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Knowledge, Attitude and Willingness to Perform Cardiopulmonary Resuscitation among Medical Students in University of Ilorin: A Cross Sectional Study

Sarah Oreoluwa Olukorode*, Olawale Taiwo Ojo-Rowland, Adejumo Oluwatobiloba Elizabeth, Morufat Gbemisola Adelagun and Adebo Adeola Oluwaseun

College of Health Sciences, University of Ilorin, Ilorin, Kwara State.

***Correspondence:**

Sarah Oreoluwa Olukorode, College of Health Sciences, University of Ilorin, Ilorin, Kwara State.

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ABSTRACT

Background: *Cardiopulmonary resuscitation (CPR) is a vital life-saving procedure. Adequate knowledge, positive attitude, and willingness to perform CPR among medical students are important for improving survival outcomes in emergency situations. This study aimed to assess the knowledge, attitude, and willingness to perform CPR among medical students at the University of Ilorin.*

Methods: *This institutional-based cross-sectional study was conducted among 270 clinical medical students at the University of Ilorin using a semi-structured self-administered questionnaire. The questionnaire assessed socio-demographic characteristics, CPR knowledge, attitude, and willingness to perform CPR. Data were analyzed using SPSS. Descriptive statistics, chi-square tests, and logistic regression analyses were performed, with $p < 0.05$ considered statistically significant.*

Results: *Among the respondents, 61.1% had previously received formal CPR/BLS training, mainly through the medical school curriculum. The mean knowledge score was 6.41 ± 1.28 out of 9, with 49% demonstrating good CPR knowledge. Respondents showed overwhelmingly positive attitudes towards CPR, with 91% demonstrating positive attitudes overall. However, only 63.3% were willing to attempt CPR during a cardiac arrest event. Significant predictors of good CPR knowledge included higher academic level and prior CPR training, while male gender and previous CPR training independently predicted willingness to perform CPR. Major barriers identified were lack of adequate skills, fear of causing harm, fear of legal consequences, and fear of infection transmission.*

Conclusion: *Although medical students demonstrated positive attitudes towards CPR, gaps in knowledge and willingness to intervene were identified. Regular practical CPR training, refresher courses, and supportive institutional policies are recommended to improve CPR competence and willingness among medical students.*

Keywords
Medical students, Knowledge, Attitude, Cardiopulmonary resuscitation, Willingness to learn.

Introduction
Cardiopulmonary resuscitation (CPR) is an emergency life-saving procedure that usually involves a combination of 30 chest compressions and 2 rescue breaths to keep a person alive until professional medical assistance is available, because a person experiencing cardiac arrest has a higher chance of being successfully revived if CPR is given as soon as possible [1].

Globally, out-of-hospital cardiac arrest (OHCA) is a prominent cause of mortality, accounting for 0.5 to 1 fatality per 1000 people per year [2]. Cardiac arrest is a serious public health concern, accounting for 15-20% of all deaths and significantly impacting cardiovascular morbidity and mortality rates in both developed and developing countries [2]. Despite a Nigerian study showing a

51.1% prevalence of out-of-hospital sudden cardiac mortality [3], with cardiac arrest leading to heart failure as a contributing factor, there is still a scarcity of data on the number of sudden cardiac fatalities in Nigeria, however figures are likely to be worse in a developing nation like Nigeria, which has an increasing incidence of cardiovascular disease and limited resources [2,3].

In 2003 the Liaison Committee on Resuscitation recommended that CPR be taught in schools in order to prepare students for cardiac arrest emergencies that may arise at school or elsewhere, [4]. There have been documented occurrences of students witnessing cardiac arrest tragedies in the past; sadly, not all of the victims of these incidents survived. These might result from their ignorance of and unfavourable attitudes toward CPR. The risks of sudden death for cardiac arrest victims in schools can be decreased by teaching students how to do emergency CPR [5].

Although CPR is widely recognised as one of the best resuscitation techniques for patients experiencing cardiac arrest, earlier research has shown that clinical students lack practice, training, and knowledge, [3,6-9]. This inspired the opinion of the necessity to develop the practice and knowledge of CPR with refresher training in both theory and skills every year for medical students [10]. However, according to a prior study, clinical undergraduate students in Southern Nigerian universities had a positive attitude (70.4%) and adequate knowledge (96.3%) of CPR [11]. Factors affecting willingness to perform CPR include concern of spreading infectious diseases during mouth-to-mouth resuscitation, fear of legal repercussions, or incapacity to perform CPR appropriately [12].

It has been demonstrated that colleges and universities are the best places to receive CPR instruction [13]. Although college and university students are the most eligible prospective bystanders for CPR in the community and are physically and psychologically mature enough to learn and execute CPR, no prior study has examined their knowledge and attitudes and willingness in our setting. Therefore, this study is conducted to assess the knowledge, attitude, and willingness to perform cardiopulmonary resuscitation (CPR) among medical students at the University of Ilorin.

Specific Objectives

- To evaluate the level of knowledge of CPR among medical students at the University of Ilorin.
- To assess the attitudes of medical students of University of Ilorin towards performing CPR in emergency situations.
- To determine the willingness of medical students of University of Ilorin to perform CPR when required.
- To examine the association between sociodemographic characteristics and the knowledge, attitude, and willingness to perform CPR among medical students at the University of Ilorin
- To determine the factors responsible for knowledge, attitude and willingness to perform CPR among medial students in University of Ilorin

Methodology

This was an institutional-based cross sectional study that was carried out in University of Ilorin, Ilorin, Kwara state. University of Ilorin is a Federal tertiary university located in Ilorin, Kwara state in the North Central part of Nigeria. It has a college of health sciences which comprises the Faculty of Clinical Sciences, Faculty of Basic Medical Sciences, and other departments like Nursing and allied Health Sciences. This study focused specifically on the clinical students enrolled in the MB;BS program.

The target population for the study were students from the 400 level to 600 level class studying Medicine and Surgery in the University of Ilorin. The minimum required sample size of 288 was calculated using the Fischer's formula for cross sectional studies using a confidence level of 95%, margin of error of 5% and prevalence of 75% considering a limited population and also correcting for non-response [14].

$$n = (Z^2 \text{ x } p \text{ x } (1 - p)) / d^2$$

To assess the knowledge, attitude and willingness to perform CPR among medical students in University of Ilorin, Kwara state, a non-probability convenience sampling technique was used. Participation was voluntary and students who were available and willing to respond during the data collection period were included in the study.

The semi- structured questionnaire used for this study was developed after an extensive review of relevant literature on cardiopulmonary resuscitation (CPR), basic life support (BLS), and previous Knowledge–Attitude–Practice (KAP) studies conducted among healthcare students and professionals. Items commonly used in similar studies were adapted and modified to suit the study population and local context.
To ensure content validity and clarity, the draft questionnaire was reviewed by four experts, including a clinician experienced in CPR education and training. Their input was used to refine the wording. The overall content validity and internal consistency of the instrument were assessed and found to be satisfactory for the study objectives.

The final questionnaire consisted of four sections. The first section recorded socio-demographic characteristics of the participants, including age, gender, level of study, and previous exposure to CPR or BLS training. The second section assessed participants' knowledge of CPR using multiple-choice questions based on standard CPR guidelines. The knowledge scores were graded using Bloom's cut-off points and categorized into good knowledge (80–100%), moderate knowledge (50–79%), and poor knowledge (less than 50%). The third section assessed participants' attitudes towards CPR using Likert-scale statements. Attitude levels were classified using modified Bloom's cut-off points into positive, neutral, and negative attitudes. The fourth section assessed participants' willingness to perform CPR in various emergency scenarios and included additional questions exploring factors that could prevent or encourage them to perform CPR when

required. The questionnaire was designed to be self-administered and suitable for both online distribution using Google Forms and offline distribution.

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics such as mean, frequencies and percentages were used to summarise demographic and response data. Inferential techniques, including chi-square and logistic regression, were used to determine relationships between variables. Results were presented using tables, charts, and graphs for clarity. A probability value of $P < 0.05$ was considered statistically significant.

Ethical approval for this study was obtained from the University of Ilorin Teaching Hospital Ethical board. Participants were enlightened about the study objectives and informed consent was received from all respondents. The identities of the respondents were kept anonymous and the privacy of their response was ensured throughout the study.

The questionnaire was pretested among 10 students from other universities to check validity and reliability of the tool.

Result

Table 1 shows the sociodemographic features of the respondents. More than two-thirds of the respondents (179/270, 66.3%) were within the age range of 20-24 years. Slightly more half of them (147/270, 54.4%) were females. Respondents were distributed across clinical class levels, with 37.0% in 400 level, 33.3% in 500 level, and 29.6% in 600 level. Majority of them were single (266/270, 98.5%). More than half (172/270, 63.7%) were Christians. Majority were Yoruba (198/270. 73.3%)

In addition, Table 2 shows that more than half of the respondents (165/270, 61.1%) had received formal CPR/BLS training before, with the majority (124/165), 72.9%) receiving it as part of the school curriculum. Among the 270 respondents, those in 600level had more exposure to CPR/BLS training (Figure 1). About one – third of the respondents (62/165, 33%) who had received CPR had done so in the last 6 months, while about 38% received the training between 6months to a year ago. Only about thirty-six respondents (13.3%) have ever performed CPR in a real-life scenario, with most encounters occurring in hospital settings (96.3%).

Furthermore, Table 3 shows assessment of CPR knowledge demonstrated variable levels of understanding across core resuscitation concepts. While most respondents correctly identified the appropriate airway-opening manoeuvre in the absence of cervical spine injury (73.3%), the correct compression-to-ventilation ratio for single-rescuer adult CPR (58.5%), and the characteristics of high-quality CPR (90.4%), only 22.6% correctly identified the recommended initial sequence in adult CPR as compression–airway–breathing. Furthermore, only 30.7% correctly identified the recommended chest compression depth in adults. Nearly all respondents (98.9%) correctly recognized that CPR should be performed on a firm, flat surface.

In Figure 2, the mean knowledge score was 6.41 ± 1.28 out of a maximum score of 9. Using a cut-off score of $\geq 7/9$ to define good knowledge, slightly more than half of the respondents (51%) had inadequate knowledge of CPR, while 49% of respondents demonstrated good CPR knowledge.

Also Table 4 shows a bivariate analysis which shows significant associations between CPR knowledge and gender ($p = 0.015$), academic level ($p < 0.001$), religion ($p = 0.005$), and previous CPR training ($p < 0.001$). No statistically significant associations were observed between sociodemographic variables and overall attitude towards CPR ($p > 0.05$ for all variables).

In Table 5, multivariable logistic regression identified academic level and prior CPR training as independent predictors of good CPR knowledge. Compared with 600-level students, respondents in lower academic levels demonstrated significantly lower odds of good knowledge, while prior CPR training independently increased the likelihood of good knowledge (OR = 2.503, $p = 0.003$). Male gender showed a positive but non-significant association with good knowledge (OR = 1.624, $p = 0.066$). Logistic regression analysis demonstrated no statistically significant predictors of overall attitude towards CPR among the variables assessed.

In Table 6, despite the gap in knowledge, the respondents had an overwhelmingly positive attitude (91%) towards CPR. The majority of respondents agreed that learning CPR was their professional responsibility (95.2%), that CPR knowledge should be shared among colleagues (97.4%), and that all healthcare students should receive BLS training before clinical practice (93.7%). Most respondents also considered CPR training worth the time and effort (98.9%) and expressed willingness to undergo further training (97.0%).

Regarding willingness to perform CPR, 63.3% of respondents indicated that they would attempt CPR if they encountered a victim of cardiac arrest (Figure 4). The major barriers identified were lack of adequate skills (63.7%), fear of causing harm (54.4%), fear of legal consequences (47.8%), and fear of infection transmission (46.3%) (Figure 5). Factors most likely to improve willingness to intervene included the presence of other bystanders (65.9%) and legal protection for first responders (62.2%) (Figure 6).

Willingness to perform CPR was significantly associated with gender ($p = 0.001$) and prior CPR training ($p = 0.020$). Male respondents and those with prior CPR training were significantly more willing to attempt CPR during a cardiac arrest event (Table 4). Similarly, logistic regression analysis for willingness to perform CPR showed that male gender (OR = 2.269, $p = 0.003$) and prior CPR training (OR = 1.995, $p = 0.034$) were significant independent predictors of willingness to attempt CPR, whereas academic level showed inconsistent associations (Table 5).

Table 1: Demographic Characteristics of Respondents.

Characteristics (n= 270)	N	Percentage (%)
Age		
20-24	179	66.3
25-29	84	31.1
30-34	6	2.2
>34	1	0.4
Gender		
Female	147	54.4
Male	123	45.6
Academic Level		
400 level	100	37.0
500 level	90	33.3
600 level	80	29.6
Marital Status		
Single	266	98.5
Married	4	1.5
Religion		
Christianity	172	63.7
Islam	96	35.6
Ethnicity		
Hausa/Fulani	6	2.2
Igbo	20	7.4
Yoruba	198	73.3
Others	46	17.0

n= total number of respondents, N= Number of respondents in each category of demographic characteristics.

Table 2: Exposure of Respondents to CPR/BLS (n=270).

Question	Frequency (%)
Received formal CPR/BLS training	
Yes	165 (61.1)
• Medical school curriculum (UNILORIN)	124 (72.9)
• Workshop/seminar (university associations)	36 (21.2)
• Online CPR/BLS course	25 (14.7)
• External certified BLS/CPR course	15 (8.8)
• Nigerian Red Cross training program	13 (7.6)
• Secondary school training	7 (4.1)
No	105 (38.9)
Time since last CPR training	
< 6 months	54 (33)
6-12 months	62 (38)
1-2 years	32 (19)
> 2 years	19 (12)
Ever performed CPR	
Yes	36 (13.3)
No	234 (86.7)
Setting of chest compressions	
Hospital setting	26 (96.3)
Outside hospital	7 (2.6)
Both	3 (1.1)

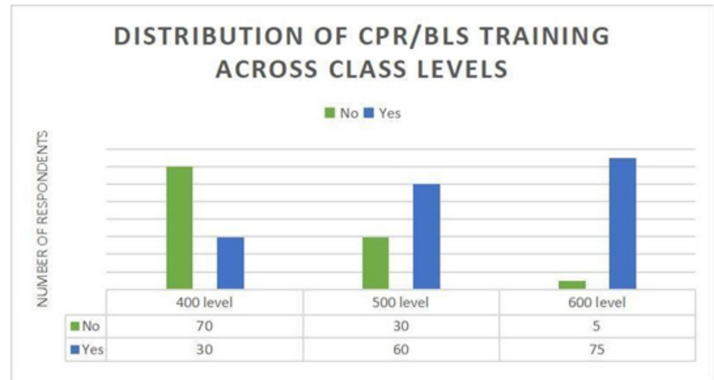

Figure 1: Distribution of CPR/BLS Training Across Class Levels (n=270).

Table 3: Responses to CPR Knowledge Items (n=270).

Knowledge Item	Response	Frequency (%)
Correct initial sequence in adult CPR	Compressions-Airway-Breathing	61 (22.6)
	Airway-Compressions-Breathing	38 (14.1)
	Airway-Breathing-Compressions	166 (61.5)
	Breathing-Compressions-Airway	5 (1.9)
Recommended compression depth in adults	5-6 cm	83 (30.7)
	2-3 cm	90 (33.3)
	3-4 cm	85 (31.5)
	>7 cm	12 (4.4)
Compression-to-ventilation ratio (single rescuer)	30:2	158 (58.5)
	15:2	68 (25.2)
	5:1	29 (10.7)
	10:2	15 (5.6)
Maneuver to open airway (no neck injury)	Head tilt-chin lift	198 (73.3)
	Jaw thrust	61 (22.6)
	Recovery position	7 (2.6)
	Neck extension	4 (1.5)
Correct surface for CPR	Firm, flat surface	267 (98.9)
	Chair	2 (0.7)
	Soft bed	1 (0.4)
First action for unresponsive adult	Check for response and call for help	247 (91.5)
	Start chest compressions immediately	21 (7.8)
	Give rescue breaths	2 (0.7)
Who can perform CPR	Any trained individual	263 (97.4)
	Nurses only	3 (1.1)
	Emergency personnel only	3 (1.1)
	Doctors only	1 (0.4)
Emergency medical service number in Nigeria	112	211 (78.1)
	911	33 (12.2)
	999	20 (7.4)
	122	6 (2.2)
Key characteristics of high-quality CPR	Deep, fast compressions with full recoil and minimal interruptions	244 (90.4)
	Slow compressions with frequent pauses	19 (7.0)
	Ventilations only	3 (1.1)
	Fast shallow compressions	4 (1.5)

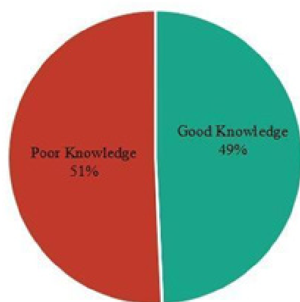

Figure 2: CPR Knowledge Categories among Respondents (n=270).

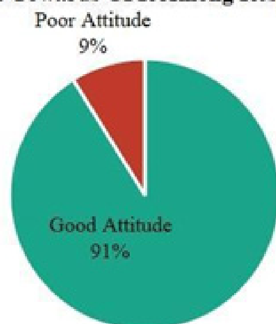

Figure 3: Overall Attitude towards CPR among Respondents.

Table 6: Distribution of Attitude towards CPR among Respondents.

Characteristics	Attitude	Frequency (%)
I believe CPR procedures are unethical, incorrect and purely inhumane.	Poor Attitude	6 (2.2)
	Good Attitude	264 (97.8)
I feel it is my professional responsibility to learn CPR.	Good Attitude	257 (95.2)
	Poor Attitude	13 (4.8)
I am confident that CPR knowledge should be shared with colleagues.	Good Attitude	263 (97.4)
	Poor Attitude	7 (2.6)
All healthcare students should receive basic life support training before clinical practice	Good Attitude	253 (93.7)
	Poor Attitude	17 (6.3)
Acquiring CPR skills is worth the time and effort	Good Attitude	267 (98.9)
	Poor Attitude	3 (1.1)
I would be willing to pay for CPR training if necessary.	Good Attitude	192 (71.1)
	Poor Attitude	78 (28.9)
I would like to be trained in CPR	Good Attitude	262 (97.0)
	Poor Attitude	8 (3.0)

Table 4: Distribution of CPR knowledge, attitude and willingness to perform CPR (n=270).

	Association Between Sociodemographic Variables and CPR Knowledge Category		Association Between Sociodemographic Variables and Attitude Towards CPR		Association Between Sociodemographic Variables and Willingness to Perform CPR	
	Chi-squared (χ^2)	P-value	Chi-squared (χ^2)	P-value	Chi-squared (χ^2)	P-value
Gender	5.869	0.015*	1.215	0.270	10.209	0.001*
Academic Level	25.507	<0.001*	2.020	0.364	4.523	0.104
Marital Status	0.000	1.000	0.065	0.798	0.001	0.972
Religion	8.060	0.005*	0.875	0.349	1.768	0.184
CPR Training	25.498	<0.001*	0.000	1.000	5.436	0.020*

* Statistically significant (p<0.05).

Table 5: Logistic regression (n=270).

	Predictors of Good CPR Knowledge			Predictors of Good Attitude Towards CPR			Predictors of Willingness to Attempt CPR		
	β (SE)	Odds Ratio	P-value	β (SE)	Odds Ratio	P-value	β (SE)	Odds Ratio	P-value
Gender	0.485 (0.264)	1.624	0.066	-0.736 (0.451)	0.479	0.103	0.819 (0.272)	2.269	0.003*
Academic Level									
400 level	0.750 (0.327)	2.117	0.022*	0.667 (0.552)	1.948	0.227	-0.738 (0.340)	0.478	0.030*
500 level	0.909 (0.372)	2.482	0.014*	1.045 (0.641)	2.842	0.103	-0.320 (0.402)	0.726	0.427
600 level									
CPR Training	0.917 (0.310)	2.503	0.003*	-0.612 (0.526)	0.542	0.244	0.691 (0.325)	1.995	0.034*

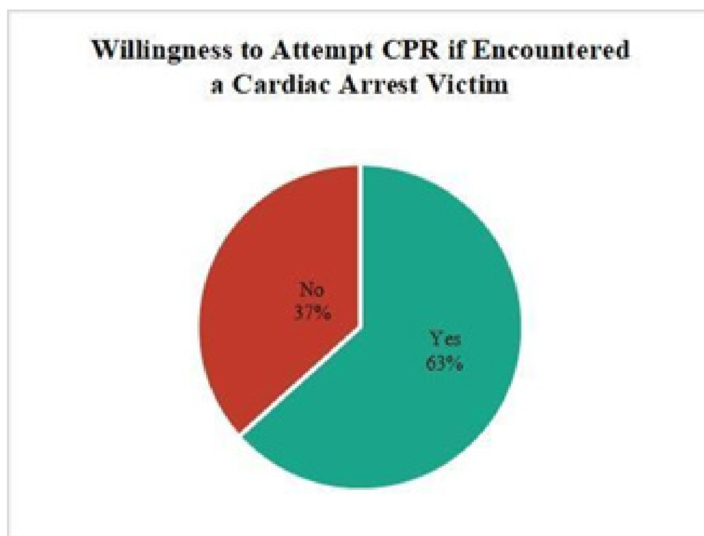

Figure 4: Willingness to Attempt CPR if Encountered a Cardiac Arrest Victim.

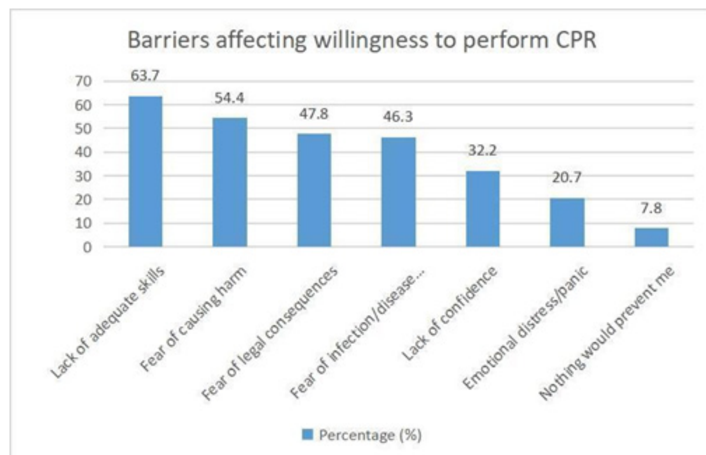

Figure 5: Barriers affecting willingness to perform CPR (n=270).

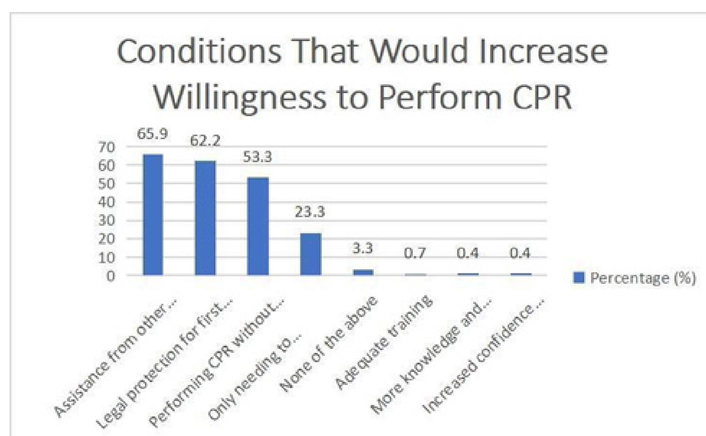

Figure 6: Conditions that Would Increase Willingness to Perform CPR (n=270).

Discussion

For patients with CA, CPR is the most crucial and frequently administered life-saving procedure. The odds of surviving CA can be greatly increased by performing CPR in a fast, efficient, and high-quality manner. Medical students should become proficient in this crucial CPR technique at least before they graduate because they will frequently come into situations that call for CPR [15].

The present study assessed the knowledge, attitude, and willingness to perform cardiopulmonary resuscitation (CPR) among clinical medical students and identified factors associated with CPR competence and readiness to intervene during cardiac emergencies.

Our study showed that most participants were young adults aged 20–24 years, predominantly female, single, and of Yoruba ethnicity. Due to the framework of undergraduate medical education, this age distribution is similar to results seen among medical students in Ethiopia and Saudi Arabia, where the majority of respondents were also in their early adult years [9,14]. The predominance of female respondents in the present study differs slightly from some earlier Nigerian studies which reported male predominance among medical students [2].

Furthermore, our study revealed that 61.1% of respondents had previously received formal CPR/BLS training, mainly through the school curriculum. Similar levels of prior CPR exposure have been reported among medical students in Saudi Arabia and Egypt where CPR training was incorporated into undergraduate curricula [16,17]. However, despite the relatively high exposure to training, only 13.3% of respondents had ever performed CPR in real-life situations. This finding is consistent with studies from Pakistan and Jordan where students demonstrated limited practical exposure despite theoretical instruction [15,18].

In addition, respondents in final year demonstrated greater exposure to CPR/BLS training compared with students in lower academic levels. This is expected because senior students usually have increased clinical rotations, emergency postings, and cumulative educational exposure. Similar findings were reported by Aedh et al. [14], where medical interns demonstrated the highest CPR knowledge levels. The significant relationship between academic level and CPR knowledge in the present study further reinforces the importance of continuous clinical exposure and repeated reinforcement of CPR concepts during medical training.

Also, more than half of respondents were categorized as having insufficient CPR knowledge, and the study's overall mean knowledge score showed moderate knowledge. This result is consistent with a number of earlier studies that found undergraduate medical students had inadequate CPR knowledge despite having previously received CPR instruction [19,20]. Similarly, Saudi medical students' knowledge of CPR was relatively moderate, according to Aedh et al. [14]. The literature has extensively documented the reduction in knowledge over time after training, with studies demonstrating a notable decline in CPR retention within months of initial training [21,22].

This study also shows a bivariate analysis which demonstrated significant associations between CPR knowledge and gender, academic level, religion, and previous CPR training. However, multivariable logistic regression identified only academic level and prior CPR training as independent predictors of good knowledge. Students who had previous CPR training were over twice as likely to possess good CPR knowledge. This finding aligns with prior research demonstrating that formal CPR training significantly improves theoretical understanding and practical competence [23,24]. The positive relationship between higher academic level and better knowledge has also been consistently reported in studies conducted among medical students globally [14].

Despite moderate knowledge levels, respondents exhibited overwhelmingly positive attitudes toward CPR. Most participants believed CPR training was a professional responsibility and supported compulsory BLS training before clinical practice. Similar positive attitudes have been documented in studies conducted in Nigeria, Saudi Arabia, and Malaysia [2,6,25].

Although attitudes were positive, willingness to perform CPR during actual cardiac arrest situations was lower, with only about 63.3% willing to intervene. This gap between positive attitude and practical willingness has been widely reported in previous studies [26,27]. The most commonly reported barriers in the present study were lack of adequate skills, fear of causing harm, fear of legal consequences, and fear of infection transmission. Similar concerns have been identified among healthcare students internationally. Aedh et al. [14] reported fear of contracting infections, particularly COVID-19, as a major deterrent to CPR performance among medical students. Fear of inadequate competence and litigation has also been documented among students in Pakistan and Ethiopia [9,15].

The willingness to perform CPR was much higher among male responders and those who had previously received CPR instruction. Willingness to intervene following cardiac arrest was independently predicted by male gender. This result is similar to that of Aedh et al. [14], who found that male students were more willing and confident to do CPR. Contrary results, however, have been documented in Saudi Arabia and Nigeria, where female students showed superior attitudes and knowledge of CPR [2,6].

Lastly, it was shown that first responders' legal protection and the presence of bystanders were likely to increase their willingness to do CPR. This result emphasizes how crucial institutional and legal support structures are for promoting bystander intervention. According to Perkins et al. [28], nations with well-established "Good Samaritan" laws have shown an increase in the public's readiness to offer immediate assistance in cases of cardiac arrest. Therefore, regular simulation-based CPR instruction and the implementation of legal protections may boost medical students' confidence and intervention rates.

Conclusion and Recommendations

This study found that although medical students at the University of Ilorin demonstrated a positive attitude towards CPR, gaps still exist in their knowledge and willingness to perform CPR during emergencies. Previous CPR training and higher academic level were associated with better knowledge, while prior training also significantly improved willingness to intervene. Major barriers identified included lack of adequate skills, fear of causing harm, fear of infection transmission, and fear of legal consequences.

Based on the above findings, we therefore recommend as follows;

1. CPR/BLS training should be incorporated into the undergraduate medical curriculum with periodic refresher courses to improve knowledge retention and practical competence.
2. More simulation-based and hands-on CPR sessions should also be introduced to increase students' confidence and willingness to intervene during cardiac emergencies.
3. Awareness on legal protection for first responders should be promoted, as this may improve willingness to perform CPR.
4. Future studies involving students from other healthcare and non-healthcare disciplines across multiple institutions are recommended to provide broader insight into CPR preparedness among young people in Nigeria.

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