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EFFECT OF A DESIGNED NURSING CARE PROGRAM ON SELECTED OUTCOMES OF CRITTICALY ILL PATIENTS UNDERGOING CARDIAC ELECTROPHYSIOLOGICAL STUDY

MONA MOHAMED SHABAN SALAMA
Former Nursing Director of the Critical Care Department, Cairo University Hospitals, Egypt.
Email: monamohamed2520@gmail.com

WARDA YOSSEF MOHAMED MORSY
Professor of Critical Care &Emergency Nursing Faculty of Nursing, Cairo University Egypt.

NAHLA SHABAN KHALIL
Professor of Critical Care &Emergency Nursing Facul1ty of Nursing, Cairo University Egypt.

HASSAN MOHAMED KHALED NAGI
Professor of Cardiology & Critical Care Medicine Faculty of Medicine Cairo University Egypt.

Abstract

Background: Electrophysiology (EP) programs that involve specialized nurses and advanced practice providers (APPs) have a positive impact on patient outcomes, leading to improved safety, reduced complications, better patient education, and increased efficiency. Cardiac electrophysiological study is a diagnostic test used to evaluate the heart's electrical conduction system and diagnose the abnormal heartbeats. **Aim of the study:** To evaluate the effect of providing a designed nursing care program on selected outcomes of the critically ill patients undergoing cardiac EPS. **Research design:** A quasi-experimental research design was utilized in the current study (pre-test and post-test). **Sample:** purposive sample of 60 adult (M&F) critically ill patients who met the inclusion criteria. **Setting:** The study was conducted in Critical Care Department Cairo university hospitals. Research hypotheses. Four research hypotheses were formulated in the current study. **Tools:** Five tools were utilized to collect data pertinent to the study **T1:** Demographic & medical data sheet **T2:** State–Trait Anxiety inventory (STAI) assessment Sheet **T3:** Pre/Post Nursing care program knowledge questionnaire **T4:** Observational checklist (5parts) **T5:** Patient outcomes assessment & complications sheet **Results:-** Majority of the (S&C)subject were males (60.0%).All four research hypotheses were supported as follows; **Knowledge Improvement ($H1$):** The study group's mean knowledge scores increased significantly from 6.80 ±2.25 pre-program to 35.40 ±0.97 post-program, while control group scores remained low (6.07 ±1.95 vs. 6.03 ±1.50), indicating a high-impact educational intervention. **Practice Improvement (H2):** Mean practice scores for the study group showed significant improvement (43.47 ±3.31 pre-program vs. 56.66 ±5.87 post-program). The control group showed no significant improvement (44.65 ±3.93 vs. 45.4 ±3.74). **Anxiety Reduction ($H3$):** State-Trait Anxiety Inventory (STAI) results indicated a significant decrease in anxiety for the study group. Post-intervention, study group state anxiety dropped (39.86 ±6.06) compared to the control group (42.76 ±8.17). Furthermore, severe anxiety was eliminated in the study group (0.0 %) compared to 6.6% in the control group. **Patient Outcomes (H4):** The study group exhibited better clinical outcomes, specifically reduced complications and shorter hospital stays. Additionally, the intervention resulted in no readmissions and improved self-care practice & reduced anxiety levels. **Conclusion:** The current study showed better patients' outcomes such as lesser complications, hospital stay, Anxiety level, with no death or readmission &with significant improvement of patients knowledge and self- care practices scores after intervention, **Recommendations:** Continuous enrichment of the critical ill patients' education is vital to improves adherence to treatment, better self-care practice , reduces anxiety level as well as complications, and

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ultimately leads to improve patients' outcomes. improves adherence to treatment, better self-care practice, reduces anxiety level as well as complications, and ultimately leads to improve patients' outcomes.

Keywords: Nursing Care Program; Outcomes; Critically Ill Patients; Cardiac Electrophysiological Study.

1. INTRODUCTION

There are various types of arrhythmias including sinus, atrial, junctional, and ventricular arrhythmias, each with its own subcategories. **[1]**. The worldwide incidence of arrhythmias specifically atrial fibrillation (AF), has notably risen over the last thirty years and currently stands at approximately 60 million cases **[2].** Ventricular tachycardia (VT) represents a significant contributor to sudden cardiac death and is linked to a considerable escalation in both morbidity and mortality. **[3].**

Cardiac electrophysiology study (EPS) is a specialized field within cardiology that focuses on diagnosing and managing patients with complex rhythm or conduction disorders. The EP study is done to evaluate the function of the Sinoatrial (SA) node, the atrioventricular (AV) node and the His-Purkinje system. Moreover, it helps in identifying the characteristics of arrhythmia and mapping the location of arrhythmia foci for potential ablation identifying the characteristics of arrhythmia and Indications for interventional electrophysiology and catheter ablation involve a two-stage process comprising both diagnostic EP and catheter ablation The initial phase of the procedure focuses on confirming the mechanism of the arrhythmia, while the subsequent stage involves ablation. This procedure is indicated for conditions such as atrioventricular nodal reentrant tachycardia, atrial fibrillation or flutter, and ventricular tachycardia **[4].**

Therefore, the goals that can be achieved by cardiac electrophysiology studies determining the cause of syncope, stratifying patients for sudden cardiac death, determining the feasibility or effectiveness of nonpharmacologic therapy (e.g., radiofrequency ablation or implantable cardioverter/defibrillator therapy), and conclusively diagnosing an arrhythmia (supraventricular or ventricular tachyarrhythmias or a bradyarrhythmia. **[5].** Patients undergoing EPS may expose to acute complications which comprises minors and major complications. Major complications defined as those likely to cause permanent consequences, requiring intervention to prevent injury or death**.[6].** Major complications include cerebrovascular accidents, though the risk of stroke is higher with curative atrial fibrillation ablation .Other major complications include tamponade vascular damage, deep venous thrombosis, and heart block that require a permanent pacemaker. atrioventricular node Minor complications are defined as a treatment related adverse event requiring nominal therapy or no treatment with or without overnight hospitalization for observation Including issues with vascular access such as hematoma, localized bleeding &tenderness at the catheter insertion site(groin or arm). Other minor complications include minor infection **[7].**

The patients care before, during, and following electrophysiology procedures will be provided by the electrophysiology nurse. The patient may have several tests scheduled before the cardiac electrophysiology investigation. These examinations give fundamental details about how the heart works. A 24-hour Holter monitor, an electrocardiogram (ECG),

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an echocardiogram, blood tests, and an exercise stress test will all be part of this testing. A heart monitor will be used while the patient is in the hospital. Before the EP study, antiarrhythmic medications may be discontinued. The doctor will determine whether this is necessary. A consent form will need to be signed by the patient. After midnight on the night before the test, the patient will fast. The patient can take any prescription drugs the doctor prescribes by taking sips of water. Before the test, the patient will be instructed to empty their bladder. The patient may not be allowed to wear eye glasses, dentures throughout the process **[8].**

The patient needs to understand that the procedure will take roughly an hour for the diagnostic cardiac electrophysiology study and two to four hours for the cardiac electrophysiology study with ablation. Along with taking the patient's medical history, a physical examination should be performed. A baseline electrocardiogram (ECG) and basic blood tests like serum electrolyte and urea should be performed. Patients taking warfarin require an international normalized ratio (INR) and a complete blood count CBC. Furthermore, a woman of childbearing age should have her pregnancy test checked no later than two weeks before the procedure. The patient should be instructed to stop taking anticoagulation drugs at least three days before the procedure as part of their preparation. Moreover, antiarrhythmic drug use should be discontinued for a minimum of five days before the procedure as doctors' order; the patient was also instructed to fast for six hours. The nurse also instructed patients to bring his /her regular medications, and any necessary paperwork about previous hospital stays, along with only outside clothing (no jewelry was allowed). **[9].**

A crucial component of preparing patients for cardiac electrophysiology is psychological testing. Anxiety, a loss of control, denial, depression, and disruption of family functioning are common responses to cardiac arrhythmias in patients and their families. According to **[10].** Anxiety is a common psychological reaction in patients with cardiovascular disease (60 percent). It can result in unintended clinical reactions like arrhythmias and ischemia, which can hurt the patient's cardiovascular outcome during cardiac catheterization. **[11].** Moreover, Patients waiting for cardiac EPS procedure are often anxious and worried. An investigation has shown that more than 82% of patients waiting for cardiac catheterization are anxious. About 74% of the studied cardiac patients experienced anxiety before EPS. The manifestation of such emotion is often called state anxiety, which is an emotional disorder in which tension, fear, and worry cause the autonomic nervous system to become more active in reaction to the situation **[12].** The sympathetic nervous system's reaction to stress raises plasma adrenaline levels, which in turn raises blood pressure and heart rate. Nursing staff caring for patients with anxiety should also be aware of the following adverse events: decreased serum potassium levels, cardiac arrhythmias, and changes in mental state that may impair the ability to make appropriate treatment decisions. **[13].**

A critical care nurse must be capable of providing accurate patient education, physical examinations, patient monitoring, and nursing care both before and after cardiac electrophysiology procedures. Comprehensive comprehension of interventional

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techniques, ability to identify unforeseen circumstances, and anticipation of options centered on solutions **[14].** According to **[15].** Patients should receive consistent information and clear instructions to ensure safety of patients and improve the patients outcomes, reduce anxiety and to facilitate their transition from hospital to home care.

Patient education can be defined as the process of influencing patient behavior and producing the changes in knowledge, attitudes and skills necessary to maintain & improve health. In EPS procedure the patients are in need of health education, & instructions related to electrophysiological study procedures such as self-management before, during, after procedure, & after discharge. A nurse must be capable of providing accurate patient education, **[16].**

The nursing care program is a clustered nurse-led intervention that provides evidence-based clinical treatment actions for the management of critically ill patients undergoing cardiac electrophysiological study. These program aims to maintain the patients 'outcomes, provide assessment and interventional measures to avoid complications. It covers provision of theoretical knowledge, instructions & practical skills about electrophysiological study to help patients to care for themselves and reduce their complications & anxiety level**. [17].**

In order to prevent patients 'complications specific instructions, knowledge & practice should be taught to the patients for those who are undergoing Electrophysiological study (EPS). The goal of the program is to inform and increase the patient's knowledge, practice and self-care capabilities using an individualized approach in an effort to achieve desired outcomes, improve quality of life, reduced readmissions & prevent complications. Electrophysiological study program is the provision of information, to improve clinical outcomes, patient's overall status, functional capacity, and quality of life, as well as to reduce mortality. Patients' education is a vital and important issue for building knowledge, attitudes and skills necessary to maintain & improve health.

2. METHODS

2.1 Aim

The current study is conducted to evaluate the Effect of a Designed Nursing Care Program on Selected Outcomes of Critically Ill Patients Undergoing Cardiac Electrophysiological Study. To achieve the aim of the current trial the following **research hypotheses were formulated:**

H1: The post means assessment knowledge scores of the critically ill patients who will receive a designed nursing –care program regarding Electrophysiological study (EPS) will be greater than their pre-assessment mean knowledge scores as compared to control group .

H2 : The post means assessment practice scores of critically ill patients who will receive a designed nursing –care program regarding Electrophysiological study (EPS) will be greater than their pre-assessment mean practice scores as compared to control group

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H3: The mean scores of state- Trait Anxiety Level of the study group who will receive a designed nursing –care program regarding electrophysiological study will be lesser than those in the control group.

H4: Electrophysiological study patients who are exposed to a designed nursing care program will have butter outcomes e.g. lesser hospital stay, lesser disease severity, good survival status, lesser complications than those who are not.

2.2. Design

A quasi-experimental design (one group pretest-posttest) was used to achieve the aim of the current study.

2.3 Setting

The study was conducted in the critical care department at Cairo University Hospitals the department consists 2 floors with total no. of 61 beds.

2.4. Participants

A purposive sample of 60 adult (male and female) cardiac critically ill patients who met the inclusion criteria who were subjected to cardiac electrophysiological study (EPS) constituted the study subjects were randomly assigned equally into two matched groups, (both study and control). 30 subject each.

2.5. Data Collection Tools

The current study data was collected using the following five tools:

First tool: Demographic & medical data sheet of critically ill patients undergoing cardiac electrophysiological study .Its consists of (2) main parts. The first part is related to Socio-demographic & personal data of the participant. It includes age, gender, occupation, marital status, level of education, date of admission, smoking habits etc. (7questions). & the 2nd part related to patients' Medical data which includes all data related to present and past medical history of cardiac arrhythmias e.g. causes, the development of cardiac arrhythmias, & its frequency

Second tool: Patient State–Trait Anxiety inventory (STAI) Level assessment Sheet for critically ill patient undergoing cardiac electrophysiological study .It was used to gauge how anxious patients were about the electrophysiology study. Created and tested this self-report scale, which asks participants to rate their own intensity on a four point scale. The SAI is a commonly used and acknowledged scale on a global scale. The state-trait anxiety inventory (STAI) validity and reliability have also been confirmed. A Cronbach's alpha of 0.91–0.94 indicated the scale's internal consistency reliability while a test-retest correlation of 0.86 indicated stability. Scoring system:-• Anxiety levels between 20 and 39 are regarded as, mild. • Anxiety levels between 40 and 59 are regarded as moderate. • Anxiety levels between 60 and 80 are regarded as severe.

Third tool: - Pre/Post Nursing care program knowledge questionnaire sheet for critically ill patient undergoing cardiac electrophysiological study. This tool was developed to

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assess patients' knowledge about electrophysiological study procedure. Which related to the general data about electrophysiological studies, knowledge regarding self-preparation before & after electrophysiological study, knowledge related to the procedure and patient's role during & after procedure, instructions regarding the new life style & self-care practice, & instructions regarding care of the catheter insertion site, signs & symptoms of infection, how to control bleeding if it will occur.

Scoring system: Each correct item was scored of one grade with total scores of 41 those who are scored as having 100 % of the total knowledge scored as considered satisfactory level 75%.

Fourth tool: - Observational checklist for critically ill patients undergoing cardiac electrophysiological study throughout the procedure stages (5parts) (pre, during, post procedure, before discharge & follow up for one week after discharge reported by telephone contact. Its consists of & covering (5 main) parts &totally contain 60 items. (5parts) evaluation of self-care actions

Part I: Observational check list for evaluation of self-care actions all through electrophysiological study procedure

Part II: This part concern the role of patient during procedure, this part was developed to assess patients' ability for implementing the program actions & instructions.

Part III: This part developed to assess patients' ability to implement the program actions & instructions post procedure.

Part IV: This part was developed to assess patients' ability to implement the care program actions & instruction before discharge & observing the patients 'performance to follow the discharge notes.

Part V: This part developed to assess the patient status & his ability to follow the program actions & instructions one week at home reported by telephone contact twice daily up to 7 days after discharge.

Scoring System: - Each correct action was scored one grade with total practice scores of 80 % or above will be considered as having satisfactory level of practice.

Fifth tool: Patient outcomes assessment & complications sheet for critically ill patients undergoing cardiac electrophysiological study. This tool used to follow up the patients' complications & outcomes e.g. the general body system status such as hemodynamic status, respiratory system status, and neurological function occurrence of stroke. renal and urinary system status, blood glucose level, dermatological status &affected limb monitoring , leg movement, lower limb numbness, skin temperature, skin color occurrence of bleeding, Then catheter insertion site status which includes; presence of hematoma, bleeding& oozing, edema, or infection, symptoms of DVT, swelling & Leg pain.

Tool validity and reliability: Content validity was done to identify the degree to which the used tools measure what was supposed to be measured. Developed tools were examined by a panel of three critical care nursing and medical experts to ensure clarity,

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validity, objectivity, relevance and feasibility of the study & to determine whether the included items were clear and suitable to achieve the aim of the current study. Needed modifications will be done accordingly & reliability of the developed tools will be tested by using SPSS & by using a Cronbach' Alpha value of =0.79. Cornbrash's alpha test it's the most common measure of internal the scale has good psychometric properties.

The state-trait anxiety inventory (STAI) validity and reliability have also been confirmed. A Cronbach's alpha of 0.91–0.94 indicated the scale's internal consistency reliability [20], while a test-retest correlation of 0.86 indicated stability.[20] further supported concurrent validity, face validity, and content validity.

2.6. Procedure

Study was carried out on two phases: Preparatory / Designation phase, and implementation and evaluation phases.

1) Preparatory /designation phase:

Its involved preparation and designing of the program objectives and plan, and data collection tools and the designing of the instructional booklet. This phase was concerned with the managerial arrangements to carry out the study in addition to the construction and preparation of the different data collection tools, designing the program and the instructional booklet. As regards to the managerial arrangements, the researcher prepared formal requests to the head of the Critical Care Department include the purpose and the natures of the study were explained to gain their assistance &approval, sharing and support to carry out the current study. This phase involved preparation and testing of data collection tools, designation of the program and the teaching aids. The whole teaching plan ensured content validity and reliability. Instructional booklet As regards preparation of instructional booklet required an extensive review of relevant literature either from textbooks, scientific research articles and web sites searches. The contents of the instructional booklet were reviewed by a panel of critical care of medical and nursing experts to ensure validity. The theoretical content of the booklet were concerned with understanding each and every aspect related to EPS procedure.

2) Implementation and evaluation phases

The study was conducted from October 2023 till November 2024. Once official permissions were granted to proceed with the proposed study, A total number of 60 critical care patients undergoing electrophysiological study were recruited to participate in the current study were divided into 2 groups (study and control group) 30 patients for each group , they were informed and asked one by one for their agreement and formal consents to participate in the current study after explaining the aim and the nature of the current study. Then the demographic & medical data sheet was fulfilled. Both study & control group subjects were received the routine hospital care. The theoretical and the practical aspects were used to carry out the study objectives. Each session involved one patient separately. The length of each session for each theoretical and practical session was between forty and forty-five minutes, and they were held in the morning before the EPS

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study time on Sunday, Monday, and Tuesday of each week. From 10:00 AM to 10:45 PM, theoretical instructions & practical video sessions were held &includes the definition, indications, benefits, contraindications, preparations, complications, instructions immediately after, during procedure, before & after discharge & instructions related to insertion site care& etc.

For study group subject. The theoretical part of the designed program was conducted as follows;

The summary of the Theoretical Program Conducted as follows:

- Initial Assessment (Tool 1 & 2): Demographic/medical data and baseline trait-anxiety levels were collected, likely to establish a baseline profile for each subject, completed within 15 minutes.
- Pre-test Assessment (Tool 3): An individualized pre-test (Tool 3) was conducted, requiring 20 minutes, to measure the patient's existing knowledge and anxiety levels before receiving the intervention.
- Theoretical Intervention: The core program was delivered individually using a colored instructional booklet. This method is effective for patient education, allowing for personalized, self-paced learning on the cardiac catheterization procedure.
- Immediate Post-test: A post-test was administered immediately after the instruction to assess immediate knowledge gain and knowledge retention.
- Situational Anxiety Assessment: State anxiety levels were measured specifically before the patient was shifted to the cardiac catheterization table (highest anxiety point) to evaluate the intervention's immediate effect.
- Outcome Evaluation (Tool 4 & 5): Additional tools, likely checklist(s) of knowledge or anxiety indicators (Tool 4) and a final assessment tool (Tool 5), were collected to evaluate the comprehensive impact of the educational intervention.

Summary of the practical part of Program Conducted:

In the form of videos & pictures provided to the patient individually within 25 mints regarding the leg movement after procedure, the care & dressing of the catheter insertion site, control of bleeding site if it happen. Patients' teaching relied on informal discussion with the patients it was provided according to the patients' tolerance and they allowed asking questions to clarify any misunderstanding.

For the control group subject data collection was conducted as follows;

The control group data collection process for a cardiac catheterization study was structured as follows:

Tool (1): Demographic & medical data sheet was collected.

Tool (2): Trait-Anxiety level was measured.

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Tool (3): Pre-test was provided to the study group subjects (note: based on the prompt, it seems this might be a placeholder for a pre-intervention check, though typically the control group does not receive the experimental intervention). This was conducted with each patient individually within 20 minutes.

Post-test: After some time, the post-test was collected.

Tool (2) - State Anxiety: State anxiety level was collected immediately before shifting to the cardiac catheterization table.

Tool (4): Checklist was collected.

Tool (5): Collected.

This process implies a control group designed for comparison against a treatment group in a structured study setting.

2.7. Statistical data analysis

The collected data was organized, computed, and statistically analyzed using IBM Statistical Package for The Social Sciences (SPSS) software version 24 (SPSS Inc., Chicago, IL, USA). Both descriptive and inferential statistics were applied, including frequency distribution, percentages, means, and standard deviations. Were utilized to analyze data pertinent to the study. The level of significance was set at P ≤0.05.

3. RESULTS

The statistical findings of the current study included three sections. The first section describes the patients 'demographic and medical data, and the second section covers the findings pertinent to testing the research hypothesis. Finally, the third section covers the additional correlational findings of the study.

Table (1) Shows that: The highest percentage of adult age of the study group & control group (30%) were the age between (21-30) & (51-60) respectively. The current study shows the dominance of males. More than half of study subjects were males (60.0%). Moreover, the majority of the study & control group sample were married& educated.

Table (1): Frequency distribution of the study and control groups regarding demographic characteristics (n= 60)

Demographic characteristics	Study		Control		*X2*	P
	No.	%	No.	%		
Age					**27.1**	**0.6**
21-30	**9**	**30.0**	**6**	**20.0**		
31-40	**8**	**26.7**	**8**	**26.7**		
41-50	**6**	**20.0**	**7**	**23.3**		
51-60	**7**	**23.3**	**9**	**30.0**		
Gender					**0.0**	**1.0**
Male	**18**	**60.0**	**18**	**60.0**		
Female	**12**	**40.0**	**12**	**40.0**		
Marital status					**3.4**	**0.33**

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Single	**4**	**13.3**	**6**	**20.0**		
Married	**24**	**80.0**	**23**	**76.7**		
Widow	**0**	**0.0**	**1**	**3.3**		
Divorced	**2**	**6.7**	**0**	**0.0**		
Educational level					**1.4**	**0.49**
Diploma education	**20**	**66.7**	**17**	**56.7**		
High education	**10**	**33.3**	**13**	**43.3**		

Table (2): This table revels that no significant difference between the study and control groups regarding their medical characteristics. So, most of them have arrhythmia, Palpitation and comorbid diseases, both groups have the same ratio of smoking habits 6.7%. Moreover, both groups have no family history of cardiac arrhythmias, or previous EPS & ablation procedure with fewer ratios of 3.3 % a history of cardiac surgery in study group only.

Table (2): Frequency distribution of the study and control groups regarding medical characteristics (n= 60)

medical characteristics	Study		Control		*X2*	P
	No.	%	No.	%		
Current diagnosis					**3.1**	**0.38**
AF	0	0.0	1	3.3		
Non sustained Tachycardia	1	3.3	0	0.0		
SVT& Palpitation	29	96.7	28	93.3		
Palpitation	0	0.0	1	3.3		
Comorbidity diseases					**10.2**	**0.17**
DM	3	10.0	3	10.0		
HTN	14	46.7	14	46.7		
DM/HTN	6	20.0	6	20.0		
No comorbidity diseases	7	23.3	7	23.3		
Smoking					**0.0**	**1.0**
No	28	93.3	28	93.3		
Yes	2	6.7	2	6.7		
Body weight					**5.9**	**0.21**
<60	4	13.3	1	3.3		
60-70	10	33.3	4	13.3		
71-80	8	26.7	12	40.0		
81-90	4	13.3	6	20.0		
>90	7	23.3	4	13.3		
History of cardiac surgery					**1.1**	**0.31**
No	29	96.7	30	100.0		
Yes	1	3.3	0	0.0		
History of previous EPS & Ablation procedure					**0.0**	**1.0**
No	30	100.0	30	100.0		
Family history of Arrhythmia					**0.0**	**1.0**
No	30	100.0	30	100.0		
Patient history of cardiac Arrhythmia					**1.1**	**0.31**
Yes	29	96.7	30	100.0		
No	1	3.3	0	0.0		

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Table (3): This table Shows that, both groups have 100% of chronic arrhythmias, the high ratio of the weekly & monthly occurrence of arrhythmias 43.3%, 56.7% were reported from the study &control group respectively. The less ratio of arrhythmia duration 3.3% is (one hour duration of arrhythmia) was reported from the study group, on the other hand the high ratio (70.0%) reported (30 minutes in duration) from the control group. Regarding the factors caused & induced arrhythmias, the stress factor considered the most common factor caused arrhythmia & reported a high ratio 66.7% of the study group compared to 43.3% in control group.

Regarding the prodromal signs before the arrhythmia attack, it revealed that palpitation was found the most common prodromal sign happened before the arrhythmia attack (86.7& 90.0 %) for the study & control group respectively. Concerning termination of arrhythmias, the medical treatment reports a high ratio in termination of arrhythmia (73.3%, 83.3%) in study and control group respectively. However, the 2nd alternative of arrhythmia termination is cardio-version were report 20.0%, 16.7% for study &control group respectively.

Table (3): Comparison between the study & control groups in relation to cardiac arrhythmias ,onset ,frequency ,duration ,precipitating factor &triggers of attack, prodromal symptoms before attack (n=30 study group & 30 control group) (n=60)

Arrhythmia	Study		Control		*X2*	P
	No.	%	No.	%		
Onset					**0.0**	**1.0**
Chronic	**30**	**100.0**	**30**	**100.0**		
Frequency					**56.3**	**0.00***
Daily	**6**	**20.0**	**5**	**16.7**		
Weekly	**13**	**43.3**	**8**	**26.7**		
Monthly	**11**	**36.7**	**17**	**56.7**		
Duration					**5.8**	**0.14**
10 min	**6**	**20.0**	**2**	**6.7**		
30 min.	**13**	**43.3**	**21**	**70.0**		
1 hour	**1**	**3.3**	**2**	**6.7**		
>1 hour	**10**	**33.3**	**5**	**16.7**		
Precipitating factors triggers of attack					**3.4**	**0.28**
Effort	**9**	**30.0**	**16**	**53.3**		
Stress	**20**	**66.7**	**13**	**43.3**		
Exercise	**1**	**3.3**	**1**	**3.3**		
Prodromal signs before attack					**0.02**	**0.891**
Dizziness	**2**	**6.7**	**3**	**10.0**		
Fainting	**2**	**6.7**	**0**	**0.0**		
Palpitations	**26**	**86.7**	**27**	**90.0**		
Termination of Attack					**4.3**	**0.36**
Medication	**22**	**73.3**	**25**	**83.3**		
Spontaneous	**2**	**6.7**	**0**	**0.0**		
Cardio version	**6**	**20.0**	**5**	**16.7**		

Table (4): Reveals that, there were a significance statistical differences between the pre & post mean knowledge scores of the study group (Paired t-test 63.933 at P-value 0.000)

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while there were no statistical differences in pre & post mean knowledge scores of the control group (Paired t-test 0.089 at P-value 0.929). Regarding the comparison between both study & control group. There was a significance differences between both groups in post mean knowledge scores (t-test 90.055 at P-Value 0.000).

Table (4): Comparison between the study & control groups in relation to knowledge regarding Electrophysiological study (n=60)

Group	Pre		Post		Paired t-test	p-value
	Mean	SD	Mean	SD		
Study	6.80	2.25	**35.40**	0.97	63.933	0.000*
Control	6.07	1.95	**6.03**	1.50	0.089	0.929
Timing	**Study**		**Control**		**T-test**	**p-value**
	Mean	**SD**	**Mean**	**SD**		
Pre	6.80	2.25	6.07	1.95	1.343	0.185
Post	35.40	0.97	6.03	1.50	90.055	0.000*

*significant at p-value<0.05

Table (5): Illustrates that, there were a significance statistical differences between the pre & post mean self –care practice scores of the study group & there were no statistical differences in pre & post mean knowledge scores of the control group (t-test 10.72 at P-value 0.000) . While for the comparison between both study & control group there were a significance statistical differences between both groups in post mean self –care practice (t-test 8.814 at P-Value 0.000).

Table (5): Comparison between the study & control groups in relation to practice regarding Electrophysiological study (n=60)

Group	Pre		Post		Paired t-test	p-value
	Mean	SD	Mean	SD		
Study	43.47	3.31	56.66	5.87	10.720	0.000*
Control	44.65	3.93	45.46	3.74	0.824	0.414
Timing	**Study**		**Control**		**T-test**	**p-value**
	Mean	**SD**	**Mean**	**SD**		
Pre	43.47	3.31	44.65	3.93	1.258	0.213
Post	56.66	5.87	45.46	3.74	8.814	0.000*

***significant at p-value<0.05**

Figure (1): Shows, significant statistical differences were found between study subjects before & after intervention in relation to state anxiety levels scores, on the other hand, no differences were found among the control group subjects.

In relation to comparison of state anxiety scores differences between the study & control group it showed no differences what so ever between them before and after intervention. However, the study group subjects reported lesser state anxiety level scores versus to those in control group.

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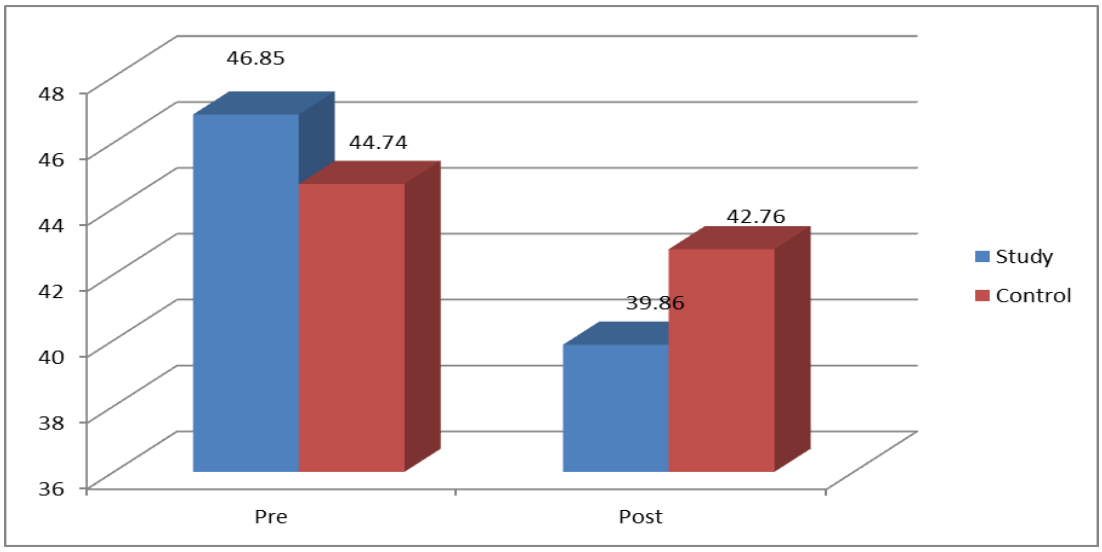

Figure (1): Comparison between the study & control groups in relation to state anxiety score (n=60)

Figure (2): As seen in Figure 2, there were a significant statistical differences were found between the pre & post mean trait anxiety levels scores post intervention in the study group only, Moreover , no statistical differences were found between the study and control subject in pre mean trait anxiety level scores. On the other hand, a significant statistical difference in post means trait anxiety level scores between both groups. This finding revealed that the study group showed lesser anxiety scores when compared to the control group.

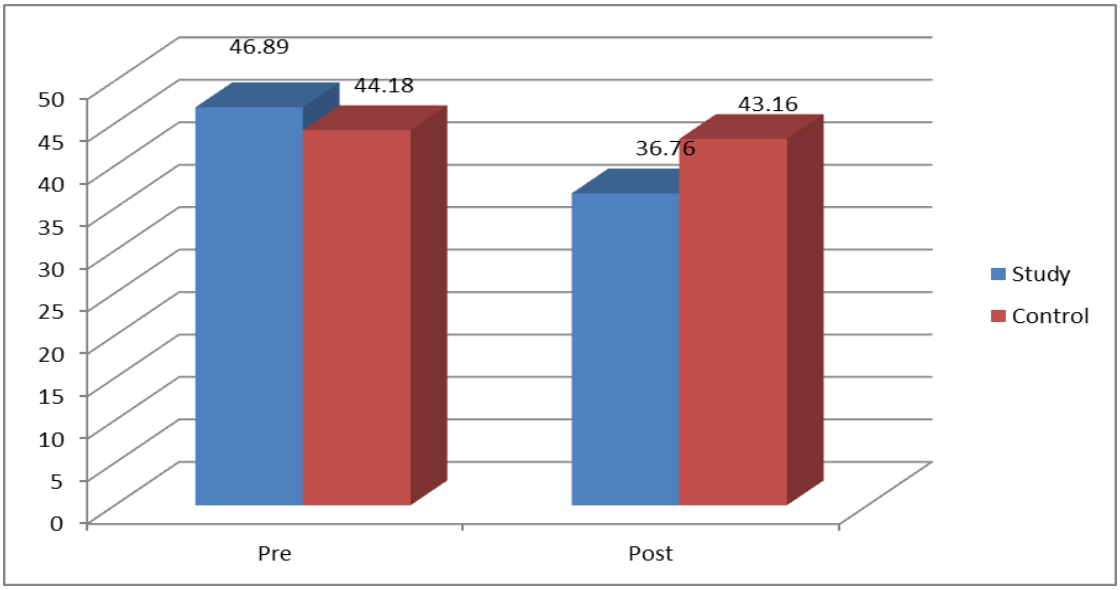

Figure (2): Comparison between the study & control groups in relation to trait anxiety score (n=60)

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Table (6): As can be seen from the table that most of the study group subjects (73.3 %) showed mild anxiety. While the control group showed moderate anxiety (46.7%) and severe anxiety (6.6%).

Table (6): Comparison between the study & control groups in relation to severity of anxiety post exposure to the nursing care program regarding Electrophysiological study (n=60)

Anxiety level	Study		Control		X2	P
	No	%	No	%		
Mild	**22**	73.3	14	46.7	11.1	**0.01***
Moderate	**8**	16.7	14	46.7		
Severe	**0**	0.0	2	6.6		

Table (7): Revealed no significant differences between the study and control groups regarding body system status and incidence of complications. However, 50% of the control group exhibited slight hematoma 3.3% of them exhibited infection and oozing, while the study group didn't show any complications.

Table (7): Comparison between the study & control groups in relation to patient's outcomes in terms of incidence of complications & body system status (n=60)

Outcomes	Status	Study		Control		*X2*	P
		No.	%	No.	%		
Cardiac &Hemodynamic status	**Normal**	**30**	**100%**	**30**	**100%**	**0.0**	**1.0**
Neurological status	**Normal**	30	100.0	30	100.0	**0.0**	**1.0**
Respiratory status	**Normal**	30	100.0	30	100.0	**0.0**	**1.0**
Renal status	**Normal**	30	100.0	30	100.0	**0.0**	**1.0**
Gastrointestinal Status	**Normal**	**30**	**100.0**	**30**	**100.0**	**0.0**	**1.0**
Dermatological status	**Normal**	30	100.0	30	100.0	**0.0**	**1.0**
Insertion site status							
• **Slight Hematoma**		9	30	15	50	**1.5**	**0.22**
• **Infection**		0	0	1	3.3	**1.0**	**0.31**
• **Bleeding**		0	0	0	0	**0.0**	**1.0**
• **Oozing**		0	0	1	3.3	**1.0**	**0.31**
Vascular Status	**Normal**	30	100.0	30	100.0	**0.0**	**1.0**

Table (8): Indicate that, the patient outcomes of success rate for the study & control group were report 86.7, 100% respectively with X2 of 0.29, 4.00 & at P-value, 0.593, 0.046*.This percent of the less percentage of failure 13.3 of the study group subject according the EPS specialist its means that the patients are in need of another advanced procedures such as 3D CARTO procedure, or repeated ablation, or patient will receive a medical treatment for cardiac arrhythmias.

Table (8): Comparison between the study & control groups in relation to patients' outcomes regarding success and failure rate of EPS and Ablation procedure (n=30 study group & 30 control group) total (n=60)

Outcomes	Study		Control		*X2*	P
	No.	%	No.	%		
Success	26	86.7	30	100.0	0.29	0.593
Failure	4	13.3	0	0.0	4.00	0.046*

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Table (9): showed no significant differences between them. So 100 % both of group subject in maintains of survival status.

Table (9): Comparison between the study & control groups in relation to patient's outcomes regarding survival status (n=30 study group & 30 control group) total (n=60)

Outcomes	Study		Control		*X2*	P
	No.	%	No.	%		
Survival	30	100.0	30	100.0	**0.0**	**1.0**
Death	0	0.0	0	0.0	**0.0**	**1.0**

4. DISCUSSION

Common and clinically significant cardiovascular condition arrhythmias affect millions of people worldwide. More than 2.5 million people in the United States have atrial fibrillation AF, and by 2030, there will likely be 12.1 million instances globally. **[18].** An Electrophysiological Study (EPS) is a serious invasive cardiac test used to examine & evaluate the heart's electrical activity it's performed to check & diagnose the abnormal heartbeats or arrhythmia. **[19].** The focus of cardiac electrophysiology studies has quickly shifted from diagnostic techniques to therapeutic strategies. Several cardiac arrhythmias that were previously treated with antiarrhythmic drugs, cardio- version, or heart surgery. In EPS they should treat a problem by destroying the place inside the heart that is causing the abnormal electrical signal. This procedure is called catheter radiofrequency ablation. CRFA. **[20].**

The present study delineated the dominance of male, more than half of the both group subject were males (60.0%). This result is in agreement with the study done by **[21].** Who conduct a study to evaluate the Effect of reflexology on anxiety level among patients undergoing coronary angiography & majority of study subject were male. The current study was supported by **[22].** Who conducted a study about effects of foot massage and patient education in patients undergoing coronary artery bypass graft surgery, the study was done in India on a sample size of 55 participants. Most of the participants were male in the experimental group and control group. The researcher Perspective is that predominance of male patients in this study and similar, such as those evaluating similar care protocols, is likely linked to behavioral factors and a lack of hormone-based protection compared to females. The current study finding was contradicting with the results of **[23].** Who studied the Effect of foot reflexology on chest pain and anxiety in patients with acute myocardial infarction: A double blind randomized clinical trial. The study was done in Iran on a sample size of 90 participants and revealed that 56.7% of study group and 63.3% of placebo group were females.

In addition, the current study revealed that, a significant portion (30%) of the study and control groups were aged 21–30 years, while another prominent group was 51–60 years, highlighting a bimodal or wide distribution of cardiac arrhythmias among adults. The researcher point of view Based on the provided text, the study findings indicate a broad

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age distribution of cardiac arrhythmias across the adult lifespan, with substantial representation in both younger (21-30 y) and older (51-60 y) age groups, supporting the view that these conditions can occur at any adult age. In relation to the studied sample's level of education all are educated. Concerning the marital status more than half of both groups (study & control) are married. These finding aligns with studies highlighting the high prevalence of cardiovascular disease (CVD) risk factors, particularly in specific population groups. **[24].**

As regard to medical data of both groups of the studied sample.

The current study shows that both study & control group have been complaining of cardiac arrhythmias, SVT & palpitation, this results contradicts the findings of **[25].** Who reported that roughly one-third of the patients in the study had VF diagnoses. In the term of comorbidities, both groups are similar in the ratio of comorbidity diseases (DM, HTN) or (DM&HTN). The current study discovered that hypertension, and diabetes (DM& HTN) affected all groups equally in ratio. The current study findings indicate that both study and control groups suffer from chronic arrhythmias, with a high frequency of weekly and monthly occurrences observed in both groups. Regarding duration, the control group experienced a wider range, reporting both shorter durations (ten minutes) and, notably, a higher ratio of longer-lasting arrhythmias (thirty minutes) compared to the study group. This is reinforced by **[26].** The study identifies stress as the most common trigger for arrhythmia, with a significantly higher incidence of stress-induced episodes in the study group compared to the control group. This is consistent with literature indicating that stress impacts both atrial and ventricular arrhythmias through autonomic nervous system dysfunction.

Concerning termination of arrhythmias. Research indicates that in modern electrophysiology settings (such as the study and control groups mentioned), pharmacological treatments (e.g., amiodarone, beta-blockers) and catheter ablation have achieved high rates of success in terminating AF and other tachycardia. From the researcher point of view the Stress activates the sympathetic nervous system, leading to the release of adrenaline and cortisol, which causes the heart to beat faster and increases blood pressure and this can trigger atrial fibrillation (AF) and ventricular arrhythmias. Chronic stress also weakens the immune system, disrupts sleep, and can lead to unhealthy behaviors. Moreover, chronic stress contributes to inflammation and plaque buildup in the arteries, which can lead to coronary artery disease and, subsequently, heart failure. **[27]**

Concerning the first research hypothesis The current study revealed that both study & control group provided unsatisfactory level of knowledge scores in pre- test regarding the general data about electrophysiological studies, knowledge regarding self-preparation before EPS procedure, the patient's role during, after procedure, instructions regarding the new life style after discharge.. On the other hand, the current study demonstrated a satisfactory level of knowledge scores in post - test of the study group compared to control group subject. The current finding is in agreement with study of **[28]** which conducted to examine the effectiveness of video-assisted teaching intervention on Knowledge, Acute

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Complications, and Anxiety Level for Arrhythmic patients undergoing Cardiac Electrophysiology. this study showed that nearly all of the study group receiving cardiac electrophysiology had unsatisfactory knowledge on the pretest, the majority of them had appropriate knowledge score after the video-assisted education intervention regarding cardiac arrhythmia and cardiac electrophysiology. There was a significant improvement in patients' total post knowledge mean scores regarding arrhythmia and cardiac electrophysiology after video-assisted teaching intervention. As well, a similar study conducted by **[29]**.Who investigated the effects of the teaching among cardiac catheterization procedure. The study found a significant improvement in disease-specific knowledge, treatment adherence, and self-care competence as a result of the teach-back method of education. The use of patient education can identify patient's knowledge gaps and improve patients' self-care confidence **[30].**

Concerning testing the second research hypotheses, the current study's findings revealed that all patients' self –care practice scores showed statistically significant differences between the study and control group after the exposure to nursing program. As well, the finding is in agreement with the study of **[31].** The study done & aimed to evaluate in the literature the effectiveness of the health education interventions in self-care and adherence to treatment of patients with Chronic Heart Failure. This result was supported by a study entitled the effect of health education intervention on permanent pacemaker patients adherence to care practice &daily activities which conducted by **[32].** And exhibited a highly statistical significant difference between the study & control group in relation to adherence with pacemaker care & practice & performing daily activities.

In addition, the Present finding is congruent with the study of with other similar study done **[33].** That conducted at the Bonifatius Hospital Lingen, Germany that aimed to evaluate effect of nurse-led education on self-care behavior and disease knowledge in heart failure patients and self-care practice scores were increased immediately after the educational program. As well, the current study finding is agreed with that of the **[34]** who assessed the effect of a self-care education Intervention on self-care adherence among CHF patients in Northwest Ethiopia. They found that the intervention was associated with a statistically significant, four-point increase on our 40-point self-care adherence scale.

Concerning the testing of 3rd hypothesis pertinent to anxiety level.

In relation to anxiety level among the patients underwent the EPS, The current study, illustrate that the pre mean of the state anxiety level scores of the study group sample was high compared to the post mean anxiety level scores of the same group its decreased up to 6 percent only after implementation of the EPS program. Compared to the slight gradual decrement in control group anxiety mean level scores. With significant statistical difference between both groups before and after the procedure. These findings are in agreement with that of **[35].** Who conduct a study for 186 patient undergone cardiac catheterization to explore the effectiveness of an educational video intervention in lowering per procedural anxiety among Jordanian patients hospitalized for cardiac catheterization because there are many potential reasons of anxiety related to cardiac catheterization including involvement of the heart and the actual test procedure the study

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shows that the Patient's anxiety levels were measured by physiological parameters of anxiety (by the State Anxiety Inventory (SAI). The Results after video education, there was a significant difference in pre procedural perceived anxiety between the groups: pre procedural anxiety levels for the experimental group versus for the control group with p.001, and post procedural perceived anxiety for the experimental versus the control group.

The current study finding is in accordance with the study of **[36]**Who conduct a study to evaluate the effects of education on anxiety among Chinese patients with heart disease undergoing cardiac catheterization regarding anxiety in patients undergoing cardiac procedures, the findings described—severe pre-procedural anxiety in over half the participants, significant reduction following the program instruction &teaching, and identifying factors like ignorance about Study uncertainty, and fear of pain—align with established research on interventions in cardiac electrophysiology (EP) units. Studies have shown that patients undergoing EP studies frequently suffer from high levels of pre-procedural anxiety due to a lack of knowledge, which is successfully mitigated by structured educational interventions. Studies by **[37]** indicate that elevated anxiety levels are common among cardiac patients, frequently peaking after an acute cardiac event. These findings are supported by research showing that 20–30% of patients experience high anxiety after Acute Coronary Syndrome (ACS), with such anxiety persisting for up to a year in approximately 50% of cases. In relation to Peak Timing: Contrary to the peak following an acute event. The finding of the current study is in line with study by **[38]** who demonstrated that structured early nursing preparation significantly reduces anxiety among patients undergoing cardiac catheterization, showing highly significant differences between study and control groups, particularly at the P=0.0001 Level. This approach improves patient knowledge and effectively manages fear/anxiety during pre- and post-procedure periods.

On the other hand ,the current finding was contradicted with, [**39],** titled "Psychophysiological manifestations of anxiety in patients undergoing electrophysiology studies," investigated state anxiety and autonomic responses in 32 adults undergoing initial EP studies at three specific times: 24 hours before (pre-procedure teaching), 1 hour before (reinforcement), and 3 hours after (results explanation) .The study concluded that even though the procedure is invasive, the anxiety reported was moderate, allowing for patient education to be conducted effectively at these intervals

As regard the patient outcomes & complications associated with electrophysiological study procedure the; The current study provide 100.0% of good outcomes which related to no significant differences between the study and control groups regarding body system status and incidence of complications . However, half of the control group exhibited slight hematoma & very less percentage of them exhibited infection and oozing, while the study group didn't show any complications. More than half of the study group subject have success rate compared to 100% of the control group who have a high success rate. This percent of failure rate according the EPS specialist its means that the patients are in need of another advanced procedure such as 3D CARTO procedure, or repeated ablation, or

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patient will receive a medical treatment for cardiac arrhythmias. The current study is in line with the study conducted by **[40]** they conduct a study to assess the patient outcomes. & quality of life after invasive cardiac procedure. A telephone follow-up interview was conducted at 30 days after hospital discharge when patients' clinical outcome, re hospitalization rate or other events, as well patients' health status, was assessed. The results of the this study emphasize the effect of nursing intervention in patients undergoing invasive cardiac procedures in relation to pain and discomfort during hospitalization and at 30 days after hospital discharge. The nurse-led patient education during patient's hospital stay was effective in relation to per-procedural pain and discomfort reduction, improved QOL at 30 days after discharge and reduced the likelihood of having a cardiac event and readmission at the same time-point.

The current study revealed that all the participant in the study group subject have no post-procedural complications in the form of impaired vascular access & insertion site pain, discomfort, local complications such as bleeding, hematoma, infection, pain, and discomfort, &vascular access & arterial damage, as well as systemic complications like arrhythmia, allergic reactions, and air embolism,. This result was contradicted with the study conducted by **[41]** who conduct a study to assess the clinical outcomes among patients undergoing diagnostic cardiac catheterization (DCC). The results revealed that 67.3% of the studied patients had normal and acceptable vascular access sites pre-DCC, while 59.1%had impaired and severely impaired vascular access sites post-Diagnostic cardiac catheterization DCC. Most patients reported experiencing pain at the back and insertion site, 80% of the patient's experienced relatively mild post-DCC complications. This study of DCC carries a risk of mild negative clinical outcomes, Furthermore, 95.5% of patients expressed a satisfactory level of satisfaction with their overall experience in the Cardiac care unit.

Regarding minor complications, the current study found that the minor complication of studied patients underwent EPS was Hematoma at the puncture site that not require any surgical intervention, not require medical therapy, with no vascular damage. This finding in agreement with **[42]** who reported that minor complication was Hematoma puncture site that not require any surgical intervention. In contrast, the current study is contradicted with the study conducted by **[7]** who reported that highest percentage of complication was pericardial effusion that requiring pericardiocentesis.

In the context of major complications. The present study showed that a study group subjects exhibited better outcomes & lesser complications. This finding is contradicted with the study done by **[28]** who conduct a study to determine the Effectiveness of video-assisted teaching intervention on knowledge, acute complications, and anxiety levels for arrhythmic patients undergoing cardiac electrophysiology. The study found that 4% of the examined patients developed atrioventricular (AV) block, requiring pacemaker implantation, and 2% developed deep vein thrombosis (DVT). On the other hand, the current finding is consistent with the findings of a study by **[43],** which found that 2% of their study participants undergoing EPS developed AV block. Finally, our results are

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consistent with the findings of the study by **[44],** which found that 2% of the patients under investigation for DVT.

5. CONCLUSION AND RECOMMENDATIONS

Based on the present study results & findings it could be concluded that nursing teaching intervention had a highly statistical significant positive effect on reducing patients reducing state-trait anxiety levels among the studied subject undergoing cardiac electrophysiological study in study group. Also, it had a highly significant positive effect on improving their pre and post procedure knowledge, enhances self-care practice & management, reducing complications, than control group and ultimately leads to improve patients' outcomes.

Recommendations:

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

1) A qualified nurses should take the responsibility to determine the information preparation of patient's undergoing cardiac electrophysiological study.
2) Establishment of an educational teaching booklet about cardiac EPS because it can teach a large number of patients in a short period of time.
3) Further studies involving studies a large number of patients can be conducted to detect that the health education can influence the patient overall adaptation.

Abbreviations

EPS	Electrophysiological study
ECG	Electrocardiogram
CBC	Complete Blood Picture
INR	International Normalized Ratio
CRFA	Catheter radiofrequency Ablation

DECLARATIONS

Ethical Considerations

An official permission to conduct the study was obtained from the Vice dean of Higher Education and Research -Faculty of nursing Cairo University , ethical committee of research in the faculty of nursing Cairo university which approved in May 2023 with RHDIRB2019041701 no. And from the head of the critical care department at Cairo University Hospital approved in September 2023. The study was conducted based on the ethical principles of avoiding harm. Written consent was obtained from all participant of the selected critical care department. Anonymity and protection of privacy and personal information. The study was conducted based on the ethical principles of avoiding harm. Written consent was obtained from all participant include explaining the purpose, nature of the study and stating the possibility to withdraw at any time. Participation in the study all are voluntary. & to ensure confidentiality for the participants; data will not be accessed by any other party without taking permission of the participants.

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Availability of data and materials

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Competing Interests

The authors declare that they have no competing interests.

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