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Comparison of Practising and Student Teachers' Knowledge of Cardiopulmonary Resuscitation in Nigeria

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Abstract **Background /Objective of the Study:** School teachers are expected to be involved in the training of school children in cardiopulmonary resuscitation (CPR), as well serve as bystander CPR providers in out-of-hospital cardiac arrest (OHCA) victims both in school environment and the larger communities. Meanwhile, Nigerian teachers are not prepared for these functions. Therefore, this study aimed at comparing the pre-training and post-training CPR knowledge of some Nigerian practising teachers and student teachers (potential teachers). **Materials and Methods:** A quasi-experimental study design involving two cohorts of 41 participants each (practising and student teachers) - 9 (21.95%) male and 36(78.05%) female in each group with age ranges of 20-50 years for practising teachers and 18-28 years for the student teachers was carried out. Using the American Heart Association protocol, each group at different times answered some questions on CPR knowledge using a self-administered questionnaire before and after CPR trainings. The data were analysed using descriptive statistics and the null hypotheses tested using paired T-tests with significance value set at $P < .05$. **Results:** Over 85% of the student teachers had post-training 'good CPR knowledge' compared to about 42% of the practicing teachers. In the pre-training, both groups had 'poor CPR knowledge' found to be statistically significantly similar ($P > .05$), but the student teachers' post-training CPR knowledge was found to be statistically significantly better than that of the practising teachers ($P < .001$). **Conclusion:** Although both cohorts had pre-training 'poor CPR knowledge', the student teachers showed significantly better improvement in CPR knowledge after the training, showing that they were better in understanding the subject.

Keywords Practising and Student Teachers, CPR Knowledge, Nigeria

1. Introduction

There is increasing global interest and advocacy for promotion of bystander cardiopulmonary resuscitation (CPR) among students and teachers [1-14]. In addition to their role as potential bystander CPR providers, school teachers have been very useful in the training of school children in CPR as potential bystander CPR providers also for out-of-hospital cardiac attacks [1, 8-10].

Many States in the USA require certification or re-certification of teachers for effectiveness in Schools CPR programme. It has been documented that one of the barriers to expected good outcome in bystander CPR practice is that many school teachers lack adequate knowledge of CPR, among other things, even in some cases where legislation exist supporting the incorporation of teaching and training in CPR in schools [11-15].

Few previous Nigerian research efforts recommended the introduction of CPR into the schools curricula [16-19]. Although there are a few studies involving Nigerian practising and student teachers [20-22], there is need to compare the practicing and the future potential teachers. It will be worthwhile to assess these potential teachers on bystander CPR using the same criteria because the future of CPR program in Nigerian school system will depend partly on these student teachers. Therefore, this study aimed at comparing the theoretical CPR knowledge of two groups of Nigerian practising and students teachers before and after exposing them to CPR teaching and training. It was hypothesized that (1) their pre-training CPR theoretical knowledge would not be significantly similar; (2) their post-training CPR theoretical knowledge would not be statistically significantly different from each group.

2. Materials and Methods

The study design and the entire methodology for this study have been reported earlier [20, 22].

As part of a larger study, this study involving two cohort groups of forty one (41) each - 41 Post National Certificate of Education (Post NCE) teachers, who are pursuing

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Bachelor degree in Education majoring in Human Kinetics and Health Education, that came for their long vacation studies in the Faculty of Education of the University of Port Harcourt, Nigeria and another 41 student teachers in 200 level in the Department of Human Kinetics and Health Education, Faculty of Education, University of Port Harcourt, was carried out.

The two cohort groups were matched for sex but obviously belonged to different age groups. The study took place between September 2016 and June 2017 at the University of Port Harcourt, Port Harcourt, Nigeria.

The participants are teachers from various primary and secondary schools in Nigeria while the student teachers were admitted into the Bachelor of Science in Education from different states of Nigeria. This convenience sample (the cohort groups) was naturally drawn which makes it a fairly representative sample.

The following null hypotheses were generated and tested:

Ho1: That their pre-training CPR theoretical knowledge would not be statistically significantly similar.

Ho2: That their post-training CPR theoretical knowledge would not be statistically significantly different from each group.

Study Design

In this quasi-experimental study design, the current report is on the theoretical cardiopulmonary resuscitation knowledge of the two cohort groups without their practical CPR skills.

Stage 1 (Pre-training)

A questionnaire containing a section for the demographic data of the participants and a section having 7-item questions on CPR to assess their pre-training cardiopulmonary resuscitation theoretical knowledge was used.

Stage 2 (Training and Post-training Assessment)

Teaching was carried out using American Heart Association (AHA) CPR guideline which is available online. Their post-training theoretical knowledge of CPR was also tested using the same questionnaire after the teaching and training on CPR (Appendix). The conventional CPR technique using the manikins for their hands-on session was used. The power point teaching and training with their practical sessions took about 4 hours.

Determination of Poor and Good CPR Theoretical Knowledge

For the five (5) questions on CPR knowledge, those who scored four (4) or five (5) questions correctly were considered as having 'good theoretical CPR knowledge' while any score less than four (4) was considered 'poor theoretical CPR knowledge'.

Statistical Analysis

The Statistical Package for Social Sciences (SPSS) was used to analyse the data. In addition to descriptive statistics, two-sample T-test statistics were employed in the analysis and testing of the null hypotheses with significance level set at $P < 0.05$.

3. Results

In this report, both the practicing teachers and student teachers cohort groups had 9 (21.95%) male and 36(78.05%) female each with age ranges of 20-50 years for practicing teachers and 18-28 years for the student teachers.

Table 1 gives the descriptive statistics showing the means with standard deviations for the two cohort groups.

Table 1. Descriptive statistics showing the means with standard deviations for the two cohort groups

		N	Mean	Std. Deviation	Std. Error Mean
Pre-Training	Practicing teachers	41	1.7317	.83520	.13979
	Student teachers	41	2.0488	.89511	.13044
Post-Training	Practicing teachers	41	3.3902	.86250	.13470
	Student teachers	41	3.9512	.49755	.07771

Table 2. Summary of the pre-training and post-training CPR theoretical knowledge of the two groups of participants compared

Questions on CPR knowledge	**Pre-Training CPR theoretical knowledge**		**Post-Training CPR theoretical knowledge**	
Scores %	Practising teachers n %	Student teachers n %	Practising teachers n %	Student teachers n %
0 (0)	2(4.9%)	1 (2.4%)	-	-
1 (20)	16 (39.0%)	8 (19.5%)	1(2.4%)	-
2 (40)	15 (36.6%)	22 (53.7%)	3 (7.3%)	-
3 (60)	7 (17.1%)	8 (19.5%)	20 (48.8%)	6 (14.6%)
4 (80)	1 (2.4%)	2 (4.9%)	13 (31.7%)	31 (75.6%)
5 (100)	-	-	4 (9.8%)	4 (9.8%)

Note: Only one (2.4%) practising teacher had 'good pre-training CPR knowledge' and 2 (2.9%) student teachers while 17 (41.5%) practising teachers and 35 (85.4%) student teachers, respectively had 'good post-training CPR knowledge'

Table 3. The Paired Sample T-test statistical analysis showing the rejection of the first null hypothesis

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pre-training student teachers knowledge-Pre-training practicing teachers knowledge	.31707	1.21324	.18948	.06587	.70002	1.673	40	.102

P > .05

Table 4. The Paired Sample T-test statistical analysis showing the rejection of the second null hypothesis

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95%Confidence Interval of the Difference				
				Lower	Upper			
Post-training student teachers knowledge-post-training practicing teachers knowledge of CPR	.56098	.77617	.12122	.31599	.80596	4.628	40	.000

P < .001

Table 2 shows the summary of the pre-training and post-training CPR theoretical knowledge of the two groups of participants compared. The two groups had similar pattern of pre-training theoretical CPR knowledge, although the student teachers showed slight better knowledge. Meanwhile, only 17 (41.5%) of the practising teachers had 'good CPR knowledge' post-training while 35 (85.4%) of the student teachers had 'good CPR knowledge' post-training.

The first null hypothesis was rejected (P > .05), meaning that the pre-training CPR knowledge of the two groups were statistically significantly similar (Table 3). This confirms the descriptive statistics seen in Table 2.

Table 4 shows the rejection of the second null hypothesis (P < .001). This means that the post-training CPR knowledge of the student teachers was statistically significantly better than the post-training CPR knowledge of the practising teachers. This is again consistent with the descriptive statistics of the results shown in Table 2 for the post-training CPR knowledge of the two groups.

4. Discussion

This first comparative, quasi-experimental study of the CPR knowledge of the practising teachers and their student counterparts in Nigeria has revealed a similar pattern of poor CPR knowledge of the two groups and statistically significant better post-training CPR knowledge of the student teachers.

The student teachers' post-training CPR knowledge more than doubled that of the practising teachers [35 (85.4%) as against 17 (41.5%)], which could be due to different possible reasons. First, it could be because the student teachers are younger and were able to learn this relatively new thing faster than their older practising counterparts. Ability of the younger people to learn new things faster than older people has been reported [23]. According to Chen [23] in his success operating principles, says 'never stop working on yourself' which means you should continue to acquire new knowledge and skills in life. However, it is naturally easier to relax as one starts work or settles in one's career and slows in learning new things. Secondly, it could be a reflection of the much enthusiasm the student teachers showed during the teaching / training, although both groups showed interest in the study.

In a similar study in Belgium by Mpotos et al [2], 59% of the respondents had received previous CPR training with the highest proportion of them in the 21-30 age brackets. Similarly, among teachers of 31 and 50 years of age in Saudi Arabia, Al Enizi et al [3] reported that 35.7% completed CPR training previously but still had low CPR knowledge. In China, Chen et al [24] reported that in their survey 25.6% of the participants had taken part in previous layperson CPR. Bekhradian et al [25] reported that 71.8% of their participants had not had any previous training in cardiopulmonary resuscitation. In our present Nigerian study, none of participants in both groups had received any previous CPR training.

In a related interventional study in Malaysia by Rahman et al [26], the level of CPR knowledge of the secondary school children was shown to be acceptable prior to the intervention. Furthermore, a brief CPR training programme improved their level of knowledge significantly as compared to those who had never been trained with significant differences in mean knowledge scores between the intervention and control groups with regard to time (pre- and post-intervention). Our Nigerian study showed much better improvement in CPR knowledge after the training.

A related study among Nigerian secondary school students revealed similar pre- and post-training CPR knowledge [16]. In a comparative study involving advanced practice student nurses at a medical training college in Kenya [27], who had undergone two different levels of CPR

training, namely Advanced Life Support (ALS) and Basic Life Support (BLS), only five (7.04%) students obtained a competency score of 90%. Compared with the present Nigerian study, 4 (9.8%) participants each for both practicing teachers and student teachers scored 100% in their CPR knowledge and 13(31.7%) practicing teachers and 31(75.6%) of student teachers scored 80% in their CPR theoretical knowledge.

This present Nigerian study has the strength of having fairly representative samples for both cohorts (the practising and students teachers), as well as being the first of such comparative study involving the present and future school teachers in Nigeria which is good for a country hoping to improve her school curriculum to meet up with the challenges usually associated with growing global modernization. However, it is important to mention that the generalization of the results of this study for the whole country should be done with caution because the study was carried in the south-south region of Nigeria until more similar studies are carried out in other parts of our country.

5. Conclusions

The present Nigerian comparative study on pre and post-training CPR knowledge between the practising teachers and student teachers has shown that the pre-training CPR knowledge of the two groups were statistically similar but the student teachers' post-training CPR knowledge was statistically significantly better than that of the practising teachers. This is a reflection of better understanding of the subject by the student teachers compared to the practising ones, and is promising for the future of CPR programme in Nigerian school system.

6. Recommendations

There is need to replicate the study in other parts of Nigeria so as to encourage a more effective advocacy for introduction of cardiopulmonary resuscitation into the curriculum of Nigerian schools with the intention of school teachers playing a central role for its successful implementation.

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Appendix

QUESTIONNAIRE ON BYSTANDER CARDIOPULMONARY RESUSCITATION (CPR)

Section A: Personal Data

Please tick as it applies to you.

1. Gender:

   Male: ☐ Female: ☐

2. Age in Years: ----------

   1. Please state your department here in the University----------

Section B

Concerning a collapsed victim, please tick only one option in questions 4 to 8 below

4. What is the first thing you should do if you come across a collapsed person?
   - ☐ Call an ambulance
   - ☐ Try to get the person to respond to you
   - ☐ Check to see if the person is breathing normally
5. Why would you shake and shout at a collapsed person?
   - ☐ To open the airway
   - ☐ To restart the heart
   - ☐ To check for response
6. What action would you use to open the person's airway?
   - ☐ Tilt the head back and lift the chin
   - ☐ Tilt the head and push the chin down
   - ☐ Tilt the head down and turn the chin to the right
7. When giving rescue breaths, for how long do you breathe into the person's mouth?
   - ☐ 1 second
   - ☐ 5 seconds
   - ☐ 10 seconds
8. How many chest compressions and rescue breaths would you give per cycle of CPR?
   - ☐ 20 presses and one breathe
   - ☐ 30 presses and two breaths
   - ☐ 30 presses and three breaths

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