Knowledge of Cardiopulmonary Resuscitation among Student Teachers in Nigeria

Adedamola Olutoyin Onyeaso[1,*], Onyedikachi Oluferanmi Onyeaso[2]

[1]Department of Human Kinetics and Health Education, Faculty of Education, University of Port Harcourt, Port Harcourt, Nigeria
[2]Department of Community and Social Medicine, University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria

Abstract **Background /Aim of Study**: Although the teaching of cardiopulmonary resuscitation (CPR) to of school teachers is highly recommended and practised in many countries across the globe for the purposes of generally increasing potential bystander CPR providers for out-of –hospital cardiac arrests in the community, informed management of emergency situations in schools as well as teaching of the school children the same, the situation is different in Nigeria. This study aimed at assessing the pre-training and post-training CPR knowledge of a group of Nigerian student teachers. **Materials and Methods**: A cohort quasi-experimental study involving 150 student teachers - 56 (37.33%) male and 94 (62.67%) female, age range of 17-28 years and mean age of 21.11 ± 2.40 (SD) was carried out in the Department of Human Kinetics and Health Education, Faculty of Education, University of Port Harcourt in June, 2017. By asking the participants to answer some questions in a questionnaire, their CPR knowledge before and after CPR training was tested. **Results**: The pre-training CPR knowledge of the student teachers was poor, but there was statistically significant improvement after the training ($P = .000$). **Conclusion**: Nigerian student teachers are very useful target group in the strategy for effective CPR training in Nigerian schools to produce potential bystander CPR instructors in our communities.

Keywords CPR knowledge, Student teachers, Nigerian University

1. Introduction

It was strongly recommended that instruction in cardiopulmonary resuscitation (CPR) be incorporated as a standard part of the school curriculum [1, 2]. Although many school systems in other parts of the world have complied with these international standards with several publications supporting this [3-17], the situation is different in Nigeria with only few recently reported works on cardiopulmonary resuscitation involving the Nigerian school system [18-24].

Cardiopulmonary resuscitation is a combination of rescue breaths and chest compressions which are intended to re-establish cardiac function and blood circulation in an individual who has suffered cardiac or respiratory arrest [25]. Cardiac / respiratory arrest is a very common emergency in not just the adult group but also in the neonatal period [26]. The medical science opined that the first 4-8 minutes in sudden collapse is the most crucial period in which resuscitation intervention is most needed [2]. If properly carried out effectively by a trained bystander in an emergency situation of cardiac arrest, cardiopulmonary resuscitation (CPR) can keep the victim alive until a medical expert takes over the care. When trained in CPR, children and adolescents can recognize the need for care and administer CPR [26].

However, the shortage of CPR instructors has been one of the limiting factors to increasing the number of potentially available bystander CPR providers in many communities [27, 28]. Consequently, there has been increasing support globally for school teachers to be trained in CPR so as to help train the school children as well as serve as bystander CPR providers both in the school environment and in the larger society [29-34].

There is still paucity of published data on cardiopulmonary resuscitation (CPR) and school teachers in Nigeria with only two recent reports [35, 36]. In an attempt to contribute relevant data on this important subject for a developing country like Nigeria, the current report aimed at assessing the CPR knowledge of student teachers at the University of Port Harcourt, Port Harcourt, Rivers State, in the South-South part of Nigeria. It was hypothesized that: (1) the CPR knowledge of the potential teachers for the Nigerian primary and secondary schools would not have poor CPR knowledge before being exposed to CPR training; (2) the CPR knowledge of the same group of student teachers would not be significantly better than their pre-training CPR knowledge.

2. Materials and Methods

A cohort quasi-experimental study involving one hundred and fifty two (152) 200-level undergraduate physical and health education students (student teachers) in the Department of Human Kinetics and Health Education, Faculty of Education, University of Port Harcourt, Port Harcourt, Nigeria was carried out. Out of the one hundred and fifty two (152) student teachers who filled the pre-training questionnaire on CPR knowledge, one hundred and fifty (150) completed the same questionnaire after the CPR training. Therefore, the final study sample size was one hundred and fifty (150) student teachers.

The study took place in June, 2017. This convenience sample of the student teachers in the Department of Human Kinetics and Health Education were admitted in 2015 and are studying to graduate with Bachelor of Education Degree (majoring in either Health Education or Human Kinetics). They are being trained primarily to become teachers in primary and secondary schools. These student teachers are from different parts of Nigeria.

The following null hypotheses were generated and tested:

Ho1: That the pre-training CPR knowledge of the student teachers would not be poor.

Ho2: That their post-training CPR knowledge would not be significantly different from their pre-training CPR knowledge.

The methodology described below adopted in this study has been reported earlier [37].

Stage 1 (Pre-training)

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

Stage 2 (Training and Immediate Post-training)

Teaching was carried out for 60 minutes using American Heart Association (AHA) CPR guideline which is available online. Immediately after training the participants on the CPR technique using the manikins for their hands-on session, each of them was asked to answer the same questions they were given before the training. The process of training them on hands-on and the re-assessment took another 4 hours.

Determination of Poor 'CPR Knowledge' and 'Good CPR Knowledge'

For the seven (7) questions on CPR knowledge, those who scored four (4) questions and above correctly were considered 'Good CPR knowledge' while any score less than that was considered 'Poor CPR knowledge'.

Statistical Analysis

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

3. Results

The final cohort of one hundred and fifty (150) participants in this study was made up of 56 (37.33%) male and 94 (62.67%) female, age range of 17-28 years and mean age of 21.11 ± 2.40 (SD).

Table 1 below shows 40 (26.67%, 'Good CPR knowledge') for the participants scoring four (4) questions and above rightly. The rest had 3 and below right. Meanwhile, all the participants scored 5 questions and above correctly during post-training assessment (100%, 'Good CPR knowledge').

Table 1b shows the summary of the participant' pre- and pot-training CPR knowledge scores with the means and standard deviations.

Table 2 gives the total number of participants with the right answers for the seven (7) questions during the CPR pre-training and post-training assessments.

The participants showed the least improvement in CPR knowledge in the giving of rescue breaths (6 in the pre-training and 27 in the post-training), followed by the knowledge of what to do if the victim has denture in the mouth (44 and 66 for pre-training and post-training, respectively).

Rejection of the first null hypothesis with the P value of .000 is shown in Table 3 below. This confirms statistically that the participants' pre-training CPR knowledge was poor. Table 4 below shows the rejection of the second null hypothesis, confirming that the post-training CPR knowledge of the participants is statistically better than their pre-training knowledge.

Table 1a. The pre-training and post-training CPR knowledge scores for all the participants

Scores	Pre-training	Post-training
0	3 (2.0%)	
1	15 (10.0%)	-----
2	43 (28.7%)	-----
3	49 (32.7%)	----
4	22 (14.7%)	47 (31.3%)
5	14 (9.3%)	62 (41.4%)
6	4 (2.7%)	36 (24.0%)
7	------	5 (3.3%)

Table 1b. The summary of the participants' pre-training and post-training CPR knowledge scores showing the means with the standard deviations

Descriptive statistics					
	N	Minimum	Maximum	Mean	Std. deviation
Pre-training Knowledge	150	.00	6.00	2.8667	1.27267
Post-training Knowledge	150	4.00	7.00	4.9933	.83140
Valid N (list wise)	150				

Table 2. The total number of participants with the right answers to the CPR questions

	Questions on cardiopulmonary resuscitation	Pre Training	Post Training
1	What is the first thing you should do if you come across a collapsed person	18	130
2	Why would you shake and shout at a collapsed person?	119	149
3	What action would you use to open the person's airway	115	148
4	If a victim has dentures, what should you do?	70	81
5	What is the first link in the "Chain of Survival"?	44	66
6	When giving rescue breaths, for how long do you breathe into the person's mouth?	6	27
7	How many chest compressions and rescue breaths would you give per cycle of CPR?	58	146

Table 3. One-sample t-test analysis of the pre-training CPR knowledge of the participants

				Test Value = 0		
	T	**Df**	**Sig.(2-tailed)**	**Mean Difference**	**95% Confidence Interval of the difference**	
	27.587	149	.000	2.86667	Lower	Upper
Pre-training knowledge					2.6613	3.0720

P < .001

Table 4. Paired sample T-test analysis of the difference between the post-training and pre-training CPR knowledge of the participants

	Paired differences							
	Mean	**Std. Deviation**	**Std. Error**	**95% Confidence Interval of the Difference**		**t**	**Df**	**Sig.(2-tailed)**
				Lower	**Upper**			
Post-training knowledge –Pre-training knowledge	2.12667	1.47597	12051	1.88853	2.36480	17.647	149	.000

P < .001

4. Discussion

The present Nigerian study has shown poor pre-training CPR knowledge by the Nigerian student teachers which significantly improved to good CPR knowledge during their post-training assessment. Although a similar earlier study among a group of Nigerian teachers [38] revealed the same pattern but the current study showed better pre-training CPR knowledge (26.67%) than that reported in the earlier study (2.4%). The better pre-training CPR knowledge observed among these student teachers could be due to some knowledge of CPR   they gathered in their classroom lecture on first aid which was not centred on detailed teaching on CPR unlike those practising teachers who hardly had any teaching related to emergency care. Also, Patsaki et al [32] reported that as the age of the teachers increased, the ratio of the correct answers decreased. They equally reported that teachers were less motivated to be kept updated. The present Nigerian study has the age range of the student teachers as 17-28 years while the previous similar Nigerian study had older participants (practising teachers) with 20-50 years age range. Meanwhile, a Nigerian study among secondary school students that investigated the relationship between age, gender and school class and retention of CPR knowledge did not reveal any significant interaction between age and the their ability to retain CPR knowledge [24].

Mpotos et al [33] reported poor CPR knowledge among the Flemish teachers despite the fact that majority of the (59%) had previous CPR training. In their report, 69% felt incompetent to perform correct CPR and 73% wished more training [33]. Similarly, the reports by Patsaki et al [32] had 21% of the Greek teachers with previous exposure to CPR training and many had mediocre level of knowledge of basic life support, automated external defibrillation, and foreign body airway obstruction. Al Enizi et al, [34] in their study involving mainly Saudi teachers, reported that despite the fact that 35.7% of their study population had previous CPR training, the average scores in their study did not show any difference between those who had previous CPR training and those who did not. The study concluded that secondary school teachers in Al-Qassim lacked CPR training and as such had little CPR knowledge or skills.

In the pre-training phase, the present Nigerian study has 26.67% 'Good CPR Knowledge' which ended up in the post-training phase as 100% 'Good CPR Knowledge.' Considering the importance of introducing CPR teaching into the curriculum of Nigerian schools and its potential multiplying effect on increasing the number of potential laypersons bystander CPR providers in the community, this effort or advocacy should involve both students and teachers. A related Nigerian report [19] involving the school students gave only 8.9% pre-training CPR knowledge that later

improved significantly to 88.6%. The impact of the CPR training on those students is comparable to the present report with pre-training 26.67% 'Good CPR Knowledge' which later became 100% 'Good CPR Knowledge' after the training. However, the participants in the present Nigerian study had better pre-training CPR knowledge than the secondary school students. This is understandable because the participants in the present study are undergraduate students who would have acquired some knowledge on emergency care as mentioned earlier compared to the very ignorant secondary school students.

In the present Nigerian study it was observed that the least improvement in CPR knowledge from the pre-training to the post-training stages of the study was found in rescue breaths (6 to 27). This observation is consistent with related earlier reports where 2 to 6 (pre-training and post-training, respectively was reported [35] while the highest percentage of respondents (46.7%) indicated that they would not want to give mouth-to-mouth breathing to a stranger [38].

5. Limitation of the Study

The present Nigerian study has the strength of having relatively adequate sample size and the participants (potential school teachers) were drawn from various States in Nigeria which makes it fairly representative. One of the University Admissions Policies in Nigeria, which the National Universities Commissions (NUC) oversees, is to admit students from every part of the country. However, this fairly representative nature of the study sample must be interpreted with caution because there is usually limited number of potential university students from the Northern parts of Nigeria that apply for admissions into the Nigerian Universities in the Southern parts of country.

6. Conclusions

1. Despite the poor pre-training CPR knowledge of the participants (student teachers) in this quasi-experimental study, their post-training CPR knowledge was significantly improved and better.

2. Although their pre-training CPR knowledge is significantly poor, it is relatively better than those of similar earlier Nigerian studies [19, 35].

7. Recommendations

Training student teachers in CPR is a major means of laying a strong foundation for Nigerian school children to be properly trained in CPR as well as increasing the number of potential bystander CPR providers in Nigerian community.

More similar studies should be carried out in other Nigerian Universities in other parts of Nigeria.

ACKNOWLEDGEMENTS

REFERENCES

[1] International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. (2010). "Part 1: Executive Summary Science with Treatment Recommendations." Circulation 2010; 122:16 (Suppl2), S25075. doi:10.1161/CIRCULATIONAHA.110.970897. PMID 20956249.

[2] Resuscitation (2010). European Resuscitation Council Guidelines for Resuscitation 2010 Executive Summary.

[3] Isbye DL, Meyhoff CS, Lippert FK, Rasmussen LS "Skill retention in adults and in children 3 months after. Basic life support training using a simple personal resuscitation manikin." Resuscitation 2007; 74: 296–302.

[4] Lorem T, Palm A, Wik L. Impact of a self-instruction CPR kit on 7th graders' and adults' skills and CPR performance. Resuscitation 2008; 79:103–108.

[5] Mindell JS. Teaching first aid and cardiopulmonary resuscitation to secondary school children. Int J Health Educ 1997; 35(4): 129-132.

[6] Cho GC, Sohn YD, Kang KH, et al. 'The effect of basic life support education on laypersons' willingness in performing bystander hands only cardiopulmonary resuscitation' Resuscitation 2010; 81(6).691-694.

[7] Cave DM, Tom P A, Jeff B, et al. Importance and Implementation of Training in Cardiopulmonary Resuscitation and Automated External Defibrillation in Schools: A Science Advisory from the American Heart Association. Circulation 2011; 123: 691-706 originally, doi 10.1161/CIR.0b013e31820b5328.

[8] Atkins DL, Everson-Stewart S, Sears GK, et al. Epidemiology and outcomes Out-of-hospital cardiac arrest in children: the Resuscitation Outcomes Consortium Epistry-Cardiac Arrest. Circulation 2009; 119: 1484 –1491.

[9] Fleischhackl R, Nuernberger A., Sterz F, Schoenberg C, Urso T, Habart T. School children sufficiently apply life supporting first aid: a prospective investigation. Critical Care 2009; 13(4), R127, doi: 10.1186/cc7984.

[10] Hill K, Mohan C, Stevenson M, McCluskey D. Objective assessment of Cardiopulmonary Resuscitation Skills of 10–11-year-old School Children using Two Different External Chest Compression to Ventilation Ratios. Resuscitation 2009; 80: 96 –99.

[11] Holmberg M, Holmberg S, Herlitz J. Effect of bystander cardiopulmonary resuscitation in out-of-hospital cardiac arrest patients in Sweden. Resuscitation 2000; 47(1): 59-70.

[12] Lafferty C., Larsen PD, Galletly D. "Resuscitation teaching in New Zealand schools." New Zealand J Med 2003; 116(1181), U582.

[13] Kelley J, Richman R. "Eighth grade students become proficient at CPR and use of an AED following a condensed training programme." Resuscitation 2006; 71(2): 229–236.

[14] Kanstad BK, Nilsen SA, Fredriksen K. CPR knowledge and attitude to performing bystander CPR among secondary school students in Norway. Resuscitation 2011; 82(8): 1053 1059, doi:10.1016/j.resuscitation.2011.03.033.

[15] Jones I, Whitfield R, Colquhoun M, Chamberlain D, Vetter N, Newcombe R. At what age can schoolchildren provide effective chest compressions? An observational study from the Heartstart UK schools training programme. Br Med J 2007; 334:1201–1203.

[16] Lorem T, Palm A, Wik L. Impact of a self-instruction CPR kit on 7th graders' and adults' skills and CPR performance. Resuscitation 2008; 79:103–108.

[17] Meissner TM, Kloppe C, Hanefeld C. Basic life support skills of high school students before and after cardiopulmonary resuscitation training: a longitudinal investigation. Scand J Trauma Resusc Emerg Med.2012; 14, 20:31.

[18] Onyeaso AO, Imogie AO. Attitude towards Cardiopulmonary Resuscitation among some secondary school students in Rivers State, Nigeria. Br J Educ 2014; 2(3): 37-41.

[19] Onyeaso AO, Achalu EI. Knowledge of Cardiopulmonary Resuscitation among secondary school students in Nigeria. J Educ Pract 2014; 5(15): 180-183.

[20] Onyeaso AO. Awareness of Cardiopulmonary Resuscitation among secondary school students in Port Harcourt, Nigeria. Journal of Education in Developing Areas, 2014; 22(1): 137-142.

[21] Onyeaso AO, Onyeaso CO. Cardiopulmonary Resuscitation skills in some Nigerian secondary school students. Port Harcourt Med J 2016; 10(2): 60-65.

[22] Onyeaso AO. Retention of Cardiopulmonary Resuscitation skills in Nigerian secondary school students. J Educ Pract 2016; 7(15): 162-168.

[23] Onyeaso AO, Onyeaso CO. Effects of age, gender, school class on Cardiopulmonary Resuscitation skills of Nigerian secondary school students. J Educ Pract 2016; 7(18): 44-48.

[24] Onyeaso AO. Age, gender and school class and retention of Cardiopulmonary Resuscitation knowledge among secondary school students in Nigeria. BJMMR 2016; 16(4): 1-7.

[25] Field JM, Hazinski MF, Sayre MR, Chameides L, Stephen M, Schenxnayder R, Hemphill SR, Hoek V. Part 1: Executive Summary: 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation 2010; 122:S640-S656, doi: 10.1161/CIRCULATIONAHA.110.970889.

[26] World Health Organization (2016). Cardiovascular disease Fact Sheet, http://www.who.int/mediacentre/factsheets/fs317/en/index.html retrieved on 158/08/2017.

[27] Zinckernagel L, Hansen CM, Rod MH, Folke F, Torp-Pedersen C, Tjornhoj-Thomsen T. A qualitative study to identify barriers to deployment and student training in the use of automated external defibrillators in schools. BMC Emerg Med 2017; 17: 3 DOI: 10.1186/s12873-0114-9.

[28] Zinckernagel L, Hansen CM, Rod MH, Folke F, Torp-Redersen C, Tjornhoj-Thomsen T. What are the barriers to implementation of cardiopulmonary resuscitation training in secondary school? A qualitative study.BMJ Open 2016; 6: e010481. Doi: 10.1136/bmjopen-2015-010481.

[29] Compton S, Swor RA, Dunne R, Weich RD, Zalennskt RJ. (2003). Urban public school teachers' attitudes and perceptions of the effectiveness of CPR and Automated External Defibrillators. Am J Health Educ 2003; 34(4): 186-192.

[30] Miro O, Jimenez-Fabrega X, Espigol G, Culla A, Escalada-Roig X, Diaz N, Salvador J, Abad J, Sanchez M. Teaching basic life support to 12-16 year olds in Barcelona schools: views of head teachers. Resuscitation 2006; 70: 107-16.

[31] Chew KS, Yazid MN, Kamarul BA, Rashidi A. Translating knowledge to attitude: a survey on the perception of bystander cardiopulmonary resuscitation among dental students in Universiti Sains Malaysia and school teachers in Kota Bharu, Kelantan. Med J Malaysia 2009; 64(3): 205-9.

[32] Patsaki A, Pantazopoulos I, Dontas I, Passali C., Papadimitriou L, Xanthos T. Evaluation of Greek high school teachers' knowledge in basic life support, automated external defibrillation, and foreign body airway obstruction: implications for nursing interventions. J Emerg Nurs 2012; 38: 176-81.

[33] Mpotos N, Vekerman E, Monsieurs K, Derese A, Valcke M. Knowledge and willingness to teach cardiopulmonary resuscitation: A survey amongst 4273 teachers. Resuscitation 2013; 84: 496-500.

[34] Al Enizi BA, Saquib N, Zaghloul MS, Shahid M Saquib J. Knowledge and attitude about Basic Life Support among secondary school teachers in Al-Qassim, Saudi Arabia. Int J Health Sci (Qassim) 2016; 10(3): 415-422.

[35] Onyeaso AO, Onyeaso CO. Nigerian Public Primary and Secondary School Teachers' Knowledge and Attitude towards Cardiopulmonary Resuscitation. Int J Adv Res 2016; 5(1): 89-95.

[36] Onyeaso AO, Onyeaso OO. Cardiopulmonary Resuscitation skills of some Nigerian Primary and Secondary Schools Teachers. JAMMR 2017; 23(2): 1-8.

[37] Onyeaso AO, Onyeaso OO. Cardiopulmonary Resuscitation Skills of Some Undergraduate Human Kinetics and Health Education Students in a Nigerian University. J Health Sci 2017; 7(4): 84-90. DOI: 10.5923/j.health.20170704.03.

[38] Onyeaso AO, Onyeaso OO. Theoretical knowledge of Cardiopulmonary Resuscitation among some Nigerian primary and secondary school teachers. Asian J Med Health 2017; 6(4): 1-10.