

Critical Care Nurses' Knowledge And Practice Regarding Care Of Patients With Intra-Aortic Balloon Pump

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Abstract

Background: The intra-aortic balloon pump is a mechanical circulatory assist device used in cardiogenic shock and acute myocardial infarction. It enhances coronary perfusion and reduces afterload through synchronized balloon inflation and deflation within the aorta. Effective nursing care is essential for monitoring intra-aortic balloon pump (IABP) function, preventing complications, and supporting recovery in high-risk procedures such as percutaneous coronary intervention and coronary artery bypass grafting.

Aim: To assess the critical care nurses' knowledge and practices regarding care of patients with IABP.

Method: A descriptive research design was used.

Setting: The study conducted in the Cardio-Thoracic care unit and the Coronary Care Unit at Suez Canal University Hospitals in El Ismailia city, in addition to the Cardio-Thoracic care unit and the Coronary Care Unit at specialized hospital in El Giza city, Cairo.

Subjects: A purposive sample of sixty critical care nurses who involved in direct patient care.

Tools: Two tools used to collect data: Tool (I) Nurses' self-administered knowledge questionnaire. Tool (II) Nurses' practice observational checklists for intra-aortic balloon pump.

Results: The findings revealed that 65% of the studied nurses had an unsatisfactory overall level of knowledge regarding intra-aortic balloon pump (IABP) care. Additionally, 76.7% of the nurses demonstrated an overall level of practice deemed incompetent.

Conclusion: The studied nurses demonstrated inadequate overall knowledge and practice levels concerning the care of patients with an intra-aortic balloon pump.

Recommendations: provide targeted educational and training programs for nurses to enhance their knowledge and skills in managing IABP effectively.

Keywords: Critical Care Nurses'; knowledge, practice, Intra-aortic balloon pump.

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I. Introduction

Cardiovascular diseases (CVDs), encompassing conditions like coronary heart disease, cerebrovascular disorders, and rheumatic heart disease, are the leading global cause of death, with heart attacks and strokes accounting for the majority of cases. Major contributors include unhealthy lifestyle choices such as poor diets, lack of physical activity, smoking, and excessive alcohol use, along with environmental factors like air pollution. These risks often result in elevated blood pressure, high glucose levels, abnormal lipid profiles, and obesity, which significantly increase the likelihood of severe cardiovascular events (WHO, 2021).

Treatment for CVDs involves a combination of lifestyle changes, medical therapies, and advanced interventions. Pharmacological treatments target blood pressure, cholesterol, and blood sugar management using medications like antihypertensive, statins, and antidiabetics. In severe cases, mechanical support devices such as the Intra-Aortic Balloon Pump (IABP) may use to improve heart function by enhancing coronary blood flow and reducing cardiac workload. For advanced conditions, procedures like angioplasty, stent placement, or bypass surgery may be necessary. Comprehensive care often incorporates cardiac rehabilitation and patient education to address risk factors and prevent recurrence (Ghodeswar, 2023).

The Intra-Aortic Balloon Pump (IABP) is a widely used mechanical circulatory support device designed to enhance cardiac function in critically ill patients. It first introduced in the 1960s and has since become a standard therapy for individuals suffering from severe cardiac dysfunction, such as cardiogenic shock, post-cardiac surgery complications, and acute heart failure (Kimman et al., 2020). The primary function of the

IABP is to assist the heart in its pumping activity by using a balloon catheter inserted into the aorta. The balloon inflates and deflates in synchrony with the cardiac cycle, creating a counter pulsation effect. This device is typically used in patients whose hearts are unable to generate sufficient cardiac output on their own (**Fang et al, 2023**).

The IABP has the ability to temporarily stabilize patients in severe cardiac distress has made it an essential therapy in modern critical care and cardiac surgery units (**Jannati & Attar 2019**). The IABP therapy is primarily indicated for patients with cardiogenic shock, unstable angina that is unresponsive to medical management, during complex percutaneous coronary interventions (PCI), as a bridge to ventricular assist devices (VADs) or heart transplantation to provide temporary hemodynamic support, IABP allows patients to stabilize until further treatment options become viable (**Gajanan et al., 2021**).

The basic nursing staff should have the information regarding IABP treatment in a protected and remedial way, nurses' role in caring for patients receiving IABP therapy, the implication for nursing practice of IABP management, physiology of IABP safety, monitoring and preventing cardiac complications. The nursing's job requires monitoring the activity of the IABP, coordination of standards of timing with hemodynamic impacts. In any case, a few researches detailed that information and practice on most of basic consideration regarding medical and nursing caretakers are insufficient (**Kuno et al., 2021**). Therefore, the current study will improve nursing knowledge and practices regarding this concern, which in turn improve patients' outcomes and reduce healthcare burden.

Significance of the study:

Exceeding 23 million populations worldwide affects heart failure and fatal diseases. According to the American College of Cardiology, heart failure treatment and medical devices have been a major improvement in the last several decades. American heart association, 260,000 patients suffer from advanced cardiac heart failure. Mechanical circulatory support devices have been used to continue organ function. Intra-aortic balloon pumps are mostly used for temporary circulatory support in cardiac patients; today, more than 160000 patients worldwide receive this therapy annually (**Ghafoor et al., 2022**).

The aim of the study: This study aimed to assess nurses' knowledge and practices regarding care of patients connected to Intra-Aortic Balloon Pump.

Objectives of the study:

1. Identify the Critical Care Nurses' knowledge regarding care of patient with Intra-Aortic Balloon Pump.
2. Assess the Critical Care Nurses' practice regarding care of patient with Intra-Aortic Balloon Pump.
3. Assess a relationship between nurses' knowledge and practice towards care of patient with Intra-Aortic Balloon Pump.

Research questions:

1. What is the nurses' level of knowledge regarding care of patient with Intra-Aortic Balloon Pump?
2. What is the nurses' level of practice regarding care of patient with Intra-Aortic Balloon Pump?
3. Is there a relationship between nurses' knowledge and practice towards care of patient with Intra-Aortic Balloon Pump?

II. Subjects And Methods

Study design:

A descriptive research design was used in this study.

Study setting:

This study was conducted at two setting, the Cardio-Thoracic care unit and the Coronary Care Unit at Suez Canal University Hospitals, Ismailia city. In addition to the Cardio -Thoracic care unit and the Coronary Care Unit at specialized hospital in El Giza city, governorate, Egypt.

The sample of the study:

A Purposive sample of sixty critical care nurses was involved in providing direct patient care in critical care units.

The study will include registered and licensed nurses who meet the following criteria: having a minimum of six months of experience in critical care units, being employed full-time during the data collection period, and actively involved in direct patient care. Additionally, participants must express their willingness to take part in the study by providing informed consent. These criteria ensure the selection of experienced professionals directly engaged in critical care, enhancing the reliability and relevance of the findings.

Tools of data collection:

Two tools were utilized to collect data pertinent to the current study.

Tool I -Nurses' self-administered knowledge questionnaire: consist of two parts:

Part one: Concerned with demographic characteristics and nurses' profile under study as: age, gender, marital status, educational level , position , general years of experience, years of experience in CCU, and previous attendance of training courses regarding IABP (8 items).

Part two: Knowledge questionnaire: This part was consisted of structured multiple choice items. This part developed by the researcher after reviewing literatures and referenced from (AlyMahgoub & Hafez, 2017). It was consisted of (30) M.C.Q items. It was translated into simple Arabic language to assess and evaluate nurses' knowledge about description and physiological effects of Intra –Aortic Balloon Pump (items 1-11); indications, contraindications, and complications of Intra-Aortic Balloon Pump (items 12-17); nursing care of patients connected with Intra-Aortic Balloon Pump (items 18-25); in addition to, weaning and removal of Intra-Aortic Balloon Pump (items 26-30). This part needs about 30 minutes to be completed.

Scoring

The scoring system distributed according to (AlyMahgoub & Hafez, 2017) to be (1) degree for the correct answer and (0) for the incorrect answer with total of 30 degrees. Scores were classified into unsatisfactory knowledge level if the total score percentage was less than 85% , score of 25 or less fall under unsatisfactory and satisfactory knowledge level if the score equal and more 85%, score of 26 or more out of 30 classified as satisfactory.

Tool II: The nurses' practice observational checklists: It developed by the researcher after reviewing the related literature referenced from (McGlone &Sadler, 2016). It was complete by the researcher through observing nurses actions in managing these patients. This tool applied on the patients admitted to CCU with an IABP in place. It was consisted of initial assessment for patient with IABP (items from 1-9), safe nursing care about IABP (items from 10-14), regular patient monitoring (items from 15-19), complications of IABP awareness (items from 20-24), preparation of removal of IABP (items from 25-30), and nursing considerations during weaning and IABP removal (items from 31-42). This part needs about 30 minutes to be completed.

Scoring

The scoring system was distributed according to (McGlone &Sadler, 2016) to be (1) degree for the correct implemented items and (0) for the incorrect or incomplete items. Scores were classified into unsatisfactory practice level if the total score percentage was less than 85%, score of 35 or less fall under incompetent, and satisfactory practice level if the score equal and more 85%, Score of 36 or more out of 42 classified as competent.

Tool validity and reliability:

The tool was revised by a panel of 5 experts in the field of medical- surgical nursing specialty related fields and then the necessary modification were done accordingly.

Coefficient of reliability of the evaluating tools was measured by Cronbach's α alpha test. The reliability scores of the knowledge and practice assessment tools were (0.876 and 0.896 respectively), which indicate high tool internal consistency.

Field work:

Permission to conduct the study obtained from the hospital's responsible authorities after explaining the aim of the study. An approval also obtained from the ethical committee affiliated with the Faculty of Nursing, Suez Canal University. Additionally, approval secured from the administration of the data collection sites. The study adhered to the common ethical principles in clinical research. The tools and booklet used in this study developed in simple Arabic language by the researcher based on a review of relevant literature.

The level of nurses' knowledge and practice was initially assessed using two data collection tools to establish baseline data. The practical aspect was evaluated using Tool II for the study group. Data collection took place from January 2023 to June 2023.

Pilot Study:

A pilot study carried out on 10% of nurses under study over a period of one month, from the beginning of November, 2022 up to the beginning of December, 2022. Conducted on six nurses to test the feasibility and applicability of the tool and the necessary modification were done. The pilot was excluded from the study sample as modifications on the tools were done.

Ethical consideration

The research approval was obtained from the Scientific Ethical Committee at the Faculty of Nursing, Suez Canal University, under code 178-9-2022. The researcher clarified the objective and aim of the study to the nurses included in the study. The researcher assured maintaining anonymity and confidentiality of the collected data. Nurses informed about their rights to participate or withdraw from the study at any time.

Statistical design:

Data collected were coded, entered and analyzed using Statistical Package for the Social Sciences (SPSS Ver.26.). Descriptive statistics done using (number, percentage, mean and standard deviation). Chi-square test were doing to compare difference between variables and Pearson correlation between quantitative variables. P-value was be considered statistically significant when $p < 0.05$.

III. Results:

Results of the present study were presented in the following sequence:

Table (1): clarified that 90% of the studied nurses age ranged between 20 to 30 years with mean age 27.35 ± 2.254 , 45% of nurses had technical institute in nursing, 89.9% had a staff nurse position, and 56.7% of nurses had years of experience ranged between 1 to less than 5 years. Concerning the studied nurses' attendance of training programs related to IABP; 91.7% didn't attend any training courses related to IABP.

Table (2): showed the studied nurses' knowledge regarding IABP, as 69% of the studied nurses had unsatisfactory knowledge level regarding IABP, and 31% had satisfactory knowledge regarding IABP.

Table (3): showed the studied nurses' practice level regarding IABP, as 65% of the studied nurses had incompetent practice regarding IABP, and 35% had competent practice regarding IABP.

Table (4): revealed a highly statistically significant relationship between nurses' knowledge and demographic data such as age, educational level, job position, and attending training courses, with p-values of 0.05, <0.05, <0.000, and 0.02, respectively.

Table (5): demonstrated a highly statistically significant relationship between nurses' practice and both years of experience and years of experience in the intensive care unit, with p-values of 0.000 for both.

Table (6): showed that, there was a statistically significant positive correlation between the studied nurses total knowledge and practice with $p\text{-value}=0.000^*$.

IV. Discussion

The intra-aortic balloon pump utilization has increased over 3-fold since the 2018 policy change with improved waitlist outcomes and comparable post- heart transplant survival. Thus, bridging patients to heart transplant with IABPs appears to be an effective strategy in the current era (**Maitra et al., 2023**).

Nursing staff requires specialized skills to achieve the best nursing management results for patients with IABP. Nurses' role include continuous assessment and measurement of changes in patient condition that requires acquiring the best knowledge about the cardiovascular system and nurses' role in caring for patient having IABP therapy. The implication for nursing practice of IABP insertion, maintenance and management of weaning from the therapy requires having knowledge of IAPB mechanism of action. Physiology of IABP safety, benefit and monitoring of cardiac complications, regular comprehensive patient assessment are the core nursing responsibility in the management of IABP patients (**Amin et al., 2024**).

Therefore, the present study aimed to assess nurses' knowledge and practice regarding care of patients with IABP. To fulfill the objective of this study, the discussion of the current study findings was covered four main parts in the following sequence: Part I, nurses' demographic characteristics of the studied nurses; Part II, nurses' level of knowledge regarding IABP; Part III, nurses' level of practice regarding IABP and Part IV, relation and correlations between the study variables.

Regarding the demographic characteristics of the studied nurses, the finding of the current study showed that the majority of the nurses' ages ranged from 20 to less than 30 years, with a mean age of 27.35 ± 2.254 years. This finding aligns with the study conducted by **Amin et al. (2023)** titled "Nurses' Knowledge, Attitude, and Safety Interpretation of Waves for Patients Connected with Intra-Aortic Balloon Pump." Their research, conducted in the cardiothoracic intensive care units at Ain-Shams University and Nasser Institute for Research and Treatment, found that more than three-quarters of the studied nurses were aged 20 to less than 30 years.

From a researcher's perspective, this age distribution is likely due to the fact that many nurses in this group are recent graduates who are at the beginning of their professional journey.

The results of this study contrast with those found by **Mohamed et al. (2023)** in their research titled "Effect of Educational Guidelines on Nurses' Performance regarding Caring for Patients with an Intra-Aortic Balloon Pump." Conducted in the Cardio-Thoracic unit at Benha University and the open-heart units at Nasser

Institute Hospitals, as their study revealed that less than half of the studied nurses were aged between 20 and less than 30 years.

With regard to educational level, the current study revealed that slightly less than half of the studied nurses had a technical institute of nursing degree. From investigator point of view this can be interpreted as reflecting the current trend in the healthcare job market and nursing education in Egypt. The higher proportion of technical institute graduates may be due to these institutes offering quicker and more affordable educational opportunities compared to colleges, making them a preferred choice for many, especially in rural areas or for individuals with limited financial resources.

This result was in agreement with the study by **Ghafoor & Bilal, (2022)**, titled "Validity of Standardized Guidelines of Intra-Aortic Balloon Pump Care among Nurses on Hospital Stay of Cardiac Patients." Conducted in the Intensive Care Units in Lahore, Pakistan, their research revealed that less than half of studied nurses had a technical institute nursing degree. This result was disagreed with **Mohamed (2023)** who revealed that the majority of nurses had a bachelor's degree. From the investigator point of view; this may be because of the spread of nursing colleges in all governorates of Egypt.

As regard to years of experience, the current study revealed that more than half of the studied nurses had years of experience ranged from 1 < 5 years old in the nursing field, and nearly three - quarters had yearly experience ranged from 1 < 5 years in ICU, and the majority of nurses studied not attend training programs about IABP.

This result aligns with **Neelavathi, (2018)**, who conducted the study titled "Effectiveness of Capacity Building Program Regarding Care of Patients with Intra-Aortic Balloon Pump upon the Level of Knowledge and Practice among Nurses." This study carried out at Apollo Main Hospital & Apollo Specialty Hospital in Chennai and revealed that more than half of the nurses had up to two years of experience in the ICU, with most of them having previous experience in the care of patients with IABP.

This result disagrees with the study by **Ghafoor et al. (2022)** titled "The Effect of Teaching Program on Knowledge and Caring Practice of Intra-Aortic Balloon Pump Patient among ICU Staff Nurses" conducted in Pakistan. The study revealed that the majority of nurses had more than 5 years of experience in the ICU, and most of them had 5 years of experience in caring for patients with IABP. Additionally, the study found that the majority of the nurses had not attended training programs about IABP.

As regard to the total knowledge of nurses, the current study revealed that nearly one-third of the studied nurses had a satisfactory level of knowledge. This might be related to a lack of training about IABP, non-availability of education resources in ICU and CCU units, and non-availability of access for knowledge refreshment. In addition, nurses experience exhaustion and burnout due to long work hours and an increased workload, which hinders their ability to read and update their knowledge.

This result about total knowledge of nurses, agrees with the findings of **Mohamed et al. (2023)**, who reported that more than one-third of the nurses had a satisfactory level of knowledge and disagree with **Rushdy et al. (2015)**, who conducted the study titled "Nurses' knowledge and practice regarding care of patients connected to intra-aortic balloon pump at Cairo university hospitals" and reported that the minority of the nurses had a satisfactory level of knowledge.

The current study showed that nearly two thirds of the studied nurses exhibited an incompetent level of practice. This may be attributed to many causes, which include the lack of guidelines, lack of continuous supervision and annual evaluation of their performance, lack of motivation and absence of job specifications, and inadequate training about the IABP. These training programs are very important to improve nurses' performance and increase awareness about their role about care of patient connected to IABP and in preventing complications. Finally, it cannot be ignored that working nurses are overloaded. These findings were consistent with the results of **Mohamed et al. (2023)**, who reported that two thirds of studied nurses achieved incompetent level of practice. However, this current study also disagreed with **Rushdy et al. (2015)**, which revealed that the majority of nurses initially had an incompetent level of practice.

On investigating the relationship between nurses' knowledge and demographic characteristics. This study demonstrated that, there was a highly statistically significant relation between nurses' knowledge, age, educational level, job and training courses. Older nurses may benefit from years of experience, while higher educational levels provide a strong theoretical foundation and critical thinking skills, crucial for handling complex clinical scenarios. Furthermore, specialized job roles often demand continuous professional development, which enhances knowledge and expertise. Lastly, training courses play an essential role in updating nurses on the latest advancements and best practices in healthcare.

This study was in agreement with **Henedy & El-Sayad, (2019)** who revealed that there is a significant relation between nurses' knowledge, years of experience and educational level, but this result disagree with **Rushdy et al. (2015)**, who revealed that there are significant correlation between knowledge and gender but insignificant correlation between knowledge and age.

Regarding the relation between total nurses' practice and demographic characteristics; this study illustrates that there was a highly statistically significant relation between nurses' practice, years of experience in nursing and years of experience in the intensive care unit. This study was in disagreement with **Neelavathi, (2018)**, who revealed that there was no significant association between level of practice regarding IABP care nurses and their demographic variables namely age, gender, educational level, years of ICU experience and previous experience of care of patient with IABP. Similarly disagreement with **Rushdy et al. (2015)**, who revealed that there was no significant relation between total practice to gender and age category of the studied nurses.

As regarding the correlation between knowledge and practice, the finding of current study revealed positive correlation between knowledge and practice score obtained by critical care nurses receiving teaching program. This reflected the importance of integration between theory and practice .In the same line **AlyMahgoub & Hafez (2017)**, revealed statistical significant positive change, and **Ghafoor et al. (2022)**, found a positive significant correlation between nurses knowledge and performance.

V. Conclusion:

The results of the current study concluded, that nearly tow third of the studied nurses had an average level of knowledge regarding IABP and a poor level of practice regarding care of patient connected to IABP. Moreover, there was statistically significant positive correlation between nurses' total knowledge, and their total practice.

VI. Recommendations:

Based upon the findings of the current study, the following recommendations can be concluded that:

1. Periodic evaluation of nurses' knowledge and practice regarding IABP.
2. Establish regular, mandatory training courses and workshops theoretical and practical focus on the care of patients with advanced medical devices like the IABP to improve the quality and safety of patient.
3. Develop and disseminate standardized care protocols and guidelines for IABP management across critical care units.
4. Educational posters in the ICU and CCU units include an outline concerning the care and management of pt. connected to IABP which is beneficial for nurses
5. Establish mentoring system where experienced nurses provide guidance and support to less experienced colleagues in managing IABP patients to reinforce learning and improve clinical practice.
6. Replication of the study on a larger probability sample selected from different geographical areas in Egypt to be generalizable data.

Tables And Figures

Table (1): Frequency and percentage distribution of demographic data for the studied nurses (n=60).

Demographic data	Studied nurses (n = 60)	
	N	%
Age		
• From 20 to > 30	54	90
• from 30 to > 40	4	6.7
• From 40 to > 50	2	3.3
Mean ± SD	27.35±2.254	
Gender		
• Male	25	41.7
• Female	35	58.3
Marital status		
• Single	24	40
• Married	36	60
• Widow	0	0
• Divorced	0	0
Educational level		
• Bachelor degree of nursing	8	13.3
• Technical institute of nursing	27	45
• Diploma nursing	23	38.3
• Master degree nursing	2	3.3
Job		
• Charge nurse	6	11.1
• Staff nurse	54	89.9
Years of experience in the field of nursing		
• From 1 year to 5 years	34	56.7
• from 5 years to 10 years	22	36.7
• More than 10 years	4	.66
Years of experience in the intensive care unit (ICU)		
• From 1 year to 5 years	43	71.7
• from 5 years to 10 years	15	25
• More than 10 years	2	3.3
Attendance of training programs related to IABP		
• Yes	5	8.3
• No	55	91.7

Table (2): Distribution of the total nurses' knowledge regarding IABP (n=60).

Level of knowledge	Total Knowledge	
	N	%
Un Satisfactory	41	69
Satisfactory	19	31

Table (3): Distribution of the total nurses' practice regarding IABP (n=60).

Level of practice	Total practice	
	N	%
incompetent	39	65
competent	21	35

Table (4): Relation between total nurses' knowledge and demographic characteristic

Demographic characteristic	Nurses' Knowledge				x2	P-value
	Un satisfactory (n=41)		Satisfactory (n=19)			
	No	%	No	%		
Age: •From 20 to > 30 •from 30 to > 40 •From 40 to > 50	37 4 0	90.2 9.8 0	17 0 2	89.5 0 10.5	5.869	0.05*
Gender: •Male •Female	15 26	36.6 63.4	10 9	52.6 47.4	2.937	0.089
Marital status: •Single •Married	13 28	31.7 68.3	11 8	52.4 47.6	2.063	0.154
Educational level: •Bachelor degree of nursing •Technical institute of nursing •Diploma nursing •Master degree nursing	5 19 17 0	12.2 46.3 41.5 0	3 8 6 2	15.8 42.1 31.6 10.5	4.079	0.05*
Job •Charge nurse •Staff nurse	4 37	9.8 90.2	2 17	10.5 89.5	17.958	0.000*
Years of experience in the field of nursing: •From 1 year to 5 years •from5 years to 10 years •More than 10 years	21 18 2	51.2 43.9 4.9	13 4 2	68.5 21 10.5	1.129	0.828
Years of experience in ICU: •From 1 year to 5 years •from5 years to 10 years •More than 10 years	29 12 0	69.2 30.8 0	14 3 2	73.7 15.8 10.5	5.290	0.682
Attendance of training programs related to IABP •Yes •No	2 39	4.9 95.1	3 17	10.5 89.5	1.499	0.02*

*: Significant at $P \leq 0.05$ **Table (5):** Relation between total nurses' practice and demographic characteristic

Demographic characteristic	Nurses' practice				x2	P-value
	Incompetent (n=39)		Competent (n=21)			
	No	%	No	%		
Age: <ul style="list-style-type: none"> From 20 to > 30 from 30 to > 40 From 40 to > 50 	36	92.3	18	85.7	2.437	0.280
	2	5.1	2	9.5		
	1	2.6	1	4.8		
Gender: <ul style="list-style-type: none"> Male Female 	11	25	14	83.3	2.012	0.124
	28	75	7	16.4		

Marital status: • Single • Married	15 24	38.5 61.5	9 12	42.9 57.1	5.031	0.158
Educational level: • Bachelor degree of nursing • Technical institute of nursing • Diploma nursing • Master degree nursing	2 18 19 0	5.1 46.2 48.7 0	6 9 4 2	28.6 42.9 19 9.5	1.737	0.860
Job: • Charge nurse • Staff nurse	3 36	7.7 92.3	3 18	14.3 85.7	1.586	0.448
Years of experience in the field of nursing: • From 1 year to 5 years • from 5 years to 10 years • More than 10 years	22 15 2	56.4 38.5 5.1	12 7 2	57.1 33.3 9.5	2.934	0.000*
Years of experience in the intensive care unit • From 1 year to 5 years • from 5 years to 10 years • More than 10 years	27 10 2	69.2 25.7 5.1	16 5 0	76.2 23.8 0	1.823	0.000*
Attendance of training programs related to IABP • Yes • No	2 37	5.1 94.9	3 18	14.3 85.7	1.660	0.095

*: Significant at $P \leq 0.05$

Table (6): Correlation between total nurses' knowledge and total practice levels

Items	Total knowledge	
	Correlation Coefficient	P-value
Total practice	0.236	0.000*

*: Significant at $P \leq 0.05$

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