

# A Study to Evaluate the Effectiveness of a Planned CPR Education Program on the Knowledge of CPR among Doctors in a State (Ekiti- Nigeria).

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## ABSTRACT

**Background:** Cardiopulmonary resuscitation (CPR) is an emergency intervention aimed at re-starting the heart in the event of cardiac arrest. In the state-under our investigation, there is no institution on the ground, providing CPR training and certification for health care professionals prior to study. CPR training or re-certification was not undertaken for at least the previous 2 years preceding this study. Therefore, the researcher felt the need to conduct the study to investigate the effectiveness of teaching CPR, on the knowledge of CPR among doctors in the state. **Methods:** The study used a one-group quantitative pre-test – post-test, quasi-experimental design. Participants were presented with 12 multiple-choice questions before and after the course. The correct responses (pre-test and post-test) were marked against standard answers and the final scores were recorded as percentages. The data generated, including demographics were entered into spss computer spreadsheet and analyzed. Main outcome measure: The difference between mean percentage scores on the pre-test and post-test. Further effectiveness (of the teaching program) was tested using 'paired't-test. **Results:** The mean percentage in the pre-test for all doctors was 45.43%, SD of 14.83% and the mean percentage in the post-test was 68.31%, SD of 13.83%. The mean percentage difference between the scores was 22.88%. The difference between pre-test and post-test score was statistically significant ( $t=-13.23$ ;  $p<0.0001$ ). **Conclusion:** The significant difference between the pre-test and post-test scores was due to the CPR education program. Therefore, the teaching program was effective in improving the knowledge of the participating doctors in 2010UK-CPR-GUIDELINE in a state.

**Keywords:** Effectiveness, CPR education program, knowledge of CPR, doctors.

## INTRODUCTION

Cardiopulmonary resuscitation (CPR) is an emergency intervention aimed at re-starting the heart in the event of cardiac arrest. Timely and effective CPR prevents premature cardiovascular death and makes the difference between life and death and between intact survival and debilitation. CPR education for healthcare professionals with a duty to respond, on early recognition and effective management of cardiac arrest is lifesaving, and important for improving outcome after cardiac arrest.<sup>[1,2]</sup> CPR training or re-certification was not undertaken for at least the previous 2 years preceding this study for health care providers in the index states' health institutions. Research evidence supporting the effectiveness of prompt and skilful CPR abounds; these make it imperative for health care professionals to acquire CPR knowledge and be licensed to practice BLS and ALS. Therefore, the researcher felt the need to conduct the study to investigate the effectiveness of teaching CPR, on the knowledge of CPR among doctors in a state.

The outcome of the study would assist CPR instructors and health authorities in the state to plan and support, training and infrastructure for CPR practice in Ekiti-state, Southern-Nigeria.

## MATERIALS AND METHODS

**IRB:** Not necessary for a questionnaire survey. Participants provided informed consent before the pre-test. This Interventional study was designed to determine the current level of knowledge and the effectiveness of a teaching program on the learning of CPR by doctors in a state. The objectives are-

- 1) To conduct pre-test to assess the knowledge of CPR among doctors in a state.
- 2) To administer a teaching program, the 2010 UK-CPR guideline for doctors in a state.
- 3) To evaluate the learning of CPR - by assessing gains in knowledge; which is determined by comparing the pre-test percentage score of the studied group with the post-test percentage score.

**Design:** The study used one-group quantitative pre-test and post-test quasi-experimental design (without a control group). The independent variables in the study were the planned teaching programme, while the dependent variables were the performance on the pre-test and post-test.

**Settings/participants:** The study participants were drawn from health workers (including nurses and doctors) attending a CPR education program in a

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state; without advance information of taking any tests during the program. The inclusion criteria were a convenience sample of all attending doctors. Exclusion criteria were non-doctors attending the program.

**Interventions:** The CPR education program was designed to help the doctors acquire current information in the management of cardiac arrests; interventions involves power point classroom lecture presentations (in a didactic fashion), focusing on adult, child and neonatal CPR using the 2010 UK-RESUSCITATION GUIDELINE plus ACLS video case presentation- demonstrating one ALS scenario and a second video demonstrating one BLS scenario (2010 UK-GUIDELINE). The program took place at the school of nursing auditorium Ekiti State University Teaching Hospital Ado-Ekiti, on the 25/2/2013. Each participant was given two-knowledge questionnaires containing twelve multiple-choice questions, prepared by the investigator and validated by other researchers; which was used to assess the pre-test knowledge. The same structured

questionnaire was administered as post-test (participants were not allowed to interact with their colleagues or phone while the second test was being taken), to assess the effectiveness of the teaching program. The correct responses (pre-test and post-test) were marked against standard answers and the final scores were recorded as percentages. The data generated, including demographics was entered into SPSS computer spreadsheet and analyzed.

**Main outcome measure:** The difference between mean percentage scores on the pre-test and post-test, among the doctors. Further effectiveness (of the teaching program) was tested using 'paired'-test.

**Sample size:** A convenient sample of all doctors who were present at the CPR education program was used. The participants were informed four weeks in advance that attendance at the CPR education program was voluntary and free of charge to all participants, including non-doctors (who were excluded from the study).

<b>QUESTIONNAIRE</b>	
<b><u>A STUDY TO EVALUATE THE EFFECTIVENESS OF CPR EDUCATION PROGRAM AMONG DOCTORS IN A STATE.</u></b>	
<b><u>PLEASE TICK THE BOXES AS APPROPRIATE/ONE OPTION ONLY.</u></b>	
DEMOGRAPHIC STATUS:	
YEARS OF EXPERIENCE IN PRACTICE:	
a). < 5	<input type="checkbox"/>
b). <10	<input type="checkbox"/>
c). <15	<input type="checkbox"/>
d). <20	<input type="checkbox"/>
e). > 20	<input type="checkbox"/>
1). The following is a/are possible cardiac arrest rhythm:	
a). Asystole/ P.E.A.	True/false/don't know
b). Arterial flutter	True/false/don't know
c). V.F /VT	True/false/don't know
d). Atrial fibrillation	True/false/don't know
e).PVCs	True/false/don't know
2). The following drugs are in vogue for routine treatment of cardiac arrest:	
a). Atropine	True/false/don't know
b). Amiodarone	True/false/don't know
c). Calcium gluconate	True/false/don't know
d). Sodium bicarbonate	True/false/don't know
e). Adrenaline	True/false/don't know
3).The following signs is/are suggestive of cardiac arrest according to current guidelines:	
a). Unresponsiveness	True/false/don't know
b). Unconsciousness	True/false/don't know
c). Agonal breathing	True/false/don't know
d). Absent breathing	True/false/don't know
e). Absent pulse	True/false/don't know
4). Management of cardiac arrest involves:	
a). Mouth to mouth breathing	True/false/don't know
b). Intermittent chest compression	True/false/don't know
c). Continuous chest compression	True/false/don't know
d). Immediate defibrillation	True/false/don't know
e). Call for help	True/false/don't know
5). Current management of adult cardiac arrest includes:	
a). Remove patient and rescuer from scene of danger	True/false/don't know
b).shout for help	True/false/don't know
c). Unsynchroized cardioversion for PEA.	True/false/don't know

d). 15 chest compressions to 2 rescue breathing	True/false/don't know
e). Open the airway	True/false/don't know
6). Basic life support involves:	
a). Immediate defibrillation	True/false/don't know
b).immediate intubation	True/false/don't know
c). Immediate chest compression	True/false/don't know
d). Immediate airway opening	True/false/don't know
e). Rescue breathing	True/false/don't know
7). Compression: Ventillation Ratio for paediatric BLS IS:	
a). 15:2 for ages 1-8years	True/false/don't know
b). 30:2 for ages 8-14years	True/false/don't know
c). 3:1 for newborn	True/false/don't know
d).120/min:12/min ages 1-8yrs	True/false/don't know
e). 15:2 for newborn	True/false/don't know
8). The defibrillation strategy for adult CPR involves:	
a). Use of 2-4joule/kg of d.c energy	True/false/don't know
b). Use of 100joule d.c energy	True/false/don't know
c). Use of 150joule d.c energy for bi-phasic defribillator	True/false/don't know
d). 200-360joule d.c energy for monophasic defribillator	True/false/don't know
e). Unsynchronized cardioversion for shockable rhythms	True/false/don't know
9). Shockable rhythms include:	
a). P.E.A	True/false/don't know
b). A-systole	True/false/don't know
c). V.F	True/false/don't know
d). SVT	True/false/don't know
e). Arterial flutter	True/false/don't know
10).The following are true about management of cardiac arrest:	
a). B.L.S is sufficient in all situations	True/false/don't know
b). A.L.S is sufficient in all situations	True/false/don't know
c). A.L.S needs no expensive equipment	True/false/don't know
d). B.L.S includes giving adrenaline or atropine	True/false/don't know
e). B.L.S includes intubation	True/false/don't know
11). The following are reversible underlying causes of cardiac arrest :	
a).hypertension	True/false/don't know
b).hypovolaemia	True/false/don't know
c). Hypokalaemia	True/false/don't know
d). Hypothermia	True/false/don't know
e).Tension pneumothorax	True/false/don't know
12). The following are interventions in chain of survival for treatment of cardiac arrest:	
a). Recognition cardiac arrest	True/false/don't know
b). Early CPR	True/false/don't know
c). Early Defibrillation	True/false/don't know
d). Call for Help	True/false/don't know
e). Post Resuscitation Care.	True/false/don't know

**DATA ANALYSIS**

Demographic and numeric (pre-test-post-test) data were entered into spss 14.0 computer spread sheet and analyzed; using descriptive statistics including, percentages, mean, standard deviation, mean percentage difference. Within group, differences from pre-test (baseline) to post-test (outcome) were analyzed using paired t-tests. The data was analyzed and presented in the form of tables.

**RESULTS**

The total number of doctors that returned the completed questionnaires, were 68 (89.4%) and 59 (77.6%) for the pre-test, and post-test respectively. A difference of 12% in compliance rate in favour of the pre-test.

[Table 1] showed that the mean percentage pre-test score for the group was 46.9%; SD 13.15; CI 41.8 – 49.0; and the mean percentage post-test score were 68.3; SD 13.83; CI 64.7-71.9. The mean percentage difference between the scores was 22.88%. The difference between pre-test and post-test score was significant (t=-13.23; p<0.0001).

**Table 1:** Paired-sample t-test.

Variable	Number (N)	Mean% Score	SD	X <sup>2</sup>	CI
Pretest	68 (89.5%)	46.88	13.15	24.24	41.84-49.02
Posttest	59 (77.6%)	68.31	13.83	42.03	64.71-71.92

N =number of subjects that returned the completed questionnaire, SD =Standard deviation, X<sup>2</sup> = Chi-square.

[Tables 2 and 3] Showed that 28 (41.4%) participants out of 68 that took the pre-test, and 57 (96.6%) participants out of 59 that took the post-test scored above 50%. The differences between the pre-test and post-test performance was statistically significant  $P < 0.05$ . The number of doctors between 11 to 15 years of practice who passed the pre-test and post-test remained the same (four out of five), despite the teaching program in comparison with other subsets (of years in practice) which showed improvement in their post-test performances. The differences between the performance (in either pre-test or post-test) and demographics were not analyzed further because of relative small numbers of participants, especially for the years of practice  $>15$  and  $>20$  (years).

**Table 2:** Pretest and Post test scoring.

Years in Practice	Number (N)	Pretest Score $>50\%$	Posttest Score $>50\%$
$<5$	34	15 (44%)	31 (91.2)
$<10$	15	5 (33.3%)	10 (66.7%)
$<15$	5	4 (80%)	4 (80%)
$<20$	4	2 (50%)	4 (100%)
$>20$	9	2 (22.2%)	8 (88.9%)
TOTAL	67	28 (41.4%)	57 (96.6%)

N =number of subjects.

**Table 3:** Descriptive statistics- not analyzed further.

Years in Practice	Mean Pretest %	SD	Mean Posttest%	SD
$<5$	46.20	11.80	88.20	15.57
$<10$	44.89	19.42	68.03	13.17
$<15$	52.67	10.04	67.08	9.74
$<20$	54.17	23.27	79.17	4.41
$>20$	36.67	13.39	61.25	6.89

## DISCUSSION

The compliance rate of 89.4%, for the pre-test was impressive considering the fact that participation was voluntary and there was no incentive for returning the questionnaires (such as the end of program certification). However, 12% of doctors who completed the pre-test questionnaires did not submit their post-test. It was possible that some of them left the venue before the end of the CPR lectures: since the participants were, free to withdraw at any time in the course of the program. The poor mean percentage pre-test score for the group (of 46.9%; SD 13.15; CI 41.8 – 49.0), is a reflection of neglect of CPR training and re-training in over the years preceding this study; for health care providers in the index states' health institutions. This observation can be further explained by the unwillingness of the state government to fund specialist services by withholding capital votes due to poor facilities over the years, having effects on poor CPR knowledge. Funding is a major challenge which government

needs to tackle in order to uplift health infrastructure for overall benefit of training and knowledge acquisition.

The improvement in the mean percentage post-test score for the group (of 68.3; SD 13.83; CI 64.7-71.9), with the mean percentage difference between the scores of 22.88% suggests an improvement in the post-intervention knowledge acquisition. An observation of 96.6% pass rate in the post-test compared with 41.4% in the pre-test; implies better overall performance by the group because of CPR instruction. Further conventional survey 1,3, 6, and 12 months after the instruction are required to demonstrate the impact of the study on knowledge retention by the participants, since research evidence has shown that BLS/ALS knowledge and skills can deteriorate in as little as 3 to 6 months: leading to the recommendation for retraining every 12 to 24 months.<sup>[3,4]</sup>

The significant difference between pre-test and post-test score revealed that the participants significantly increased their knowledge. Improvements were seen in scores in overall performance pre-test was 45.43% and post-test was 68.31% ( $t = -13.23$ ;  $p < 0.0001$ ). This study revealed those 28 (41.4%) participants out of 68 that took the pre-test, and 57 (96.6%) participants out of 59 that took the post-test scored above 50%. The differences between the pre-test and post-test performance was statistically significant  $P < 0.05$ . The number of doctors within 11 to 15 years of practice who passed the pre-test and post-test remained the same (4 out of 5), despite the teaching program in comparison with other subsets (of doctors years in practice) which showed improvement in their post-test performances. The differences between the performance (in either pre-test or post-test) and demographics were not analyzed further because of relative small numbers of participants, especially for the years of practice  $>15$  and  $>20$  (years).

In Ekiti-state, there is no institution on ground providing CPR training and certification for health care professionals; worse still, there is lack of public access defibrillators for use in an emergency or programmable AEDs in any of the states 'health institutions. The experience from Europe can provide a framework to assess the opportunities and limitations of Emergency Medical Services/care with regard to the public health burden of cardiac arrest.<sup>[1]</sup>

## CONCLUSION

There was a significant increase in knowledge scores of doctors in Ekiti State after participating in learning the CPR 2010 guideline. Therefore, the teaching program was effective in improving the knowledge of the participating doctors in 2010UK-CPR-GUIDELINE in a state. The significant

difference between the pre-test and post-test scores was due to the CPR education program. Quality education, frequent assessments and, refresher training are recommended to maintain resuscitation knowledge.

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