

## Defibrillation Training Program and Its effects on Acquisition of Nurses Knowledge and Practice

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### ABSTRACT

Defibrillation is electrical therapy used to quickly terminate lethal dysrhythmias through defibrillation or cardioversion and early defibrillation lead to higher rates of survival. Critical care nurse is the first realize to life-threatening conditions so it is important that critical care nurses must have sufficient knowledge and skills about defibrillation. **Aim:** evaluate the effect of training program on nurses' knowledge and practice regarding defibrillation. **Design:** A quasi-experimental design was used. **Setting:** The study was conducted in coronary care unit at Beni-Suef University Hospital. **Sample:** All convenient samples 38 nurses. **Tools:** Two tools were used (1) a self-administered questionnaire to assess knowledge, (2) an observational checklist to assess practice regarding defibrillation. **Results:** preprogram; the majority of the nurses had unsatisfactory knowledge and practice regarding defibrillation (84.2% and 92.1% respectively). A significant improvement was found immediately post-program (86.8% and 81.6% respectively) while this improvement lowered slightly post 3 months at follow up (76,3% and 71,1% respectively). **Conclusion:** A statistically significant improvement in nurses' knowledge and practice had got after implementation of the program which supported the study hypothesis. **Recommendation:** Continuous in-service training programs about defibrillation.

**Key word:** Defibrillation, Knowledge, Practice, Training Program.

### Introduction

Defibrillation is electrical therapy used to terminate or control potentially lethal dysrhythmias quickly and can be administered by defibrillation, cardioversion (*Lynn, 2018*).

Cardioversion and defibrillation are used to treat tachydysrhythmias, defibrillator is same type of device, used for both cardioversion and defibrillation. The major difference between cardioversion and defibrillation is the timing of the delivery of electrical current. In cardioversion, is synchronized with the patient's electrical events (*Hinkle and Cheever, 2018*).

Defibrillation is unsynchronized and immediate countershock with the patient's electrical events. It is performed to correct life-threatening arrhythmias of ventricular fibrillation, pulseless ventricular tachycardia, and cardiac arrest (*Colyar, 2020*).

Cardioversion is a synchronized countershock performed in emergencies for unstable ventricular or supraventricular tachydysrhythmias or electively for stable tachydysrhythmias that are resistant to medical therapies (*Ignatavicius et al., 2020*).

Defibrillation has no contraindications. The presence of a pacemaker or implanted cardiac defibrillator does not change the indication or performance of the procedure when a shockable rhythm is present (*Goyal et al. 2021*).

Today defibrillators are widely used both in and out of the hospital, Research shows that developing team is the key to improving results after defibrillation. There is no question that defibrillation is an interprofessional event but in order to achieve good success rates, the team has to be organized and functional. *Society of Thoracic*

### ***Surgeons Task Force on Resuscitation After Cardiac Surgery (2017).***

Delay of defibrillation is deleterious with sharp decrease in survival as the time of defibrillation increases. The defibrillation should be performed as soon as possible (*Parrillo, and Dellinger, 2019*).

As the nurses remain with patient round the clock and spend significant time alongside patients, they are often the first to realize in hospital cardiac arrest (*Sachdeva, 2020*).

Critical care nursing as a nursing specialty that involves human responses to life-threatening conditions (*Harding et al., 2020*).

#### **Significance of the study:**

Cardiac arrest remains a major public health problem, with more than 600 000 cardiac arrests per year in the United States (*Cheng et al., 2020*).

In Egypt 2020 death from cardiovascular disease are estimated to account for 28% of all deaths according world health organization (*WHO, 2021*). The Global burden of disease study showed that sudden cardiac arrest is the most common fatal manifestation of cardiovascular disease and a leading cause of death worldwide.

Many nurses uncertain about using defibrillator, which leading to less experience and lower levels of knowledge and self-efficacy due to lack of exposure to a defibrillator (*Alaryani et al., 2021*).

Therefore, it is essential to developing implementing and evaluating educational program for nurses for enhancing their knowledge and practice about defibrillation.

#### **Aim of the study:**

- 1- The aim of the current study is to evaluate the effect of training program on nurses' knowledge and

practice regarding defibrillation.

Through:

- 1- Assess nurse's knowledge regarding Defibrillation.
- 2- Evaluate nurse's practice technique in Defibrillation.
- 3- Evaluate the effect of training program on nurses' knowledge and practice

#### **Research Hypothesis:**

H1 Nurse's knowledge will be improved post-implementation of training program.

H2 Nurse's practice will be improved post-implementation of training program

## **Subjects and Methods**

### **Research Design:**

A quasi-experimental design was used in this study.

The study is portrayed under four designs:

- Technical design.
- Operational design.
- Administrative design.
- Statistical design.

### **Technical design:**

The technical design includes setting, subjects and tools of data collection which used in this study.

#### **A. Setting:**

The study was conducted in coronary care unit at Beni-Suef University Hospital.

#### **b. Subject:**

All convenient samples included 38 nurses working in coronary care unit at Beni-Suef University Hospital and agreed to participate in this study.

#### **C. Tools of data collection:**

Two tools were constructed to collect data pertinent to this study, these tools are:

### I. A self-administered questionnaire:

It was used to assess nurses' level of knowledge regarding defibrillation. It was developed by the researchers based on review of related literature (*Urden et al., 2021*). It comprised Arabic structured items related to different aspects of assessment knowledge about defibrillation. It was including two parts:

#### Part one:

It concerned with demographic characteristics of the nurses involved in the study (age, gender, marital status, level of education and years of experience coronary care unit.

#### Part two:

It concerned with assessment knowledge regarding the following issues:

- 1- Anatomy and physiology of cardiovascular system (4questions) (4 grades).
- 2- Defibrillator device (8 questions) (8 grades).
- 3- Identifying lethal dysrhythmias (6 questions) (6 grades).
- 4- Defibrillation (4 questions) (4 grades).
- 5- Cardioversion (4questions) (4 grades).
- 6- Role of nurse (9 questions) (9 grades).

#### Scoring system:

All knowledge variables were closed ended questions. The total numbers were 35 questions; they were scored as the following.

- Each correct answer was given one grade
- The incorrect answer was given zero.

Total knowledge score was classified as the following:

- $\geq 75\%$  satisfactory
- $< 75\%$  unsatisfactory.

### II. Observational checklist for nurse practice regarding defibrillation:

It was adopted from (*Lynn, 2018 and Burns, and Delgado (2018)*). It was used to assess nurses' practices regarding defibrillation.

It concerned with assess nurses' practices as the following:

- Nurses' role regarding defibrillation (14 grades)
- Nurses' role regarding cardioversion (7 grades).
- Nurses' role post procedure (7 grades).

#### Scoring system:

- Complete correct done was assigned a score of (2)
- Incomplete correct done was assigned a score of (1)
- Not done was assigned a score of (0)

Total practice score was  $28 \times 2 = 56$

Total score of practice was classified into:

- $\geq 75\%$  satisfactory practice level.
- $< 75\%$  unsatisfactory practice level.

#### Tools validity and reliability:

##### • Content validity:

The tools were revised for content validity by a group of seven experts of Medical-Surgical Nursing Specialties. The expertise reviewed the tool for objectivity, clarity, appropriately and comprehensiveness, minor modification was done.

##### • The reliability:

Was tested for tool one (Knowledge assessment tool), and tool two practice assessment tool) by using alpha Cronbach's test ( $r = 0.932, 0.965$ ).

#### Operational design

The operational design included a preparatory phase, pilot study, ethical consideration and field work.

##### • Pilot study:

It was carried out on 10% of the total study. This was done to test applicability,

clarity and efficiency of the tools. No modification was done, so the nurses who shared in the pilot study were excluded from the sample.

### **Ethical consideration:**

1. The researchers were clarifying the goal and purpose of the study to the studied nurses.
2. The researchers were confident preserving privateness of the subject's data for the cause of this research and could now no longer be used once more without new consent.
3. Nurses had been informed about their rights to take part or withdraw from the study at any time without any rational. As well, the outcomes of this study will not have any impact on their job.

### **Field work:**

Data were collected from the beginning August 2021 to the end of April 2022. The program was implemented for nurses working in coronary care unit at Beni-Suef University Hospital.

### **Program phase:**

#### **1. Preparatory phase:**

It was included reviewing of literature and theoretical knowledge of numerous aspects of the study use books, articles, internet, periodicals and magazines to developing tools for data collection and the training program for nurses.

The program implementation schedule was designed through the researchers. Goals, learning activity, teaching methods and media were prepared. The content of the training program was divided into 6 sessions; the period of each session is 45 minutes.

Permission for data collection and implementation of the study in Beni-Suef University hospital was obtained from the hospital administrative person through the

submission of a proper letter from the faculty of nursing, Beni-Suef University. Meeting and discussions had been held through the researchers and nurses to provide an explanation about the aim and the character of the study and take their approval to participate in the study before any data collection.

### **Educational booklet:**

It was designed in Arabic language by researchers based on the results obtained from assessment of the nurses' knowledge and practice. which included anatomy and physiology of the cardiovascular system (anatomy of the cardiovascular system, function, component of cardiovascular system), General information about defibrillator device (definition, types, component, indication, contraindication, location, precaution and complication), identifying lethal dysrhythmias, information about defibrillation and cardioversion (meaning, purpose, contraindication, joule used) and role of the nurse defibrillation and cardioversion before, during and after procedure).The content was developed by the researchers after reviewing the related literature

### **Program assessment:**

The researchers were assessing of nurse's knowledge and practice about defibrillation at Beni-Suef University Hospital by used questionnaire and observational checklist. The researchers were attended to the setting 3 days per week in the morning and afternoon shift.

- 1) As regards to the observational checklist the evaluation was done firstly to assess of nurse's practice regarding defibrillation.
- 2) As regards to the questionnaire was carried to assess of nurse's knowledge regarding defibrillation.

Assess of nurse's knowledge and practice was carried out three times firstly before

training program, secondly immediately and thirdly after three months.

The observational checklist was filled by the researchers by observing the nurses. The time allowed for answers took about 30- 40 minutes.

#### **Program implementation:**

- This was primarily based totally on the studied nurses. The content of training program sessions was organized as the following.
- After the official permission were taken from director of Beni-Suef university hospital and nursing director, the implementation phase started.
- The program was implemented over 12-week period - The researchers approached the critical care nurses, three days a week at two shifts (morning and afternoon) daily in coronary care unit at Beni-Suef University Hospital.
- Nurses were interviewed individually to explain the purpose and nature of the study, obtaining the written consent, their needs/expectations, discuss the outline of the program, and regulate the next visit and the best way for content.

#### **The theoretical part:**

Each theoretical session was carried out in class to include all nurses. All the topics were presented in the form of PowerPoint programs and posters as needed.

Theoretical sessions started with discussion (10 minutes) to assess nurse's feedback of knowledge about related topics then the researchers started to explain the session content. After the session break time was given to them, (10 minutes) followed by a discussion to assess the nurses' level of understanding and feedback (10 minutes).

Every session was started first with discussion to assess nurse's feedback about the procedure (5 minutes) then the training phase as the following:

- Anatomy and physiology of cardiovascular system including anatomy of the cardiovascular system, function, component of cardiovascular system.
- General information about defibrillator device (definition, types, component, indication, contraindication, location, precaution and complication).
- Identifying lethal dysrhythmias (meaning, types, causes and nurse role)
- Information about defibrillation (meaning, purpose, contraindication, joule used).
- Information about cardioversion (meaning, purpose, contraindication, joule used).
- Role of the nurse defibrillation and cardioversion before, during and after procedure).

#### **The practical part:**

The researchers provided teaching material as videos about the procedure to help nurses during demonstrating it. Videos were presented before and after the demonstration time.

Each clinical session was repeated more than once on the same day and in the other day to be sure that every nurse reached an accurate skills level of the procedure.

All nurses included in the study group demonstrated the procedure once or more under the supervision of the researchers to ensure correct practice and identify the weak points.

Each nurse of all studied groups obtained a copy of the educational program in Arabic and an English language is a form of a booklet that included all theoretical and practical content.

The educational aids to explain the topics included hand out, posters and clinical videos for a demonstration of the care provided.

An open channel communication was achieved between researchers and nurses to ensure understanding answer any question and verify the information and practical skills given.

The observational checklist was used during data collection to evaluate the nursing level of skills about defibrillation to ensure nurses' skills until the competency level.

- Each group takes one-week training in ICU so that evaluation of the nurse's skills started from the second week of every group for post-implementation and follow up after three months.

#### **Teaching methods:**

- Lecture
- Discussion
- Demonstration

#### **Teaching media:**

- Hand out of the program
- Data show
- Booklet
- Picture

#### **The Evaluation stage:**

After implementation of training program, the post test was administered to assess nurses' knowledge and practice using the same questionnaire and same observational checklist of the pre- test. It was done twice, immediately after finishing training program and after three months from first evaluation, this helped to evaluate the effect of the implementing program

#### **Administrative design:**

To carry out the study, the necessary approval was obtained from the director of Beni-Suef university hospital. A letter was issued to him from the faculty of nursing

explaining the aim of the study in order to obtain permission for collection of data.

#### **Statistical Design:**

An IBM compatible personal computer was used to store and analyze data and to produce graphic presentation for some important results. Statistical package for the social science (SPSS) version 23 was used for statistical analysis of data, as it contains the test of significance given in standard statistical books.

#### **▪ Descriptive statistics**

Data were summarized using the arithmetic mean as an average, central tendency, the standard deviation as a measure of dispersion of results around the mean and frequency and percentage of observations. Other statistical tests such as correlation coefficient were calculated and p value was used to determine the relation between total knowledge score and total practice score. Also, Alpha Cronbach test was used to test reliability of tools.

#### **Results**

**Table (1):** Demonstrates that more than half of the studied nurses' (55.3%) their aged ranged between (25- <27) with a mean age was (25.71±2.091) years. Also, this table show that about two third (65.8%) of the studied nurses' were females, as well the most (84.2%) of nurses were married. Regarding educational qualification this table shows that most (78.9%) of the studied nurses' had Institute nursing education.

As regard of the nurse's year of experience more than one third of the studied nurses' (44,7%) were more than 6 years of experience with a mean year of experience was (4.84±2.507) years.

**Table (2):** demonstrates that a highly significant positive correlation between nurses knowledge and practice at pre program implementation, immediately post

program implementation and follow up program implementation with r and p value ( $676^{**}/0.000$ ,  $.819^{**}/.000$ ,  $.873^{**}/.000$ ) respectively.

**Fig. (1)** Illustrates that 84.2% of the studied nurses had unsatisfactory knowledge pre program implementation which improved immediately post program and follow up program to the satisfactory level at 86.8% and 76,3 %) of the studied nurses had satisfactory knowledge regarding defibrillation respectively.

**Fig. (2)** this Fig. illustrates that 92.1% of the studied nurses had unsatisfactory practice pre program implementation which improved immediately post program and follow up program to the satisfactory level at (81.6% and 71,1%) of the studied

nurses had satisfactory practice regarding defibrillation respectively.

Table (3) clarify that age, gender, level of education and years' experience were no statistically significant association with nurse knowledge at different phases of implementing the training program.

Table (4) show that age, gender, level of education and years of experience were no statistically significant association with nurse practice at different phases of implementing the training program. However, there is a statistically significant association between nurses' years of experience and their practice through follow up implementing of education program (p-value > 0.039).

**Table (1): Percentage distribution of the studied nurses according to their demographic characteristics**

Variable	Frequency	%
<b>Age in years</b>		
<25	11	28.9
25-<27	21	55.3
>27	6	15.8
<b>Mean ±SD</b>	<b>25.71±2.091</b>	
<b>Gender</b>		
Male	13	34.2
Female	25	65.8
<b>Marital status</b>		
Single	6	15.8
Married	32	84.2
<b>Educational qualification</b>		
Institute nursing education	30	78.9
Bachelor of nursing	8	21.1
<b>Years of experience</b>		
1-	14	36.8
4-	7	18.5
>6	17	44.7
<b>Mean ±SD</b>	<b>4.84±2.507</b>	

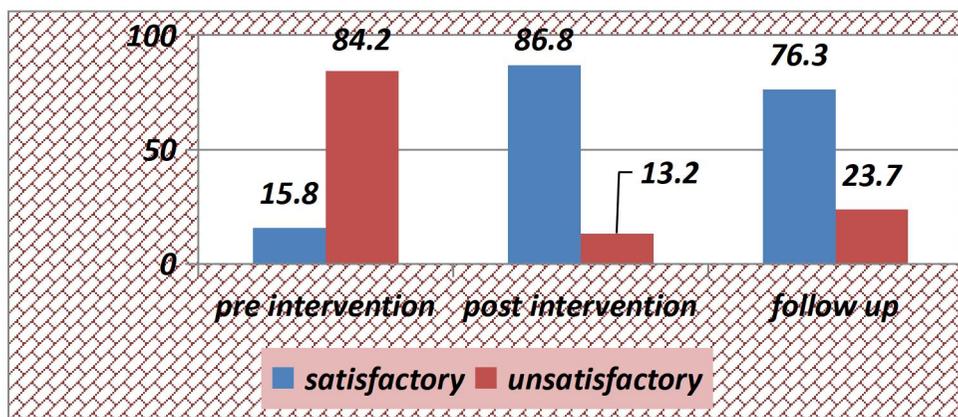


Fig. (1): Percentage distribution of studied nurses' total knowledge score regarding defibrillation at different phases of program.

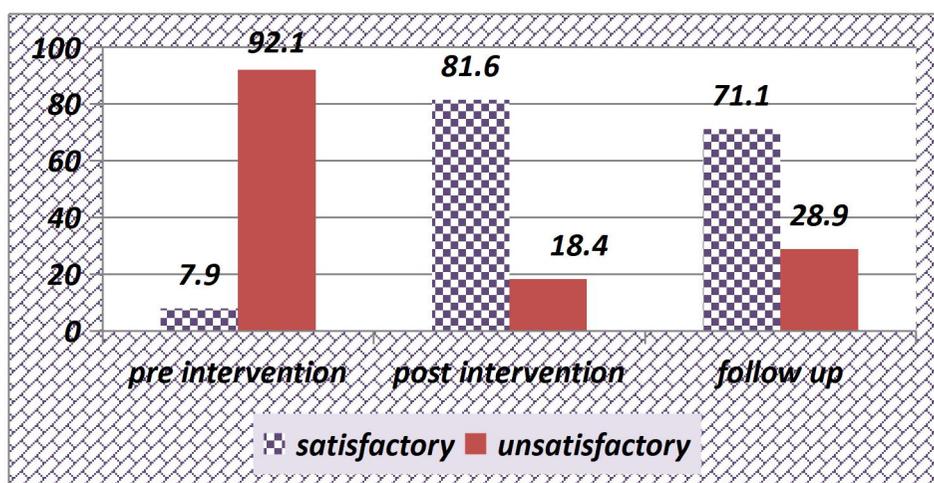


Fig. (2): Percentage distribution of studied nurses' total practice score regarding defibrillation at different phases of program.

Fig. (2) this Fig. illustrates that 92.1% of the studied nurses had unsatisfactory practice pre program implementation which improved immediately post program and follow up program (81.6% and 71,1%) of the studied nurses had satisfactory

Table (2): Correlation between total nurses' knowledge score and total of nurses' practices score at different phases of program.

Total knowledge	Pre-program	Total practice Immediate post	Follow -up
r	.676**	.819**	.873**
p	.000	.000	.000

**Table (3):** Relationship between studied nurses' total knowledge level and demographic data at different phases of implementing education program (n=38).

Variable	Total Knowledge		
	Pre program implementation Mean $\pm$ SD	Post program implementation Mean $\pm$ SD	Follow up implementation Mean $\pm$ SD
<b>Age in years</b>			
<25	19.72 $\pm$ 6.63	31.90 $\pm$ 2.42	<b>29.54</b> $\pm$ 2.01
25-<27	15.52 $\pm$ 7.61	30.66 $\pm$ 3.82	<b>26.71</b> $\pm$ 6.20
>27	19.83 $\pm$ 8.23	31.50 $\pm$ 3.33	27.66 $\pm$ 6.62
<b>F(p)</b>	1.524(0.232)	.515(0.602)	.983 (0.384)
<b>Gender</b>			
Male	15.07 $\pm$ 7.69	30.53 $\pm$ 3.15	26.07 $\pm$ 5.92
Female	18.64 $\pm$ 7.33	31.48 $\pm$ 3.48	28.52 $\pm$ 5.06
<b>t(p)</b>	1.398(0.171)	0.814 (0.421)	1.331 (0.192)
<b>Educational qualification</b>			
Institute nursing education	17.36 $\pm$ 7.64	31.00 $\pm$ 3.50	27.56 $\pm$ 5.43
Bachelor of nursing	17.62 $\pm$ 7.67	31.75 $\pm$ 2.91	28.12 $\pm$ 5.71
<b>t(p)</b>	0.085(0.933)	0.555 (0.582)	2.55 (0.800)
<b>Years of experience</b>			
1-	19.07 $\pm$ 6.75	32.07 $\pm$ 2.20	29.64 $\pm$ 1.90
4-	18.00 $\pm$ 8.38	30.42 $\pm$ 5.09	27.14 $\pm$ 6.96
>6	15.82 $\pm$ 7.94	30.70 $\pm$ 3.36	26.29 $\pm$ 6.43
<b>F(p)</b>	0.725(0.492)	0.826 (0.446)	1.551 (0.226)

**Table (4):** Relationship between studied nurses' total practice level and demographic data at different phases of implementing education program (n=38).

Variable	Total practice		
	Pre program implementation Mean $\pm$ SD	Post program implementation Mean $\pm$ SD	Follow up implementation Mean $\pm$ SD
<b>Age in years</b>			
<25	22.90 $\pm$ 8.51	53.54 $\pm$ 4.63	45.90 $\pm$ 3.33
25-<27	19.47 $\pm$ 6.98	48.33 $\pm$ 7.86	39.57 $\pm$ 9.56
>27	22.83 $\pm$ 10.45	51.16 $\pm$ 8.47	40.00 $\pm$ 9.69
<b>F(p)</b>	0.849 (0.436)	1.949 (0.158)	2.218 (0.124)
<b>Gender</b>			
Male	19.00 $\pm$ 5.11	47.92 $\pm$ 8.40	38.15 $\pm$ 10.07
Female	22.04 $\pm$ 9.04	51.52 $\pm$ 6.62	43.20 $\pm$ 7.30
<b>t(p)</b>	1.118 (0.271)	1.448 (.156)	1.772 (0.085)
<b>Educational qualification</b>			
Institute nursing education	21.00 $\pm$ 7.77	50.13 $\pm$ 7.53	41.43 $\pm$ 8.63
Bachelor of nursing	21.00 $\pm$ 9.27	50.87 $\pm$ 7.18	41.62 $\pm$ 8.89
<b>t(p)</b>	0.000(1.000)	0.250 (0.804)	<b>0.055</b> (0.956)
<b>Years of experience</b>			
1-	22.00 $\pm$ 7.76	53.14 $\pm$ 4.92	45.78 $\pm$ 3.06
4-	21.57 $\pm$ 10.17	49.42 $\pm$ 8.22	41.14 $\pm$ 9.22
>6	19.94 $\pm$ 7.56	48.29 $\pm$ 8.58	38.05 $\pm$ 10.0
<b>F(p)</b>	0.267(0.768)	1.792 (0.182)	3.563(0.039)

## Discussion

Nurses are the heartbeat of a smooth-running operation in any health care setting. Nurses are obligated to know just about everything regarding health care: the status of their patients. Therefore, it is important to realize that the critical care nurse's accumulated knowledge extends beyond one's basic level of nursing education (Keogh and Weaver, 2021).

### *Firstly, demographic characteristics of the studied nurses:*

This study indicated that more than half of the studied nurses' their aged ranged between (25- <27). This might be due to the fact the newly graduate nurses are appointed in the coronary care units which can tolerate the nature of work in this area. The study results supported by Malk et al., (2018) who found that half of nurses were at the age (25- 30 years).

Disagree with Peyrovi et al., (2020) who stated that the most of studied nurses were age between 30 to 39 years old.

As regard of the gender the study revealed that that about two third of the studied nurses' were females. This might be due to the fact that, the numbers of females nurses in Egypt are still greater than males in nursing fields. In the same line with Abass and Soliman., (2020) who finding that more than half were female.

Disagree with Nasr-Esfahani. et al., (2019) who found that the most of studied nurses were male.

As regards to marital status, the present study indicated the most of nurses were married. In the same line with Malk and Hassan. (2018) who stated that most of the nurses were married.

Related to nurses' educational qualification The current study revealed that most of the studied nurses' had Institute

nursing education, which might explain the high demand by the Egyptian to increase the number of nurses with bachelor degree to work in CCU. These results were in agreement with those of Thabet et al., (2019) who noted that more than half of studied nurses have nursing institute degree.

Regarding the nurses' years of experience, the present study indicated that more than one third of the studied nurses were more than 6 years of experience. This finding agreed with Bakr et al., (2020) who stated that high percentage of studied nurses had experience from 5 year to less than 10 years

### *Secondly: effect of training program on nurses' knowledge regarding defibrillation*

The study revealed that majority of the study nurse had unsatisfactory level of knowledge regarding defibrillation this may be due to workload, lack of concentration and insufficient knowledge overloaded by more duties and having more work hours.

This finding supported by Mohamed et al., (2019) who found that 47.5% of them had poor level of knowledge about DC shock

In the same line with Rajeswaran et al., (2018) who stated that there was deficient of cardiopulmonary resuscitation knowledge among registered nurses in the three district hospitals.

The current study revealed a significant improvement post program implementation. These findings were in agreement with Khudur, (2019) who found in her study that great improvement in knowledge score levels after implementing of the educational program.

### *Thirdly: effect of training program on nurses' practices regarding defibrillation*

The study revealed that the majority of the study nurse had unsatisfactory level of practice regarding defibrillation pre

program implementation this may be due to poor skills and interruptions.

The current study revealed that there was improved post program implementation. In the same line with *Ahmed et al., (2019) and Abass and Soliman, (2020)* mentioned that there was improvement after implementation of standards practices related to defibrillation compared with before implementation.

#### **Fourthly: Relation between total nurses' knowledge and their practices regarding defibrillation.**

The current study revealed that there were highly significant positive correlation between total nurses' knowledge and practice at pre, post and follow up program implementation. This means that the lack of nurses' knowledge scores effects on their practice and reflect the effectiveness of the training program which improved the nurses' knowledge and practice regarding defibrillation.

This result agreed with *Fathy et al., (2018)* showed that significant correlation between the studied nurse's mean difference in knowledge and performance regarding advanced cardiovascular life support Pre and Post the guideline implementation (0.000\*).

#### **Relation between nurses knowledge and practices regarding defibrillation to their demographic characteristics:**

This study showed that there was no statistically significant relation between age, gender, level of education and years' experience and their total nurses' knowledge score regarding defibrillation at pre, post and follow up phases of the program implementation. This means that increasing the nurses age was associated with decreasing the level of knowledge and practice which explain the fact of newly graduate and younger age have refresh knowledge than older and more flexible to learning new skills. Moreover,

senior nurses are harder and more resistance to changing.

The findings of this study were in the same line with *Malk et al., (2018)* were in the same line with the current study findings, who revealed that no statistically significant relation between nurses' knowledge and their demographic characteristics. And disagreed with *Ruhwanya, et al. (2018)* who found that An association between the nurses' knowledge and their level of education.

In relation to nurses' practices and their years of experience, the finding of the current study revealed that there was no statistically significant relation between years of experience in CCU and their total nurses practice score pre and post program implementation, this may be due to the fact that, senior nurses, of a higher age category take administrative role, so they are far away from the practical field and consequently their mastering skills are decreased or diminished. Confirmed by *Ali et al., (2021)* who stated that there was no statistically significant correlation between all personal characteristics for studied nurses and their total performance score pre structured cardiopulmonary resuscitation training program.

Meanwhile there is statistically significant difference between years of experience in CCU and total practice score at follow up program implementation. Supported by *Henedy and El-Sayad, (2019), Elsebai et al., (2022)* they documented that there was statistically significant relation between nurses' practice and their years of experience.

## **Conclusion**

Based on the findings of the current study, it can be included that majority of the nurses were having an unsatisfactory knowledge and practice regarding defibrillation pre the

program implementation. Meanwhile, the majority of the studied nurses had got statistically significant improvement in their knowledge and practice post the program implementation, while this improvement lowered slightly post three months at follow up, which supported the study hypothesis.

## Recommendations

Based on results of the present study the following recommendations can be suggested:

1. Continuous in-service training programs about defibrillation.
2. The importance of establishing booklet guideline for critical care nurses regarding defibrillation.
3. Supervisors should attend continuous refreshing educational program to be acquainted with up-to-date knowledge and practice to guide their staff
4. Regular meetings between nurses and their supervision should be conducted to evaluate and find way for improvement.
5. Further researchers recommended for implementing the educational training program on larger sample from different geographical area on Egypt to raise the efficiency of nurses performance regarding defibrillation.

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