

# Assessment Of Nurses Performance During Cardiopulmonary Resuscitation In Intensive Care Unit And Cardiac Care Unit At The Alexandria Main University Hospital.

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**Abstract:** Background Cardiopulmonary resuscitation one of the most emergency management, the nurse has a pivotal role and should be highly qualified in performing these procedures. The aim of the study is to assess performance of nurses during Cardio pulmonary resuscitation for patient with cardiac arrest In Intensive Care Unit and Cardiac Care Unit at the Alexandria main university hospital. To answer the question; what are the most common area of satisfactory and area of neglect in nurse's performance during Cardio Pulmonary Resuscitation. The sample consists of 53 staff nurses, working in Intensive care unit & cardiac care unit at Alexandria main university hospital. The tools of data collection were structured of questionnaire sheet and observational check list. The results showed that unsatisfactory performance between nurses in both units. The study concluded that all nurses need to improve their performance during cardiopulmonary resuscitation for patient with cardiac arrest , it is crucial for nursing staff to participate in CPR courses in order to refresh and update their theoretical knowledge and performance skills and consequently to improve the safety and effectiveness of care. The study recommended that continuous evaluation of nurses' knowledge and performance is essential, the optimal frequency with which CPR training should be implemented at least every 6 months, in order to avoid deterioration in nurses CPR knowledge and skills.

**Index Terms:** Cardiopulmonary Resuscitation (CPR).

## 1 INTRODUCTION

The World Health Organization (WHO) estimates that 17 million people died in 2010 from cardiopulmonary diseases, which are consequently classified as the leading causes of death among all non-communicable diseases [1]. Cardiopulmonary resuscitation (CPR) reduces in-hospital cardiac arrests and related deaths, when patients receive CPR promptly from adequately trained and specialized healthcare professionals [2,3]. During the 40 years after the introduction of modern CPR there have been major developments and changes in the performance of resuscitation. Although some authors have showed improved survival rates [4]. Others have found them to be relatively constant during this period [5]. But only 10-15% of patients who receive CPR following cardiopulmonary arrest will survive to be discharged [6]. Factors The lack of resuscitation skills of nurses and doctors in basic and advanced life support has been identified as a contributing factor to poor outcomes in post cardiac arrest [7], Intensive care nurse functions as the nurse leader. The ICU nurse is responsible for directing and coordinating all nursing roles. Coordinates resuscitation efforts in collaboration with the physicians, serves as a resource for the nurse recorder, assures paperwork is complete and distributed appropriately. Nurses are often faced with life and death situations and their ability to act quickly and efficiently is of paramount importance [8].

Because of the nature of their profession, nurses spend significant time alongside patients and are often the first to attend at in-hospital cardiovascular arrests; they are thus the ones who respond by providing CPR [9]. The nurse plays a vital role in the efforts to resuscitate a patient. As mentioned, the nurse often is one first assesses the patient initiates CPR calling of the team. The patient's primary nurse as should be present to answer questions about the arrest. Roles of the nurses who respond to the arrest situation include continuing CPR, monitoring heart rhythm and other vital signs, defibrillating ,administering drugs, recording of events, controlling any crowds, and notifying the attending physician and family members [10]. Although their contribution to effective care delivery is crucial, either individually or as a member of a rapid response team, studies have often detected that they have poor knowledge and skills in light of international guidelines and recommendations [11, 12].The association between ACLS training and survival that maintained after controlling for rhythm severity indicates that ACLS-trained nurses provide an independent contribution to the increased survival rate [13]. Training programs in CPR may augment nurses' theoretical knowledge and may make a significant contribution to the elimination of their anxiety and an increase in their self-confidence and effectiveness in dealing with a cardiac arrest, individually or as members of a team [14, 15]. Moreover, such training and competence development should be continuous, as studies have observed a significant deterioration of CPR knowledge and skills as early as three months after attending a training program [16, 17]. Therefore, given the importance of CPR in delivering effective care and protecting human life, healthcare organizations must organize training programs on an ongoing basis, in order to keep healthcare professionals competent.

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## 2. MATERIALS AND METHODS:

**Design:** A descriptive design was used to assess nursing performance during cardiopulmonary resuscitation for patients with cardiac arrest in intensive care unit and cardiac care unit at the Alexandria main university hospital, Alexandria.

**Setting:** This study was conducted at two units: - cardiac care unit (28 nurse: - 10 bachelor degree & 18 secondary school) and intensive care unit include (30 nurse) which commonly have cardiac arrested patient at the Alexandria main university hospital.

**Subjects of the study:** The subject of the study includes a convenience sample of 58 staff nurses in both units (ICU & CCU) at the Alexandria main university hospital. Five nurses were excluded in the pilot study; the final sample size was 53 staff with different qualifications (Secondary school or technical school and bachelor degree).

**Tools for data collection:** Data was collected using the following two different tools: Cardiopulmonary resuscitation questionnaire sheet to assess the nurse's knowledge. 2- Cardiopulmonary resuscitation observation check list to assess the nurse's performance about.

### 1-Cardiopulmonary resuscitation questionnaire sheet:

It was developed by the researcher to assess nurse's knowledge regarding nursing care during cardiopulmonary resuscitation for patients with cardiac arrest .It was constructed and reviewed utilizing the most recent and relevant literature It was written in Arabic language in the form of multiple – choice questions . It included the following parts:

Part (A) That includes socio demographic variables such as, (age, educational level, occupation, marital status, years of experience in unit and training program .....etc.)

Part (B) it was designed to assess nurse's knowledge about nursing care during cardiopulmonary resuscitation for patients with cardiac arrest. This part includes questions about CPR and nursing care of patients with cardiac arrest covered the following items:

- Basic knowledge about cardiac arrest includes (definition, causes, signs & nursing management). (5 items)
- Nursing care during CPR and complications. (12 items)
- External defibrillation, uses & complications. (9 items)
- - Emergency drugs used during cardiac arrest and common side effect. (3 items)
- Nursing care for tracheostomy & suctioning care. (2 items)
- Crash cart include content & preparation (2 items)

### Knowledge scoring system:

All knowledge variables were weighted according to the items included in the answer of each question. The

grading system for the answer; "10" score for correct answer and "zero" score for incorrect answer. The data collected from the knowledge test was computed and the test received a grade out of 330point, the scores were allocated as follows:

Items	Questions	Scores in points
*Basic knowledge about cardiac arrest& Nursing management.	5	50
*Nursing care during CPR and complications.	12	120
*External defibrillation ,uses & complications	9	90
*Emergency drugs used during cardiac arrest &common side effect.	3	30
*Nursing care for tracheostomy and suctioning Care.	2	20
*Crash cart include content &preparation	2	20
Total questions	33Questions	330 points

The score of knowledge test expressed as percent from a maximum of 330 points as follow:-

- Satisfactory: Started from 65% and above.
- Unsatisfactory: Below 65%.

### II- Cardiopulmonary resuscitation observational check list:

The researcher based on the evolutionary check list for nurse's practice during CPR. Developed by (Hinze, 2004 & Smith et al., 2004) [18, 19]. It was modified by the researcher, and presented to a jury professor's expertise from medical surgical nursing department, faculty of nursing. That is to suit the hospital standard and check its clarity, their comments and suggestions were taken into consideration, and the final form was developed. The observational check list was used to evaluate practices of nurses about nursing care for patients with cardiac arrest three times. The tool covered all the procedure about nursing care for patient with cardiac arrest & CPR. Such as:

I- CPR procedure (two rescuers).

Emergency medication (preparation, procedure, administration IV infusion& evaluation).

External defibrillation.

Nursing care for tracheostomy and Suctioning care.

Crash cart include. (Content &preparation).

### Practice scoring system:

Regarding to a scoring system for practicing of the studied nurses, a check list was assigned to score according to its number of sub-items. For each sub-item , the participant is assigned (3) score if done correctly for three times of observation , (2) score if done correctly two times out of three observation ,(1) score if done correctly ones time out

of three observation and (zero) score if done incorrectly. The scoring system of the tool check list was computed and the sheet received a grade out of total 366 points.

Items	Questions	Scores in points
*CPR(tow rescuer):- - For unresponsiveness.	3 steps	9
- For air way.	13steps	39
- When getting tired.	6 steps	18
* Emergency medication :- - Preparation	5 steps	15
- Procedure.	10 steps	30
- Administration of IV infusion.	14 steps	42
- Evaluation.	5 steps	15
* External Defibrillator :- - During procedure.	18 steps	54
- Post procedure care of equipment.	5 steps	15
- Post procedure care of patient.	6 steps	18
* Suctioning care.	28 steps	84
*Crash cart (content &preparation).	9 steps	27
Total Items	122 steps	366 points

The score of practice test expressed as percent from a maximum of 366 points as follow:-

- Satisfactory: Started from 65% and above.
- Unsatisfactory: Below 65%.

### Operational Design:

#### A- The preparatory phase:

Reviewing the available literature concerning the topic of the study using books, articles periodical and magazines was done to identify the nursing care provided during cardiopulmonary resuscitation. Also questionnaire was designed for nurses. More over observational checklist was developed to assess nursing care provided during cardiopulmonary resuscitation. Content of Validity was done by a jury of professors from the medical surgical nursing department, faculty of nursing. That is to check the relevancy, coverage content and clarity of the questions. Accordingly, modifications were done

#### Pilot study:

A pilot study was carried out on 10% of subject. It was done to test the clarity and practicality of the tools, the results of the data obtained from the pilot study helped in modification of the tools; items were corrected or added as needed. Accordingly modifications were done and the final form was developed. The sample & results from the pilot study were not included in the main statistical sample.

#### C. Field work:

Field study was conducted during the period from the beginning of October (2014) to the end of January (2015). The researcher visited the Hospital, three days weekly (morning & afternoon) to collect the data by using previous tools. The questionnaire sheet was administered by the researcher to nurses either individually or in groups in their work place in both units. And explanation of the questionnaire sheet was done by the researcher. The

observational checklist was utilized by the researcher to assess nurse's performance. The assessment of nursing performance was done through three time of observation; the researcher spent four hours/day in observing nurses during morning & afternoon shift. The researcher observed each nurse three times for each skill.

#### Administrative design:

Formal approval was written and presented to the Dean of faculty of nursing and sent to the directors of the hospital and matrons of the two units. The letter included the title, aim of the study and setting where the study would be conducted.

#### \* Protection of human rights:-

After an official permission to conduct the study was obtained by researcher from Alexandria main university hospital. Nurses were informed of the aim and nature of the study. The investigator emphasized that the participation is voluntary and confidentiality and anonymity of the subject will be assured through coding of data

#### Statistical design:

Upon completion of data collection, variables included in each data collection sheets (sociodemographic data sheet and observational sheet) were coded prior to computerized data entry used ( Means and standard deviation as well percentage, frequency, t test, f test, X2 test, correlation coefficient ).

#### Limitation of the study:

Nurses were often busy in administrative duties, so they take a long time to complete answering the test in one shift.

## 3. RESULTS

### Part I: - Characteristics of the studied nurses:

**Table (1):** Number and percentage distribution of the studied nurses is according to their characteristics.

Units Items	ICU &CCU units	
	Number 53	Percentage %
Age(years)		
< 20	14	26.4
20-26	22	41.5
>26	17	32.1
Marital status: Single	33	62.3
Married	20	37.7
Level of Education		
Secondary school	33	62.3
Technical school	5	9.4
Bachelor degree	15	28.3
Experience in units (years) < 2	15	28.3
2-4	19	35.8
>4	19	35.8
Attending previous training program in last 6 month		
No	32	60.4
Yes	21	39.6
Desire to take refreshing training courses regarding CPR		
No	21	39.6
Yes	32	60.4

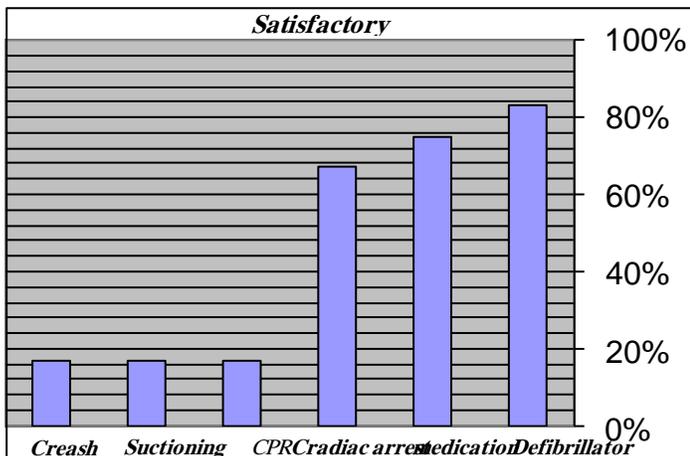
Table (1) This table shows that nurse's age, finding of the

present study revealed that less than half (41.5%) were in the age group (20 – 26years). As regard their level of education it was found that the more than half of them (62.3%) were having secondary school in nursing. As regard, their marital status was found (62.3%) were single .It is clear that the years of experience (35.8%) were >4 years, more than half of studied nurse (60.3%) did not receive previous training program in the last 6 month.

**Part II: Nurse’s knowledge working with cardiac arrest patients &nursing care during CPR.**

Item	before	After	Paired t-test
	Mean ± SD	Mean ± SD	
Total Nurse’s knowledge	5.08 ± 1.61	18.34 ± 1.62	t=44.697 P<.001 (HLS)
Nurse’s role in assessing DVT	0.46± 0.58	1.9 ±0.24	
Nursing practice in using mechanical prophylaxis	19.56 ± 3.51	60.38 ± 3.72	t=55.837 P<.001 (HLS)

The following figure shows that the majority of nurses (83.0%) had satisfactory knowledge level about external defibrillator, use and complication while the minority of nurses (17.0%) had satisfactory knowledge level about nursing care during CPR & their complication, suctioning care and crash cart.



**Figure (1):-** Most common satisfactory nurse's knowledge regarding to Cardiac arrest &nursing care during CPR.

**Table (2):** Mean score of nurse's knowledge regarding to cardiac arrest and nursing care during cardiopulmonary resuscitation.

Item	Knowledge score
	Mean. + S.D
1-Basic knowledge about Cardiac arrest and nursing management.	37.74 + 8.69
2-Nursing care during Cardio pulmonary resuscitation and their complication.	36.96 + 21.51
3-Nursing care for external defibrillator, uses and complication.	73.7 + 17.01
4- Emergency drug used during CPR and common side effect.	26.98 + 6.07
5-Nursing care for tracheostomy and Suctioning care.	7.93 + 7.17
6-Crash cart content and preparation.	7.74 + 7.24
Total knowledge	218.1 + 38.87

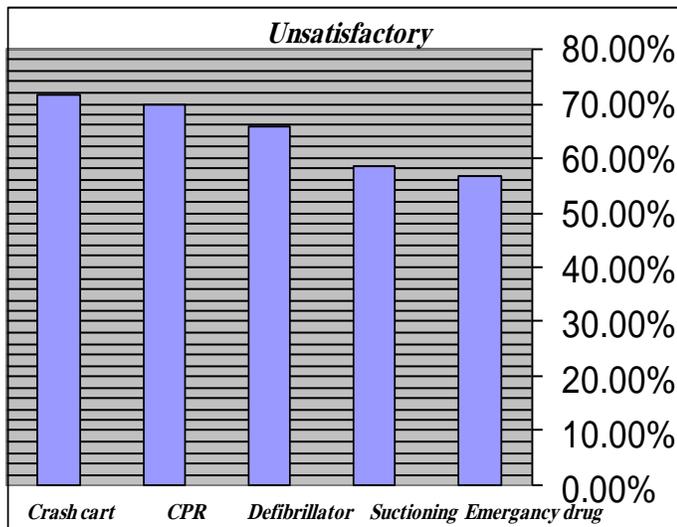
This table shows the highest mean score (73.77 +17.01) of nurses knowledge level about nursing care for external defibrillator, while the lowest mean score (7.74+7.24) in nurses knowledge level about crash cart (content & preparation).

**Part III: - Nurses performance about nursing care for cardiopulmonary resuscitation during cardiac arrest.**

**Table (3):-** Number and percentage distribution of studied nurses level of performance during cardiopulmonary resuscitation and external defibrillator.

Item	Satisfactory		Unsatisfactory	
	no	%	no	%
	53		53	
1- CPR ( Two rescuer ) :- * For unresponsiveness.	16	30.2	37	69.8
* For air way.	16	34.0	35	66.0
* When getting tired.	23	43.4	30	56.6
2-External Defibrillator :- * During procedure.	18	34.0	35	66.0
* Post procedure care of equipment.	20	37.7	33	62.3
* Post procedure care of patient	24	45.3	29	54.7

This table shows that less than half of nurses (45.3%) had satisfactory in nurses performance level about external defibrillation (post procedure care of patient) & and more than half (69.8%) had unsatisfactory nurses performance about CPR (for unresponsiveness). This figure shows that the majority of nurses (71.5%) had unsatisfactory performance about crash cart (content & preparation and more than half (56.6%) had unsatisfactory performance level about emergency medication.



**Figure (2):-** Most common unsatisfactory nurse's performance regarding Cardiac arrest & nursing care during CPR.

**Part IV: - The relation between nurses knowledge and practice in relation to their characteristics.**

**Table (4):** Relation between knowledge score, age and years of Experience of the studied nurses in both units.

Age / Years of Experience	NO	Knowledge score/ 330	F Test	P Value
		Mean + SD		
Age(years) < 20	17	219.4 + 33.4	0.69	>0.05
20-26	29	213.8 + 43.1		
>26	7	232.9 + 32.5		
Years of experience < 2 years	15	222.5 + 34.6	1.44	>0.05
2-4 years	19	204.0 + 41.7		
> 4 years	19	225.7 + 41.1		

This table shows high mean score (232.9 + 32.5) between total knowledge and age group (>26 years). Also high mean score (225.7+ 41.1) between total knowledge and years of experience (> 4years) in both units, (this mean when increase age and years of experience increase knowledge) but without statistical significant.

**Table (5):** Relation between knowledge score, level of education and previous training of studied nurses in both units.

Knowledge With	no	Knowledge score/ 330	F Test	P Value
		Mean + SD		
Education			3.65	<0.05
Secondary school	33	212.1 + 42.4		
Technical school	5	196.0 + 24.1		
Bachelor degree	15	238.7 + 24.5		
Previous training			T Test	P Value
Yes	21	218 + 30.56		
No	32	217.5 + 47.5	0.10	>0.05

The highest knowledge mean score (238.7±24.5) was presented by Bachelor degree nurses as regard level of education. There was a significant relation between nurse knowledge scores & Level of education P value = (<0.05).

**Table (6):** Relation between mean practice scores , level of education and previous training of studied nurses in both units.

Practice With	no	Practice score/ 366	F Test	P Value
		Mean + SD		
Education			1.138	>0.05
Secondary school	33	234.3 + 15.67		
Technical school	5	227.6 + 20.59		
Bachelor degree	15	237.8 + 13.68		
Previous training			T test	P Value
Yes	21	237.72 + 15.67		
No	32	233.67 + 14.05	0.89	>0.05
Desire to take refreshing training courses regarding CPR			T Test	P Value
Yes	32	233.67 + 14.05	0.89	>0.05
No	21	237.72 + 15.67		

In this table, high mean practice score (237.72+ 15.67) related to studies nurses have previous training with practice. Also the highest mean score (237.8+13.68) related to studies nurses about level of education (Bachelor degree) with practice without statistical significant P value = (>0.05) .

**Table (7):- Relation between total knowledge and total practice in both units.**

Practice	Knowledge				Total	
	Unsatisfactory		Satisfactory			
	No	%	No	%	No	%
Unsatisfactory	2	6.9	27	93.1	29	54.7
Satisfactory	5	20.8	19	79.2	24	45.3
Total	7	13.2	40	86.8	53	100

P value >0.05      X2 2.225

This table reveals that the majority of nurses (93.1%) had unsatisfactory knowledge and practice. there is no statistically significant in relation between total nurse's knowledge and total nurse practice.

**Table (8):- Correlation coefficient for nurses knowledge, practice, age and years of experience.**

Units Items	ICU &CCU	
	r	P
Age With knowledge	0.21	>0.05
Age With practice	0.41.	>0.05
years of experience with knowledge	0.21	>0.05
years of experience with practice	0.41.	>0.05

This table illustrates the positive correlation between practices with age & years of experience without statistical significant. Also this table shows weak correlation between knowledge with age & years of experience.

## DISCUSSION:

Cardiopulmonary resuscitation has been recognized as an intra-arrest factor that is associated with a higher percentage of patient survival. [20]. good theoretical knowledge is a prerequisite for nursing staff to provide high quality and effective CPR. Competent and knowledgeable nurses can implement effective CPR interventions to save patients' lives. This study's findings emphasize the importance of increasing the CPR knowledge and skills of the nurses at the Alexandria main university hospital. the present study revealed that the studied nursing staff had unsatisfactory knowledge, since the minority of nurses (17.0%) had satisfactory knowledge level about nursing care during CPR & their complication, suctioning care and crash cart. this finding is consistent with the findings of zaharopoulos and colleagues [21]. the low level of theoretical knowledge can be partly explained by the fact that only 39.6% of the respondents had participated in a CPR training course during the last 6 months prior to the study. although the nursing staff takes part in training programs during their career, very few refresh and update their knowledge and skills on the subject [22]. studies have shown that participation in training courses once every six months contributes to retention of both theoretical knowledge and performance

skills [23, 24, 25]. these highlight the need for continuous training. in relation to nurse's performance regarding to cardiac arrest & nursing care during CPR. it is found that the majority of nurses (71.5%) had unsatisfactory performance about crash cart (content & preparation and more than half (56.6%) had unsatisfactory performance level about emergency medication. this is consistent with findings reported in Ireland 26 (madden 2006:218) [26], and Bahrain (Marzooq & Lyneham 2009:294) [27]. A significant correlation was found between educational level and level of knowledge, as the highest knowledge mean score ( $238.7 \pm 24.5$ ) was presented by bachelor degree nurses as regard to level of education. There was a significant relation between nurse knowledge scores & level of education p value = ( $<0.05$ ). several studies have shown that patients in hospitals that have greater percentages of nurses with higher education experience lower mortality and complication rates [28,29].the vast majority (60.4%) of respondents expressed their willingness to take part in ongoing CPR refreshing courses. this finding is consistent with (Oermann, Edgren & Maryon 2011:447) [30], who indicated that teaching of the relevant, frequently used CPR skills could increase the survival rate of cardiac arrest victims. a well-trained nursing staff may even evaluate an unconscious patient and consequently begin early CPR until the arrival of a response team, which may improve patient (survival) and hospital (mortality rate) outcomes [31]. the findings from the present study and from others mentioned above indicate the need for good training that will enhance the knowledge level of nurses and consequently the in-hospital health outcomes through more effective care. This is congruent with (Leary & Abella 2008:1) [32], who mentioned that; all nurses should attend mandatory in-service CPR training to prevent life-threatening deterioration in their CPR skills. another study, the authors collected data in every instance of CPR care over the preceding twelve months, before and after implementing the course. the study results showed that the nurses felt confident during the CPR care delivered shortly after the course but that, with time, they felt incapable of performing the competencies without supervision [33]. These results reinforce the need for systematic and more frequent training since, in fact, the acquired knowledge is reduced and abilities are lost if they are not practiced. nevertheless, it should be mentioned that, whilst the sample of the study was quite large, it came exclusively from a single hospital and therefore the study needs to be viewed in that light. A larger nationwide survey may be needed to ascertain whether the findings reported here hold true for all other hospitals, although this might reasonably be expected to be the case.

## CONCLUSIONS:

Education and CPR training are provided to nurses during their undergraduate studies; therefore, frequent refresher courses are crucial for keeping them up to date with an intervention that, if properly delivered, may be crucially beneficial for patients in certain circumstances. In this light, the increasing incidence of cardiopulmonary diseases makes continuing CPR training imperative for nursing staff. The present study indicates that there is such a need for frequent refresher nursing courses

regarding CPR technique. This finding should be taken into consideration by health care managers and policy makers in their business planning.

#### RECOMMENDATIONS:

- These findings indicate that it is imperative for nurses to receive regular, periodic in-service CPR courses, updating nurses on the latest CPR techniques, technologies and developments.
- The ability of registered nurses to perform BLS and to maintain their CPR skills and knowledge are indispensable professional requirements of all registered nurses working in healthcare settings.
- The optimal frequency with which CPR training should be implemented at least every 6 months, in order to avoid deterioration in nurses CPR knowledge and skills.

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