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ORIGINAL ARTICLE

KNOWLEDGE, ATTITUDE AND PRACTICE OF CARDIOPULMONARY RESUSCITATION AMONG NIGERIAN PHYSIOTHERAPISTS

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Objective: This study assessed the knowledge, attitude and practice of CardioPulmonary Resuscitation (CPR) among Nigerian physiotherapists.

Methods: This cross-sectional study involved 140 physiotherapists from seven selected hospitals in South-western Nigeria, yielding a response rate of 87.5%. A self-administered questionnaire that sought information on knowledge, attitude, and practice of CPR was used as the survey instrument. Data were also obtained on socio-demographic and occupational characteristics. Data was analyzed using descriptive and inferential statistics.

Results: More than half per cent, 63.6%, of the respondents had within poor to average knowledge of CPR, 45% of the respondents demonstrated positive attitude towards CPR while only 27.1% of respondents had ever performed CPR. The 92.1% of respondents answered questions seeking to know "when CPR is most effective" correctly and, 25% knows the correct compression to ventilation ratio. Only 20.7% knew the steps of CPR in the correct sequence and 18.6% knew the correct chest compression landmark. Mandatory training in CPR was recommended as graduation requirement for physiotherapy (92.1%).

Conclusion: Nigerian physiotherapists had poor to average knowledge but positive attitude towards CPR practice. Nigerian physiotherapists had a low CPR practice frequency attributable to the lack of opportunity to practice CPR or lack of adequate knowledge.

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INTRODUCTION

CardioPulmonary Resuscitation (CPR) is a vital life-saving procedure, which involves the combination of chest compressions and rescue breathing delivered to the victims who are thought to be in cardiac arrest [1]. CPR as the foundational technique for the emergency treatment of cardiac arrest [2] has been shown to protect brain viability after as much as 10 minutes without circulation[3], increase survival rates in cases of ventricular fibrillation from 20 to 40 percent [4] and consequently maintain neurologic function [5]. CPR as a basic life support is commonly a component of medical curriculum in the training of physicians [6] and in the qualification of licensed nurses [7]. The complexities in practice of CPR with respect to sequence, ratios of chest compression to ventilation has been modified and simplified for lay people in the developed countries; such that CPR should not be practiced exclusively by medical professionals [8]. The International Liaison Committee on Resuscitation in a consensus document strongly recommended that instruction in CPR be incorporated as a standard part of the school curriculum [9]. Similarly, the American Heart Association recommended that schools should establish a goal to train every teacher in CPR and first aid and train all students in CPR as part of their preparation for a response to medical emergencies on campus [10]. Furthermore, there has been increased interest in policy, legislation and practice of CPR [11, 12].

Previous researches have explored the knowledge, attitude and practice on CPR among physicians [6, 13,14], dentists [15,16], nurses [7,17,18], paramedical professionals [19], radiographers [20], university students [21], secondary school students [22] and the general public [23]. However, there seems to be a paucity of data on physiotherapists' knowledge, attitude and practice of CPR globally. Meanwhile, the physiotherapist works constantly at places that require knowledge of CPR, so it is important to assess the knowledge of these professionals on this topic with a view to advocate for curricula reviews and continuous education that will equip physiotherapists to improve patients care. This study assessed knowledge, attitude and practice of CPR among Nigerian physiotherapists.

METHODS

This cross-sectional study involved 140 physiotherapists in South-western Nigeria, yielding a response rate of 87.5% (i.e. 140/160). The physiotherapists were recruited from seven selected hospitals in South-Western Nigeria namely Obafemi Awolowo University Teaching Hospitals Complex Ile-Ife, University College Hospital, Ibadan, Lagos University Teaching Hospital, Lagos State University Teaching Hospital, National Orthopaedic Hospital Igbobi, Lagos, Island General Hospital, Lagos, Ladoke Akintola University of Technology Hospital, Osogbo and Osun State Hospital Asubiaro Osogbo. A self-administered questionnaire developed from three related studies [13,21,24] and subjected to expert reviewers for content validity was used as the survey instrument. The two-section questionnaire sought information on demographics and knowledge, attitude and practice of CPR. The questions were a combination of multiple choices and 5-points scale ranging from strongly agree 1 to strongly disagree 5. Ethical approval for this study was obtained from the Health Research Ethics Committee, of the Institute of Public Health (IPH) of the Obafemi Awolowo University, Ile-Ife, Nigeria. The Heads of Departments of the selected physiotherapy clinics provided permission for conducting the study and each respondent gave signed consent.

DATA ANALYSIS

Data were summarized using descriptive statistics of mean, standard deviation, and frequency distribution. Inferential statistic of Chi square test was used to test the association of level of knowledge, attitude, and practice of physiotherapists with CPR. Alpha level was set at $p < 0.05$.

COMPUTATIONS

The multiple-choice questions, which assessed knowledge, were transformed into yes and no representing right and wrong answers respectively. The multiple choice questions which assessed attitude were also transformed into yes and no to represent a positive attitude and a negative attitude respectively. The 5-point like structure, which assessed largely attitude, was collapsed during the analysis into 3

groups 'agree' (i.e. strongly agree, agree), 'indifferent' and 'disagree' (i.e. disagree and strongly disagree).

RESULTS

The majority of the respondents were females (52.1%), age less than 30 years (43.6%) with physical therapy Bachelor's degree (65.7%). The 62.9 % of the respondents work in the teaching hospitals setting and had between 5 to 10 years of work experience (24.3%). More than a half of the respondents answered correctly to questions seeking to know "when CPR is most effective", the best way to open the

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airway prior to giving mouth-to-mouth ventilation and for the chance of saving a victim when CPR is performed correctly. The socio-demographic characteristics are shown on Table 1. Table 2 shows the frequency distribution of correct responses to knowledge questions on CardioPulmonary Resuscitation. Table 3 shows the attitude of the respondents toward CPR. Only 18.6% respondents feel that their knowledge of CPR is sufficient. Table 2 shows the assessment of respondents' knowledge on CPR.

Table 1: Socio-demographic characteristics of the respondents

Variable	Frequency (n)	Percentage (%)
Sex		
Male	67	47.9
Female	73	52.1
Religion		
Christianity	117	83.6
Islam	23	16.4
Marital status		
Single	56	40
Married	84	60
Qualification		
BSc/BMR/BPT	92	65.7
MSc	47	33.6
Phd	1	0.7
Year of experience		
1 years	33	23.6
2-5 years	33	23.5
5-10 years	34	24.3
10-15 years	28	20.0
15-20 years	9	6.4
> 20 years	3	2.1
Work setting		
State hospital	52	37.1
Teaching hospital	88	62.9

Key: BSc, Bachelor of Science (PT); BMR, Bachelor of Medical Rehabilitation (PT); BPT, Bachelor of Physiotherapy; MSc, Master of Science and PhD, Doctor of Philosophy

Table 2: Frequency distribution of correct responses to knowledge questions on CardioPulmonary Resuscitation

Item	n (%)
1.CPR is most effective R: When started immediately after the patient collapse	129 (92.1)
2. The recommended compression to ventilation ratio R: 3:2	35 (25)
3. Victims are to be given another rescue breathe R: If the chest does not rise after delivering the first rescue breathe	37 (26.4)
4. The recommended chest compression to be performed each minute when giving CPR is R: 100	45 (32.1)
5. The best way to open the airway prior to giving mouth-to-mouth ventilation is R: To tilt the head back and lift the chin up	124 (88.6)
6. The chest compression landmark on adult is at R: The centre of the chest	26 (18.6)
7. Chest compressions should be performed on an infant R: With two fingers of one hand while doing CPR	62 (44.3)
8. The steps of CPR in the correct sequence is R: Compression, maintain a patent airway and artificial breathing	29 (20.7)
9. The CAB of resuscitation represents R: C= Compression, A= Airway, B= Breathing	A= 122(87.1) B= 121(86.4) C= 69 (47.3)
10. The chance of saving a victim when CPR is performed correctly is R: 75	72 (51.4)
11. When dealing with a conscious choking patient, the treatment or action to be taken is R: An abdominal thrust (also called Heimlich maneuver)	55 (39.3)
12. Children become adults in CPR terms by R: 12 years	51 (36.4)

R: represent response to questions

Table 3: Frequency distribution of 'Yes' or 'No' responses to attitude questions on CardioPulmonary Resuscitation

Item	n (%)
1. Would you want to perform mouth-to-mouth ventilation during CPR?	94 (67.1)
2. Do you feel that your knowledge of CPR is sufficient?	26 (18.6)
3. Would you want to learn CPR techniques?	129 (92.1)
4. Would you abstain from performing CPR to?	116 (82.9)
5. Do you think CPR training course should be	
** - Mandatory for all physiotherapy students (graduation requirement)**	129 (92.1)
** - Mandatory for physicians and nurses only**	13 (9.3)
** - Mandatory for Cardio-pulmonary PT only**	11 (7.9)
** - Optional**	8 (5.7)
6. Best method to increase awareness of CPR among Nigerian PTs is to	
** - Encourage increase publicity**	54 (38.6)
** - Encourage CPR training in Continuous Professional Development**	96 (68.6)
** - Encourage free training courses for physiotherapists**	57(40.7)
** - Encourage CPR training in school**	65 (46.4)
7. I would feel unsure of how to react when present at the scene	44 (31.4)
8. I would feel nervous to be brought face to face with a situation requiring CPR	48 (34.3)
9. I would consider it my duty to intervene in a situation requiring CPR	115 (82.1)
10. I would feel secure in my CPR knowledge	90(64.3)
11. I would feel anxious to perform CPR	77 (55)
12. I know what to do if cardiac arrests occur	96 (68.6)
13. I would act instinctively to perform CPR	98 (70)
14. I would see CPR as a chance to help	124 (88.6)
15. I would need gloves, face mask and other items relevant for self protection to act	62 (44.3)
16. I would prefer not to perform the mouth to mouth ventilation during CPR	76 (54.3)

Table 4: Chi - Square test of association between knowledge of CardioPulmonary Resuscitation and socio-demographic and occupational characteristics

Variable	Knowledge level of CardioPulmonary Resuscitation				
	Poor	Average	Good		
	n (%)	n (%)	n (%)	χ^2	*p* - value
Gender					
Male	23 (34.3)	19 (28.44)	25 (37.3)	0.344	0.842
Female	23 (31.5)	24 (32.9)	26 (35.6)		
Religion					
Islam	7 (30.4)	6 (26.1)	10 (43.5)	0.616	0.735
Christianity	39 (33.3)	37(31.7)	41 (35.0)		
Marital status					
Single	15 (26.8)	16 (28.6)	25 (44.6)	2.655	0.103
Married	31 (36.9)	27 (32.1)	26 (31.0)		
Age					
<30 years	14 (23.0)	17 (27.9)	30 (49.1)	3.658	0.301
30 – 40 years	21 (36.8)	20 (35.1)	16 (20.1)		
40 – 50 years	10 (52.6)	5 (26.3)	4 (21.1)		
>50 years	1 (33.3)	1 (33.3)	1 (33.3)		
Education					
Bsc	34 (36.6)	23 (24.7)	36 (38.7)	4.780	0.092
Msc	12 (25.5)	20 (42.6)	15 (31.9)		
Year's of experience					
1 years	7 (21.9)	7 (21.9)	18 (56.2)	13.954	0.175
2 – 5 years	9 (26.5)	12 (35.3)	13 (38.2)		

BSc, Bachelor of Science (PT); MSc, Master of Science

Table 5: Chi-square test of association between attitude and socio-demographic and occupational characteristic

	Attitude			
	Negative	**Positive**		
Variable	**n (%)**	**n (%)**	**χ^2**	**_p_ - value**
Gender				
Male	31 (42.3)	36 (53.7)	3.958	0.047*
Female	46 (55.4)	27 (32.5)		
Religion				
Islam	10 (43.5)	13 (56.5)	1.476	0.224
Christianity	67 (57.3)	50 (42.7)		
Marital status				
Single	40 (71.4)	16 (28.6)	10.178	0.001*
Married	37 (44.0)	47 (56.0)		
Age				
<30 years	41 (67.2)	20 (32.8)	7.147	0.067
30 – 40 years	25 (43.9)	32 (56.1)		
40 – 50 years	10 (52.6)	9 (47.4)		
>50 years	1 (33.3)	2 (66.7)		

*Indicates significance of association at $p < 0.05$

The majority agreed that CPR training should be a mandatory graduation requirement for physiotherapy students and that the best method to increase awareness of the importance of CPR among physiotherapists is to encourage CPR training in continuous professional development. A majority of the respondents had never performed CPR while 27.1% reported to have carried out resuscitation on someone before. 67.1% of the respondents had never encountered a situation that required the use of CPR. Only 37.1% of the respondents had taken a CPR training course. 63.6% of the respondents (i.e. sum of percentages of respondents that had poor or average knowledge of CPR) had poor to average knowledge of CPR. The frequency for poor, average and good knowledge level of CPR was 32.9%, 30.7% and 36.4% respectively. Furthermore, 45% of the respondents had positive attitude towards CPR. Chi- square test of association results indicated that there was no significant association between knowledge about CPR and the socio-demographic and occupational characteristics ($p > 0.05$) (table 4). There was no significant association between attitude towards CPR and each of age, religion, years of experience and work setting ($p > 0.05$). However, there was significant positive association between attitude towards CPR and

Table 6: Chi-square test of association between practice of CardioPulmonary Resuscitation and socio-demographic and occupational characteristics

Practice of of CardioPulmonary Resuscitation

Variable	No (%)	Yes (%)	χ^2	*p* - value
Gender				
Male	49 (73.1)	18 (26.9)	0.005	0.944
Female	53 (72.6)	20 (23.4)		
Religion				
Islam	21 (91.3)	2 (8.7)	4.736	0.030*
Christianity	81 (69.2)	36 (30.8)		
Marital status				
Single	45 (80.4)	11 (19.6)	2.655	0.103
Married	57 (67.9)	27 (32.1)		
Age				
<30 years	47 (77.0)	14 (23.0)	3.658	0.301
30 – 40 years	37 (64.9)	20 (35.1)		
40 – 50 years	16 (84.2)	3 (15.8)		
>50 years	2 (66.7)	1 (33.3)		
Education				
Bsc	70 (75.3)	23 (24.7)	0.815	0.367
Msc	32 (68.1)	15 (31.9)		
Year's of experience				
1 years	25 (78.1)	7 (21.9)	13.077	0.023*
2 - 5 years	24 (70.6)	10 (29.4)		
5 - 10 years	28 (82.4)	6 (17.6)		
10 - 15 years	15 (53.6)	13 (46.4)		
15 - 20years	9 (100.0)	0 (0.0)		
>20 years	1(33.3)	2 (66.7)		
Work setting				
States hospital	35 (67.3)	17 (32.7)	1.288	0.256
Teaching hospital	67 (76.1)	21 (23.9)		

*Indicates significance of association at *p* < 0.05. BSc, Bachelor of Science (PT); MSc, Master of Science

each of gender (p = 0.047), marital status (p = 0.001) and educational level (p = 0.014) showing better results on female, married and higher education degree persons (table 5)**.** Furthermore, there was no significant association between practice of CPR and each of gender, marital status, educational level, work setting and age (p > 0.05). However, there was significant positive association between practice of CPR and each of religion (p = 0.030) and years of experience (p = 0.023) showing better results among those of Christian religion and those with 10 -15 years of work experience (table 6)**.**

DISCUSSION

This study assessed knowledge, attitude and practice of CPR among Nigerian physiotherapists. The results revealed that Nigerian physiotherapists had some baseline theoretical knowledge on the principles and practice of CPR as indicated by the frequency of correct responses to knowledge questions. However, about 64% of the physiotherapists had within poor to average knowledge of CPR on the overall score. Comparison of this study's findings is hamstrung by the apparent dearth of CPR studies specific to physiotherapists. Nonetheless, this study's result is consistent with some earlier Nigerian studies indicating poor and unsatisfactory knowledge among doctors and nurses [25,26]. Some earlier studies in other populations have also revealed poor and unacceptable practice of CPR among health care professionals [18,27]. From this study, no significant association was observed between physiotherapists' knowledge of CPR and socio-demographic and occupational characteristics. However, educational qualification, gender and marital status significantly influenced the physiotherapists' attitude towards CPR. Furthermore, religion and years of experience significantly influenced the physiotherapists' practice of CPR. The finding of this study showed that more than 50% of the physiotherapists had positive attitude towards CPR and a majority of them (92.1%) agreed that CPR training should be a mandatory graduation requirement for physiotherapy while only a few of them have taken courses in CPR. This result is consistent with some earlier findings among paramedical professionals [19] and university students [21] indicating positive attitude and

readiness to perform CPR despite poor knowledge about the procedures. Having a positive attitude but poor knowledge about CPR procedure may lead to wrong practice which instead of life-saving may portend a dangerous dimension. However, a majority of Nigerian physiotherapists had never performed CPR nor encountered a situation that required the use of CPR. The finding on low practice level of CPR may be due to lack of opportunity to practice CPR or lack of adequate knowledge. This finding may also be associated with the current physiotherapy practice milieu in some settings in Nigeria, where physiotherapists work largely in the outpatient departments and not in settings like the accident and emergency, intensive care and other specialized care centers where their competence in CPR may have been tested. Physiotherapists are an integral part of the multi-disciplinary health care system and are perceived to have basic skills and knowledge that are needed to perform CPR. Many times, physiotherapists may be expected to provide emergency care while carrying out their duties and/or alongside or in the absence of a physician in the event of a cardiac arrest or other conditions requiring CPR. Unfortunately, many physiotherapists in Nigeria had no previous training in CPR in school and also do not have any post-qualification training in CPR. This may have accounted for the poor to average knowledge and low practice rate of CPR among them. Furthermore, practice of CPR in Nigeria is still largely within the sphere of the medical profession, unlike in the developed countries where the school pupils and the general public are taught and expected to be competent in CPR methods [8-10]. In order to strengthen physiotherapists' position and advocacy for first contact practice and also improve the outcome of patients who may suffer a cardiac arrest, mandatory resuscitation training in physiotherapy education curricula and continuous professional development in CPR is recommended in Nigeria. The potential limitations of this study include its non-probability sampling and the relatively small sample size, which may limit the external validity of the findings. This cross-sectional survey was carried out in selected facilities in South-western, Nigeria. However, the region has the largest concentration of physiotherapists and training institution for physiotherapy. There is need for

national level survey on knowledge, attitude and practice of CPR among physiotherapists to validate the findings of this present study. There is also the need for more studies on physiotherapists' knowledge, skills and competence towards emergency situations as these may further enhance the global advocacy for professional autonomy of physiotherapy within the health care system.

CONCLUSION

Nigerian physiotherapists had poor to average knowledge but positive attitude towards CPR practice. Nigerian physiotherapists had a low CPR practice frequency attributable to lack of opportunity to practice CPR or lack of adequate knowledge.

CONFLICT OF INTEREST

The authors declared none.

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REFERENCES

1. American Heart Association (AHA) summary. Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care". Circulation. 2010; 122 (18 Suppl 3): S640–56.

2. Chen X, Zhang R, Fu Y, Wang T. Survey of knowledge of cardiopulmonary resuscitation in nurses of community-based health services in Hainan province. Al Ameen J Med Sci. 2008 1(2): 93-98.

3. Angelos M, Safar P, Reich H. External cardiopulmonary resuscitation preserves brain viability after prolonged cardiac arrest in dogs. Amer. J. Emerg. Med. 1991;9:436-443.

4. Pearn J. Successful cardiopulmonary resuscitation outcome reviews. Resuscitation. 2000;47:311-316.

5. Sanders AB, Kern KB, Bragg S, Ewy GA. Neurologic benefits from the use of early cardiopulmonary resuscitation. Ann. Emerg. Med.1987;16(2):142-146.

6. Fullagar CJ, Prasad NH, Brown LH, Anaya N. State requirements for physician emergency medical services providers. Prehosp Emerg Care. 2010; 14(2):164-6.

7. Nursing: Mandatory Requirements for Clinical Nursing Courses. Ferris State University. http://www.ferris.edu/htmls/colleges/alliedhe/Nursing/BSN/require.htm. Accessed 12/06/2014.

8. Hazinski MF, Nolan JP, Billi JE, Böttiger BW, Bossaert L, de Caen AR et al. Part 1: Executive summary: 2010 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations. Circulation. 2010; 122 (16 Suppl 2): S250–75.

9. Chamberlain DA, Hazinski MF. European Resuscitation Council; American Heart Association; Heart and Stroke Foundation of Canada; Australia and New Zealand Resuscitation Council; Resuscitation Council of Southern Africa; Consejo Latino-Americano de Resuscitación. Education in resuscitation. Resuscitation. 2003;59(1):11-43.

10. Hazinski MF, Markenson D, Neish S, Gerardi M, Hootman J, Nichol G, et al. American Heart Association Emergency Cardiovascular Care Committee. Response to cardiac arrest and selected life-threatening medical emergencies: the medical emergency response plan for schools. A statement for healthcare providers, policymakers, school administrators, and community leaders. Pediatrics. 2004 Jan;113(1 Pt 1):155-68.

11. Cave DM, Aufderheide TP, Beeson J, Ellison A, Gregory A, Hazinski MF et a. Council on Cardiovascular Disease in the Young. www.heart.org. Accessed 15/05/2014.

12. Resuscitation Council (RC) United Kingdom. Decisions relating to cardiopulmonary resuscitation. A joint statement from the British Medical Association, the Resuscitation Council (UK) and the Royal College of Nursing. www.resus.org.uk. Accessed 14/06/2014.

13. Ong MEH, Yap S, Chan KP, Sultana P, Anantharaman V. Knowledge and attitudes towards cardiopulmonary resuscitation and defibrillation amongst Asian primary health care physicians. Open Access Emergency Medicine 2009:1 11–20.

14. Chew FKS, Mohd Hashairi F, Ida Zarina Z, Shaik Farid AW, Abu Yazid MN, Nik Hisamuddin NA. A Survey on The Knowledge, Attitude and Confidence Level of Adult Cardiopulmonary Resuscitation Among Junior Doctors

in Hospital Universiti Sains Malaysia and Hospital Raja Perempuan Zainab II, Kota Bharu, Kelantan, Malaysia. Med J Malaysia. 2011; 66(1):56-9.

15. Boddu S, Prathigudupu RS, Somuri AV, Lingamaneni KP, Rao P, Kuchimanchi PK. Evaluation of knowledge and experience among oral and maxillofacial surgeons about cardiopulmonary resuscitation. J Contemp Dent Pract. 2012; 1;13(6):878-81.

16. Sopka S, Biermann H, Rossaint R, Knott R, Skorning M, Brokmann JC et al. Evaluation of a newly developed media-supported 4-step approach for basic life support training. Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine 2012, 20:37.

17. Parajulee S and Selvaraj V. Knowledge of Nurses Towards Cardiopulmonary Resuscitation in a Tertiary Care Teaching Hospital in Nepal. Journal of Clinical and Diagnostic Research. 2011;5(8): 1585-1588.

18. Silva JMS, Steremberg S, Valença MP. Nurses' knowledge, attitude, and practice when facing cardiac arrest and cardiopulmonary resuscitation. J Nurs UFPE online. 2012;6(6):14 95- 9.

19. Roshana S, Batajoo KH, Piryani RM, Sharma MW. Basic life support: knowledge and attitude of medical/paramedical professionals. World J Emerg Med. 2012;3(2):141-145.

20. Edomwonyi NP and Egbagbe EE. The level of awareness of Cardio–Pulmonary Resuscitation (CPR) amongst radiographers in Nigeria. Journal of Biomedical Sciences. 2006;5(1):29-35.

21. Al-Turki YA, Al-Fraih YS, Jalaly JB, Al-Maghlouth IA, Al-Rashoudi FH, Al-Otaibi AF et al. Knowledge and attitudes towards cardiopulmonary resuscitation among university students in Riyadh, Saudi Arabia. Saudi Medical Journal. 2008; 29(9): 1306-1309.

22. Kanstad BK, Nilsen SA, Fredriksen K. CPR knowledge and attitude to performing bystander CPR among secondary school students in Norway. Resuscitation. 2011;82(8):1053-9.

23. Cheung BM, Ho C, Kou KO, Kuong EE, Lai KW, Leow PL et al. University Of Hong Kong Cardiopulmonary Resuscitation Knowledge Study Group. Knowledge of cardiopulmonary resuscitation among the public in Hong Kong: telephone questionnaire survey. Hong Kong Med J. 2003;9(5):323-8.

24. Källestedt M-LS, Berglund A, Herlitz J, Leppert J, Enlund M. The impact of CPR and AED training on healthcare professionals' self-perceived attitudes to performing resuscitation. Scand J Trauma Resusc Emerg Med. 2012; 20: 26.

25. Sadoh WE, Osariogiagbon W. Knowledge and practice of cardiopulmonary resuscitation amongst doctors and nurses in Benin city, Nigeria. Nig Hosp Pract 2009; 3(1&2):12-16 .