Knowledge, Attitude and Practice of Cardiopulmonary Resuscitation among Clinical Undergraduate Students in Selected Medical Colleges in Southern Nigerian Universities

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Abstract

Background/Objectives: Basic life support skills are important in emergency health care services. The knowledge as well as level of practice of resuscitation procedures and techniques among clinical undergraduate students in Nigeria appears to be inadequate. This study assessed the knowledge, attitude and practice of cardiopulmonary resuscitation (CPR) and its relationship with socio-demographic characteristics of clinical undergraduate students in selected medical colleges in Southern Nigerian universities. **Materials and Methods**: Using a cross sectional approach, 432 respondents were recruited across three medical colleges in Southern Nigerian Universities. A validated questionnaire was used to collect data on knowledge, attitude and practice of CPR both virtually using Google forms and physically. Data obtained was analyzed using descriptive and inferential statistics. Level of significance was set at p=0.05. **Results and Conclusion:** The results of this study showed that majority (n= 416, 96.3%) of the participants had good knowledge of CPR, 304 (70.4%) had positive attitude towards CPR; however, 372 (86.1%) had not previously practiced CPR. There were no significant relationships among sociodemographic characteristics, knowledge and attitude of CPR (p>0.05). However, there were significant relationships between practice of CPR and course of study ($\chi2$=18.885, p=0.0001), gender ($\chi2$=7.548, p=0.006), and level of study ($\chi2$=22.985, p=0.0001). The knowledge of clinical students about CPR across all universities was good and the participants had an overall positive attitude towards cardiopulmonary resuscitation. However, the level of practice was low amongst all participants. There is a need to have regular CPR training and assessment since prior CPR exposure results in knowledge retention.

Keywords: Health knowledge, attitude, practice, cardiopulmonary resuscitation, universities.

Introduction

Cardiac arrest poses a significant public health challenge, contributing to approximately 15–20% of all deaths (1) and it has been identified as a major factor in cardiovascular morbidity and mortality rates in both developed and developing nations. Annually, over 356,000 individuals experience out-of-hospital cardiac arrest in the United States (2). Unfortunately, between 60% to 80% of these cases result in fatalities before the affected individuals reach a hospital (3). The observed prevalence of out-of-hospital sudden cardiac death in a Nigerian study is 51.1% (4) and one of the potential reasons for the sudden

cause of death is cardiac arrest which results into heart failure.

Cardiopulmonary Resuscitation (CPR), is an emergency life-saving procedure performed when an individual's heartbeat or breathing has stopped and it typically involves a combination of chest compressions and rescue breaths to keep the person alive until professional medical assistance is available (5). Administering CPR promptly increases the likelihood of successfully resuscitating a person in cardiac arrest (6). Additionally, CPR is not only used to save life in patients with cardiac arrest but has the potential to save lives in various other life-threatening emergencies, including stroke, respiratory arrest, trauma, drowning, and airway obstruction (7). In 2021, individuals without professional medical training-initiated CPR in 40.2% of out-of-hospital cardiac arrests in the United States (2). This shows the importance of widespread CPR education and training to empower the general public to respond effectively to cardiac emergencies and potentially improve outcomes for individuals in distress.

The immediate response to cardiac arrest can be difficult in resource-limited and developing countries, however, possessing fundamental knowledge, skills, and the right attitude remains an important aspect for medical service providers (8, 9). The resuscitation guidelines of the American Heart Association (AHA) advise that undergraduate students in direct contact with patients should undergo regular training in resuscitation as part of their preparation for emergency situations (10). Also, the International Liaison Committee on Resuscitation strongly advocates for the integration of CPR instruction as a standard component of the school curriculum (11). The crucial role of CPR in cardiac emergencies showcase the necessity for healthcare professionals to possess the adequate knowledge and competence in performing CPR. Research has documented that successful management of life-threatening events like cardiopulmonary arrest is contingent upon the competency and skill of healthcare professionals (6).

While CPR is well-established as one of the most effective resuscitative measures for patients in cardiac arrest, prior studies have documented insufficient knowledge, inadequate training, and a lack of practice among clinical students (12–16). A previous study examined the knowledge, attitude and practice of CPR among healthcare professional students in a single Nigeria medical college (14) and the results showed that majority of the participants had a poor knowledge and practice of CPR, however, majority of the participants had a positive attitude towards CPR. Despite the result of that study, it remains unclear whether a similar result regarding knowledge, attitude, and practice towards CPR exists among other clinical students in Nigerian universities. Therefore, this study aimed to assess the knowledge, attitude and practice of cardiopulmonary resuscitation and its relationship with socio-demographic characteristics of clinical undergraduate students in selected medical colleges in Southern Nigerian universities.

Materials and methods

Study design

This cross-sectional survey conducted between the months of March to November 2022 investigated the knowledge, attitude and practice of CPR among clinical undergraduate students in selected medical colleges in Southern Nigerian Universities.

Participants

This study was conducted in the southern part of Nigeria, using clinical students in the colleges of medicine from the University of Benin (UNIBEN), University of Lagos (UNILAG) and University of Nigeria, Nsukka (UNN). A sample size of 978 participants from different medical and healthcare disciplines was required for this study. Purposive sampling technique was used in selecting the southern geopolitical zone. Simple random sampling technique using ballot system was used to select the universities from the three zones South-

South, South-East and South-West. Sample size for each school was calculated using Slovin formulae ($n = N / (1+Ne^2)$) and number of participants for each department for each university was calculated using proportionate sampling method. Included in this study were male and female medical, dental, physiotherapy and nursing students in their 4^{th}, 5^{th} and 6^{th} year who consented to participate in the study, who were 18 years and above. In total, 432 participants from different medical and healthcare disciplines participated in the study.

Materials

Knowledge, Attitude and Practice questionnaire: The questionnaire was modified and adapted from Ativie *et al*. 2018 (14) which assessed the knowledge, attitude and experience of CPR among medical and healthcare professional students in a Nigerian Medical college and from the American Heart Association CPR guidelines (7). A reliability coefficient of 0.68 and Cronbach's alpha test of 0.75 was reported for this instrument (14). Face and content validity were established by three independent medical and healthcare professionals (i.e., a medical doctor, a nurse and a physiotherapist), these three professionals reviewed the questionnaire for adequate coverage of the research objectives and reported no additional corrections. The instrument contains 34 items in all. These items are divided into four sections: Section A included 8 questions on demographic characteristics, Section B contains 14 questions on knowledge of cardiopulmonary resuscitation, Section C contains 7 questions attitude towards cardiopulmonary resuscitation and Section D contains 5 questions on practice of cardiopulmonary resuscitation. Questions on attitude of cardiopulmonary resuscitation is a Likert – scale format and the responses are rated on a 5 – point scale ranging from strongly agree (1) to strongly disagree (5). Scores were categorized into positive and negative. Strongly agree, agree and good were considered as positive response while disagree and strongly disagree were deemed as negative response. Knowledge and practice of cardiopulmonary resuscitation was assessed using a Yes/No response. Scores were categorized into good and poor; good comprising of yes responses and poor comprises of the no responses.

Study procedure

Questionnaires were distributed online by the researcher via Google Form sent to the WhatsApp platforms of various Departments and physically to participants of the randomly selected universities after seeking the consent of eligible participants. A focal person from each university re-broadcast the link to the Google Form. This questionnaire was accompanied by an eligibility and consent form explaining the aims and objectives of the study and assurance of confidentiality of data collected. The 'accept to participate' box must be checked before participants could access the questionnaire online or physically.

Ethical consideration

Ethical approval was sought and obtained from the College of Medical Sciences Research Ethics Committee, University of Benin, Edo state (CMS/REC/2022/299). The aims and objectives of the study was explained to the respondents and informed consent was obtained from each respondent.

Data analysis

Data were analyzed using the Statistical Package for Social Sciences Software version 24.0. Descriptive statistics of frequency was used to summarize demographic characteristics, knowledge, level of attitude and practice of cardiopulmonary resuscitation. Inferential statistics of Chi square test was used to test the relationship between participant's level of knowledge, attitude, practice and each of the social demographic characteristics (age, gender, department, university and level of study). Alpha level was set at $p<0.05$ of significance.

Results

Respondents' sociodemographic characteristics

Among the respondents, 277 were females (64.1%); half of the respondents were in their 5th year (500 level) of study, and 407 (94.2%) were between the ages of 18 and 27 years. Most of the participants were Christians 409 (94.7%), 49 (11.3%) were dentistry students and physiotherapy was 139 (32.2%). The respondents were distributed among the academic years as follows: 185 (42.8%) were in their 4th year, 215 (49.8%) in their 5th year, and 32 (7.4%) in their 6th (final) year. Frequency distribution of respondents by institution is presented in Table 1.

Respondents' Knowledge, Attitude and Practice of CPR

Majority of the respondents 416 (96.3%) had a good knowledge of CPR. Majority 416 (96.3%) claimed to have heard of CPR while more than half 374 (86.6%) of the students reported that radial artery is usually used to feel for a pulse in adults' victim. The details of the respondent's knowledge on CPR are presented in Table 2. Regarding attitude towards CPR, majority of the participants, 304 (70.4%) had a positive attitude towards CPR (Table 1). Majority 344 (79.6%) strongly agree to CPR training course being mandatory for all clinical students, 336 (77.8%) strongly agree that basic life support should also be mandatory and added to the academic curriculum, 296 (68.5%) strongly agree that an established CPR team will be of good outcome for cardiac arrest victims (Table 3). Majority of the participants 372 (86.1%) have not practiced CPR, however, 60 (13.9%) of respondents practiced cardiopulmonary resuscitation.

Relationship between Sociodemographic Characteristics and Respondents' Knowledge, Attitude and Practice of CPR

Chi square test shows no significant relationship between respondents' knowledge of cardiopulmonary resuscitation and age group ($\chi2 = 0.007$, p=0.936), gender ($\chi2$=0.0447, p= 0.504), level of study ($\chi2$=1.374, p= 0.503), university ($\chi2$=1.338, p = 0.512) and course of study ($\chi2 = 1.396 = 0.707$) (Table 5). Table 6 shows no significant relationship between respondents' attitude of CPR and age group ($\chi2$=2.200, p=0.532), gender ($\chi2$=0.413, p=0.520), level of study ($\chi2$=2.246, p=0.325), University ($\chi2$=0.635, p=0.728) and course of study ($\chi2$=2.646, p=0.449). However, there were significant relationship between practice of CPR and course of study ($\chi2$=18.885, P=0.0001), gender ($\chi2$=7.548, P = 0.006), and level of study ($\chi2$=22.985, p=0.0001) (Table 7).

Discussion

The findings of this study showed that majority of the clinical undergraduate students in southern Nigerian universities surveyed had good knowledge of CPR. Cardiopulmonary resuscitation is an important basic life support skill valuable to both medical and non-medical personnel. It is the first course of action in emergencies where there is cessation of breath or heartbeat and it is the last hope for pulseless and breathless patients/individuals (17). This finding agrees with previous study by Tsegaye *et al*. (12) and Okwuikpo *et al*. (18) that also showed adequate knowledge of CPR among clinical undergraduates. Good knowledge scores may be as a result of prior exposure to cardiopulmonary resuscitation from other materials, discussion with other students, learning from YouTube and formal training of cardiorespiratory parameters and resuscitation by lecturers. Doctors who had prior formal training on CPR had good knowledge of cardiopulmonary resuscitation (17), this shows that prior formal training on CPR can improve clinical students' knowledge about CPR.

The findings of good knowledge of CPR among clinical students in the present study however contrasts with the result of Ativie *et al*. (14) and Pun *et al*. (19), who showed that clinical students had a poor knowledge of CPR. The observed variations in knowledge scores between this study and others may be attributed to differences in

both population characteristics and size. Notably, our study involves a larger and more diverse participants, involving multiple universities. These factors can significantly influence the outcomes, the inclusion of participants from various institutions captures a broader spectrum of experiences and backgrounds.

Majority of the students had a positive attitude towards cardiopulmonary resuscitation practice and learning. Many gave positive responses to the question seeking to know "if CPR team may have good outcome for cardiac arrest victims" and "I think basic life support is necessary and should be part of curriculum in all Colleges of Medicine". These findings show that there is an understanding for the need of these skills as health care professional students and the recognition of the duty of clinical professionals to saving lives. Further, the findings could suggest the clinical healthcare professional students in this study have a positive disposition and would favorably practice CPR when given the opportunity or when the opportunity presents itself. These findings are similar to those of Ativie *et al*. (14), Mansour *et al*. (15), and Yousuf (20) that reported that majority of the clinical students had positive attitude towards CPR. The positive attitudes could possibly be as a result of increased awareness and education about the importance of CPR because individuals who understand the life-saving potential of CPR are more likely to view it positively.

From the findings on the practice of cardiopulmonary resuscitation; majority of the participants indicated that they had not performed CPR on patients in cardiac emergencies even though some knew the protocols involved; from their answers of succeeding questions. The reason could be that there were no opportunities for the students to practice therefore resulting in fear of actually carrying out cardiopulmonary resuscitation. Also, these students may have acquired their knowledge informally, so there is no formal learning or training ground to master the skills - theory must be in tandem with practical training. This result is consistent with the study of Ativie *et al*. (14), where majority of the participants have never practiced CPR. It was also reported that regular clinical and practical illustration are essential for improvement.

It was also observed that the findings of this current study showed that there was no significant relationship between knowledge and any of the socio demographic characteristics, which indicates that sociodemographic factors of the participants were not related to the knowledge of CPR as knowledge acquisition was due to informal training. The findings of non-significant relationship between level of attitude and any of the sociodemographic characteristics, suggests that the attitude of the students was not related to sociodemographic factors but was likely due to the comprehension of the importance of the skill as health care professionals.

Significant relationships were found between practice of CPR and level of study, gender and course of study. These findings suggest a potential relationship between the level of study, gender, course of study and practice of CPR. Ativie *et al*. (14) reported a similar significant relationship between practice of CPR and level of study. This could be as a result of attention given to higher levels in clinical postings as they get closer to graduating, and the fact that female participants consisted majority of the population of the study. Also, Medicine Department might have this training in their curriculum as a requirement for holistic practice and Medical Doctors are at the frontlines of life support.

Limitation of study

The findings of this study should be interpreted with caution owing to the limitations of this study which include potential disparities in self-reported knowledge of cardiopulmonary resuscitation among clinical undergraduate students, limited generalizability due to the regional focus on Southern Nigerian universities, underachievement of the

calculated sample size, constraints associated with the cross-sectional study design, and challenges related to time constraints and distance during data collection, exacerbated by an 8-month University lecturers' strike, which affected response rates and participant availability.

Conclusions

In summary, clinical undergraduate students in Southern Nigerian Universities demonstrate satisfactory knowledge and a positive attitude towards CPR. Despite this, the practical application of CPR among these students is poor. Addressing this gap requires a determined effort to translate existing knowledge and positive attitudes into improved CPR practices, emphasizing the necessity for comprehensive training programs within educational institutions. Basic life support should be added to the curriculum for clinical students and adequate practical illustrations and trainings be performed to consolidate the knowledge and build confidence and skill for practice of clinical students. Further study should be conducted in other Medical Colleges in other geopolitical regions in Nigeria to enhance the generalization of this study outcome.

Authorship Contribution: HOF, CEO and UACO participated in the design and conception of the study. HOF. CEO and UACO participated in the data acquisition. HOF, CEO and TO analysed the data. HOF, CEO, UACO, FOK, OAI, TO and OSA participated in the result interpretations. HOF, CEO and FOK drafted the manuscript and HOF, CEO, UACO, FOK, OAI, TO, OSA COO, AO and BPE participated in manuscript revision for important intellectual content. All authors approved the final manuscript.

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Table 1: Sociodemographic data of participants

N=432

Variable	Category	Frequency	Percentage
Age	18-27	407	94.2
	28-37	25	5.8
Gender	Female	277	64.1
	Male	155	35.9
University	UNIBEN	222	51.4
	UNILAG	57	13.2
	UNN	153	35.4
Course	Dentistry	49	11.3
	Medicine	170	39.4
	Nursing science	74	17.1
	Physiotherapy	139	32.2
Level	400	185	42.8
	500	215	49.8
	600	32	7.4
Marital Status	Single	414	95.8
	Married	18	4.2
	Divorce	0.0	0.0

Religion	Christian	409	94.7
	Muslim	16	3.7
	Others	7	1.6

Table 2: Knowledge of Cardiopulmonary resuscitation N=432

Variable	**Yes n(%)**	**No n(%)**
Have you ever heard of Cardiopulmonary resuscitation (CPR)	416(96.3)	16(3.7)
Artery usually used to feel for a pulse in adult victim is radial artery	374(86.6)	58(13.4)
Head tilt chin lift is the only method to open the airway	203(47.0)	229(53.7)
When a patient is suspected of a spinal cord injury, jaw thrust manouvre is used	241(55.8)	191(44.2)
Chest compression during CPR should be done at the center of the chest on lower half of the sternum.	372(86.1)	50(11.6)
Adult and pediatric chain of survival consists of six links	251(58.1)	181(41.9)
Correct order of updated cardiopulmonary resuscitation (CPR) intervention for all age groups except newborns is Chest compressions, Airway, Breathing (CAB).	286(66.2)	146(33.8)
Defibrillator is an electrical device used as shock to the heart and needed to restore a viable or “perfusing” heart rhythm	410(94.9)	22(5.1)
CPR compression depth in adult should be 2-2.4 inches (5-6cm)	358(82.9)	74(17.1)
For adults, CPR compressions to ventilation ratio is 30:2.	341(78.9)	91(21.1)
CPR has to be attempted always in the hospital not outside	50(11.6)	382(88.4)
With respect to timing, for cardiac arrest with a non-shockable rhythm, it is reasonable to administer epinephrine as soon as feasible.	341(78.9)	91(21.1)
CPR is generally continued until the person regains return of spontaneous circulation or is declared dead.	398(92.1)	34(7.9)
During CPR, the first and second doses of amiodarone are 300mg and 150mg respectively	256(59.3)	176(40.7)

Table 3: Attitudes toward CPR among clinical students N=432

Variable	**Strongly agree n(%)**	**Agree n(%)**	**Good n(%)**	**Disagree n(%)**	**Strongly disagree n(%)**
Do you consider yourself to be sufficiently well trained to perform CPR?	31(7.2)	109(25.2)	120(27.8)	136(31.5)	36(8.3)
I think that CPR training course should be mandatory for all clinical student.	344(79.6)	69(16.0)	13(3.0)	2(0.5)	4(0.9)
I think establishing CPR team may have good outcome for cardiac arrest victims.	296(68.5)	119(27.5)	13(3.0)	2(0.5)	2(0.5)
I think basic life support is necessary and should be part of curriculum in all college of medicine.	336(77.8)	77(17.8)	16(3.7)	3(0.7)	0(0.0)
Do you consider that the person with the greatest understanding and experience in the team should be the person to lead CPR irrespective of whether they are doctors, nurses or physiotherapists?	248(57.4)	121(28.0)	30(6.9)	29(6.7)	4(0.9)
I feel CPR is complex, time consuming and energy expending?	24(5.6)	94(21.8)	40(9.3)	224(51.9)	50(11.6)
I feel doctors should be responsible for initiating CPR.	30(6.9)	55(12.7)	45(10.4)	214(49.5)	88(20.4)

Table 4: Practice of cardiopulmonary resuscitation among clinical students

N=432

Variable	**Yes n(%)**	**No n(%)**
Have you performed CPR on patients in cardiac emergencies	60(13.9)	372(86.1)
I check for patient's pulse rate before commencing CPR	265(61.3)	167(38.7)
I ensure for persons in cardiac emergencies are laid supine on a relatively hard surface before commencing CPR	283(65.5)	149(34.5)
I wear latex gloves before commencing CPR	133(30.8)	299(69.2)
I pinch patient nostril before giving mouth to mouth ventilation	265(61.3)	167(38.7)

Table 5: Relationship between respondents' knowledge of cardiopulmonary resuscitation and the socio-demographic characteristics

N=432

Variable		No(%)	Yes(%)	$\chi 2$	p
Age	18-27	15(3.9)	392(16.4)	0.007	0.936
	28-37	1(6.3)	24(22.2)		
Gender	Female	9(6.0)	268(30.8)	0.447	0.504
	Male	7(4.9)	148(13.0)		
University	UNIBEN	6(6.0)	216(20.8)	1.338	0.512
	UNILAG	3(1.4)	54(5.6)		
	UNN	7(3.5)	146(13.9)		
Course	Dentistry	2(1.2)	47(4.6)	1.396	0.707
	Medicine	7(4.9)	163(15.3)		
	Nursing	1(1.4)	73(7.9)		
	Physiotherapy	6(3.5)	133(12.5)		
Level	400	7(4.9)	178(16.4)	1.374	0.503
	500	9(4.6)	206(21.5)		
	600	0(1.4)	32(2.3)		

Table 6: Relationship between respondent's attitude toward cardiopulmonary resuscitation and socio–demographic characteristics

N=432

Variable		Negative n (%)	Positive n (%)	$\chi 2$	p
Age	18-27	118(27.3)	289(66.9)	2.200	0.532
	28-37	10(2.3)	15(3.5)		
Gender	Female	85(19.7)	192(44.4)	0.413	0.520
	Male	43(10.0)	112(25.9)		
University	UNIBEN	62(14.4)	160(37.0)	0.635	0.728
	UNILAG	18(4.2)	39(9.0)		
	UNN	48(11.1)	105(24.3)		
Course	Dentistry	16(3.7)	33(7.6)	2.646	0.449
	Medicine	48(11.1)	122(28.2)		
	Nursing	27(6.3)	47(10.9)		
	Physiotherapy	37(8.6)	102(23.6)		
Level	400	54(12.5)	131(30.3)	2.246	0.325
	500	68(15.7)	147(34.0)		
	600	6(1.4)	26(6.0)		

Table 7: Relationship between the practice and socio-demographic characteristics

N=432

Variable		No n (%)	Yes n (%)	χ^2	p
Age	18-27	353(81.7)	54(12.5)	5.483	0.132
	28-37	19(4.4)	6(1.4)		
	>38	0(0.0)	0(0.0)		
Gender	Female	248(19.7)	29(6.7)	7.548	0.006*
	Male	124(28.7)	31(7.2)		
University	UNIBEN	186(43.1)	36(83.3)	3.312	0.191
	UNILAG	48(11.1)	9(2.1)		
	UNN	138(31.9)	15(3.5)		
Course	Dentistry	38(8.8)	11(2.5)	18.885	0.0001*
	Medicine	140(32.4)	30(6.9)		
	Nursing	60(13.9)	14(3.2)		
	Physiotherapy	134(31.0)	5(1.2)		
Level	400	158(36.6)	27(6.3)	22.985	0.0001*
	500	195(45.1)	207(47.9)		
	600	19(4.4)	13(3.0)		

*=significant

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