Assiut Scientific Nursing Journal
http://asnj.journals.ekb.eg
http://www.arabimpactfactor.com
DOI: 10.21608/ASNJ.2021.100458.1247

Effect of Training Program on Nurses' Knowledge and Practice Regarding Patients with Cardiac Arrhythmias

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Abstract
Background: The role of critical care nurse in arrhythmias management specializes in symptomatic relief, promotion of comfort and taking crisis activity in fatal dysrhythmias**. Aim:** The aim of the study was to evaluate the effect of nursing training program on nurses' knowledge and practice regarding the care of patient with cardiac arrhythmias in Cardiac Intensive Care units at Zagazig University Hospitals, Egypt. **Subjects and Methods**: **Research design:** A quazi experimental design was utilized to achieve the aim of this study. **Setting:** The study was conducted in Cardiac Intensive Care Units at Zagazig University Hospitals. **Sample:** A convenient sample of all available nurses (30 nurses) was included in this study. **Tools of data collection:** Self-administered questionnaire and observational checklists were used. Data were collected over a period of nine months. **Results:** There was statistically significant difference in total level of nurses' knowledge, and practice pre, post and post, follow-up phases of nursing training program. **Conclusion:** The nursing training program had a significant positive effect on improving nurses' knowledge, and practice regarding care of patients with cardiac arrhythmias. **Recommendations:** It was recommended periodic evaluation of nurses' knowledge and practice concerning management of patients in any emergency situation in the critical care units.

Keywords: Cardiac Arrhythmias, Nurses' Knowledge, Practice & Nursing Training Program.

Introduction:
Arrhythmias are abnormal heart rhythms due to disturbances in heart automaticity and/or abnormal heart conduction which cause a reduction in cardiac output, a change in heart rate thus affecting tissue perfusion. Any impulse originating outside the sino-atrial node can cause an abnormal heart rhythm. Much of the literature considers ventricular tachycardia, ventricular fibrillation, pulseless electrical activity, complete heart block, and a systole to be the most common types of life threatening arrhythmias. **(Ndile, et al, 2018)**.

Cardiac arrhythmia can lead to more fatal forms of rhythm disturbance, e.g.; premature ventricular depolarization may lead to ventricular fibrillation (resulting in a heart attack). Cardiac arrhythmias can cause a variety of symptoms, ranging from total asymptomatic to loss of consciousness or sudden cardiac death. In general, when systemic heart disease is present, more serious symptoms are more likely to occur. For example, sustained monomorphic ventricular tachycardia can be tolerated hemodynamically without causing syncope, particularly in a healthy heart. **(Dao et al., 2013)**.

The world health organization estimates that arrhythmias are the most frequent cause of death globally, accounting for 70,000 to 90,000 sudden cardiac deaths per year, with ventricular tachycardia and ventricular fibrillation accounting for the majority of these deaths. **(Youssef, 2017)**, when either arrhythmias happen, the heart cannot pump sufficient blood throughout the body. Unless treatment is delivered within minutes, death is eminent. Long-run treatment choices for individuals who survive arrhythmias include medication, surgery, implantable cardioverter electronic device or a mixture of medications **(Link, et al., 2015)**.

Successful treatment of arrhythmias depends on fast diagnosis and activates management, regularly requiring a multimodality procedure, which may consist of synchronous correction of electrolytes and pH, pharmacological measures for rate control, pressors, exact antiarrhythmic therapeutic drugs, electrical pacing, or cardio version. Management must be cautiously custom made to the affected person's specific arrhythmia, its basic cause, and the patient's own coexisting therapeutic and surgical condition **(Brown et al., 2018)**.

Critical care nurse plays a vital role in arrhythmias management specializes in symptomatic relief, promotion of comfort and taking crisis activity in fatal dysrhythmias which incorporate assessment of disturbed rhythm, getting 12- lead ECG to recognize the type of dysrhythmia, and turning in satisfactory oxygen to diminish heart workload **(Elfeky, et al., 2015)**.

As well, while administering medication as prescribed, the nurse should observe the possible adverse drug reactions and perform aimed nursing care. In cases such as ventricular fibrillation and cardiac arrest, the nurse should perform quick and secure defibrillation and other cardiac life support procedures to preserve oxygen supply to vital organs **(Lough, et al., 2020).**

Significance of study:

Globally 16 million deaths were reported due to cardiovascular disorders. Cardiac arrhythmias are some of the conditions which carry life threatening risks leading to heart failure or death (**Jacob, et al., 2018**). In Egypt, approximately four million people have arrhythmias (**Statistics by Country for Arrhythmias, 2011**). More than 70% of Intensive Care Units patients experience heart rhythm disturbances, and these patients have correspondingly higher mortality rates particularly with ventricular arrhythmias **(Mijatovic, et al., 2017)**. Hence, this study has been conducted to improve nurses' knowledge and practices regarding the care of patients with cardiac arrhythmias.

Aim of the study:

The aim of this study was to evaluate the effect of nursing training program on nurses' knowledge, and practice regarding the care of patients with cardiac arrhythmias in cardiac intensive care units at Zagazig University Hospital.

Includes: assessment pre - post and follow-up nursing training program.

Objectives:

- Assess nurses' knowledge and practice regarding the care of patients with cardiac arrhythmias.
- Based on nurses' needs design and implement the nursing training program regarding the care of patients with cardiac arrhythmias.
- Evaluate the nurses' knowledge, and practice regarding the care of patients with cardiac arrhythmias.

Research hypothesis:

- Nurses' knowledge will increase post program and follow-up phases.
- Nurses' practice will increase post program and follow-up phases.

Subjects and Methods:

Design:

A quasi experimental design was used to achieve the study's aim.

Setting:

The present study was conducted in three cardiac Intensive Care Units at Zagazig University Hospitals; one is located in the third floor of the heart and chest, Sednawy Hospital, and other in the fourth floor in the same building, There is also one in the ground floor of General Medical Hospital, each one consists of 10 beds, one ventilator and one monitor for each bed.

Study subjects:

A convenient sample of all available nurses (30) nurses working in cardiac intensive care units at Zagazig University Hospitals.

Data collection:

Tool I: Self- administered questionnaire of nurses: was written in a simple Arabic language to avoid misunderstanding. It was designed by the researcher after reviewing of related literature **(Caon, 2018, Burri, et al, 2017, & Lader, 2013)** divided into two parts:-

Part 1: Nurses' characteristics: Composed of six closed ended questions included age, sex, marital status, qualification, years of cardiac intensive care unit experience and attendance training courses.

Part 2: Nurses knowledge questionnaire: to assess nurses' knowledge regarding the care of patient with cardiac arrhythmias**.** It composed of eight parts about: Cardiac arrhythmias, connecting the patient to the monitor, ECG, emergency drugs, cardiopulmonary resuscitation, defibrillator, emergency cart, and nursing care for patients with cardiac arrhythmias.

The scoring system:

Scoring system for the knowledge items, the correct answer was scored one and the incorrect answer scored zero. Knowledge was considered satisfactory if the percent score was equal or above 80% and unsatisfactory if less than 80% based on statistical analysis and importance of nurses' knowledge regarding the care of patients with cardiac arrhythmias.

Tool II- An observational checklist: to assess the nurses' practice regarding the care of patients with cardiac arrhythmias. It was adapted from **Mcewen & Rothrock, (2018)**, **Ostendorf, et al., (2018**) **Garrels et al., (2017**), **Wiegand, (2017**), **American Heart Association, (2016)**; **Barneft et al., (2016**) **Ostendorf, et al., (2016) Galura & Haugen, (2015):** It consisted of eight checklists about: Emergency management of cardiac arrhythmias, connecting patient to cardiac monitor, recording and interpreting 12 lead Electrocardiogram (ECG), recording of cardiac arrhythmias, performing Cardiopulmonary Resuscitation, Automated External Defibrillation, emergency medications, and crash cart preparation.

The Scoring system:

Each item in observational checklist scored one if done correctly and score zero if done in correctly. The nurses had competent level of practice when the total score equal or above 80% and not competent if it below 80% based on statistical analysis and importance of nurses' practice regarding the care of patients with cardiac arrhythmias.

Content validity and reliability:
Once the tools were prepared, face and content validity were ascertained by a panel of five experts included three professors of medical surgical nursing and two professors of cardiology from Faculty of Medicine, Zagazig University, who revised the tools content for clarity, relevance, comprehensiveness, understanding, and ease for implementation. Reliability statistics of the proposed tool, Cronbach's Alpha was 0.89.

Pilot study:
A pilot study was carried out on five nurses to check and ensure applicability and feasibility of the tools. They are selected at random from critical care units. Those nurses were included in the study because of no modifications in the used tools.

Administrative design and Ethical consideration:
The research approval was obtained from the Dean of the faculty of Nursing and from the director of Zagazig University Hospital before the program implementation. The nurses were given information about the study's aims and objectives. The researcher confirmed the anonymity and confidentiality of nurses. Nurses had the right to withdraw from the study at any time without penalty.

Field work:
The study was implemented from November, 2020 to July, 2021, which classified as follow: 2 months for pre-test (from beginning of November to the end of December 2020, 6 months for implementation of nursing training program and posttest from January to July2021 from cardiac Intensive Care Units at Zagazig University Hospitals where the researcher available three days per week in morning and afternoon shifts.

The study was conducted in three phases (assessment phase, implementation phase, and evaluation phase).

Assessment phase: The researchers started by introducing their self and explain purpose of the study for the nurses included in the study. Also explain the component of the tools at the beginning of training program. The researcher then assessed the nurses' knowledge and practice regarding caring of patients with cardiac arrhythmias by using questionnaire and observational checklist.

First, the researcher observed the nurses' practice while caring the patients with cardiac arrhythmias using the observational checklist. Each skill was evaluated three times and the mean was calculated. The time required to complete the checklist ranged between 30-45 minutes.

Second, the questionnaire was administered by the researcher to all nurses individually to assess their knowledge about cardiac arrhythmias. The questionnaire was explained to the nurses by the researcher. The average time needed for the completion of each interview (by nurses) was between 30 and 40 min. This period of pretests (knowledge and practice) took 2 months

Implementation phase:
The implementation phase was achieved over 6 months. The total number of sessions was 13, divided as follows: four sessions for knowledge and nine sessions for practice. The duration of each session ranged from 45 to 60 min for each group, including 10 min for discussion and feedback.

Description of the nursing training program:
To facilitate the implementation of the training program about cardiac arrhythmias, the training places were selected by the researchers, also teaching aids, posters, videos and brochures prepared. At initial interview the researcher clarified the nature, aim of the nursing training program and asked the nurses to fill the questionnaire. Nurses were divided into small groups, and each group contained 3-5 nurses.

The nursing training program included two parts, theoretical part about: anatomy of the heart, functions, factors affecting heart rate, definition of cardiac arrhythmia, manifestation, causes and types, diagnosis, recording of ECG, definition of DC shock and its types, definition of cardiopulmonary resuscitation, crash cart and emergency medications and its side effects, and pacemaker. Practical part concerning care of patients with cardiac arrhythmias, recording of cardiac arrhythmias, reading ECG, connecting patient to monitor, performing CPR, external automated defibrillation, and arranging of crash cart

Evaluation phase:
The same data collection tools were used to assess each nurse three times in the study; one before the nursing intervention program (Pretest), second occurred immediately after program (Posttest), and three months after the end of the nursing training program (follow-up test).

Statistical analysis:
After data collection, all data were coded, entered and analyzed using the Statistical Package for Social Science (SPSS) version 25.0. Qualitative data were presented as frequencies and percentages while, quantitative data were presented as mean, standard deviations. While, comparison of paired data of pre, posttest and follow up done with McNemar and fisher exact test. Pearson Correlation (r) to detect the relation between the variables. P-value ≤ 0.05 was considered statistically significant difference.

Results:

Table (1): Frequency and Percentage Distribution of personal characteristics for studied nurses (n = 30):

Personal characteristics	No.	Percent (%)
Age (years)		
<30	10	33.3
≥30	20	66.7
Mean ±SD	30.8±9.2	
Range	23-45	
Sex		
Male	4	13.3
Female	26	86.7
Social status		
Single	10	33.3
Married	20	66.7
Qualification:		
Diploma	12	40
Diploma +specialty	2	6.7
Bachelors	16	53.3
Experience ICU (years)		
<5	12	40
≥5	18	60
Mean ±SD	9.2±7.1	
Range	1-25	
Training courses		
Yes	20	66.7
No	10	33.3

Table (2): Frequency and Percentage Distribution of Nurses' Satisfactory Knowledge Regarding the Care of Patients with Cardiac Arrhythmias throughout study phases (n = 30)

Satisfactory knowledge	Time of program			*p-value	
	Pre	Post	Follow up	Pre/post	Post/follow
	No (%)	No (%)	No (%)		
Anatomy	2(6.7)	30(100)	30(100)	<0.001	
Arrhythmias	2(6.7)	30(100)	22(73.3)	<0.001	<0.001
Diagnosis	0.0	30(100)	28(93.3)	<0.001	0.5
Monitoring	14(46.7)	30(100)	30(100)	<0.001	-
Recording ECG	0.0	30(100)	22(73.3)	<0.001	0.008
Interpretation ECG	0.0	30(100)	10(33.3)	<0.001	<0.001
Emergency treatment	0.0	30(100)	24(80)	<0.001	0.031
Resuscitation	2(6.7)	30(100)	30(100)	<0.001	-
Electric shock	2(6.7)	30(100)	30(100)	<0.001	-
Emergency cart	14(46.7)	30(100)	30(100)	<0.001	-
Nursing Care	2(6.7)	30(100)	24(80)	<0.001	0.031
Total Knowledge	0.0	30(100)	28(93.3)	<0.001	0.5

**McNemar Test* **Statistically significant at P≤0.05.*

Table (3): Frequency and Percentage Distribution of Nurses' Competent Practice Regarding the Care of Patients with Cardiac Arrhythmias throughout study phases (n = 30)

Competent practice	Time of program			p-value	
	Pre	Post	Follow up	Pre/ post	Post /follow up
	No (%)	No (%)	No (%)		
Management of cardiac arrhythmias	8(26.7)	30(100)	14(46.7)	<0.001	<0.001
Connecting patients to monitor	8(26.7)	30(100)	26(86.7)	<0.001	0.12
Recording.12 lead ECG	12(40)	30(100)	30(100)	<0.001	-
Recording cardiac arrhythmias	8(26.7)	30(100)	18(60)	<0.001	<0.001
Performing CPR	18(60)	30(100)	28(93.3)	<0.001	0.5
External automated defibrillation	8(26.7)	30(100)	30(100)	<0.001	-
Emergency medication	12(40)	30(100)	28(93.3)	<0.001	0.5
Crash cart	8(26.7)	30(100)	24(80)	<0.001	0.031
Total Competent practices	8(26.7)	30(100)	30(100)	<0.001	-

**McNemar Test* **Statistically significant at P≤0.05.*

Table (4): Relation between Total Level of Nurses' Knowledge Regarding the Care of Patients with Cardiac Arrhythmias and their Personal Characteristics in Follow up Phase (n=30)

Personal characteristics	Knowledge at follow up phase				Number	*p
	Satisfactory n=28		Unsatisfactory n=2			
	No	%	No	%		
Age per years		.		.		
<30	8	80	2	20	10	0.11
≥30	20	100	0	.00	20	
Sex		.		.		
Male	2	50	2	50	4	**0.014***
Female	26	100	0	.00	26	
Social status		.		.		
Single	8	80	2	20	10	0.11
Married	20	100	0	.00	20	
Education		.		.		
Diploma	10	83. 33	2	16.67	12	
Diploma +specialty	2	100	0	.00	2	χ^2=3.2
Bachelors	16	100	0	.00	16	P=0.2
Experience per years		.		.		
<5	10	83.33	2	16.67	12	0.15
≥5	18	100	0	.00	18	
Experience ICU per years		.		.		
<5	10	83.33	2	16.67	12	0.15
≥5	18	100	0	.00	18	
Training courses		.		.		
Yes	18	90	2	10	20	0.54
No	10	100	0	.00	10	

***Fisher exact test** ***Statistically significant at P≤0.05.**

Table (5): Relation between total level of Nurses' Practice and their Personal Characteristics Regarding the care of patients with Cardiac Arrhythmias Preprogram (n=30)

Personal characteristics	Practice preprogram				Number	*p
	Competent n=8		Not competent n=22			
	No	%	No	%		
Age per **years**		.		.		
<30	2	20	8	80	10	
≥30	6	30	14	70	20	0.68
Sex		.		.		
Male	0	0	4	100	4	0.55
Female	8	30.77	18	69.23	26	
Social status	69	.		.		
Single	2	20	8	80	10	0.68
Married	6	30	14	70	20	
Qualifications Diploma Diploma +specialty Bachelors	 2 2 4	 16.67 100 25	 10 0 12	 . 83.33 0 75	 12 2 16	**0.015***
Experience per years		.		.		
<5	2	16.67	10	83.33	12	0.42
≥5	6	33.33	12	66.67	18	
Experience ICU per years		.		.		
<5	2	16.67	10	83.33	12	0.42
≥5	6	33.33	12	66.67	18	
Training courses		.				
Yes	4	20	16	80	20	0.38
No	4	40	6	60	10	

Fisher exact test *****Statistically significant at P≤0.05***

Table (6): Correlation between total level of Nurses' Knowledge and Their Practice Regarding the care of patients with Cardiac Arrhythmias Throughout Study Phases (n=30)

	Nurses' knowledge		
	Pre	Post	Follow up
Nurses' practice			
r	0.349	0.514	0.423
p	0.059	0.004*****	0.002*****

***** *Significant <0.05* *(r): correlation coefficient*

Table (1): Showed that 66.7% of studied nurses, their age was more than or equal 30 years old with Mean± SD 30.8±9.2 and range 23-45. Also, 86.7% of them were females and 66.7% were married. Also, 53.3% of them had bachelor's degree in nursing and 60% had more than five years of experience in Cardiac Intensive Care Unit with Mean± SD 9.2±7.1. In addition 66.7% of them received training courses about cardiac arrhythmias.

Table (2): Indicated that none of nurses in the study had satisfactory level of total knowledge regarding the care of patients with cardiac arrhythmias prior to preprogram. Meanwhile, all the studied nurses had satisfactory level of total knowledge post program (100%) and the majority of them had satisfactory level of total knowledge in follow up phase (93.3%). Also, the table outlined that there was highly statistical significant difference between pre/posttest regarding anatomy of the heart, cardiac arrhythmias, diagnosis, monitoring, recording ECG, interpretation of ECG, emergency treatment, resuscitation, Electric shock, emergency cart, and nursing care (P<0.001). While, there was a highly statistical significant difference between post/follow up test regarding arrhythmias and interpretation of ECG (P<0.001).

Table (3): Revealed that only 26.7% of nurses in the

study had competent practice level regarding the care of patients with cardiac arrhythmias preprogram. While all of them had competent practice level in post program and follow up phases (100%). Also, the table illustrated that there was highly statistical significant difference between pre/posttest regarding the care of patients with cardiac arrhythmias, connecting patients to monitor, recording12 lead ECG, recording arrhythmias, performing cardiopulmonary resuscitation, external automated defibrillation, emergency medication, and crash cart (P<0.001). Meanwhile, there was a highly statistical significant difference between post/follow up test regarding management of arrhythmias and recording of arrhythmias (P<0.001).

Table (4): Evidenced that there was a statistical significant difference between total level of nurses' knowledge and sex regarding the care of patients with cardiac arrhythmias in follow up phase of program (P=0.014),while there was no statistical significant difference between total level of nurses' knowledge and other personal characteristics.

Table (5): Displayed that there was a statistical significant difference between total level of nurses' practice regarding the care of patients with cardiac arrhythmias preprogram and their qualifications (P=**0.015**), while there was no statistical significant between total level of nurses' practice and other personal characteristics.

Table (6): Illustrated that there was a positive correlation between nurses' knowledge and their practice regarding the care of patients with cardiac arrhythmias throughout the study phase with statistical significant difference post program and follow up phase(P=0.004***,** 0.002*****).

Discussion

According finding of the current study about two third of the studied nurses their age more than 30 years with Mean ±SD 30.8±9.2 and married. The majority of them were females. In addition, more than half of them had bachelor degree in nursing. A female gender was higher than male due to the most of nurses recruited in nursing field in the past were female Also, more than half of them had more than five years of experience in Cardiac Intensive Care unit with Mean± SD 9.2±7.1.. Further nearly two thirds of them received training courses about cardiac arrhythmias, indicating that the cardiac care unit is an environment where more skilled nurses are required. These findings were in the same line with **Mousa, (2015)** who found that two thirds of the studied nurses had training session. Conversely with **Mehta & Yadav, (2018)** who stated that the majority of the nurses in the study had never attended the life support training courses before.

The current study result clarified that none of the studied nurses had satisfactory total knowledge regarding the care of patients with cardiac arrhythmias preprogram. This lack of knowledge may be related to nurses' exhaustion from increased work load which may hinder their ability to read and update their knowledge. Similarly the result is in the consequence with **Ahmed et al., (2016)** who stated that more than two thirds of nurses, their knowledge regarding ventricular dysrhythmias was unsatisfactory. This was contraindicated with **Rajput, (2016)** who reported that near to half of nursing staff were have very good knowledge regarding identification and management of cardiac dysrhythmias.

Following implementation of current training program, statistically significant improvements were shown in nurses' knowledge regarding the care of patients with cardiac arrhythmias compared to preprogram and these persisted in follow-up phase with slight decline. These findings indicated success of the training program which can be associated to educational booklet's content, which was based on nurses' needs, in addition its process where adult learning methods with active participation were used. This current study finding agreed with **Ahmed, (2011)**; who found a significant increase in knowledge occurred post implementation of designed program. In the same line with, **Abd-Allah et al., (2017) & Refaey, (2012)** who indicated that the mean knowledge scores of nurses are increased immediately after program's implementation with a statistically significant difference.

The present study finding mentioned that only one quarter of nurses in the study had total competent practice level regarding the care of patient s with cardiac arrhythmias preprogram. This could be attributed to lack of nurses' knowledge, which reflects on their skills, inadequate continuous training program and sometimes insufficient equipment. This agreed with **Ndile, et al., (2018)** who stated that the studied nurses had poor skills regarding life threatening arrhythmias.

After training program implementation, the current study result revealed that there was statistically significant increase in nurses' practice in contrast to preprogram and persisted in follow-up phase. This may be contributed to the training program success in improving nurses' knowledge, which in turn improved their skills. This result is backed up by **Taha, (2017) & Abd El-Aziz et al., (2016)** and who indicated that the nurses had adequate practice score after program implementation, with a highly statistically significant difference. According to **Abd-Elkareem, et al., (2012)** the nurses' performance in CPR was not

satisfactory before using the nursing procedures manual but was satisfactory afterwards.

Relation's analysis in the present study clarified that there was a statistical significant relation between total level of nurses' knowledge about the care of patient with cardiac arrhythmias and sex in follow up phase. This could be attributed to that the majority of the studied nurses were females. This finding is not agreed with **Ndile, et al., (2018)** who stated that there was an association between the nurses' level of knowledge and educational qualifications.

The result of the present study revealed that there was a statistical significant relation between total level of nurse's practice and their qualifications regarding the care of patients with cardiac arrhythmias in preprogram phase. This may be due to more than half of nurses in the study had bachelor's degree in nursing. This finding agreed with **Taha, (2017)**, who discovered that there was a relationship between nurse's practice and their personal characteristics prior to the study intervention.

Throughout study phases, there was positive correlation between total level of nurses' knowledge and their practice regarding the care of patients with cardiac arrhythmias. This has explained as knowledge and its implementation in clinical practice are most valuable for retention. So, knowledge alone without practice has no effect. Moreover, new techniques based on, intended to improve nurses' knowledge through nursing care standard could enhance their knowledge and consequently improve their skills.

This finding disagreed with **Ahmed et al., (2018)** who found no statistically significance relation between total nurse's knowledge and practice regarding cardio version and defibrillation. In line with, **Abdel Aziz & El Shafaey, (2018)** who discovered that there was no statistical significance difference between total nurse's level of knowledge and their practice.

Conclusion:

It can be concluded that the nursing training program had a significant positive effect on improving nurses' knowledge, and practice regarding the care of patients with cardiac arrhythmias

Recommendations:

- Pre-service training program for the purpose of refreshing and updating the knowledge, and practice of the nurses assigned to start working with cardiac arrhythmias patients.
- Periodic evaluation of nurses' knowledge and practice concerning management of patients in any emergency situation in the critical care units.
- Further study is needed with larger sample sizes to evaluate the application of nursing training program and evaluate its effect on nurses' performance regarding care of patients with cardiac arrhythmias.

Author contribution:

The first and second authors contributed to conception of the research, the development of the tools, statistical analysis, and commentary on the tables, writing the discussion and references, preparing the training program and collecting data and reference. Third author participated in reference and data collection.

Financial support: No funding was received.

Conflict of interest: No

References:

- **Abd El-Aziz M, Abd El naeem M, Mohammed M, & Mohamed N, (2016):** Effect of Teaching Program on Knowledge and Skills Regarding Automatic External Defibrillation among Nurses Working In Emergency Unit, Volume 5, Issue 1, Pp.08-1
- **Abd-Allah K, Arafa O, Ibrahim R, & Mohammed S., (2017):** Effect of nursing care standards on nurses' performance in caring for patients with cardiac arrhythmias. Egyptian Nursing Journal,14(3), Pp.251.
- **Abdel Aziz B & El Shafaey, (2018):** Effect of Implementing Teaching Program on Knowledge and Practice of Nurses and Clinical Outcomes of Patients Post Cataract Surgery, Journal of Nursing and Health Science, 7 (3), Pp. 60-70.
- **Abd-Elkareem H, Adam S, & Hassan R., (2012):** Effect of Nursing Procedures Manual on Nursing Performance in the Intensive Care Unit. New Egypt J Med, 46:2, Pp1–232.
- **Ahmed RA, (2011):** Developing nursing care standards for patient with chronic subdural haematoma at Assuit University Hospital. Unpublished Master thesis of Medical-Surgical Nursing, Faculty of Nursing Assiut, University, 57-58.
- **Ahmed RS, Mousa AM, Shalal SH, Owaid HA, & Zedaan HA, (2016):** Nurses' Knowledge Concerning Early Interventions for Patients with Ventricular Tachycardia at Baghdad Teaching Hospitals, KUFA Journal For Nursing Sciences; 6(2), Pp:3-6.
- **Ahmed SM, Ali HH, Mehany MM, Muhammad MA, & Muhammad ZA, (2018):** Effect of an Educational Program on Nurses' Knowledge and Practice Regarding Defibrillation and Cardioversion, Assiut Scientific Nursing Journal, Vol (7) No , (17) June,Pp24-31.

- **America Heart Association, (2016):** Adult CPR and AED Skills Testing Checklist, 2016. Available at: https://www.cprconsultants.com/wp-content/uploads/2016/05/BLS-Adult-Skills-Checklist-2016.pdf, Accessed on:3/5/2018,at: 2.00pm.
- **Barneft KL, Smith MH, Treas LS, & Wilkinson JM, (2016)**: Procedure Checklists for Fundamentals of Nursing, 3rd ed., United States of America, F.A. Davis company, p: 367-368.
- **Brown C, Inaba K, Martin MJ., & Salim A, (2018)**: Surgical Critical Care Therapy a Clinically Oriented Practical Approach, Arrhythmia Evaluation and Management in The Surgical ICU, 1st ed., united states of America, Springer, P:85.
- **Burri H, Duytschaever M, & Heidbuchel H., (2017):** The EHRA Book of Interventional Electrophysiology: Case- Based Learning with Multiple Choice Questions, 1st ed., United kingdom, Oxford, Pp.10-20.
- **Caon M., (2018):** Examination Questions and Answers in Basic Anatomy and Physiology 2400 Multiple Choice Questions, Cardiovascular System, 2nd ed., Australia, Springer, Pp.328-329/ 279-283.
- **Dao DT, Hollander SA, Rosenthal, DN, & Dubin AM., (2013):** QRS Prolongation is Strongly Associated with Life-Threatening Ventricular Arrhythmias in Children with Dilated Cardiomyopathy, Elsevier, The Journal of Heart and Lung Transplantation; 32(10), Pp1013-1014.
- **Elfeky H, Morsy W, & Rushdy TI (2015)**:Nurses' Knowledge and Practice Regarding Care of patients Connected to Intraaortic Balloon Pump at Cairo University Hospitals, Egyptian Journal of Nursing; 10(1), Pp1-14 .
- **Galura S & Haugen N, (2015):** Ulrich and Canals Nursing Care Planning Guides Prioritization, Delegation and Critical Thinking, 8th ed., Missouri, United States, Elsevier, Pp.247-249.
- **Garrels M, Mills H, Niedzwiecki B, Pepper J, & Proctor D, (2017):** Study Guide and Procedure Checklist Manual for kinns' the Medical Assistant, principles of Electrocardiography, 13th ed., United States of America, Elsevier, Pp 535-536.
- **Jacob J, Tryambake R, Jamdade V, & Sakhardande V, (2018):** Astudy to Assess the Effect of Planned Teaching Program on Knowledge Regarding Interpretation of Cardiac Arrhythmias and its Management among Staff Nurses in Selected Hospitals of Pune City. Journal of Nursing and Care;7(4),PP1-2.
- **Lader EW., (2013):** Field Guide to The Arrhythmias, 1st ed., India, Wiley-Blackwell, Pp.118-125.
- **Link MS, Maron MS., & Shenasa M., (2015):** Arrhythmias in Cardiomyopathies, An Issue of Cardiac Electrophysiology Clinics, Right Ventricular Dysplasia and Exercise, Elsevier, 7(2), Pp. 198.
- **Lough ME, Stacy KM, & Urden LD, (2020):** Priorities in Critical Care Nursing-E-Book, Caring for the Critically Ill patient & Cardiovascular Therapeutic Management, 8th ed., Canada, Elsevier,Pp 1/194.
- **Mcewen DR, & Rothrock JC, (2018):** Alexander's Care of the Patient in Surgery, Post-Operative Patient Care and Pain Management, 16th ed., Missouri, Elsevier, Pp. 263-264 .
- **Mehta & Yadav, (2018):** Effectiveness of Education Intervention Programme on Life Support Measures for The Nurses Working in Emergency Unit of BPKIHS : A pre- experimental Study, Journal of BPKHS, 1(1), Pp.14-19.
- **MiJatovic V, Pejakovic J, & Uvelin A, (2017):** Acquired prolongation of QT Interval as a Risk Factor for Torsade de pointes Ventricular Tachycardia: A Narrative Review for the Anesthesiologist and Intensivist, Japanes Society of Anesthesiologists, Springer, vol.31, Pp.413-423.
- **Mousa AM, (2015):** Critical Care Nurses' Knowledge Regarding Management of Patients with Atrial Fibrillation at Baghdad City, *Journal of Nursing and Health science;* 4(4), Pp. 56-60.
- **Ndile M, Ruhwanya DI, & Tarimo E,(2018)**: Life Threatening Arrhythmias: Knowledge and Skills Among Nurses Working in Critical Care Settings at Muhimbili National Hospital, Dar EL Salaam, Tanzania , Tanzania Journal of Health Research; 20(2), Pp.5-10.
- **Ostendorf WC, Perry AG, & Potter PA, (2016):** Nursing Interventions and Clinical Skills E-Book, Collecting Specimen, 6th ed., Missouri, Elsevier, Pp. 208-211.
- **Ostendorf WC, Perry AG, & Potter PA, (2018):** Skills Performance Checklists for Clinical Nursing Skills and Techniques: Cardiac Care & Emergency Measures for Life Support, 9th ed., united states of America, Elsevier, Pp.331-332/344-345.
- **Rajput NS, (2016):** Knowledge of Staff Nurses Regarding Identification and Management of Cardiac Arrhythmias, Sinhgad E-journal of Nursing; 4(1), Pp.32-35.
- **Refaey A, (2012)**: Impact of Adesigned Teaching Protocol about Advanced Cardiac Life Support (ACLS) On Critical Care Nurse's Knowledge and Practices at Benha University Hospital, Cairo, Egypt. J Am Sci, 8(12), Pp.838-50.
- **Statistics by Country for Arrhythmias (2011):** Extrapolation of prevalence rate of arrhythmias to countries and regions. Available at: http://www.rightdiagnosis. com/a/arrhythmias/stats-country.htm.

- **Taha AS, (2017):** Impact of a Designed Teaching Protocol about Nursing Management of Coronary Artery Bypass Grafting on Nurse's Knowledge, Practices and Patient's Outcome, IOSR Journal of Nursing and Health Science, 6(4), Pp.13-28.
- **Wiegand DL., (2017):** AACN Procedure Manual for High Acuity, Progressive and Critical Care, Twelve- Lead Electrocardiogram, 7th ed., USA, Elsevier, Pp. 494-499.
- **Youssef, M. (2017):** Nurse's Performance Regarding the Care of the Patients with Arrhythmia, Un Published Master Thesis of Medical Surgical Nursing, Faculty of Nursing, Ain shams university, P:44.