care toward moisture	0.25±0.54	-5.395	0.001**
Nursing care toward respiratory exercise	1.70±1.50	-5.462	0.001**
Nursing care as regard diet and fluids	2.85±0.36	-2.518	0.012*
Nursing care toward infection control	0.95±0.59	-5.069	0.001**
Care of patients with chest tube	4.35±1.23	-4.958	0.001**
Nurses' knowledge about nursing care of urinary catheter	7.82±0.74	-5.176	0.001**
Total knowledge	28.85±3.27	-5.515	0.001**

W: Wilcoxon Signed Ranks Test, *: statistically significant (p<0.05), **: statistically highly significant (p<0.001)

Table 3: Total mean scores of practice and its domains as reported by the studied nurses throughout study phases (n=40)

Nurse practice about post-operative care	Pre	Paire	p-

	Mean± SD	d t-test	value
A - Primary assessment: Vital signs	3.00±1.03	-5.663	0.001**
Respiratory assessment	3.45±0.58	2.525	0.013*
Cardiovascular assessment	2.05±0.87	-6.676	0.001**
Neurological assessment	4.32±1.42	3.805	0.001**
Fluid/electrolyte assessment	2.07±0.97	-5.176	0.001**
Circulation	5.17±1.11	1.194	0.239
Digestive system	2.95±1.19	-8.475	0.001**
Urinary system	3.70±1.39	4.686	0.001**
Medication administered as ordered	4.72±1.50	-5.538	0.001**
Patient position	2.30±0.88	3.865	0.001**
Wound assessment	4.65±1.70	-4.997	0.001**
Pain assessment	3.00±1.29	3.6205	0.001**
Total Primary assessment	42.47±7.33	-8.410	0.001**
B-Secondary assessment. Maintain patent airway	52.87±12.01	6.639	0.001**
Care of endotracheal tube	31.15±9.50	-6.559	0.001**
ABG	32.10±5.46	6.563	0.001**
Ventilator weaning and safe extubation	33.27±6.01	-8.328	0.001**
Measuring central venous pressure (CVP)	37.67±7.04	6.559	0.001**
Routine care for chest tube	26.22±4.96	-9.974	0.001**
Measuring Intake and Output	22.12±3.58	2.5129	0.014*
Total secondary assessment	232.42±38.47	-9.083	0.001**
Total practice	274.90±39.02	-10.574	0.001**

Non-significant (p>0.05), *: statistically significant (p<0.05), **: statistically highly significant (p<0.001)

Table (4): Relation between Demographic Characteristics of Studied Nurses and Their Satisfactory Knowledge Score throughout study phase Demographic Characteristics

Demographic Characteristics	Total satisfactory knowledge≥70 Pre=9 No.	%	χ^2 (^{1}p-value)	χ 2 (2p-value)
Age:				
30≥20	4	44.4	2.191	25.11 (0.001**)
40≥30	3	33.3	(0.334)	
40-50	2	22.2		
Gender				
Male	2	22.2	FET (0.99)	FET (0.557)
Female	7	77.8		
Nursing qualification:				
Diploma	3	33.3	FET (0.451)	FET (0.605)
Technician diploma	6	66.7		
Marital status:				
Single	3	33.3	1.257	0.269
Married	5	55.6	(0.534)	(0.874)
Widow	1	11.1		
Income				
Not enough	5	55.6	FET (0.99)	FET (0.294)
Enough	4	44.4		
Residence				
Rural	4	44.4	FET (0.234)	FET (0.602)
Urban	5	55.6		
Attended training about care of patients:				
Yes	6	66.7	FET (0.457)	FET (0.99)
No	3	33.3		
Experience years in nursing				
<20	8	88.9	FET (0.99)	FET (0.001**)
≥ 20	1	11.1		
Experience years (ICU)				
<10	7	77.8	FET (0.99)	FET (0.001**)
≥10	2	22.2		

χ 2 : Chi square test FET: Fisher exact test non-significant (p>0.05), **: statistically highly significant (p<0.01), p^1: for pre-intervention,

Table (5):Relation between Demographic Characteristics of Studied Nurses and Their Satisfactory practice Score throughout study phases

Demographic Characteristics	Total satisfactory practice≥70 Pre=25 No.	%	χ^2 (^{1}p-value)	χ 2 (2p-value)
Age:				
30≥20	18	72.0	1.436	2.213
40≥30	4	16.0	(0.488)	(0.331)
40-50	3	12.0		
Gender				
Male	6	24.0	FET (0.99)	FET
Female	19	76.0		(0.001**)
Nursing qualification:				
Diploma	13	52.0	FET (0.99)	FET
Technician diploma	12	48.0		(0.487)
Marital status:				
Single	7	28.0	3.539	11.231
Married	18	72.0	(0.170)	(0.001**)
Widow	0	0.0		
Income				
Not enough	16	64.0	FET (0.336)	FET (0.99)
Enough	9	36.0		
Residence				
Rural	18	72.0	FET (0.310)	FET (0.99)
Urban	7	28.0		
Attended training about care of patients:				
Yes	13	52.0	FET (0.99)	FET
No	12	48.0		(0.023*)
Experience years in nursing				
<20	23	92.0	FET (0.622)	FET
≥ 20	2	8.0		(0.192)
Experience years (ICU)				
<10	20	80.0	FET (0.99)	FET
≥10	5	20.0		(0.364)

χ 2 : Chi square test FET: Fisher exact test non-significant (p>0.05), *: statistically significant (p<0.05), **: statistically highly significant (p<0.01), p^1: for pre-intervention,

Table 6: Correlation between knowledge and practice of studied nurses throughout study phases.

Pre	Practice	
knowledge	r	P
	0.077	0.635

Non-significant (p>0.05), **: statistically highly significant (p<0.001), r: correlation coefficient

DISCUSSION

Coronary artery bypass grafting (CABG) is a well-established procedure to treat coronary artery stenosis. Since the introduction of percutaneous coronary intervention, CABG is now more common among patients with advanced coronary disease and comorbid conditions **(Billard, Wells, Farrell, Curran, & Sheppard, 2024).**

The performance of nurses in intensive care units (ICUs) significantly impacts patient outcomes, particularly for those undergoing complex medical procedures such as CABG. This surgical intervention is associated with various postoperative

complications and requires specialized nursing care to ensure patient safety and promote recovery **(Lee et al., 2020).** So, cardiothoracic surgery nurses should be qualified enough to care for patients because those patients need special nursing care; standard nursing care to improve their conditions and to help in preventing or reducing potential postoperative compli-cations. They should develop their standards of care and the profession should agree on acceptable levels of excellence. Nurses are planned, systematic, and focused on mutually agreed goals in which standards of care influence nursing practice, education, and management **(Qiu, 2024).**

With the current study, four main areas will be covered; firstly, the **demographic data of the studied nurses,** secondly, **nurses' knowledge regarding care of patients undergoing CABG,** third is the **nurses' practice regarding care of patients undergoing CABG,** and lastly is **the relation between the nurses' level of knowledge and practice**. The current study aimed to assess nurses' performance regarding care for patients undergoing coronary artery bypass graft in intensive care units at Zagazig University Hospital. The utilized sample constituted 40 nurses who applied care of patients undergoing CABG in the Intensive Care Unit at Zagazig University Hospital.

Regarding the age of the studied nurses, the result of the present study showed that the majority of the studied sample was aged between 20 to 30 years old and were females. This may be due to that in Egypt, nursing was exclusive for females only till a few years ago. In addition, all the nurses had diploma and technician diploma degrees, and more than half of them were married. Most of them had less than 10 years of experience in the ICU, and more than half had attended training about the care of patients.

That's in agreement with the finding of the study by **Ragheb and Metwally, (2016)** who revealed that three-quarter of their studied nurses aged less than 30 years. Also, this finding was congruent with an Egyptian study by **Abusaad and Etawy (2015),** who revealed that the majority of nursing staff were female, and more than half of them aged between 25-35 years old.

On the other hand, **Abukhader, and Abukhader, (2020)** found that the majority 53.8% of the studied samples were male. Additionally, in the study by **Masibo, Kibusi, and Masika, (2024),** in Tanzania, they found that most of their participants aged 26-44 years old, half of them were males, and more than two-thirds of them had education levels of diploma and below level.

Regarding previous training and years of experience, more than half of studied nurses attended training about care of patients This may refers to the continuous training that the hospital offers to the healthcare providers. Also, the highest percent of these nurses had less than twenty years of experience in nursing and less than ten years of experience in intensive care units. This may be due to the need for experienced, qualified nurses in providing care for the critically ill patients in ICUs in order to provide quality and effective care for better patients' outcome and satisfaction. From the researcher's point of view the continuous training sessions for nurses and increased years of experience are fully important to improve their performance, and affect positively the quality of care.

This goes on line with **Alsadaan et al., (2023)** who studied "impact of nurse leaders' behaviors on nursing staff performance" and found that the majority of the participants in most of the studies were females and aged above 30 years with high work experience. They explained that nurses are the primary healthcare providers who spend a significant amount of time with patients delivering care and services, and experienced nurses are highly recommended.

However, **Sulosaari et al. (2015),** studied "factors associated with nursing students' medication competence at the beginning and end of their education" in Finland and found that their participant nurses had had neither adequate training nor working experience, so they confirmed that training and education were identified as major drivers for the safe, competent and punctual provision of care and it was crucial for nurses to undertake the necessary training to keep the level of their knowledge and technical skills up to date.

In this study, regarding the total mean score of knowledge, it was found that the total mean score of knowledge was low. It was a cause of great concern and indicated the urgent need for new information among CABG nursing staff. Due to lack of knowledge, errors can occur in care, which can be detrimental to patients. Thus, it is essential for nursing staff to have the most current and correct information about each patient's medical and surgical procedures. Furthermore, after discharge, this knowledge can also be passed to the patient and family members. Simultaneously, this knowledge of patients and families can have a positive impact on improved care at home after discharge.

This is in agreement with **Jabr, Taha, & Metwally, (2022)** in Egypt who depicted an improvement in nurses' total knowledge level after applying an educational program. They stated that applying an educational program for nurses is fully important in

enhancing their levels of knowledge and recommended continuous evaluation of nurses' knowledge and practice to identify their needs, encourage and help nurses to attend national and international conferences, workshops, and training courses related to nursing care for patients undergoing cardiac catheterization, and also an educational program for cardiac catheterization unit nurses to improve knowledge and avoid complications after cardiac catheterization.

Nurses and other health care providers have significant roles in guiding patients on procedures and post-discharge care. They need to emphasize the necessary care techniques to achieve successful treatment outcomes. But studies have identified a basic lack of understanding among nursing professionals about the procedure that may have significant treatment repercussions as well. Research conducted at a hospital showed that nurses within the hospital had below-average ratings of understanding of the necessity of post-surgical care or the protocol to be established for CABG surgery **(Maggard-Gibbons et al., 2023).**

Also, these finding goes in with the study conducted by **Goda Elbqry, (2023)** In Egypt who found that the studied nurses had low mean score of knowledge, and concluded that nurses must improve their knowledge levels regarding CABG through ongoing seminars, educational programs, and journals as these programs are urgently designed to assess nursing staff in developing and enhancing the skills needed to provide high qualities of care to CABG patients.

Additionally, this goes on the same line with **Hassan, (2023)** in Iraq whose study findings reported that the studied nurses' level of knowledge was low, and confirmed that the educational program was highly effective in improving nurses' levels of knowledge on their care of patients with CABG. Accordingly, they recommended that the educational program can be used as an educational mean for all nurses working at cardiopulmonary bypass units.

As it is obvious, the previous results underscore the critical need for ongoing education in nursing particularly concerning complex surgical procedures like CABG. The substantial increase in knowledge suggests that structured educational interventions can bridge the knowledge gap among nursing professionals. This improvement not only enhances the quality of care provided to patients but also empowers nurses to engage in informed discussions with patients and their families regarding the surgical process and postoperative care. Furthermore, in Sudan, **Mohamed, (2023)** conducted a study on "effect of training nurses in ICU in immediate care post cardiac surgery". They found that the knowledge of most of the nurses was very low and significantly improved after implementing a training program.

On the other hand, **Abd El Samiea, Abd El-Moniem, & Hassan, (2024)** in Egypt studied "assessment of nurses' performance regarding postoperative care of children with cardiac surgery" and stated that more than half of the studied nurses had satisfactory knowledge.

In this study, regarding total mean score of practice and its domains as reported by the studied nurses throughout the study phases, it was found that the total mean score was satisfactory. Also, nurses who participate in these programs are better equipped to manage CABG patients' needs, including monitoring for complications, providing appropriate interventions, and educating patients on self-care1. From the researcher's point of view, high-level evidenced educational programs help standardize care practices, ensuring that all nurses follow evidence-based guidelines for CABG patient care, also the facilitating knowledge and skills educational programs may enhance nurses' levels of performance regarding post-operative care, cardiac rehabilitation, and patient education.

This finding is in accordance with **Soliman, Ahmed, and Abd Elsatter, (2020)** who depicted that more than half of nurses under studies got total satisfactory level of practice regarding post-operative care of patient with open-heart surgery. They referred that to the close supervision from senior staff, enough years of experience and better qualifications among studied nurses. Also, **Al Battniji, (2013)** who conducted a study titled "Nurses' knowledge and practice regarding post- operative care for patient with open heart surgery at Sudan heart center" and found that more than two thirds of nurses' under study got satisfactory level of total practice of participants regarding post- operative care for patient with open heart surgery.

Consistent with these findings **Chhaba, (2024)** who studied a quasi-experimental pretest and posttest study titled "Impact of awareness educational program on knowledge and practice regarding cardiac rehabilitation of patients with CABG among staff nurses working in the post-operative cardiac care units" and depicted that their studied nurses had an unsatisfactory level of practice. So, they completed that cardiac rehabilitation teaching program is an effective intervention for staff nurses and will influence their confidence and skills in caring for post-operative CABG patients. Furthermore, a continuous supply of instructional materials and training from medical experts is recommended on a timely basis. Additionally, **Louis, (2019)** in India conducted a study on the "Effect of planned teaching on knowledge and practices among staff nurses working in a selected

hospital regarding the prevention of selected cardiopulmonary complications in post-operative CABG patients" and revealed that their studied nurses had an unsatisfactory level of practice before applying a teaching program, and that planned teaching program successfully increased staff nurses' understanding and skills related to preventing specific complications in patients who have undergone CABG surgery. As a result, the quality of care provided to these patients improved.

Additionally, **Mlambo, Silén, & McGrath, (2021)** contributed that their studied nurses had an unsatisfactory level of practice regarding CABG, and they recommended that the nurses must be able to expand their knowledge of this area through ongoing education, journals, 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. Moreover, the above finding matches with **Maglanque, (2017)** who conduct the study titled "cardiac nurses' knowledge, assessment practices and management of post- operative patient care" and found that the nurse's practice was poor in general.

In the present study, concerning the relation between demographic characteristics of studied nurses and their satisfactory knowledge, it was found that there was no significant relation between demographic characteristics of studied nurses and their satisfactory knowledge score except in those who aged from 20 to 30 years and who had experienced less than 20 years in nursing and less than 10 years in ICU, this aligns well with the idea that younger nurses and those with less experience are newly graduated with recent information and also might be more eager to learn and adapt to new information and skills. This suggests a targeted educational program for different nurse demographics.

Correspondingly, this result agrees with **Chukwunonso et al., (2018)** who revealed that there was a significant association between level of education with staff nurses and knowledge and practice scores. The highest scores were reported where staff nurses' education is within the registered nurses and MSc nursing groups.

Our finding isn't in concordance with the Egyptian study by **Khalil, (2019)** who studied the "Effectiveness of the educational program on prevention and control of MRSA" and declared no correlations between nurses' demographic characteristics and knowledge regarding MRSA. Moreover, **Al Salmi, & Kadium, (2015)** conducted a study in a hemodialysis unit in Oman about an education intervention to improve nurses' knowledge to reduce catheter-related bloodstream infection showing no statistically significant association between years of experience of their nursing staff and the pre-test scores.

On completing the present study, our findings clarified that a high percentage of studied nurses who had satisfactory practice scores in the post-phase were female, married, and attended training about the care of patients. The relationship between years of experience and good practice level might be expected to be positive because the practice presumably derives from new information and skills offered through training which is often assumed to increase the awareness of mistakes.

Accordingly, **Majeed, (2017)** portrayed that there was no significant association between nurses' practices and their socio-demographic characteristics except training courses. They referred that working experience increases; knowledge and practice level also increase practice performance depending on the training course to improve nurses' skills and knowledge about endotracheal tube suctioning.

Similar to this, our findings follow **Hesham, (2016)** in Egypt, who depicted that there was a statistically significant relationship between nurses' practice and their demographic characteristics such as being females, highly educated, and well-trained. Their point of view is attributed to the fact that the nurses' practice depends more on attending training and imitation of obstacles that may hinder the males from acquiring new skills or attending educational courses. Moreover, in Malaysia, **Afandi, and Ludin, (2020)** found that a significant relationship was declared between the nurses' socio-demographic characteristics such as gender, attending training about the care of patients, and their level of practice. They expounded that attending training sessions increases the level of information and practice increases from repeated procedures and training programs. So recurrent education and guidelines among nurses help them to improve their knowledge and reflect on practice in patient care.

Conversely, **Zainib et al., (2017)** found a statistically significant relationship between total experience and practices of ICU nurses, but no relationship was determined between these nurses' qualifications and level of practice. Also, an Egyptian study at Menoufia University by **Aboalizm, & Elhy, (2019)** illustrated that there were significant relationships between the nurses' level of education, years of experience, and their baseline practice before and after the educational program. Also, **Said, (2012)** found that the practice of ICU nurses was found to be statistically associated with their educational level but not statistically associated with ICU training and years of working experience. Together with **Mwakanyanga et al., (2018)** who illustrated that there was

no association between the practice and the nurses' gender, level of education, work experience, and ICU training.

In this study, testing the correlation between the knowledge and practice of studied nurses illustrated that there was no significant correlation between them This may be explained as in the lack of significant correlation between knowledge and practice could indicate that nurses' practical experience did not fully align with theoretical knowledge. This could be due to varied levels of formal education, differing on-the-job experiences, or gaps in continuing education.

Similarly, in Egypt, **Elsayed, Shebl, Ali, & Omran, (2022)** found that no statistically significant correlations were found between total knowledge and total practice of the nurses neither in the pre- nor the post-educational program. They interpreted it as a lack of knowledge that may affect nurses' practices. Additionally, a Chinese study by **Bali, Peer, Kour, Ahmad, and Koul, (2019)** reported that there was no correlation between knowledge and practice. As well, **Alhumaid et al., (2021)** added that more confounding variables of good practice other than knowledge or experience exist. Nonavailability of resources, high workload, and time limitations have been reported as the main factors influencing their compliance with practice.

Opposite to these findings, **Ayed, (2015)** reported that there was a statistically significant association between nurses' knowledge, practice, and degree of education. In addition, the study by **Mohamed, Mohamed, & ELmetwaly, (2021)** revealed that there was a positive relationship between pre-education and post-education knowledge. They explained that the practice is independent of knowledge. This does not mean that knowledge does not play a role in practice and this could be most likely because of the attitude of nurses towards the practice.

Further, a study by **Gaheen, et al., (2021)** about the "knowledge and compliance of nursing students regarding infection control standard precautions during their clinical training in Egypt", and **Ajani, Elikwu, Anaedobe, Okangba, and Tayo, (2020)** in Nigeria, demonstrated a statistically significant positive correlation between knowledge and practice of universal precautions**.**

Conclusively, improving nursing performance regarding care of patients undergoing Coronary Artery Bypass Graft is crucial. The educational program was found to significantly improve the knowledge, and practice skills of nurses. The post-intervention groups have a large influence on their information and skills in caring for post-operative CABG patients. The current study indicated that there appears to be an insufficient learning resource available in the cardiac unit. Furthermore, a continuous supply of instructional materials and training from medical experts is recommended on a timely basis.

Conclusion:

Based on the findings of the present study, it can be concluded that the majority of studied nurses had unsatisfactory knowledge and practices knowledge regarding care of patient undergoing coronary artery bypass graft. Also, there was no significant correlation between nurses' knowledge score, and practice score. .

Recommendations:

In view of the main results of the study the following recommendations were derived and suggested

- Continuous in-service training programs are recommended to improve and maintain nurses' performance regarding care for patients undergoing coronary artery bypass graft.
- Exerting more efforts by the continuing education units in the hospital to develop and update the nurses' knowledge, practice regarding care of patients undergoing CABG.
- Regular evaluation of nursing staff performance, using a motivation action as rewarding good performance and giving them feedback.

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