International Journal of Scientific Research and Management (IJSRM)
||Volume||5||Issue||11||Pages||7510-7517||2017||
Website: www.ijsrm.in ISSN (e): 2321-3418
Index Copernicus value (2015): 57.47 DOI: 10.18535/ijsrm/v5i11.21

Impact of Age and Sex on Bystander Cardiopulmonary Resuscitation Knowledge

Adedamola Olutoyin Onyeaso, Onyeadikachi Oluferanmi Onyeaso
Senior Lecturer
Department of Human Kinetics and Health Education
Faculty of Education
University of Port Harcourt Port Harcourt, Nigeria
Medical Doctor
Department of Community and Social Medicine
University of Port Harcourt Teaching Hospital Port Harcourt, Nigeria

Corresponding Author: Dr. Adedamola O. Onyeaso, Department of Human Kinetics and Health Education, Faculty of Education, University of Port Harcourt, Nigeria.

Abstract
Objective: To assess the impact of age and sex on the bystander CPR Knowledge in a group of Nigerian student teachers.
Materials and Methods: A quasi-experimental study design was used with the cohort made up of forty one (41) male and forty one (41) female undergraduate students of Physical and Health Education with 40 participants in the 17-20 years age group and 42 participants belonging to the 21-28 years of age bracket were randomly selected from the larger main cohort for analysis of possible impact of age and sex on their pre-training and post-training cardiopulmonary resuscitation knowledge. In addition to the descriptive statistics, one-way analysis of variance (ANOVA) was used to test the null hypotheses generated with significance level set at $P < 0.05$.
Results: No significant age impact was found on the pre-training and post-training CPR knowledge of the student teachers ($P > 0.05$). However, there was a positive impact of male gender on post-training CPR knowledge of the participants ($P < 0.001$).
Conclusion: Although age could not impact significantly on the cardiopulmonary resuscitation knowledge of the participants, male gender significantly impacted on the post-training cardiopulmonary resuscitation knowledge of the cohort.

Keywords: CPR knowledge, Age, Gender, Impact, Nigeria

1. Introduction

Bystander cardiopulmonary resuscitation (CPR) can increase the likelihood of survival from out-of-hospital cardiac arrest.[1-8] Cardiopulmonary resuscitation (CPR) programme in schools has been receiving increasing global attention because of its great potential in increasing the number of potential bystander CPR providers not only in schools' environments but ultimately in the larger communities.[9-11]

Teachers are encouraged to play central roles in the implementation of cardiopulmonary resuscitation (CPR) worldwide where the CPR programmes are available in the schools' systems.[12-15] Despite the various challenges to the effective CPR programmes in schools, many countries of the world have made meaningful progress in line with the initial effort by Norway.[16-19]

According to Kanstad et al, [16] young people are potentially important bystander CPR providers, as basic life support (BLS) training can be distributed widely as part of the school curriculum. In Nigeria, few earlier reports have shown the willingness, ability to learn and retain CPR knowledge and skills by some secondary

school students and their desire to have it incorporated in Nigerian school system .[21-23] Their enthusiasm can only be sustained and concretized if and when the teachers are adequately trained to become trainers in schools when the Nigerian Government eventually runs with this innovation in line with international expectation. However, the knowledge and attitude of teachers globally have been shown to impact on the effectiveness of CPR programmes in schools.[24-26]

Various factors have been reported to have varying effects on the incidence, outcomes of out-of-hospital cardiac arrests (OHCA), as well as the impact of demographics such as age and sex on effective bystander CPR provision.[27-31] Recently, two reports on bystander CPR involving Nigerian teachers have been documented.[32, 33] Meanwhile, more baseline data is still needed in this advocacy for possible incorporation of bystander CPR training in Nigerian schools and further contribution to the body of knowledge in this subject.

Therefore, this report aims at investigating into the possible impact of age and sex on the bystander cardiopulmonary resuscitation knowledge of some student teachers who are the future potential teachers for the Nigerian school system. It was hypothesized that: 1. there would be no significant age impact on the pre-training and post-training CPR knowledge of the student teacher; 2. there would be no significant differences in the pre-training and post-training CPR knowledge of the student teachers with respect to sex.

2. Materials and Methods

2.1 Study Design and Setting

This is part of major quasi-experimental cohort study design carried out in the Department of Human Kinetics and Health Education, Faculty of Education, University of Port Harcourt, Port Harcourt, Nigeria in June, 2017.

2.2 Participants

Forty one (41) male and forty one (41) female undergraduate students of Physical and Health Education with 40 participants in the 17-20 years age group and 42 participants belonging to the 21-28 years of age bracket were randomly selected from the larger main cohorts for analysis of possible impact of age and sex on their pre-training and post-training cardiopulmonary resuscitation knowledge.

The student teachers in the Department of Human Kinetics and Health Education were admitted in 2015 through an established quota system that ensures fair representation from all the states in Nigeria during the admission process. They are to graduate with Bachelor degree in Education with bias in either Human Kinetics or Health Education. By their training they are expected to teach in primary or secondary schools in the country.

2.3 The Null hypotheses

We generated and tested the following null hypotheses:

Ho1: That there would be no significant age impact on the pre-training and post-training CPR knowledge of the student teachers.

Ho2: That there would be no significant differences in the pre-training and post-training CPR knowledge of the student teachers with respect to sex.

2.4 Stage 1 (Pre-training)

A questionnaire containing a section for the demographic data of the participants and a section having the questions testing their knowledge of cardiopulmonary resuscitation (CPR), as well as a section on modified AHA 'Skills Evaluation Guide' for assessment of their CPR skills. Prior to the teaching and training on CPR, all of them answered the questions on CPR knowledge.

2.5 Stage 2 (Training and Immediate Post-training)

The teaching on CPR was carried out for 60 minutes using both power points projections and video films in line with internationally accepted standards [34], followed by the process of training the same participants on hands-on and re-assessment which took another 3 hours.

2.6 Determination of Poor and Good CPR knowledge

For the seven (7) questions on CPR knowledge, those who scored four (4) questions and above right were considered as having 'Good CPR knowledge.' Meanwhile, any score less was considered to belong to 'Poor CPR knowledge'.

2.7 Statistical Analysis

The Statistical Package for Social Sciences (SPSS) was used to analyze the data. In addition to descriptive statistics, analysis of variance (ANOVA) was used in the analysis and testing of the null hypotheses with significance level set at $P < 0.05$.

3. RESULTS

Table 1 provides the frequency distribution of age against the pre- and post-training CPR knowledge of the student teachers with similar patterns in both pre-training and post-training CPR knowledge of the participants.

Table 1: Frequency distribution of age against the pre- and post-training CPR knowledge of the student teachers

Number of question items on CPR knowledge correctly answered	**Age Group 1 (17-20 years)**		**Age Group 2 21-28 years)**	
	Pre-training	Post-training	Pre-training	Post-training
0	1(2.4%)	----	1(2.4%)	
1	2(4.8%)	---	7(16.7%)	
2	6(14.3%)	3(7.1%)	13(31.0%)	1(2.4%)
3	14(33.3%)	2(4.8%)	7(16.7%)	2(4.8%)
4	14(33.3%)	13(31.0%)	6(14.3%)	13(31.0%)
5	1(2.4%)	9(21.4%)	4(9.5%)	13(31.0%)
6	2(4.8%)	13(31.0%)	4(9.5%)	13(31.0%)
7	---	---	---	---

Tables 2 and 3 show the testing of the first null hypothesis using the analysis of variance (ANOVA) which is accepted ($P > 0.05$).

Table 2: Age against the pre-training CPR knowledge of the participants tested using ANOVA

		Sums of Square	Df	Mean Square	F	Sig
Group1	Between Groups	4.365	2	2.182	1.535	.229
	Within Groups	52.610	37	1.422		
	Total	56.975	39			
Group 2	Between Groups	3.012	2	1.506	1.036	.365
	Within Groups	53.763	37	1.453		
	Total	56.775	39			

Table 3: Age against the post-training CPR knowledge of the participants tested using ANOVA

		Sums of Square	Df	Mean Square	F	Sig
Group1	Between Groups	17.901	6	2.983	1.164	.348
	Within Groups	89.718	35	2.563		
	Total	107.619	41			
Group 2	Between Groups	3.628	6	.605	.554	.764
	Within Groups	38.206	35	1.092		
	Total	41.833	41			

Table 4 shows the frequency distribution of sex against the pre- and post-training CPR knowledge of the participants. The post-training CPR knowledge of the male participants gives clearly better post-training CPR knowledge. Table 5 confirms the positive impact of male gender on post-training CPR knowledge of the participants ($P < 0.001$), thereby rejecting the second hypothesis.

Table 4: Frequency distribution of sex against the pre- and post-training CPR knowledge of the student teachers

	Male		Female	
Number of question items on CPR knowledge correctly answered	**Pre-training**	**Post-training**	**Pre-training**	**Post-training**
0	1(2.4%)	----	1(2.4%)	----
1	6(14.6%)	----	3(7.3%)	----
2	12(29.3%)	2(4.9%)	7(17.1%)	2(4.9%)
3	7(17.1%)	2(4.9%)	14(34.1%)	12(29.3%)
4	8(19.5%)	13(31.7%)	12(29.3%)	14(34.1%)
5	1(2.4%)	11(26.8%)	4(9.8%)	13(31.7%)
6	6(14.6%)	13(31.7%)	---	---
7	-----	-----	-----	----

Table 5: Sex against the pre-training and post-training CPR knowledge of the participants tested using ANOVA

		Sum of Square	df	Mean Square	F	Sig
Pre-training						
	Between Groups	.110	1	.110	.053	.819
	Within Groups	166.585	80	2.082		
	Total	166.695	81			
Post-training	Between Groups	14.098	1	14.098	13.697	.000
	Within Groups	82.341	80	1.029		
	Total	96.439	81			

$P < 0.001$(for post-training CPR knowledge)

4. Discussion

This quasi-experimental cohort study of future Nigerian teachers has shown that although age could not impact significantly on the cardiopulmonary resuscitation knowledge of the participants, male gender significantly impacted on the post-training cardiopulmonary resuscitation knowledge of the cohort

Wang et al[35] reported that male gender had statistically significant relationship with cardiopulmonary resuscitation, especially with the quality of chest compressions. Although our present report is on CPR knowledge, their finding which is on CPR skills is comparable to ours. Meanwhile, Swor et al[36] found bystander age as a predictor of CPR performance in CPR-trained bystanders but not gender in their report. However, the age of laypersons of more than 62 years and male gender were associated with shallower chest compressions.[37] Leary et al [38] found that older adults were able to learn CPR faster than others. The current finding of no significant impact of age on the cardiopulmonary resuscitation knowledge of the participants could be due to the fact that the age range of the participants shows that they were all young. In fact, it has been reported that children as young as 9 years of age could learn CPR and carry out adequate chest compressions since the body mass index (BMI) or strength plays a role in the effectiveness of skills performance.[39, 40] Their retention level of CPR knowledge and skills after months of initial training was found to be good, according to the opinion of Austria scientists based on research.[39] In South Africa, age was one of the demographic factors that influenced the knowledge and skills of cardiopulmonary resuscitation.[41]

Jaafar et al[42] reported that females were significantly faster than males in carrying out the chest compressions while participants with less BMI than the study mean were providing more correct chest compressions depth than those with BMI more than the study mean. An earlier Nigerian study showed that while age had statistically significant influence on attitude of some Nigerian students to cardiopulmonary resuscitation, gender did not.[43] In another similar study, [44] it was reported that neither age nor gender had any significant effect on the cardiopulmonary resuscitation skills of some Nigerian students who were trained on bystander cardiopulmonary resuscitation.

Due to the association between socioeconomic status and bystander CPR and survival of out-of-hospital cardiac arrest (OHCA), it has been suggested that bystander CPR training should be encouraged in the lower socioeconomic settings.[45] Nigeria is a developing economy with poverty still very much prevalent. It is very imperative to intensify advocacy on bystander CPR.

Strength and Limitations of the study

Although the sample could be seen as fairly representative by reason of the representative nature of the undergraduate students (student teachers) admitted into the University of Port Harcourt (being a Federal Government University), the cohort cannot be a perfect representation of the student teachers in Nigerian Universities. It becomes necessary to replicate this study involving at least a University from the three main geo-political zones in the country in order to have a better representation of the future teachers in Nigeria**.** In addition, this larger sample will probably involve wider age range of the participants.

4.1 Conclusion

Although age could not impact significantly on the cardiopulmonary resuscitation knowledge of the participants, male gender significantly impacted on the post-training cardiopulmonary resuscitation knowledge of the cohort.

4.2 Recommendation

As mentioned above, this study should be repeated in a national study with larger sample size of the cohort which will help in increasing the awareness of bystander CPR among Nigerian potential future school teachers in the advocacy for inclusion of cardiopulmonary resuscitation training into the Nigerian school system and

References

1. Wik L, Kramer-Johansen J, Myklebust H, Sorebo H, Svensson L, Fellows B, Steen PA. Quality of cardiopulmonary resuscitation during out-of-hospital cardiac arrest. JAMA 2005; 293(3): 299-304.
2. Daya MR, Schmicker RH, Zive DM, Rea TD, Nichol G, Buick JE, et al. Resuscitation Outcomes Consortium Investigators. Out-of-hospital cardiac arrest survival improving over time: Results from the Resuscitation Outcomes Consortium (ROC) Resuscitation. 2015; 91: 108-15.
3. Berdowski J, Berg RA, Tijssen JG, Koster RW. Global incidences of out-of-hospital cardiac arrest and survival rates: systematic review of 67 prospective studies. Resuscitation 2010; 81: 1479-87.
4. Cho H, Moon S, Park SJ, Han G, Park JH, Lee H, et al. Out-of-hospital cardiac arrest: incidence, process of care, and outcomes in an urban city, Korea. Clin Exp Emerg Med 2014; 1(2): 94-100. http://dx.doi.org/10.15441/ceem.14.021
5. Strategies to Improve Cardiac Arrest Survival: A Time to Act. The Public Experience with Cardiac Arrest. Committee on the Treatment of Cardiac Arrest: Current c and Future Directions, Board of Health Sciences Policy, Institute of Medicine, Graham R, McCoy MA, Schultz AM, editors. Washington (DC): National Academies Press (US); 2015Sep 29.
6. Strategies to Improve Cardiac Arrest Survival: A Time to Act. Understanding the Public Health Burden of Cardiac Arrest: The Need for National Surveillance. Committee on the Treatment of Cardiac Arrest: Current Status and Future Directions, Board of Health Sciences Policy, Institute of Medicine, Graham R, McCoy MA, Schultz AM, editors. Washington (DC): National Academies Press (US); 2015Sep 29.
7. Chan PS, McNally B, Tang F, Kellermann A. CARES Surveillance Group. Recent trends in survival from out-of-hospital cardiac arrest in the United States. Circulation. 2014; 130(21): 1876-82.
8. Hasselqvist-Ax RN, Riva G, Herlitz J, Rosenqvist M, Hollenberg J, Nordberg P, R et al. Early cardiopulmonary resuscitation in out-of-hospital cardiac arrest. N Engl J Med. 2015; 373:1572-1574. DOI: 10.1056.NEJMc 1509059.
9. Lockey AS, Barton K, Yoxall H. Opportunities and barriers to cardiopulmonary resuscitation training in English secondary schools. Eur J Emerg Med 2016; 2395): 381-5.doi:10.1097/MEJ.0000000000000307.
10. Hazinski MF, Markenson D, Neish S, Geradi M, Hootman J, Nichol G, Taras H, Hickey R, O'Connor R, Pottos J, Van der Jagt E, Berger S, Schexnayder S, Garson A Jr., Doherty A, Smith S.

American Heart Association; American Academy of Pediatrics; American College of Emergency Physicians; American National Red Cross; National Association of School Nurses; National Association of State EMS Directors; National Association of EMS Physicians; National Association of Emergency Medical Technicians; Program For School Preparedness and Planning National Center For Disaster Preparedness Columbia University Mailman School of Public Health. 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. Ann Emerg Med. 2004; 43**:** 83-99.

11. Rahman NHNA, Sheng CK, Kamauzaman THT, et al. A multicenter controlled trial on knowledge and attitude about cardiopulmonary resuscitation among secondary school children in Malaysia. Int J Emerg Med 2013; 6: 37. https//doi.org/10.1186/1865-1380-6-37.
12. Compton S, Swor RA, Dunne R, Weich RD, Zalennskt RJ. Urban public school teachers' attitudes and perceptions of the effectiveness of CPR and Automated External Defibrillators. Am J Health Educ 2003; 34(4): 186-192.
13. Miro O, Jimenez-Fabrega X, Espigol G, Culla A, Escalada-Roig X, Diaz N, Salvador J, Abad J, Sanchez M. Teaching basic life support to 12-16 year olds in Barcelona schools: views of head teachers. Resuscitation 2006; 70: 107-16.
14. Chew KS, Yazid MN, Kamarul BA, Rashidi A. Translating knowledge to attitude: a survey on the perception of bystander cardiopulmonary resuscitation among dental students in Universiti Sains Malaysia and school teachers in Kota Bharu, Kelantan. Med J Malaysia 2009; 64(3): 205-9.
15. Joseph N, Narayanan T, Bin Zakaria S, Nair AV, Belayutham L, Subramarian AM, Gopakumar KG. Awareness, attitudes and practices of first aid among school teachers in Mangalore, South India. J Prim Health Care 2015; 7(4): 274-81.
16. Kanstad BK, Nilsen SA, Fredriksen K. CPR knowledge and attitude to attitude to performing bystander CPR among students in Norway. Resuscitation 2011; 82(8): 1053-9. DOI:10.1016/j.resuscitation.2011.03.033.
17. Mathiesen WT, Hoiland S, Bjorshol CA, Soreide E. Why do bystanders initiate CPR in Norway?Resuscitation.2012;83:e41.DOI:http://dx.doi.org/10.1016/j.resuscitation.2012.08.103?
18. Zinckernagel L, Hansen CM, Rod MH, Folke F, Torp-Pedersen C, Tjornhoj-Thomsen T. A qualitative study to identify barriers to deployment and student training in the use of automated external defibrillators in schools. BMC Emerg Med 2017; 17: 3 DOI: 10.1186/s12873-0114-9.
19. Zinckernagel L, Hansen CM, Rod MH, Folke F, Torp-Redersen C, Tjornhoj-Thomsen T. What are the barriers to implementation of cardiopulmonary resuscitation training in secondary school? A qualitative study. BMJ Open 2016; 6: e010481. Doi: 10.1136/bmjopen-2015-010481.
20. Onyeaso AO. Awareness of Cardiopulmonary Resuscitation among secondary school students in Port Harcourt, Nigeria. Journal of Education in Developing Areas, 2014; 22(1): 137-14.
21. Onyeaso AO, Achalu EI. Knowledge of Cardiopulmonary Resuscitation among secondary school students in Nigeria. J Educ Pract 2014; 5(15): 180-183.
22. Onyeaso AO, Onyeaso CO. Cardiopulmonary Resuscitation skills in some Nigerian secondary school students. Port Harcourt Med J 2016; 10(2): 60-65.
23. Onyeaso AO. Retention of Cardiopulmonary Resuscitation skills in Nigerian secondary school students. J Educ Pract 2016; 7(15): 162-168.
24. Patsaki A, Pantazopoulos I, Dontas I, Passali C, Papadimitriou L, Xanthos T. Evaluation of Greek high school teachers' knowledge in basic life support, automated external defibrillation, and foreign body airway obstruction: implications for nursing interventions. J Emerg Nurs 2012; 38: 176-81.
25. Mpotos N, Vekerman E, Monsieurs K, Derese A, Valcke M. (2013). Knowledge and willingness to teach cardiopulmonary resuscitation: A survey amongst 4273 teachers. Resuscitation 2013; 84: 496-500.
26. Al Enizi BA, Saquib N, Zaghloul MS, Shahid M Saquib J. Knowledge and attitude about Basic Life Support among secondary school teachers in Al-Qassim, Saudi Arabia. Int J Health Sci (Qassim) 2016; 10(3): 415-422.

27. Takei Y, Nishi T, Matsubara H, Hashimoto M, Inaba H. Factors associated with quality of bystander CPR: the presence of multiple rescuers and bystander-initiated CPR without instruction. Resuscitation 2014; 85(4): 492-8.
28. Papalexopoulou K, Chalkias A, Dontas I, Pliatsika P, Giannakakos C, Papapanagiotou P, et al. Education and age affect skill acquisition and retention in lay rescuers after a European Resuscitation Council CPR/AED course. Heart Lung 2014; 43(1): 66-71.
29. Lopez-Gonalez A, Sanchez-Lopez M, Rovira-Gil E, Gonzalez-Garcia A, Ferrer-Lopez V, Martinez-Vizcaino V. Sex differences in the effort indicators during cardiopulmonary resuscitation manoeuvres on manikins. Eur J Emerg Med. 2015; 22(1): 62-5.
30. Sasson C, Magid DJ, Chan P, Root ED, McNally BF, Kellermann AL, Haukoos JS. Association of Neighborhood Characteristics with Bystander-initiated CPR. N Engl J Med. 2012; 367: 1607-1615.
31. Chiang WC, Ko PCI, Chang AM, Chen WT, Liu SSH, Huang YS, et al. Bystander –initiated CPR in an Asian metropolitan: Does the socioeconomic status matter? Resuscitation 2014; 85(1): 53-58.
32. Onyeaso AO, Onyeaso OO. Theoretical knowledge of cardiopulmonary resuscitation among some Nigerian primary and secondary school teachers Asian J Med Health 6(4): 1-10.
33. Onyeaso AO, Onyeaso CO. Nigerian Public Primary and Secondary School Teachers' Knowledge and Attitude towards Cardiopulmonary Resuscitation Int J Adv Res 2016; 5(1): 89-95.
34. RESUSCITATION SCIENCE, American Heart Association (AHA). CPR & First Aid, Emergency a nd Cardiovascular Care. CPR & ECC Guidelines.https://eccguideline.heart.org/index.php/circulation /cpr-ecc-guidelines-2/part-5-adult-basic-life-support-and-cardiopulmonary resuscitation quality
35. Wang J, Zhuo C, Zhang L, Gong Y, Yin C, Li Y. Performance of cardiopulmonary resuscitation duri ng prolonged basic life support in military medical university students: A manikin study. World J Em erg Med 2015; 6(3): 179-185.
36. Swor R, Khan I, Domeier R, Honeycutt L, Chu K, Compton S. Cardiopulmonary training and CPR p erformance: Do CPR-trained Bystanders perform CPR? Acad Emerg Med 2006; 13(6): 596-601. doi :10.1197/j.aem.2005.12.021.
37. Leary M, Buckler DG, Ikeda DJ, Saraiva DA, Berg RA, Nadkarni VM, Blewer AL, Abella BS. The association of layperson characteristics with the quality of simulated cardiopulmonary resuscitation p erformance. World J Emerg Med 2017; 8(1): 12-18.
38. Lynch B, Einspruch EL, Nichol G, Becker LB, Aufderheide TP, Idris A. Effectiveness of 30-min CP R self-instruction program for lay responders: a controlled randomized study. Resuscitation 2005; 67 : 31-43.
39. Paddock C. Kids As Young As 9 Can And Should Learn CPR Life Support Say Researchers. MEDI CAL NEWS TODAY. Friday, July 31, 2009. Last accessed on October 20, 2017.
40. RESPONSE INSTITUTE. CPR CONSULTANTS Training Center. What Age Should Children Lear n CPR? Last Accessed on October 20, 2017.
41. Veronese J-P, Wallis L, Allgaier R, Botha R. Cardiopulmonary resuscitation by Emergency Medical Services in South Africa: Barriers to achieving high quality performance. Afr J Emerg Med (2017) http://dx.doi.org/10.1016/j.afjem.2017.08.005
42. Jaafar A, Abdulwahab M, Al-Hashemi E. Influence of Rescuers' Gender and Body Mass Index on C ardiopulmonary Resuscitation According to the American Heart Association 2010 Resuscitation Guidelines. International Scholarly Research Notices Volume 2015 (2015) Article ID 246398, 5 pages. https://dx.doi.org/10.1155/2015/246398.
43. Onyeaso AO, Achalu EI. Influence of Age, Gender and School Class of Nigerian Secondary School Students on Their Attitude towards Cardiopulmonary Resuscitation J Health Sci 2016; 6(3): 43-47. doi:10.5923/j.health.20160603.02
44. Onyeaso AO, Onyeaso CO. Effects of Age, Gender, School Class on Cardiopulmonary Resuscitation Skills of Nigerian Secondary School Students. J Educ Pract 2016; 7(18): 44-48.
45. Vaillancourt C, Lui A, De Maio VJ, Wells GA, Stiell IG. Socioeconomic status influences bystander CPR and survival rates for out-of-hospital cardiac arrest victims. Resuscitation 2008; 79(3): 417-423. DOI:10.1016/j.resuscitation.2008.07.012