



Knowledge, Attitude and Experience of Cardiopulmonary Resuscitation among Medical and Healthcare Professional Students in a Nigerian Medical College

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Authors' contributions

This work was carried out in collaboration between all authors. Authors RNA and TOA designed the study, authors OO and SAO performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Authors GTO and RAA managed the analyses of the study, and author ETF supervised the study. All authors read and approved the final manuscript.

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ABSTRACT

Skills in resuscitation are needed in emergency health care services. However, little is known about level of knowledge of resuscitation techniques among healthcare professional students (HCPS) in Nigeria. This study assessed knowledge, attitude and experience of cardiopulmonary resuscitation (CPR) among medical and HCPS undergoing training in a Nigerian medical college. The cross-sectional study purposively recruited 300 clinical HCPS from a Nigerian university studying in various health disciplines. Socio-demographic data and information on knowledge, attitude and experience were obtained using a validated CPR questionnaire. However, only 261 copies of the questionnaire were completed and valid for analysis yielding a response rate of 87.8%. Data were analyzed using descriptive and inferential statistics. Alpha level was set at $p < .05$. Results show that the mean age of respondents was 24.6 ± 4.6 years. Students from the Department of Medicine constituted about a third, (30.9%) while less than half, (44.4%) were in year four of study. Less than a quarter, (21.4%) had good knowledge of CPR. A majority, (77.4%) had never practiced CPR, however, (74.9%) had positive attitude towards CPR. There was a significant association between knowledge and department of respondents ($\chi^2=80.973$; $p= .001$) and year of study ($\chi^2=47.799$; $p = .003$). Furthermore, there was a significant association between experience and year of study ($\chi^2=9.195$; $p =.002$). Surveyed medical and healthcare professional students in clinical level had poor knowledge and low level of experience. They however had a positive attitude towards cardiopulmonary resuscitation techniques. Curriculum review detailing practical skills of cardiopulmonary resuscitation techniques among healthcare professional students is recommended.

Keywords: Knowledge; attitude; experience; cardiopulmonary resuscitation; Nigerian medical and healthcare professional students; medical college.

1. INTRODUCTION

Many chronic non-communicable diseases (NCDs) contribute to major causes of disabilities and sudden death worldwide [1]. Recent reports showed that the number one leading cause of death amongst NCDs is cardiovascular disease (CVD) which accounts for a third of all global deaths [1,2]. Presently, sub Saharan Africa (SSA) is undergoing rapid epidemiological transition due to lifestyle changes including obesity, poor dietary intake, urbanization and westernization [2]. It is now evident that the emergence of chronic NCDs has contributed to a huge number of people at risk of sudden cardiac arrest and heart attack [3]. In spite of significant advances in prevention and medical technologies, cardiac arrest and heart attack remain substantial public health problem [4].

Many emergency conditions needing basic life support including cardiopulmonary resuscitation (CPR) is an important life-saving procedure to rescue individual believed to be suffering from cardiac arrest [5]. It involves a core set of actions which provides a universal strategy for achieving successful resuscitation [6]. This includes combination of chest compressions and mouth-to-mouth breathing to restore cardiac function, oxygen delivery and cerebral circulation [5]. The

first line of action is the immediate recognition of cardiac arrest and activation of the CPR without delay. There are evidence that prompt recognition of cardiopulmonary arrest and swift instigation of CPR helps to double patient's chance of survival and protection of brain viability for as much as 10 minutes after delayed circulation [7]. However, specific training to acquire the skills is presumed to have been inculcated while undergoing undergraduate medical training during clinical exposures.

Providing an effective CPR is dependent on knowledge, experience and skills of its application [8]. Many training institutions have CPR as an important component of medical curriculum in the training of physicians and in the qualification of licensed nurses [9,10]. While CPR competency is considered a fundamental skill for medical and all health care professionals, evidence suggests that retention of CPR knowledge and skills is generally poor [11,12]. Studies have also identified differences in the quality of CPR performed by various healthcare professionals [13,14]. It is not known whether level of knowledge and practices of unsatisfactory CPR arises from undergraduate medical training and perhaps has anything to do with low quality of CPR.

Previous studies on knowledge and practices related to CPR among undergraduate medical students [15], dental students [16] and students in other healthcare professionals' training [17,18] were mostly conducted outside Nigeria or restricted to medical or a particular healthcare professional students in Nigeria [19]. Surprisingly, findings from all these studies revealed poor level of knowledge and practices of CRP among students in training. However, it is not known whether similar situation is applicable to CPR's knowledge, attitude and practice among medical and healthcare professional students in Nigeria. Furthermore, there is dearth of studies examining knowledge, attitude and experience of CPR among medical and healthcare professional students in Nigeria. The outcome of this study may help to provide an insight into the curriculum review of all students undergoing medical and healthcare professional training in Nigeria. The objective of this study was to investigate knowledge, attitude and experience of CPR among medical and healthcare professional students in a Nigerian medical college.

2. MATERIALS AND METHODS

2.1 Study Design

The study design is cross sectional survey. Three hundred clinical students studying in various healthcare disciplines in the College of Health Sciences, Obafemi Awolowo University, Ile-Ife, Nigeria participated in this study. Respondents were recruited into the study using purposive sampling technique. The sample size for this study was calculated using the computer program for epidemiologists (PEPI), version 3.01, employing the formula for estimating sample size for single proportions as described by Armitage and Berry and cited in Abramson and Gahlinger [20]. In a previous study by Okonta et al. [19], the low level of CPR's knowledge (< 50%) was reported to be 74.6% among Nigerian medical students in Port Harcourt while a precision margin of 5% was employed. Furthermore, using a standard normal deviate of 1.96 at 95% confidence interval and a maximal allowable difference from the true proportion of 5% (0.5), a sample size of 245 was estimated. However, the sample size was increased to 300 to allow for 20% incomplete response or missing data with the view to improving the validity of result. Eligibility for inclusion were students in the clinical level in the Department of Dentistry,

Medicine and Surgery, Medical Rehabilitation and Nursing Science and whose ages ranged between 20 and 35 years old. Pre-clinical and postgraduate student in the college as well as undergraduate students from other departments outside College of Health Sciences were excluded from the study.

2.2 Ethical Clearance

Ethical approval was sought and obtained (IPH/OAU/12/312) from the Institute of Public Health Research and Ethics Committee of the Obafemi Awolowo University, Ile – Ife, Nigeria. Respondents were recruited from their various departments after returning from different clinical posting between 18.00 – 20.00 hours at their halls of residence. The purpose of the research was explained to the respondents and signed informed consent was obtained before participation. Three hundred (300) copies of the questionnaire were administered on the respondents. However, only 261 copies of the questionnaire were completed and validated for analysis, yielding a response rate of 87.8%.

2.3 Assessment of Knowledge, Attitude and Practice of Cardiopulmonary Resuscitation

The instrument for this study was adapted from the knowledge, attitude and practice of cardiopulmonary resuscitation among physiotherapists in South – western Nigeria [21]. The questionnaire has three sections. Section 1: contains questions on demographic characteristics. Section 2: contains a combination of questions on knowledge, attitude and experience of CPR with some of the questions in Yes/No format and some in multiple choice formats. It contains 22 items, 12 items assessed knowledge (questions 1 - 9, 12, 13, 20), six (6) items assessed attitude (questions 10, 15, 16, 18, 21, 22) and 4 items assessed experience (questions 11, 14, 17 and 19). Section 3: this section contains 10 questions (questions 23 - 32) that addressed mainly attitude towards CPR. These questions are in Likert – scale format and the responses were rated on a 5 – point scale ranging from strongly agree (1) to strongly disagree (5). The questions were a combination of multiple choices and a 5-point Likert structure of strongly agree, agree, indifferent, disagree and strongly disagree.

The multiple choice questions which assessed knowledge were transformed into “yes” and “no” indicating the right and wrong answers respectively. The multiple choice questions which assessed attitude were also transformed into “yes” and “no” representing the positive and negative attitudes respectively. The 5-point Likert structure of strongly agree, agree, indifferent, disagree and strongly disagree were collapsed into 3 groups during analysis – Agree (for strongly agree and agree), indifferent and disagree (for strongly disagree and disagree). Respondents’ knowledge score was transformed calculating thus; $100 \times (\text{observed score} - \text{minimum possible score}) / (\text{maximum possible score} - \text{minimum possible score})$. The 25th, 50th and 75th percentiles were used to label the transformed-scores into lower, middle and upper quartiles representing “poor”, “fair” and “good” knowledge. Both attitude and practice scores were also transformed; for attitude score, below 50th and greater than 50th percentile were used to label as negative and positive attitude respectively. Similarly, experience of CRP was also categorised as poor or good practice using below and greater than 50th percentile classification respectively.

To validate how reliable the instrument was, the test-retest approach was adopted. By this method, the instrument was tested on thirty (30) students chosen at random from other faculties of the same institution. These students were not expected to be part of the normal selections that were sampled for the actual work. Using the Pearson product Moment Correlation, obtained reliability coefficient was 0.68, proving to be sufficiently reliable for decision making. Cornbrash’s alpha test returned 0.75 as well upon verification.

Descriptive statistics of frequency, percentage, mean and standard deviation were used to summarize demographic characteristics. Inferential statistics of Chi square test was used to test the association between student’s level of knowledge, attitude and practice of CPR and each of the socio-demographic characteristics. Alpha level was set at $p < 0.05$ of significance. Statistical Package of Social Sciences (SPSS) version 19 was used to perform data analysis.

3. RESULTS

Tables 1, 2, 3, 4, 5 and 6 represent data as obtained from the field; following sorting and statistical analysis.

Table 1. Socio – demographic characteristics and distribution of respondents’ knowledge, attitude and experience of cardiopulmonary resuscitation

Variables	Frequency	Percentage
Gender		
Male	131	50.2
Female	130	49.8
Age (years)		
20 – 27 years	203	77.7
28 – 35 years	58	22.3
Department		
Dentistry	46	17.6
Medicine and Surgery	80	30.7
Medical Rehabilitation	69	26.4
Nursing Science	66	25.3
Year of Study		
Year 4	116	44.4
Year 5	100	38.3
Year 6	45	17.2
Knowledge about CPR		
Good	55	21.4
Fair	76	28.6
Poor	130	50
Attitude towards CPR		
Positive	196	74.9
Negative	65	25.1
Experience of CPR		
Yes	59	22.6
No	202	77.4

Key: CPR – Cardiopulmonary resuscitation

4. DISCUSSION

This study assessed knowledge, attitude and experience of cardiopulmonary resuscitation (CPR) among clinical students undergoing training in various healthcare professional disciplines in Nigerian medical college. Findings from our study revealed that knowledge of CPR among Nigerian healthcare professional student was poor. This is consistent with findings of some previous studies that knowledge of CPR was below average among students undergoing medical training [18,19]. The plausible explanation for the persistent poor knowledge may be due to concentration on teaching theoretical basis of CPR with less emphasis on updated practical demonstrations. Although theoretical knowledge of various conditions in the field of healthcare is expected to be sound, all

practical and clinical trainings need to be evaluated regularly to be sure both areas are adequately imparted on students during training. Furthermore, our findings show that only a fifth of our students had good knowledge of CPR. This finding is consistent with some earlier findings of insufficient knowledge among undergraduate medical students in India [15], dental students in Karnataka [16] and healthcare students in Qassim University, Saudi Arabia [22]. Perhaps, it implies that poor knowledge of CPR may be attributed to methods of teaching and training of these students. Teaching and training of specific courses or cases involve experiential techniques in order to acquire skills needed for effective practice. Hence, students must be made to be interested in such areas to gain sufficient knowledge and be skillful for effective practice. We also found that respondents' departments and year of study were significantly associated with knowledge of CPR. Probably, it is possible that the peculiarities of each department could have contributed to the level of knowledge of CPR during clinical exposures especially students from the department of Medicine and Surgery. Though findings from our study showed that the poor knowledge score among our students was better compared to those of previous studies, nonetheless the below average score is not satisfactory for healthcare professional trainees who will be handling human health conditions and safety in the nearest future.

Findings from our study also revealed that a majority of our students had positive attitude towards CPR. For instance, many gave positive responses to questions seeking to know if "they would want to learn CPR techniques", "they would see CPR as a chance to help", "they would consider it necessary to intervene in a situation requiring CPR or if they would perform mouth-to-mouth ventilation during CPR. This finding corroborates some earlier findings indicating positive attitude of medical and healthcare professional students towards CPR and their willingness to perform it despite inadequate knowledge [15,17]. This may be attributed to the understanding of the nature of their training, practice and commitment to safe human life in any circumstances. However, care must be taken to ensure that a positive attitude and good knowledge of CPR procedure is sufficient in order to prevent the occurrence of wrong practice that may lead to further damage or even fatal. Furthermore, a majority of the respondents agreed that CPR training should be a mandatory graduation requirement for all healthcare professional students. This is also similar to findings of some previous studies that CPR training was advocated and emphasized as a requisite for graduates of medical and healthcare professional students [23]. Perhaps this may be linked to the importance of CPR in rescuing individuals with cardiac emergency. The current trend in developed western countries is that

Table 2. Respondents knowledge on cardiopulmonary resuscitation

Item	Question	Frequency (%)
1	CPR is most effective when.....	237(90.8)
2	What is the recommended compression to ventilation ratio	110(42.1)
3	When you deliver the first rescue breathe, what should you do if the victim's chest does not rise?	143(54.8)
4	How many chest compressions should be performed each minute when giving CPR?	41(15.7)
5	What is the best way to open the airway prior to giving mouth-to-mouth ventilation?	222(85.1)
6	Where is the chest compression landmark on adult?	58(22.2)
7	How should chest compression be performed on an infant while doing CPR?	107(41.0)
8	Number the following steps of CPR in the correct sequence using 1, 2, 3 Breathing = 130(52.8%) Airway=25(10.1%) Compression	32(12.3%)
9	The CAB of resuscitation represents?	211(80.8)
10	What is the chance of saving a victim when CPR is performed correctly?	24(9.2)
11	When dealing with a conscious choking patient, what treatment or action should you take?	74(28.4)
12	At what age do children become adults in CPR terms?	23(8.8)

Key: CPR – Cardiopulmonary resuscitation

Table 3. Respondents' attitude and experience towards cardiopulmonary resuscitation

Item	Questions	n (%)		
Attitude				
1	Would you want to perform mouth to mouth ventilation during CPR	200(76.6)		
2	Do you feel that your knowledge of CPR is sufficient	33(12.6)		
3	Would you want to learn CPR techniques	260(99.6)		
4	If the situation arises, would you abstain from performing CPR to the following people	233(89.3)		
5	Do you think CPR training course should be mandatory	242(92.7)		
	i). for all medical students (graduation requirement)	10(3.8)		
	ii). mandatory for doctors and nurses only	9(3.4)		
Optional				
6	I would feel unsure of how to react when present at the scene	51(19.5)		
7	I would feel nervous to be brought face to face with the situation	45(17.2)		
8	I would consider it my duty to intervene in a situation requiring CPR	98(37.5)		
9	I would feel secure in my CPR knowledge	98(37.5)		
10	I would feel anxious	32(12.3)		
11	I know what to do if cardiac arrest occurs	93(35.6)		
12	I would act instinctively to perform CPR	115(44.1)		
13	I would see CPR as a chance to help	111(42.5)		
14	I would need gloves, face mask, and other items relevant for self-protection before I can act	55(21.1)		
15	I would prefer not to perform mouth to mouth ventilation during CPR	31(11.9)		
Experience on CPR				
		Yes	No	
1	Have you ever encountered a situation that required CPR	59(22.6)	202(77.4)	
2	If yes, did you resuscitate the person	33(12.6)	25(9.6)	
3	Have you ever taken a CPR training course	102(39.1)	159(60.9)	
4	How many times have you performed CPR on a patient before?	Once	> Once	Never
		21(8.0)	15(5.7)	225(86.2)

*N.B. The questions are in both multiple choice and Likert format.
Key: CPR – Cardiopulmonary resuscitation*

everybody including lay men and women as well as secondary students should be well-equipped in both knowledge and skills of CPR techniques [9,24]. Recent studies have emphasized that bystander CPR is an important contributing factor in the survival of out-of-hospital cardiac arrest (OHCA) patients. The CPR is believed to be essential for sufficient functioning of the chain of survival and is definitely an important part of effective emergency services for patients needing resuscitation. However, students can only play effective role within the chain of survival if they are adequately trained with regular exposures and continuous relevant training necessary for effective skill acquisition in CPR [25].

The results of this study also revealed that a majority of the respondents had never performed CPR before and many had never encountered a situation that requires the use of CPR while very few had received training on CPR. This finding is similar to that of a previous study in which only a few students had practiced or encountered a situation requiring CPR application [15]. This suggests that medical and healthcare professional students rarely had opportunity to practice CPR. This may explain the reason why students have been demonstrating poor knowledge of CPR as reported in previous studies. The theoretical knowledge gained must be complemented with practice in order to internalize the skills. Our finding also revealed that year of study was significantly associated

with student's experience of CPR. This is in agreement with findings of some previous studies that level of study is associated with experience and practice of CPR [15,22]. It is possible that students in higher clinical classes experienced greater opportunity of witnessing a situation that requires CPR as well as performing it. Studies have reported that often time chest compression is performed inadequately with slow rates of compression and inadequate depth of compression [8]. CPR is deemed an essential competency that all students must satisfactorily achieve to ensure effective application. In the wider community, it is an expectation that knowledge and competence in CPR is at a high standard among undergraduates undergoing medical and healthcare professional training in

order to help patients with cardiac challenges whenever it is needed [17]. Adequate training and regular clinical and practical demonstrations are important keys to improving CPR's knowledge and skills. It appears that there is the need to carryout extensive curriculum review and overhauling of medical training in the area of CPR in order to advance students' knowledge of CPR in Nigeria. However, findings of this study should be interpreted with caution due to some limitations. This is a cross-sectional study carried out in a particular medical institution; hence, causal inference cannot be made to other medical schools in Nigeria, thus, limiting its generalizability. Future studies should include many Nigerian medical institutions to improve the validity of this study.

Table 4. Association between respondents' knowledge of cardiopulmonary resuscitation and the socio-demographic characteristics

		Knowledge of CPR			χ^2	p-value
		Poor	Fair	Good		
Variable		n(%)	n(%)	n(%)		
Gender	Male	66(25.3)	28(10.7)	37(14.2)	13.77	0.32
	Female	74(28.4)	28(10.7)	28(10.7)		
Age (years)	20-27	101(38.7)	69(26.4)	43(16.5)	23.07	0.95
	28-37	30(11.5)	17(6.5)	11(4.2)		
Department	Dentistry	23(8.8)	13(5.0)	10(3.8)	80.97	0.001*
	Medicine	40(15.3)	23(8.8)	17(6.5)		
	Med Rehab	33(12.6)	19(7.3)	14(5.4)		
	Nursing	35(13.4)	20(7.7)	14(5.4)		
Year of Study:	Year 4	58(22.2)	34(13.0)	24(9.2)	47.79	0.003*
	Year 5	50(19.2)	29(11.1)	21(8.1)		
	Year 6	23(8.8)	13(5.0)	9(3.5)		

*p<0.05

Key: CPR – Cardiopulmonary resuscitation, Med Rehab – Medical Rehabilitation

Table 5. Association between attitude and socio-demographic characteristics

Variables		Attitude to CPR		χ^2	p-value
		Negative n (%)	Positive n (%)		
Gender	Male	33(12.6)	98(37.5)	3.81	0.29
	Female	32(12.3)	98(37.5)		
Age (years):	20-27	51(19.5)	152(74.7)	9.05	0.51
	28-35	15(5.7)	42(16.1)		
Department:	Dentistry	12(4.6)	34(13.0)	10.57	0.27
	Medicine	20(7.7)	60(23.0)		
Med Rehab		16(6.1)	50(19.2)		
Nursing		17(6.5)	52(19.9)		
Year of study	Year 4	29(11.1)	87(33.3)	6.71	0.21
	Year 5	25(9.6)	75(28.7)		
	Year 6	11(4.2)	34(13.0)		

Key: CPR – Cardiopulmonary resuscitation, Med Rehab – Medical Rehabilitation

Table 6. Association between experience and socio-demographic characteristics

Variable	Experience in CPR		χ ²	p-value	
	No (%)	Yes (%)			
Gender	Male	30(11.5)	101(38.7)	3.82	0.44
	Female	30(11.5)	100(38.3)		
Age (years)	20-27	47(18.0)	156(59.8)	20.56	0.28
	28-35	14(5.4)	44(16.9)		
Departments	Dentistry	11(4.2)	35(13.4)	12.06	0.12
	Medicine	18(6.9)	62(23.8)		
	Med Rehab	15(5.7)	51(19.5)		
	Nursing	16(6.1)	53(20.3)		
Year of study	Year 4	27(10.3)	89(34.1)	9.19	0.002*
	Year 5	23(8.8)	77(29.5)		
	Year 6	10(3.8)	35(13.4)		

*p<0.05

Key: CPR – Cardiopulmonary resuscitation, Med Rehab – Medical Rehabilitation

5. CONCLUSION

Surveyed Nigerian medical and healthcare professional students in clinical levels had poor knowledge and low level of experience but positive attitude towards cardiopulmonary resuscitation. Curriculum review detailing regular hand-on practical skills of cardiopulmonary resuscitation techniques among clinical students undergoing medical and healthcare professional courses at various levels is recommended.

CONSENT

As per international standard or university standard, patient’s written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard, written approval of Ethics committee has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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