Effect of Instructional Guidelines on Critical Care Nurses' Knowledge and Practices regarding Cardiac Electrophysiology

1Nagwa Ibrahim Abbas Ghoneim, 2 Mona Mohamed Elhady, 3 Manal Mohamed Ahmed Ayed, 4 Sally Abd Elhamid Fayed, 5 Fatma Shoeib Ali

1Lecturer of Critical Care and Emergency Nursing, Faculty of Nursing, Tanta University, Egypt

2 a Assistant Professor of Emergency and Critical Care Nursing, Faculty of Nursing, Mansoura University

2 b Assistant Professor of Emergency and Critical Care Nursing, Faculty of Nursing, King Abdulaziz University

3Pediatric Nursing, Faculty of Nursing, Sohag University

4Assistant Professor, Nursing Education Department, Faculty of Nursing Damanhour University

5Assistant Professor of Critical Care and Emergency Nursing, Faculty of Nursing - Cairo University

Abstract

Background: The Cardiac Electrophysiology Study (EPS) procedures involve both diagnostic tests and interventional treatment procedures. Therefore, to provide proper care, Critical care nurses must be knowledgeable and competent in both the technical and psychosocial aspects of an electrophysiological Study. **Aim of the study**: To evaluate the effect of instructional guidelines on critical care **nurses'** knowledge and practices regarding cardiac electrophysiology. **Research Design**: A quasi-experimental design was recruited to conduct this study (pre/post-test). **Setting**: This study was carried out at a cardiac care unit affiliated with Sohag University Hospital. **Subjects**: A convenient sample of 50 critical care nurses working in the selected cardiac care unit. **Tools**: *Two tools were used* Tool 1: Structured interviewing questionnaire: developed by the researchers and divided into two parts; part 1: Nurses' personal data sheet, part 2: Nurses' knowledge assessment questionnaire, and tool II: Nurses' practices concerning patient care before, during, and after electrophysiology. **Results**: The results revealed that there was a positive significant correlation (P<0.001) between nurses' knowledge and practice mean scores pre and post-instructional guidelines implementation. There were highly significant improvements in nurses' knowledge and practices post-instructional guidelines implementation (P<0.005). **Conclusion:** The instructional guidelines implementation had a significant positive effect on improving nurses' knowledge and practices regarding cardiac electrophysiology. **Recommendations:** Develop and implement a nursing educational program for critical care nurses to improve their level of knowledge and practice regarding cardiac electrophysiology.

Keywords: Instructional guidelines; Critical care nurse, Cardiac Electrophysiology study, Nurses' knowledge and practice.

Introduction:

The study of electrical conduction issues in the heart is known as electrophysiology. It is a very specialized field that calls for technical know-how and a thorough understanding of the heart's electrical conduction processes. Critical care must be provided to patients prior to, during, and following electrophysiological operations by the electrophysiology nurse. The clinical methods used to diagnose and treat cardiac arrhythmias are collectively referred to as cardiac electrophysiology (**Homoud, 2019**).

Cardiac procedures provide a thorough examination of the mechanism or mechanisms causing cardiac arrhythmias, pinpoint the precise location of the site of origin, and, if necessary, provide conclusive treatment using catheter-based ablation techniques. Thus, Cardiac Electrophysiology studies can achieve the following goals: determine the cause of syncope, stratify patients for sudden cardiac death risk, make a definitive diagnosis of an arrhythmia (such as a bradyarrhythmia, supraventricular or ventricular tachyarrhythmia), and assess the viability or effectiveness of nonpharmacologic therapy (such as radiofrequency ablation or implantable cardioverter/defibrillator therapy) (**Anderson et al., 2023**).

During the clinical management of patients with supraventricular and/or ventricular arrhythmias, invasive electrophysiology techniques and/or procedures are frequently employed. The primary objectives of Cardiac

Electrophysiology are to describe the electrophysiologic characteristics of the conduction system, trigger, investigate the causes of arrhythmias, and evaluate the results of therapeutic interventions (**Anderson et al., 2023**).

The Cardiac Electrophysiology procedures involve both the diagnostic tests and the interventional treatment procedures. The diagnostic tests of Cardiac Electrophysiology are often performed to determine an arrhythmia diagnosis or the Cardiac Electrophysiology mechanism of an existing arrhythmia. Interventional or therapeutic Cardiac Electrophysiology studies include endocardial catheter ablation and surgical procedures for both the supraventricular and ventricular arrhythmias. Another interventional Cardiac Electrophysiology treatment is implanting the implantable cardioverter defibrillators to treat ventricular tachycardia (VT) and/or ventricular fibrillation (VF) (**Katritsis & Josephson., 2019**).

Patient preparation for Cardiac Electrophysiology studies includes nursing assessment and teaching. The patient's nursing assessment includes measurement of the patient's heart rate, rhythm, blood pressure, and peripheral pulses. The patient's emotional condition and attitude toward the Cardiac Electrophysiology studies are also assessed as part of the nursing assessment (**Arathy, et al., 2021**).

A 24-hour Holter monitor, an echocardiogram, blood tests, an electrocardiogram (ECG), an exercise stress test, and other tests that provide basic information about heart function may be scheduled before the Cardiac Electrophysiology study. The patient will be kept on a heart monitor during the hospital stay, and the doctor will determine whether to stop antiarrhythmic medications before the Cardiac Electrophysiology study. Before the test, the patient will be asked to sign a consent form, fast after midnight the night before, take sips of water to take any medications prescribed by the doctor, empty his or her bladder just before the test, remove underwear and pajama bottoms, and wear glasses, dentures, or hearing aids (**Northwestern Medicine, 2020**).

Studies on electrophysiology are carried out in the hospital's electrophysiology or catheterization lab. A little sedative will be administered to assist the patient's rest, and an intravenous line will be placed. They will clean and shave a section of both groin areas and maybe the right side of the neck before inserting the catheters. The place of insertion will be numbed with a local anesthetic. A huge sterile sheet will then be placed over the patient from neck to toe. The blood arteries at the insertion locations will receive tiny, flexible sheaths (**American Heart Association, 2023**).

A catheter or many are then inserted into the sheath by the physician. Fluoroscopy, a type of X-ray machine, produces images of the heart during the process to help the doctor accurately position the catheters. To determine which specific area of the heart is causing the arrhythmia, an electrical "map" of the heart is made. This is accomplished by recording the heart's electrical activity during the onset of the arrhythmia. In most cases, the Cardiac Electrophysiology testing causes little discomfort to the patient. An hour or more may be needed for the procedure, depending on how complicated the arrhythmia is. Any pressure or discomfort in the chest throughout the surgery will be reported by the patient. Following the completion of the cardiac electrophysiology study, the catheters and sheath are removed, and pressure is administered to the insertion site to stop the bleeding (**American Heart Association, 2023**).

Critical care nurses, to provide appropriate care, need to be knowledgeable about both the technical and psychological facets of cardiac electrophysiology. In the electrophysiology lab, nurses' major responsibility is to keep the patient safe (i.e., maintain aseptic methods and intervene when difficulties emerge). Nurses must possess the information and abilities necessary to provide progressive care, such as creating educational programs and support groups for patients and their families, due to the rapid advancements in technology and the rise in patients with higher levels of education (**Attin, 2021**).

In addition to providing safe transportation, medication administration, assistance with basic personal care needs, bleeding management, and hemostatic maintenance,

nurses must evaluate and care for patients who have had cardiac catheterization operations. This will assist in reducing the patient's vascular problems (**Arathy, 2021**). Accurate patient education, physical examination, monitoring, and nursing care of patients before and after cardiac electrophysiology procedures are all skills that a nurse must possess thorough knowledge of interventional techniques, the ability to identify unforeseen circumstances, and the ability to foresee options that are solution-focused (**Bryson et al., 2018**).

Significance of the study:

Critical care nurses work with patients who need high-intensity treatments and interventions, complex assessments, and ongoing nursing supervision. According to the **American Association of Critical-Care Nurses (2024)**, critical care nurses use a specific set of knowledge, abilities, and experience to care for patients and their families and establish compassionate, healing, and humane surroundings. Therefore, this study was designed to evaluate the effect of instructional guidelines on critical care **nurses'** knowledge and practices regarding cardiac electrophysiology.

Aim of the study:

To evaluate the effect of instructional guidelines on critical care **nurses'** knowledge and practices regarding cardiac electrophysiology

Research hypothesis:

H1: The total mean score of critical care nurses' knowledge post-instructional guidelines implementation will be higher than the mean score pre-implementation
H2: The total mean score of critical care nurses' practice in post-instructional guidelines implementation will be higher than the mean score pre-implementation.

Subjects and method:

Research design:

A quasi-experimental design was used to accomplish this study (pre/post-test).

Setting:

This study was carried out at a cardiac care unit affiliated with Sohag University Hospital.

Subjects :

A convenient sample of 50 critical care nurses working in the selected cardiac care unit

Tools for data collection:

Two tools were used to collect data in this study as follows:
Tool 1: Structured interviewing questionnaire: it was developed by the researcher based on pertinent literature (**Arathy, et al., 2021; Anderson et al., 2023**) and divided into two parts;

Part 1: Nurses' personal data sheet includes age, gender, educational level, and years of experience in ICU

Part 2: Nurses' knowledge assessment questionnaire:

To assess nurses' knowledge about electrophysiology study, this questionnaire involved 31 questions covering the following areas; general knowledge about electrophysiology as definition, indications and procedure duration, patient preparation for electrophysiology, nursing care before, during, and after electrophysiology, complications of electrophysiology, and follow up appointments. This questionnaire was developed in Arabic language.
Scoring system:

Less than (<80%) was seen as unsatisfactory, while more than (>80%) was regarded as satisfactory. Each correct step is worth one score for right answer and zero for wrong answer, for a total score of 31.

Tool II: Nurses' practices concerning patient care before, during, and after electrophysiology study.

Based on relevant literature, the researcher created it (**Gillingham, 2018; Katritsis & Josephson, 2019; Anderson et al., 2023**). This 24-item sheet was designed to evaluate the nurses' actions regarding patient care before the electrophysiology study, such as attaching the patient to the intensive care unit monitor, taking vital signs, and obtaining a 12-lead ECG, and following the

electrophysiology study, such as monitoring the puncture site and evaluating peripheral circulation, among other things.

Scoring system:

Less than (<80%) was seen as incompetent, while more than (>80%) was regarded as competent. Each correct step is worth one score, for a total score of 24.

Validity of the tools:

The content validity of the tools and the instructional guideline, its clarity, comprehensiveness, appropriateness, and relevance were reviewed by five expert professors in critical care nursing. Content validity was done to identify the degree to which the used tools measured what was supposed to be measured to determine whether the included items were clear and suitable to achieve the aim of the current study. According to the panel's ruling, no changes were made to guarantee the appropriateness of the content and the clarity of the sentences.

Reliability of the tools:
To assess the knowledge tool's reliability, a test-retest was employed, and Pearson correlation coefficients, which equal (0.95), Using the inter-observation method, the stated practice's reliability was assessed. The reliability of the coefficient was (r= 0.867).

Methods of data collection:

Fieldwork:
Data was gathered from **critical care nurses** who attended previously selected settings two days a week from 9 a.m. to 12 p.m. (Sunday and Monday) over six months, from the first of June 2023 to the first of December 2023. Each interview questionnaire took about 25 to 30 minutes to complete, and the current study was split into four phases: preparation, planning, implementation, and evaluation.

Methods

A pilot study

A pilot study was conducted on 10% (5 **critical care nurses**) of the total sample to test the clarity and feasibility of the research process. No modifications were carried out to develop the final form of the tools. **Critical care nurses** who were in the pilot study were included in the researchstudy.

Ethical considerations:
The Ethical Scientific Research Committee of the Faculty of Nursing at Sohag University received ethical permission for this study in June 2023, under reference number 127. The researchers met with both of the chosen setting's directors to explain the study's goal and obtain their consent. Nurses' cooperation was gained by obtaining their oral consent. To secure consent for data collection, the purpose of the study was described, along with the anticipated results of its execution. Nurses received an explanation of the study's purpose. Informing the nurses that participation in the trial was entirely optional, the researchers gave them the freedom to decline. Nurses were free to leave the study whenever they wanted, for any reason. The confidentiality of their information and its exclusive usage for research purposes were guaranteed to the nurses.

Administrative design:

A letter from the dean of Sohag University's faculty of nursing provided administrative approval to the director of the settings that were previously selected to conduct this study.

I-Preparatory phase:

The researchers met **critical care nurses** individually at previously selected setting and explained the aim of the study after introducing themself to the studied **critical care nurses**. The researchers were present every week for two days on rotation between researchers, from 9:00 am until 12:00 pm, the researchers greeted every **critical care nurse**, outlined the study's purpose, and duration, and obtained oral consent. The researchers provided the **critical care nurses** being studied with a questionnaire to evaluate their knowledge which required 20 minutes to complete. Every nurse was individually monitored while performing tasks to evaluate their level of practice, with duration of 25-30 minutes.

II-Planning phase
After analyzing the initial data from the assessment stage and conducting a thorough review of existing literature, the researchers created a simplified booklet that was used as supportive material and given to nurses. The

Instructions were customized to match the comprehension level of nurses in the basic Arabic language. Different teaching techniques were employed, including lectures, posters, scenarios, and discussions. Various teaching materials such as handouts and educational films were used to help mothers grasp the content effectively.

III- Implementation phase:

Two data collection methods were given to the critical care nurses in the study: (1) a pre-test to assess their knowledge of cardiac electrophysiology before following instructional recommendations. (2) A post-test to evaluate critical care nurses' understanding of post-cardiac electrophysiology after one month following the implementation of instructional guidelines.

The simplified booklet was used as a supportive material and given to the studied critical care nurses in the Arabic language to cover all items regarding the knowledge about cardiac electrophysiology after reviewing the related literature based on the assessment of the actual needs of the studied **critical care nurses**. Different teaching methods such as lectures, discussions, pictures, and posters were used.

The researchers designed and implemented the instructional guidelines regarding post-cardiac electrophysiology in the form of a theoretical part and a practical part. The theoretical part includes critical care nurses' knowledge regarding cardiac electrophysiology. It was implemented through lectures, posters, educational films, scenarios, and role-play. An educational booklet written in simple Arabic language and illustrative pictures were prepared by the researchers and given to the critical care nurses.

Personal data were the first part to be gathered by the researchers. Then the knowledge of each participant was evaluated using tools I and II, and practices regarding cardiac electrophysiology as baseline data. The information gathered was utilized as a pretest to evaluate the effect of instructional guidelines on critical care nurses' knowledge and practices regarding cardiac electrophysiology.

The researchers provided nurses with written materials that were illustrated with photos as well as spoken instructions to further explain cardiac electrophysiology. Based on a review of the literature, the findings and suggestions of other studies, as well as the views of healthcare professionals, the researchers developed this illustrative handout as well as were tested for its content.

The instruction guidelines sessions covered the following topics:

- Cardiac electrophysiology definition, indications, operation length, and patient preparation were all discussed in the first session.

- Nursing care before, during, and after EPS, EPS problems, and follow-up were the main topics of the second session.

- The third session included setting up the patient's ICU monitor, taking vital signs, getting a 12-lead ECG, and providing post-electrophysiology care, including monitoring the puncture site and evaluating peripheral circulation.

IV: Evaluation phase:

After one month, each nurse was re-interviewed to evaluate the effect of instructional guidelines on critical care nurses' knowledge and practices regarding cardiac electrophysiology. Re-assessment of them was done using the same tool used as pretest tools.

Statistical analysis:

Data entry and statistical analysis were performed using SPSS for Windows, version 20. Frequencies and percentages for qualitative variables and mean and SDs for quantitative variables were represented as descriptive statistics. Differences between the two means tests (t-test) were used. The chi-square (x2) test was used to compare qualitative parameters. Pearson's correlation coefficient (r) test was used. Statistical significance was considered at P-value <0.05.

Results:

According to **Table 1,** 78% of the study participants were between the ages of 20 and 30 (mean age of 29.2 + 4.3), 90% were female, 54% were Technical Institute nurses, and 70% had less than five years of experience (mean age of 3.88 ± 2.97).

The result found in **Figure 1** reveals that none of the studied Critical Care Nurses had previously received any training regarding cardiac Electrophysiology.

Table (2): Illustrates that there were highly significant improvements and differences at P<0.001 concerning all items of knowledge among the studied nurses regarding **cardiac** electrophysiology pre and post-**instructional guidelines**.

Figure 2, indicates that the majority of nurses (94%) had an unsatisfactory level of overall knowledge regarding **cardiac electrophysiology** pre-instructional guidelines implementation. While 88 % of them had a satisfactory knowledge level post-instructional guidelines implementation regarding cardiac Electrophysiology.

Table 3 illustrates that there were statistically significant differences and improvements in all **Practice** items following instructional guidelines implementation regarding **cardiac** electrophysiology (P<0.001).

As seen in **Figure 3**, 94% of the **critical care nurses** had competent **Practice Level** post-instructional guidelines implementation, while 60% had incompetent **practice** in the pretest.

Table 4 shows that the total knowledge score of nurses was statistically correlated with their years of experience, age, and educational level.

The total practice score of nurses was statistically correlated with their years of experience, age, and educational level in a highly significant correlation (**Table 5**).

Pre and post-implementation of instructional guidelines, critical care nurses' total knowledge scores and their total practice scores showed a highly significant statistical correlation, as shown **in Table 6.**

Table (1): Critical Care Nurses Distribution according to their Personal Data (n= 50)

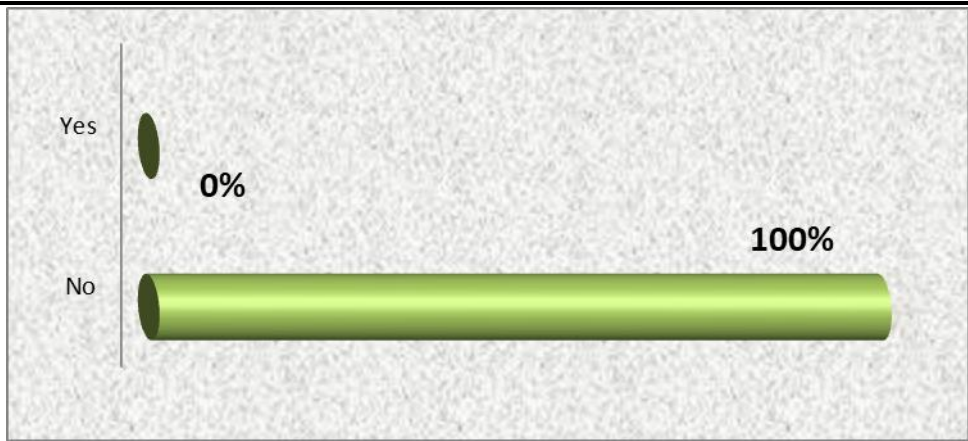| Variables	No.	%
Age 20-30	39	**78**
31-40	8	16
>40 years	3	6
Mean + SD	29.2 + 4.3	
Gender		
Male	5	10
Female	45	90
Educational Level		
Bachelor	10	20
Technical Institute	27	54
Diploma	13	26
Years of experience in ICU		
< 5	35	70
5 – 10	8	16
>10 years	7	14
Mean + SD	3.88 ± 2.97	

Figure 1: Previous training program regarding cardiac Electrophysiology among the studied Critical Care Nurses (N=50)

Table (2): Distribution of the studied critical care nurses' knowledge pre and post-instructional guidelines implementation regarding cardiac electrophysiology (n= 50)

Items	Pre (n / %)	Post (n / %)	X2	P
Cardiac electrophysiology definition	8 (16)	43 (86)	75.33	<0.00 1*
Patient preparation	13 (26)	44 (88)	85.55	<0.001*
Nursing role during cardiac electrophysiology	12 (24)	46 (92)	83.44	<0.001*
Nursing role post the cardiac electrophysiology	11(22)	41(82)	77.22	<0.001*
Complications of cardiac electrophysiology	14 (28)	45 (90)	88.35	<0.001*
Follow up	9 (18)	47 (94)	67.27	<0.00 1*
Total mean knowledge scores	15.87+ 3.05	27.65+ 3.02	t=7.22	<0.001*

(*) Statistically significant at P ≤0.05

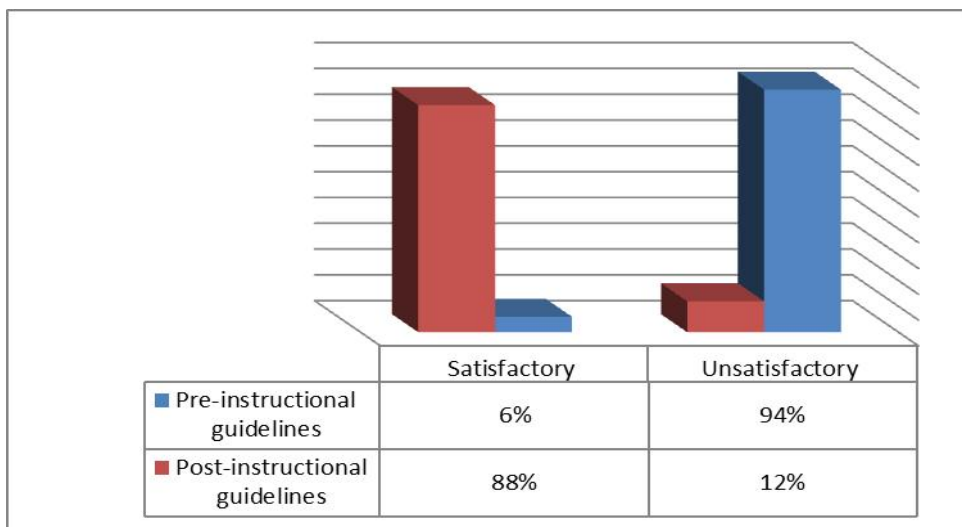|	Satisfactory	Unsatisfactory
Pre-instructional guidelines	6%	94%
Post-instructional guidelines	88%	12%

Figure 2: Total Knowledge Levels among Critical Care Nurses regarding cardiac Electrophysiology pre and post-instructional guidelines implementation (n= 50)

Table (3): Distribution of the studied critical care nurses' practice pre and post-instructional guidelines implementation regarding cardiac electrophysiology (n= 50)

Nurse's practice	Pre (n / %)	Post (n / %)	X2	P
Pre - cardiac electrophysiology	13 (26)	47 (94)	99.78	<0.00 1*
Post - cardiac electrophysiology	18 (36)	45 (90)	79.45	<0.001*
Total mean practice scores	13.54 + 2.04	20.22+0.55	t=9.56	<0.001*

(*) Statistically significant at P ≤0.05

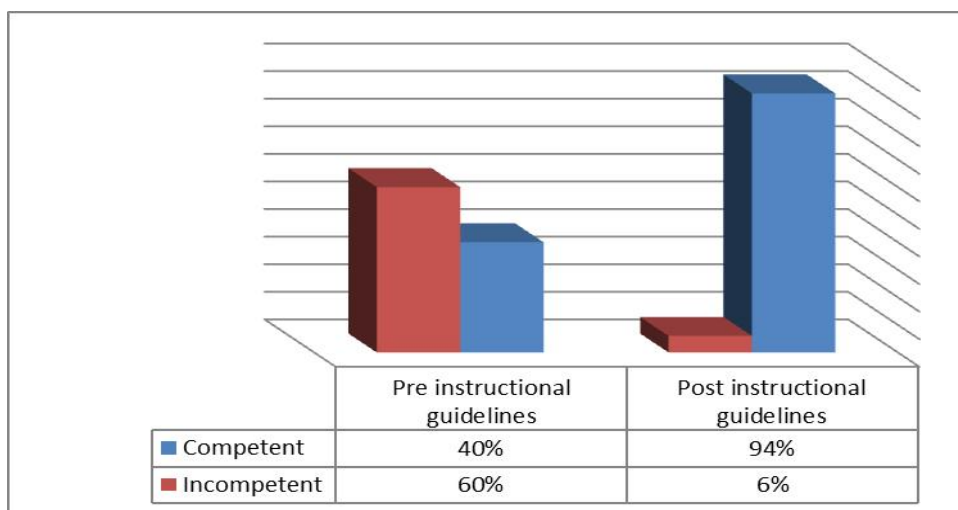|	Pre instructional guidelines	Post instructional guidelines
Competent	40%	94%
Incompetent	60%	6%

Figure 3: Total Practice Levels among the studied Critical Care Nurses regarding cardiac Electrophysiology (n=50)

Table (4): Correlation between personal data of critical care nurses and the total knowledge scores n=50

Variables	r	X^2	P value
Age and knowledge	0.35		0. 01*
Gender and knowledge		3.88	0.14 NS
Educational level and knowledge		7.46	0.02*
Years of experience and knowledge	0.33		0.01*

Table (5): Correlation between personal data of critical care nurses and the total practice (n=50)

Variables	r	X^2	P value
Age and practice	0.23		0.00*
Gender and practice		1.94	0.27 NS
Educational level and practice		9.17	0.02*
Years of experience and practice	0.42		0.00*

Table (6): Correlation between the studied critical care nurses' total knowledge level and practice level pre and post-instructional guidelines implementation (N=50)

Items	Total practice level			
	Pre		Post	
	r	P	R	P
Total knowledge level	1.00	0.001*	0.739	0.001*

Significance level at p ≤ o.o5

Discussion:

Regarding personal data, the majority of the study participants were female, over three-quarters of them were between the ages of 20 and 30 (mean age of 29.2 + 4.3), over half were Technical Institute nurses, and less than three-quarters had less than five years of experience (mean age of 3.88 ± 2.97). The high percentage of female nurses may be because, until recently, learning to become a nurse was exclusively open to women in Egyptian society, making nursing a predominantly feminine profession. It's also important to note that 90.78% of Egypt's graduated nursing staff were women, whilst 9.22% were men (**Ministry of Health and Population, 2023).**

This finding is consistent with **Ibrahim (2020**), who discovered that the median age of nurses in the intensive care unit was 27.95 ± 4.51 years, they had been there for an average of 4 years, and women outnumbered men five times. In line with this finding, **Abd Elbaky et al. (2019)** found that 38.5 percent of the subjects were men and 61.5 percent were women. Eighty-six percent were recent graduates with less than five years of experience.

The study's findings revealed that none of the critical care nurses under investigation had ever taken a cardiac electrophysiology course. These results supported the researchers' conclusion that cardiac electrophysiology training was necessary for critical care nurses. Defects in knowledge could also result from it.

The findings showed a highly significant difference in the total mean knowledge scores of the nurses under study regarding cardiac electrophysiology before and after instructional guidelines. The mean scores were 15.87+ 3.05 before instructional guidelines, and they improved to 27.65+ 3.02 after instructional guidelines. According to the researchers, it demonstrated the benefits of implementing instructional standards that enhance nurses' understanding of cardiac electrophysiology.

The result revealed that the majority of the nurses had an unsatisfactory level of total knowledge about cardiac electrophysiology pre-instructional guidelines implementation, while the majority of them had a satisfactory knowledge level post-instructional guidelines implementation regarding cardiac Electrophysiology. From the researchers' point of view, it confirmed the desire of the studied nurses to improve their knowledge about cardiac electrophysiology through instructional guidelines implementation and confirmed the effectiveness of instructional guidelines implementation.

Additionally, the lack of continuing education courses for nurses in their clinical practice settings, as well as the absence of protocols and guidelines for patient assessment and management, may have contributed to the lack of knowledge relevant to the management of patients undergoing cardiac electrophysiology, according to the researchers.

These findings supported the assertion made by **Noorjahan (2022**) that nurses lacked sufficient understanding to interpret and treat arrhythmias. In, **Rolley et al., (2020**), also created a survey research on nursing care practices after a percutaneous coronary intervention. There was a knowledge gap in this area, according to the 148 respondents who tried the poll. The poll also revealed a variety of educational demands and practice styles. Similar findings were made by **Rushdy et al., (2019**) and **Hassan & Hassan (2019**), who discovered that most nurses lacked adequate understanding of arrhythmia before the program's implementation and intra-aortic balloon pump about patient treatment. The results regarding the nurses' expertise in this cardiac operation were likewise somewhat disappointing.

In contrast to these findings **Feroze et al., (2019**) conducted a study to evaluate nurses' knowledge about problems following cardiac catheterization and discovered that nurses' knowledge was good and sufficient. **Al-Ftlawy (2024**) conducted a study in Al-Najaf City to ascertain nurses' knowledge regarding cardiac patient care, while **Atiyah (2021**) conducted a study in a cardiac unit to ascertain nurses' knowledge regarding pacemaker placement.

From the researcher's point of view, the results of the current study showed that all practice items after the implementation of instructional guidelines regarding cardiac electrophysiology showed statistically significant differences and improvements. This indicated the efficacy of the application of instructional guidelines that help to improve nurses' knowledge and are linked to practice-level improvement.

According to the current study's findings, three-fifths of the critical care nurses had incompetent practice on the pretest, however, the majority had competent practice level following the implementation of instructional guidelines. This outcome could be attributed to the absence of routine nursing education, nursing care standards, or cardiac electrophysiological practice protocols. In the same vein, **Noorjahan (2022)** discovered that most nurses had subpar practices before the educational program's implementation, but that things improved once it was put into place. According to **Feroze et al., (2019)**, 25.74% of nurses practiced poorly. Additionally, the findings of **Rushdy, et al., (2019)** on nurses' practices had unsatisfactory.

These results were Contrary to **Arathy's (2021)** findings, which indicated that the quality of care is appropriate based on observation of the practices. According to a Sulaimani City study by **Aziz (2024)**, nurses practiced post-cardiac procedures well.

The study found that nurses' total knowledge and practice levels were statistically significantly correlated with their age, years of experience, and educational attainment. In line with these findings, **Sharif et al., (2018)** conducted a study at General Hospital in Rania City to evaluate nurses' knowledge of cardiac catheterization. The findings indicated that, with the exception of educational attainment, there was a significant correlation between nurses' knowledge and age, gender, years of employment, and number of training courses. Additionally, **Feroze et al. (2019)** reported a substantial correlation between knowledge and practice and knowledge and qualification. This finding demonstrated that nurses' knowledge is greatly influenced by their qualifications and that experience can help them expand their knowledge.

On the other hand, **Shaaban et al. (2022)** found in an Egyptian study that there were statistically significant differences between nurses' educational attainment and their levels of practice and knowledge, but no correlation between gender, age, and nurses' knowledge and practice levels. In a descriptive study carried out in Baghdad, **Hassan (2019)** also found no correlation between nurses' knowledge and their years of experience, gender, or age in a cardiac care unit.

According to the study's findings, there is a statistically significant relationship between the total knowledge and practice scores of critical care nurses before and after the application of instructional guidelines.

In the same line with this, **Webster et al. (2022)** and Estes et al. (2023) stated that a nurse's approach to health evaluation may be influenced by their experience. While more experienced nurses will use their past expertise to inform decisions and direct assessment procedures, less experienced critical care nurses may require direction in the absence of the more clinical reasoning and critical thinking that the more experienced nurses employ.

Conclusion:

Based on the results and hypotheses of the present study, the study findings concluded that the results support the research hypothesis that the implementation of instructional guidelines had a significant positive effect on improving nurses' knowledge and practices regarding cardiac electrophysiology.

Recommendations:

Based on the current study results, the following recommendations are proposed:

- Develop and implement nursing educational program for critical care nurses to improve their level of knowledge and practice regarding cardiac electrophysiology
- Replication of the study on a larger probability sample to obtain more generalizable data.

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