Effect of Implementing Advanced Cardiovascular Life Support (ACLS) Guidelines 2016 on Nurse’s Knowledge and Performance

Nagwa I. Abass1,2,*, Manal Th. Soliman2,3
1Critical Care Nursing and Emergency Department, Tanta University, Egypt
2Nursing Department, Applied Medical Sciences College, UHB, SA
3Medical Surgical Nursing, Mansoura University Egypt
*Corresponding author: nagwai@uhb.edu.sa

Received June 05, 2020; Revised July 06, 2020; Accepted July 14, 2020

Abstract  Background and aim: Cardiac arrest occurs in case of cessation of effective heartbeat and blood circulation and it is one of the causes of sudden or unexpected death. Advanced cardiovascular life support (ACLS) considered, as a basic skill, is one of the most important inventions in hospital setting special intensive care units as well as a rapid and urgent intervention to prevent death or postpone it in a patient with cardiac arrest. This study aimed to assess effect of implementing advanced cardiovascular life support (ACLS) guidelines 2016 on nurse's knowledge and performance. Methods: A Quasi-Experimental study design with pre, intervention/posttest with a convenience sample included 300 nurses worked at 10 hospital settings. Data were collected by using three tools (1): Demographic Characteristics related to nurses, (2): Nurses knowledge toward ACLS pre/posttest, (3): Nurses performance an observation checklist toward ACLS according American Heart Association guidelines. Conclusions: The study confirms that significant association between the nurses’ knowledge and performance of ACLS in pre/posttest and their demographic characteristic. The educational program improves the knowledge and performance of the nursing staff regarding advanced life support. Recommendations: These findings indicate that it is imperative for nurses to receive regular, periodic in-service ACLS courses, updating AHA on the latest ACLS techniques, technologies and developments. In-service education program should make continuous training courses for the nurses about the new and up-to-date intervention related to knowledge & practice of American heart association ACLS.

Keywords: nursing, knowledge, performance, advanced cardiovascular life support, guidelines

Cite This Article: Nagwa I. Abass, and Manal Th. Soliman, “Effect of Implementing Advanced Cardiovascular Life Support (ACLS) Guidelines 2016 on Nurse’s Knowledge and Performance.” American Journal of Biomedical Research, vol. 8, no. 5 (2020): 534-542. doi: 10.12691/ajnr-8-5-6.

1. Introduction

Cardiopulmonary resuscitation (CPR) is a well-recognized critical procedure in which chest compressions and artificial ventilation are provided to maintain adequate blood flow to the brain and other vital organs. [1] Cardiopulmonary resuscitation has been shown to reduce in-hospital cardiac death and related fatalities when patients are managed by adequately trained health care professionals. [2] The American Heart Association (AHA) is the leading authority on resuscitation science. Its approved training courses are taught across the globe. In an effort to practice evidence-based medicine, AHA updates are released every 5 years. The 2016 AHA update for ACLS focuses on topics involving significant new developments in resuscitation science or ongoing controversies, and serves as an update to the 2010 AHA Guidelines for ACLS rather than as a complete revision of the guidelines [3].

Cardiopulmonary resuscitation (CPR) is one of the most important and urgent intervention to prevent death or postpone it in a patient with cardiac arrest [4]. The teaching and reinforcing of ACLS is an important part of the intensive care nurse role. Critical care Nurses are often the first health care professionals to identify a patient with cardiopulmonary arrest in the different critical care setting and therefore should possess adequate competency to provide effective resuscitation [5]. ACLS performance improves when all nurses are certified and practicing the advanced training courses. Various levels of CPR include: Basic life support measures which are conducted for opening the airway and oxygenation and maintaining blood circulation at the primary level, advanced cardiovascular life support (ACLS), including the sequence for resuscitation, medications, electrical therapy, and monitoring, the emphasis on high-quality CPR and its critical role in resuscitative efforts for purpose of maintaining blood circulation and oxygenation at the advanced level and long-term resuscitation.
measures that are done for brain or cerebral resuscitation and improvement of the brain tissue and stabilization of the patient [6,7].

The ability to respond quickly and effectively to a cardiac arrest situation rests on the nurses being competent in the emergency life-saving procedure of cardiopulmonary resuscitation [8]. The survival rate after cardiac arrest depends on the quality of CPR, alarm response time, advanced airway measures and time to defibrillation. All healthcare professionals should be able to perform CPR with competence [5,9].

Nurses working in different areas reportedly demonstrated varying levels of CPR competence, and these skills deteriorated over time. Critical care nurses performing ACLS in accident and emergency units, intensive care units, coronary care units, nursery care units in real-life situations with advanced airway measures on a daily basis retained these skills but need updating knowledge and skills.

The study aimed to evaluate the nurses' knowledge and performance toward advanced cardiovascular life support (ACLS) and to find out the association between the knowledge scores of the nurses and their selected demographic variables of age, gender, and level of education, years of experience, and a structured training programme, as well as regular updates in (ACLS).

2. Aim of the Study

This study aimed to assess effect of implementing advanced cardiovascular life support (ACLS) guidelines 2016 on nurse's knowledge and performance.

2.1. Research Hypotheses

Hypothesis 1. The nurses they receive structured training programme toward (ACLS) will have a higher ACLS knowledge score after education than that before training.

Hypothesis 2. The nurses they receive structured training programme toward (ACLS) education will have a higher ACLS performance score after education than that before training.

Hypothesis 3. The nurses of less critical department, they attend the structured training programme toward (ACLS), will have an improvement in knowledge, and performance of advanced cardiopulmonary resuscitation.

3. Subjects and Methods

3.1. Research Design

A Quasi-Experimental study design with pre, intervention/posttest were utilized to assess the effect of implementing advanced cardiovascular life support (ACLS) guidelines 2016 on nurse's knowledge and performance.

3.2. Setting

The study was conducted at 10 hospitals in Gharbia government (38) nurses from Tanta Mebara Hospital, (25) nurses from Al Menshawy General Hospital, (36) nurses from Elmogamaa Eltibi Hospital, (29) from Kafr Elzayat General Hospital, (27) nurses from Elsanta Hospital, (22) nurses from Kotor General Hospital, (20) nurses from Zelta General Hospital, (18) nurses from Samanoud General Hospital and (60) nurses from Al Mahalla Elkobra Hospital.

3.3. Subject

A convenience sample included (300) males and females with different qualifications and worked at 9 area of assignments. 87 nurses in emergency and trauma care unit, (73) nurses in operating theater, (41) nurses in intensive care unit, (30) nurses in nursery care unit, (27) nurses in coronary care unit, (24) nurses in surgical department, (9) nurses in pediatric department, (6) nurses in orthopedic department, and (3) nurses in obstetric department.

4. Tools of Data Collection

Data were collected by using three tools designed and constructed by the researcher to assess the effect of implementing ACLS guidelines 2016 on nurse's knowledge and performance [10].

Tool (1): Demographic Characteristics related to nurses: was designed after review the literatures [11,12]. It consisted of (6) items, which include gender, age, academic qualification, years of work experience, area of assignment, previous training in cardiopulmonary resuscitation.

Tool (2): Nurses knowledge toward ACLS pre/posttest: the researcher construct 20 open- end MCQs questionnaires sheet were presented to (20) scores. It composed of three parts: (6) scores for assessment and cardiac compression, (8) scores for advanced airway management and breathing, (6) scores for defibrillation and emergency drugs. Depended on the AHA Guidelines ACLS 2016.

Tool (3): Nurses performance an observation checklist toward ACLS pre/post intervention adopted from American Heart Association ACLS guidelines, 2016: The tool cover all the steps about ACLS include: Patient evaluation performance, cardiac massage performance, Opening airway and respiratory performance, Defibrillation performance. The checklist about nurse’s performance was given scores: one mark to the competent practice, don completely but not competent and don incompletely.

According to nurses’ practice, their practice was categorized into:

- Competent practice Score (3).
- Done complete but not competent score (2).
- Incomplete practice score (1).

4.1. Data Collection

The data collection process has been performed from December, 2016 to November, 2017.

Content validity was used for modified tools, AHA 2016 ACLS guidelines checklist, was in tools content validity ascertained by jury expertise (7) from nursing and medical staff members.
4.2. Pilot Study

The pilot study was applied to 10% (30) nurses of the studied sample who worked at the previously mentioned settings. The final form was modified in the tools’ item based on the findings of the pilot study. Some questions and items were omitted, added, or rephrased, and then the final form was developed. The nurses in the pilot study were excluded from the sample.

4.3. Assessment Phase

One day per week, to implement the program for each group. The group number ranged from 18 to 25 nurses from different assignment area based on workload distribution and roster. The pre-intervention questionnaire was administered to all nurses in group at the same time. Nurses completed a questioner containing 20 MCQs questions 20 minutes time duration to measure knowledge for ACLS. This 20-item scale comprised three parts: assessment and cardiac compression, advanced airway, and breathing, defibrillator and emergency drugs. The total score ranged from 0 to 20, with a higher score indicating a higher level of knowledge. The researcher collected the completed questionnaires. The observation checklist was filled in by the researchers for all nurses in group during performing CPR on Brad CPR Manikin. The time needed to fill in the checklist was 30 minutes.

4.4. Implementation Phase

The ACLS structured training programme was designed as a Four-session program.

In Session 1, program orientation about AHA guideline ACLS 2016 was given in 15 minutes.

In session 2, the Knowledge about definition and need for ACLS, the overall ACLS process, Successful chest compression, airway management, and how to use an automated defibrillator. Furthermore, watched a video titled “How to perform chest compression CPR and use automated defibrillator” was given in one hour and 30 minutes.

In session 3, Training about effective chest compression, airway management, deliver breathing, use an automated defibrillator, precautions for using a defibrillator was given in 2 hours.

In session 4, Remonstration two rescuers about CPR were given in 15 minutes.

4.5. Evaluation Phase

The same MCQ assessment sheet used for the post intervention questionnaires to all groups at the same time, immediately after the end of the education program. The questionnaire was identical to the pre-intervention questionnaire, measuring participants’ knowledge as well as the observation checklist for nurse’s performance.

Ethical Consideration: The ethical research considerations in this study included the following:

The research approval obtains before the intervention.

The researcher clears the aim of the study to all the study subjects with maintains anonymity and confidentiality of subjects.

Administrative design: To carry out the study, the necessary approval was obtained from the director of the mentioned studied settings, explaining the aim of the study to obtain the permission for data collection.

Data Analyses: In order to achieve the early stated objectives, the data of the study were analyzed through the use of statistical package of social sciences (SPSS) version 16 through descriptive and inferential statistical analyses.

5. Results

Table 1 illustrated the distribution of the studied students according to age, sex, marital status, occupation, and level of education. Regarding to gender more than half were female (70.3), related to age, it was observed that the less than half of studied group was (34.7) between 25 and 29 years. In relation years of experience the less than half studied groups (34.0) have < 5 yrs. Concerning to Academic qualification, the more than half of studied group (54.3) was high institution of nursing where, (29.0was working in Emergency room and (92.7%) of them had a no pervious training in BLS.

Figure 1 showed that most of studied group (93%) has no training course in basic life support.

Table 2 showed that studied Nurse’s knowledge regarding advanced cardiovascular life support (ACLS), related to part 1, 2, 3, have significant relation between pre and post program (.000*).

Table 3 showed that Nurse’s performance regarding advanced cardiovascular life support (ACLS) and according to patient evaluation performance, Cardiac massage performance, advanced opening airway and respiration performance, and defibrillator performance observe statistically significant difference between pre and post program with P value (.000*).

Table 4 showed the relations between socio-demographic characteristics of the studied groups with their pre and post guideline implementation. This table displays a statistically significant relation between studied groups’ related to part 1, 2, 3, have significant relation between pre and post program (.000*).

Table 5 showed the relations between socio-demographic characteristics of the studied groups with their performance regarding advanced cardiovascular life support (ACLS) Pre and Post guideline implementation. This table displays a statistically significant relation between studied groups’ related to gender, age and knowledge in posttest have (f=5.863, p=0.016*), (f=2.545, p=0.028*) respectively, as well as studied groups age and post knowledge (f=2.545, p=028*),’ academic qualifications in pretest and their knowledge (f=9.032, p=0.000*). Moreover, there is a statistically significant relation between studied groups’ area of assignment and their knowledge pretest (f=3.637, p=0.000*) and posttest have (f=5.795, p=0.000*).

Concerning previous training in (BLS), there are statistically significant relations with their knowledge pretest (f=3.4078, p=0.000*).

Table 5 showed the relations between socio-demographic characteristics of the studied groups with their performance regarding advanced cardiovascular life support (ACLS) Pre and Post guideline implementation. This table displays a statistically significant relation between studied groups’ related to gender and performance in posttest (f=4.772, p=0.030*), posttest have (f=5.373, p=0021*) academic qualifications in pretest and their performance (f=3.907, p=0.030*). Moreover, there is a statistically no significant relation between studied groups’ Area of assignment and their
performance in pretest and posttest. But concerning to previous training in BLS, there are statistically significant relations with their performance pretest ($f^2 = 42.366$, $p=0.000^*$).

Table 6 Showed that significant Correlation between the studied nurse’s mean difference in knowledge and performance regarding advanced cardiovascular life support (ACLS) Pre and Post the guideline implementation ($0.000^*$).

| Demographic characteristics of the nurses | Frequency (No. 300) | %  |
|------------------------------------------|--------------------|----|
| Gender                                   |                    |    |
| Male                                     | 89                 | 29.7|
| Female                                   | 211                | 70.3|
| Age (Years)                              |                    |    |
| 20-24                                    | 98                 | 32.7|
| 25-29                                    | 104                | 34.7|
| 30-34                                    | 24                 | 8.0 |
| 35-39                                    | 25                 | 8.3 |
| 40-44                                    | 35                 | 11.7|
| 45-50                                    | 14                 | 4.7 |
| Years of experience                      |                    |    |
| < 5 yrs.                                 | 102                | 34.0|
| 5 - 9 yrs.                               | 94                 | 31.3|
| 10 - 19 yrs.                             | 55                 | 18.3|
| ≥20 yrs.                                 | 49                 | 16.3|
| Academic qualification                   |                    |    |
| Diploma in Nursing                       | 35                 | 11.7|
| High institution of nursing              | 165                | 54.3|
| Bachelor’s in nursing                    | 100                | 33.3|
| Master’s in nursing                      | 2                  | .7  |
| Area of assignment                       |                    |    |
| Emergency room                           | 87                 | 29.0|
| Operating theater                        | 73                 | 24.3|
| Intensive care unit                      | 41                 | 13.7|
| Coronary care unit                       | 27                 | 9.0 |
| Nursery care unit                        | 30                 | 10.0|
| General Surgery                          | 24                 | 8.0 |
| Orthopedics                              | 6                  | 2.0 |
| Pediatrics                               | 9                  | 3.0 |
| Obstetric                                | 3                  | 1.0 |
| Previous training in basic life support (BLS) |                  |    |
| No                                       | 278                | 92.7|
| Yes                                      | 22                 | 7.3 |

Figure 1. Distribution of the studied nurses according to their previous training in BLS
Table 2. Distribution of the Studied Nurses According to Their Knowledge Regarding advanced cardiovascular life support (ACLS) Pre and Post the Guideline Implementation

| Variables                                      | Maximum allowed scores | Pre             | Post            | Test of sig, |
|-----------------------------------------------|------------------------|-----------------|-----------------|--------------|
| Nurse's knowledge regarding advanced cardiovascular life support (ACLS) | Mean ±SD | Mean%±SD | Mean ±SD | Mean%±SD | t test | P value |
| Knowledge_part1                               | 6                      | 3.64±.983 | 60.6±16.3 | 5.94±.271 | 99.0±4.5 | 39.868 | .000* |
| Knowledge_part2                               | 8                      | 3.58±1.0  | 44.7±12.7 | 7.70±.687 | 96.2±8.5 | 61.713 | .000* |
| Knowledge_part3                               | 6                      | 3.35±.954 | 55.8±15.9 | 5.92±.353 | 98.7±5.8 | 42.210 | .000* |
| Total knowledge                               | 20                     | 10.5±2.2   | 52.8±11.3 | 19.5±1.0  | 97.8±5.3 | 64.325 | .000* |

* significant at p value ≤0.05.

Table 3. Distribution of the Studied Nurses According to Their Performance Regarding advanced cardiovascular life support (ACLS) Pre and Post the Guideline performance

| Variables                                      | Maximum allowed scores | Pre             | Post            | Test of sig, |
|-----------------------------------------------|------------------------|-----------------|-----------------|--------------|
| Nurse's performance regarding advanced cardiovascular life support (ACLS) | Mean± SD | Mean%±SD | Mean± SD | Mean%±SD | t test | P value |
| Patient's evaluation performance              | 3                      | 1.98±.598 | 66.1±19.9 | 3.00±0.0  | 100.0±0.0 | 29.448 | .000* |
| Cardiac massage performance                   | 3                      | 1.56±.554 | 52.0±18.4 | 2.98±1.51 | 99.2±5.0  | 43.099 | .000* |
| Advanced opening airway and respiration        | 3                      | 1.56±.517 | 52.1±17.2 | 2.99±.115 | 99.5±3.8  | 47.296 | .000* |
| Defibrillator performance                      | 3                      | 1.65±.524 | 55.0±17.4 | 2.99±1.0  | 99.6±3.3  | 43.449 | .000* |
| Total performance                              | 12                     | 6.7±1.6    | 56.3±13.4 | 11.9±2.1  | 99.6±1.7  | 55.607 | .000* |

* significant at p value ≤0.05.

Table 4. Correlation between the Studied Nurse's Knowledge Regarding advanced cardiovascular life support (ACLS) Pre and Post the Guideline Implementation and Their Sociodemographic Data

| Demographic characteristics of nurses | Knowledge | Test of sig. | Test of sig. |
|--------------------------------------|-----------|--------------|--------------|
|                                      | Pre       | F | P value | Post   | F | P value |
| Gender                               |           |   |         |        |   |         |
| Male                                 | 53.8±12.4 | 0.965 | .327 | 96.6±4.8 | 5.863 | 0.016* |
| Female                               | 52.4±10.8 | 1.034 | 0.398 | 98.3±5.5 | 2.545 | 0.028* |
| Age                                  |           |   |         |        |   |         |
| 20-24                                | 51.4±11.8 | 1.643 | 0.180 | 96.7±5.0 | 2.151 | 0.094 |
| 25-29                                | 52.5±12.0 | 1.034 | 0.398 | 98.6±6.6 | 2.545 | 0.028* |
| 30-34                                | 55.0±11.1 | 1.643 | 0.180 | 97.0±4.8 | 2.545 | 0.028* |
| 35-39                                | 55.4±10.4 | 1.643 | 0.180 | 99.0±2.0 | 2.545 | 0.028* |
| 40-44                                | 52.8±7.1 | 1.643 | 0.180 | 99.0±3.1 | 2.545 | 0.028* |
| 45-50                                | 56.4±11.5 | 1.643 | 0.180 | 97.8±4.6 | 2.545 | 0.028* |
| Years of experience                  |           |   |         |        |   |         |
| < 5 yrs.                             | 51.4±11.9 | 1.643 | 0.180 | 96.7±5.0 | 2.151 | 0.094 |
| 5 - 9 yrs.                           | 52.2±12.4 | 1.034 | 0.398 | 98.1±7.0 | 2.545 | 0.028* |
| 10 - 19 yrs.                         | 54.9±8.7 | 1.034 | 0.398 | 98.4±3.5 | 2.545 | 0.028* |
| ≥20 yrs.                             | 54.5±9.6 | 1.034 | 0.398 | 98.6±3.6 | 2.545 | 0.028* |
| Academic qualification               |           |   |         |        |   |         |
| Diploma in Nursing                   | 49.7±11.8 | 9.032 | 0.000* | 96.0±3.9 | 1.682 | 0.171 |
| High institution of nursing           | 50.7±11.0 | 9.032 | 0.000* | 98.1±4.1 | 1.682 | 0.171 |
| Bachelors in nursing                  | 57.0±9.9 | 9.032 | 0.000* | 97.9±7.2 | 1.682 | 0.171 |
| Master in nursing                     | 67.5±24.7 | 9.032 | 0.000* | 100.0±0.0 | 1.682 | 0.171 |
| Area of assignment                    |           |   |         |        |   |         |
| Emergency room                        | 51.5±11.1 | 3.637 | 0.000* | 97.4±4.8 | 5.795 | 0.000* |
| Operating theater                     | 49.5±11.4 | 3.637 | 0.000* | 98.7±2.8 | 5.795 | 0.000* |
| Intensive care unit                   | 55.8±12.0 | 3.637 | 0.000* | 98.6±2.7 | 5.795 | 0.000* |
| Coronary care unit                    | 59.2±11.2 | 3.637 | 0.000* | 98.5±3.3 | 5.795 | 0.000* |
| Nursery care unit                     | 57.3±9.2 | 3.637 | 0.000* | 98.3±4.6 | 5.795 | 0.000* |
| General Surgery                       | 51.4±8.5 | 3.637 | 0.000* | 98.1±3.2 | 5.795 | 0.000* |
| Orthopedics                           | 45.8±6.6 | 3.637 | 0.000* | 95.0±6.3 | 3.637 | 0.000* |
| Pediatrics                            | 53.8±8.9 | 3.637 | 0.000* | 87.2±20.0 | 3.637 | 0.000* |
| Obstetric                             | 46.6±14.4 | 3.637 | 0.000* | 93.3±2.8 | 3.637 | 0.000* |
| Previous training in basic life support (BLS) | 51.8±10.4 | 34.078 | 0.000* | 97.9±5.3 | 3.063 | 0.081 |

F: ANOVA Test,   P value: p value of ANOVA test, *significant at p value ≤0.05.
Table 5. Association between the Studied Nurse's Performance Regarding advanced cardiovascular life support (ACLS) Pre and Post the Guideline Implementation and Their Sociodemographic Data

| Demographic characteristics of nurses | Performance | Test of sig. | Test of sig. |
|--------------------------------------|-------------|--------------|--------------|
|                                      | Pre         | Post         | Pre          | Post         |
| Gender                               |             |              |              |              |
| Male                                 | 58.8±13.6   | 58.8±13.6    | F = 4.772    | F = 5.373    |
| F < 0.05                             | .030*       | .021*        |
| Female                               | 55.2±13.2   | 59.7±14.4    | F = 1.145    | F = 1.553    |
| Age                                  |             |              | P = 0.337    | P = 0.173    |
| 20-24                                | 58.0±12.6   | 59.7±14.4    |              |              |
| 25-29                                | 54.8±13.8   | 99.2±2.3     |              |              |
| 30-34                                | 59.7±14.4   | 100.0±0.0    |              |              |
| 35-39                                | 56.3±13.6   | 100.0±0.0    |              |              |
| 40-44                                | 54.2±10.7   | 99.2±2.3     |              |              |
| 45-50                                | 54.1±17.8   | 100.0±0.0    |              |              |
| Age                                  |             |              |              |              |
| 20-24                                | 58.0±12.6   | 59.7±14.4    |              |              |
| 25-29                                | 54.8±13.8   | 99.2±2.3     |              |              |
| 30-34                                | 59.7±14.4   | 100.0±0.0    |              |              |
| 35-39                                | 56.3±13.6   | 100.0±0.0    |              |              |
| 40-44                                | 54.2±10.7   | 99.2±2.3     |              |              |
| 45-50                                | 54.1±17.8   | 100.0±0.0    |              |              |
| Years of experience                  |             |              |              |              |
| < 5 yrs                              | 56.5±13.1   | 56.5±13.1    | F = 0.606    | F = 1.911    |
| 5 - 9 yrs                            | 57.4±13.5   | 59.7±14.4    |              |              |
| 10 - 19 yrs                          | 55.6±13.9   | 99.7±1.3     |              |              |
| ≥20 yrs                              | 54.4±13.2   | 99.4±2.0     |              |              |
| Academic qualification               |             |              |              |              |
| Diploma in Nursing                   | 55.0±14.6   | 55.0±14.6    | F = 3.907    | F = 3.796    |
| High institution of nursing          | 54.6±13.0   | 54.6±13.0    |              |              |
| Bachelors in nursing                 | 59.1±12.7   | 59.1±12.7    |              |              |
| Master in nursing                    | 75.0±23.5   | 75.0±23.5    |              |              |
| Area of assignment                   |             |              |              |              |
| Emergency room                       | 55.1±12.7   | 55.1±12.7    |              |              |
| Operating theater                    | 56.0±13.3   | 56.0±13.3    |              |              |
| Intensive care unit                  | 57.3±13.7   | 57.3±13.7    |              |              |
| Coronary care unit                   | 58.6±16.7   | 58.6±16.7    |              |              |
| Nursery care unit                    | 57.2±13.2   | 57.2±13.2    |              |              |
| General Surgery                      | 53.4±12.7   | 53.4±12.7    |              |              |
| Orthopedics                          | 55.5±12.5   | 55.5±12.5    |              |              |
| Pediatrics                           | 62.9±13.8   | 62.9±13.8    |              |              |
| Obstetric                            | 55.5±9.6    | 55.5±9.6     |              |              |
| Previous training in ACPR            |             |              |              |              |
| No                                   | 54.9±12.6   | 54.9±12.6    | F = 42.366   | F = 1.159    |
| P < 0.05                            | 0.000*      | 0.000*       |
| Yes                                  | 73.1±10.8   | 73.1±10.8    |              |              |
| t test: Student t Test,             |             |              |              |              |
| P value: p value of ANOVA test,     |             |              |              |              |
| *significant at p value ≤0.05.       |             |              |              |              |

Table 6. Correlation between the Studied Nurse's Mean Difference in Knowledge and Performance Regarding advanced cardiovascular life support (ACLS) Pre and Post the Guideline Implementation

|                      | One-Sample Test |                      |                      |
|----------------------|-----------------|----------------------|----------------------|
|                      | Pre             |                      | Post                 |
|                      | t               | df                   | Sig. (2-tailed)      | Mean Difference | 95% Confidence Interval of the Difference |
|                      |                 |                      |                      |                | Lower | Upper |
|                      |                 |                      |                      |                |       |       |
|                      | 80.969          | 299                  | .000*                | 52.83333       | 51.5492 | 54.1174 |
| Total Knowledge      |                |                      |                      |                |       |       |
|                      | 72.679          | 299                  | .000*                | 56.30556       | 54.7810 | 57.8301 |
| Total Performance    |                |                      |                      |                |       |       |
|                      | 315.199         | 299                  | .000*                | 97.83333       | 97.2225 | 98.4442 |
| Total Knowledge      |                |                      |                      |                |       |       |
|                      | 979.939         | 299                  | .000*                | 99.41111       | 99.4111 | 99.8112 |
| Total Performance    |                |                      |                      |                |       |       |

6. Discussion

The advanced cardiovascular life support (ACLS) is an essential skill for all healthcare professionals, especially critical care nurses. It can be a lifesaver when applied by a competent and skilled person. The advanced CPR procedure is a coordinated integration of chest compression-induced circulation, rescue advanced airway and breathing management whereby priorities are determined by evidence from literature, practice, required professional and good training nurses [13].

As regards nurse's characteristics, the current study revealed that the less than half of studied group was (34.7%) between 25 and 29 years also most of them female. In relation Years of experience, the less than half-studied groups (34.0%) have < 5 yrs. This explained
by the fact that younger nurses were freshly graduated, more interested and motivated and much active than the older ones in these areas. Concerning to Academic qualification, the more than half of studied group (54.3%) was High institution of nursing where, (29.0%) of them was working in Emergency room and (92.7%) of them had a no pervious BLS training. This is contributing to CPR knowledge and skills remain inadequate among nurses working in different areas because young age and experience less than 5 years as well as no pervious BLS training.

This in line with (Fathy et al 2018) [13] revealed that half of the study sample was 20-25 years of age group. Also, the majority of the studied sample was female, while almost all of them did not attend CPR training and more than half of both group did not observe CPR process. This study was supported by (Ranse 2011) [14] reported that nurses with less than one year of experience, as well as nurses working in less critical situation, find CPR situations stressful. Even in settings which one would expect that nurses might need to perform CPR, such as in intensive care units, coronary care units, operating theater reported that nurses perform CPR with competently than nurses in other less critical departments that face acute stress, they may find it difficult to concentrate and can feel detached from their bodies and experience.

The current study clarified that there was a statistically significant difference between nurses’ knowledge regarding ACLS during arrest in pre and post questionnaire related to patient assessment and cardiac compression, advanced airway management and breathing, defibrillation and emergency drug. This is contributed to the effect of structural education program in improving the nurse’s knowledge. This study was in an agreement with the study of (Fathy et al 2018) [13] they revealed that there was a statistical significant difference between nurses’ knowledge related to the definition, causes, signs of cardiac arrest and sequence of CPR throughout the intervention in both groups respectively (p<0.05). A similar finding was reported by (Ahmed et al., 2017; Malk et al., 2018) [15,16] they demonstrates statistically significant improvement in nurses’ knowledge scores after implementation of advanced cardiopulmonary resuscitation training program for maternity nurses.

The nurses knowledge in pretest affected by the academic qualifications with 67.5±24.7 of nurses master degree in nursing as well as nurses had previous training program in BLS with mean 65.6±13.5 with (p<0.05). Furthermore, the nurses knowledge in pretest affected by the gender with mean 98.3±5.5 had female, and the posttest knowledge affect by the majority of participants 99.0±2.0 of competence between age 35-39 years and 99.0±3.1 between 40-44 years. The nurses knowledge were competent in pretest in intensive care unit, and coronary care unit area of assignment with mean (55.8±12.0, 59.2±11.2) respectively. This is contributed to this areas the most stressful situation. This in line with (Fathy, et al 2018) [13] they revealed that the significant difference between the competence of knowledge and nurses they had received previous training program (p<0.05). On other hand, they noted that, the age group between 30±35 years had no competent knowledge and there was non-significant association between the nurses’ knowledge toward cardiopulmonary resuscitation procedure and their gender.

Also, this was in an agreement with (Shah rakivahed 2015) [17] they reported that, a significant relationship was observed with the level of knowledge and skill in the field of CPR in terms of service location (emergency, ICU). Furthermore, they revealed a statistical any differences between the mean of scores of knowledge in relation to gender e between the skill of men and women before and after training.

This highly supported with (Al-Janabi 2014) [12] who reported that a significant association between the overall nurses' knowledge toward CPR and their Academic qualification at p-value 0.05. In addition, who mentioned that there was a non-significant association between the nurses’ knowledge toward cardiopulmonary resuscitation procedure and their area of assignment and this was contradict with our study. This result contradicted with (Elazazay et.al, 2012); & (Robin et.al. 2011) [18,19] their results indicated that there was a non-significant association between the nurses’ knowledge toward cardiopulmonary resuscitation procedure and their years of work experience at p-value 0.05.

The current study showed that the a significant relation between pre and post program Nurse’s performance regarding ACLS in relation to nurses evaluation performance, Cardiac massage performance, advanced opening airway and respiration performance, and Defibrillator performance with P value (000*). This study was in an agreement with the study of (Samson et al., 2016) [20] Who study, outcomes of education in-hospital about ventricular fibrillation, mentioned that the initial assessment of CPR was improved by educational program intervention. This in accordance with (Qalawa and Hassan 2017) [21] they clarified that there was a statistically significant difference between nurses’ performance related method to open airway in non-trauma victim & in trauma victim throughout the intervention (p<0.05).

In the current study, the nurse’s performance in pretest significantly increased in the male gender with the mean performance 55.2 ± 13.2, and the mean performance increase in relation to academic level master in nursing with mean 75.0 ± 23.5, likewise the participants they received previous training program in BLS more competently in the pretest performance with 73.1± 10.8. In addition to, the majority of studied groups had competent performance regarding ACLS in posttest with a significant performance in relation to gender (f=5.373, p=0.002) and academic qualifications master degree (f=3.796, p=0.011*). In the same, line (El-Meanawi 2015) [11] noted that the fact only 39.6% of the respondents had participated in a CPR training course during the last 6 months prior to the study.

Furthermore, reported that a significant correlation was found between level of education and performance, as the highest performance mean score (238.7±24.5) was presented by bachelor degree nurses as regard to level of education p value = (<0.05). This finding was in an agreement with (Bukiran, 2014) [22] who mentioned that the cardiopulmonary resuscitation skills of the registered nurses were poor during pre-test and no one could pass the essential skills. Also, confirms that nurses are able to demonstrate significant improvement in their performance
rates after training when one compares their initial results in the pre-test with the results obtained in the post-test.

The current study showed that significant correlation between the studied nurse’s mean difference in knowledge and performance regarding ACLS. Pre and post the guideline implementation (0.000*) (Fathy et al 2018) [13] they noted that there was statistical significant difference between nurses total practice of CPR throughout the intervention (p<0.05).

This finding is in accordance with (Ahmed et al., 2017) [15] they found statistically significant improvement in nurses’ practice scores. Moreover, the post-test score reported high score (92.9%) in the CPR practice technique. Similarly, (Shaharakivahed et al 2015) [17] they revealed that there was a significant difference between the mean of scores of the pre-test and the test after the workshop and the delay test (P<0.001) and also in the true and false answers of the test before training, the highest defect was related to patient response assessment, delay in opening the airway, imbalance in the number of heart massages and respiration in two-person or double CPR at the right time and insufficient depth pressure, unsuitable angle of the hands, delay in selecting the number of tracheal tube and its placement and pressure with insufficient depth when using electroshock (ECT) pads.

Several studies noted that the improvement could be attributed to the variety of educational methods that the researcher used as lectures, audiovisual materials and discussion, as well as demonstration and re-demonstration. [23,24,25,26]. This is in accordance with the Pyramid of Learning cited by (Masters K as by Edgar Dale or by the NTL; as many authors cited. Hassan, 2019; Hassan et al., 2017; Gamel et al., 2020; Mohamed & Hassan, 2019) [27,28,29,30,31]. The pyramid showed that people can retain 10% of what they read, and 20% of what they see and understand (audiovisual). The same authors added that some would retain 50% of what he sees and hear as watch live demonstration and 75% by practice. In addition to (Masters, 2013) [27] they also showed that in the knowledge on pre-test scores, the highest defect of the participants was related to the lack of knowledge on electroshock (ECT) and rhythm identification. This study was in agreement with similar study.

Study limitations. The study was conducted in a simulated environment rather than observing the nurses performing CPR in a real-life situation. Furthermore, the teaching sessions, both theory and practice, were conducted within a span of 3 to 4 hours unlike the usual day-long AHA ACLS course. Our training was designed to be shorter to minimize disruption in service as most of the nurses participating in the study were expected to return to the work area as soon as possible.

7. Conclusion

According to the result of present study, the researcher can make the following conclusions:

Preprogram; most of study nurses have poor knowledge and performance toward ACLS. The study confirms that significant association between the nurses’ knowledge and performance of ACLS in pre/posttest and their demographic characteristic. The educational program improves the knowledge and performance of the nursing staff regarding advanced life support.

8. Recommendation

In the light of the study findings, the following recommendations were suggested:

1. These findings indicate that it is imperative for nurses to receive regular, periodic in-service ACLS courses, updating AHA on the latest ACLS techniques, technologies and developments.
2. In-service education departments should make continuous training courses for the nurses about the new and up-to-date intervention related to knowledge & practice of American heart association ALS.
3. Training refreshing course about ACLS is important to increase the retention of nurse’s knowledge but the need for conduct the posttest after 6 months is very crucial.

References

[1] Catherine AB, Schechter J, Berzon B, Windle ML. Cardiopulmonary resuscitation (CPR). Practical essentials [homepage on the Internet]. [cited 29 August 2017]. Available from: http://www.emedicine.medscape.com.
[2] Simmes FM, Schoonhoven L, Mintjes J, Fikkers BG, Van der Hoeven JG. Incidence of cardiac arrests and unexpected deaths in surgical; patients before and after implementation of a rapid response system. Ann Intensive Care. 2012; 2(1): 141-147.
[3] Hazinski MF, Nolan JP, Aickein R, et al. Part 1: Executive summary: 2015 International consensus on cardiopulmonary resuscitation and emergency cardiovascular care science with treatment recommendations. Circulation. 2015; 132 (Suppl 1): S2-S39.
[4] Brunner and Suddarths Textbook of Medical-Surgical Nursing cardiac arrest. 12th ed. 2010; Pages 207.
[5] Herlitz J, Aune S, Bang A, Fredriksson M, Thoren AB, Ekstrom L, Holmberg S. Very high survival among patients defibrillated at an early stage after in-hospital ventricular fibrillation on wards with and without monitoring facilities. Resuscitation, 2014; Vol:66; Pp:159-166.
[6] Alton R. Arrhythmias associated with cardiopulmonary arrest. Nurse Times. 2010; 90(19):42-42.
[7] Saramma PP, Suja Raj L, Dash PK, et al. Assessment of long-term impact of formal certified cardiopulmonary resuscitation training program among nurses. Indian J Critic Care Med. 2016; 20(4): 226-232.
[8] Luciano Andre B, Marcela GF, Cesar Paulo E. Necessity of immediate cardiopulmonary resuscitation in trauma emergency. Journal of World Emergency Surgery, 2010 Aug 25; Vol.5, No:1; p.25. Pp.3497-3499. Program on Nurses Knowledge and Practice. Life Science Journal, 2012; Vol:9, No:4.
[9] Kaye W, Mancini ME, Rallis SF, Linhares KC, Angell ML, Donovan DS, Zajano NC, Finger JA Jr. Can better basic and advanced cardiac life support improve outcome from cardiac arrest? Crit Care Med, 2015; Vol:13: p.916.
[10] https://ahainstructornetwork.americanheart.org/idc/groups/ahaeecppublic/@wcm/@ecc/documents/downloadable/ucm_481402.pdf.
[11] El-Meanawi N. Assessment of Nurses Performance During Cardiopulmonary Resuscitation in Intensive Care Unit and Cardiac Care Unit at The Alexandria Main University Hospital. INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH. 2015. VOLUME 4, ISSUE 12: 141-148.
[12] Al-Janabi M. Assessment of Nurses’ Knowledge towards Cardiopulmonary Resuscitation at Al-Najaf City’s Teaching Hospital. Journal of Kufa for Nursing Science. 2014, 4(1): 1-10.
[13] Fathy Z., Mostafa H., Amin A., Ellyan O., Mostafa H., Hassan H. (2018): Effect of Educational Program on Cardiopulmonary Resuscitation. Saudi Journal of Nursing and Health Care; 1(2): 68-78.

[14] Ranse J, Cardiac arrest: can the in-hospital chain of survival be improved? Australasian Emergency Nursing Journal 2011; 9, 23-27.

[15] Ahmed SS, Saber NM., Hassan HE., Heggy EH. (2017): Impact of Pregnant Advanced Cardiopulmonary Resuscitation Training Program on Maternity Nurses’ knowledge, Attitude and Practice in Beni-Suef City”. American Research Journal of Nursing; 3(1): 1-11.

[16] Malk R., Hassan H.( 2018): Evaluation of Nurses Practice Regarding Electrocardiogram Procedure. Sumerianz Journal of Medical and Healthcare; 1(1): 24-30.

[17] Shahra Khahed A, Masinaezhad N, Shahdadi H, Arbabisarjou A, and Asadibidmeshki, E. The Effect of CPR Workshop on the Nurses’ Level of Knowledge and Skill. International archives of medicine: global health and health policy. 2015: Vol. 8 No. 108: 1-11.

[18] Elazazay M, Abdelazez L, & Elsaie A. Effect of Cardiopulmonary Resuscitation Training Program on Nurses Knowledge and Practice. Life Science Journal, 2012; 9(4): 3497-3499.

[19] Robin Gemmill, Kathy Kravits, Mildred Ortiz, Casandra Anderson, Lily Lai. Foundation for teaching and practice. Journal of continuing nursing, 2011; Vol.42, No.2: Pp.81-88.

[20] Samson, RA; Schexnayder, SM; Singletary, EM; Sinz, EH; Travers, AH; Wyckoff, MH; Hazinski, MF (2016): Part Executive Summary: American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation. 132 (18 Suppl 2): S315-67.

[21] Qalawa Sh., Hassan H. (2017): Implications of Nurse's Moral Distress Experience in Clinical Practice and Their Health Status in Obstetrics and Critical Care Settings. Clinical Practice; 6(2): 15-25.

[22] Bukiran A, Erdur B, Ozen M, Bozkurt AL. Retention of nurses’ knowledge after basic life support and advanced cardiac life support training at immediate, 6 months, and 12-month post-training intervals: A longitudinal study of nurses in Turkey. J Emerg Nurs. 2014; 40 (2): 146-152.

[23] Hassan H, Nasr E. (2017): Improving nurses’ knowledge and skills regarding tocolytics for inhibiting preterm labor. Clinical Nursing Studies; 5(1): 1-12.

[24] Mohamed W., Hassan H. (2020): Effect of Instructional Supportive Guideline for Improving Women’s Awareness towards Endometriosis. American Journal of Nursing Research; 8(1): 38-47.

[25] Hassan H., Malk R., Abdelhamed A., Genedy A., (2020): Infection Control Knowledge and Practices: Program Management in Labor Units According to Standard Infection Control Precautions in Northern Upper Egypt.” American Journal of Nursing Research; 8(4): 412-425.

[26] Sheha E., Hassan H., Genedy A., Hassanine Sh. (2020): Effect of educational program on mother's knowledge and practice regarding Hepatitis C Virus in rural areas. American Journal of Nursing Research; 8(3): 303-310.

[27] Masters K. (2013): Edgar Dale’s Pyramid of Learning in medical education: A literature review, Medical Teacher; 35(11): e1584-e1593.

[28] Hassan H. (2019): Integrative Nursing Science in Women’s Preconceptional Wellness. International Journal of Health and Biological Sciences; 2(1): 17-18.

[29] Hassan H., Mohamady Sh., & Abd El-Gawad N. (2017): Protocol for improving nursing performance towards placental examination at labor units. Clinical Nursing Studies; 5(2): 1-11.

[30] Gamel W., Genedy A., Hassan H. (2020): Impact of Puerperal Sepsis Self-Care Nursing Guideline on Women's Knowledge and Practices. American Journal of Nursing Research; 8(2): 132-141.

[31] Mohamed W., Hassan H. (2019): Educational Program to Enhance Pregnant Women’s Knowledge about Dental Care and Periodontitis Outcomes. ARC Journal of Nursing and Healthcare; 5(3): 23-33.