

Community Intervention- Teaching
Cardiopulmonary Resuscitation in Two
Schools in Madrid

Cristina Sicorschi Gutu*, Maria Jose Alarcon Gallardo and Marisela Roure Vasquez

Family Medicine Trainees, Hospital Clinico San Carlos, Spain

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*Corresponding author

Cristina Sicorschi Gutu, Family Medicine Trainees, Hospital Clinico San Carlos, Madrid, Spain, Tel: +34 913 30 30 01; Email: crsicorschi@gmail.com

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Abstract

Background: Coronary heart disease is the most important cause of death in the world. In Europe, cardiovascular disease represent 40% of total deaths among people aged less than 75 years and sudden cardiac arrest 60% of death in adults with coronary heart disease. Immediate cardiopulmonary resuscitation can double or even triple the survival of cardiac arrest.

Objectives: The main objective of the study was to increase knowledge of first aid among school students. This study also aimed to establish how much influence has variables like sex, parents' educational background, social and economical factors over learning.

Methods: Two schools, one public in a disadvantaged neighborhood and one private in one of the richest areas of Madrid, Spain were selected. CPR training consisted of theoretical lesson followed by practice on manikins. Multiple choice questionnaires were provided before and after the training. The results were processed using central and dispersion-tendency statistics.

Results: In total, 85 school students aged between 14 and 19 year-old completed the training. Only 10.6 % of the students received previous training. Pre-test score was higher among public school students, but post-test evaluation showed better results among private school students. The parent's educational background didn't influence the outcomes.

Introduction

Cardiac arrest is a major public health issue. Sudden out-of-hospital cardiac arrest is the third leading cause of death in industrialised nations. Alone in Europe, more than 350.000 people are affected yearly [1]. Survival rate can increase up to two-three times when cardiac arrests are witnessed and attended by persons able to provide immediate resuscitation [2-4].

Training Basic Life Support among general population provides appropriate first aid and improves outcomes. Several Scandinavian studies prove the successful resuscitation courses of adults among school students.

Therefore, the aim of this study was to describe learning outcomes among school students, trained and supervised by medical trainees.

Methods

Study design and participants

In this quasi-experimental study, convenience sampling was done by emailing different private and public schools in Madrid, Spain. One private and one public school were willing to participate. In total 85 Students aged between 14 and 19 were collected. School students were taught in groups of 20-35 participants and the directors of each of these schools approved the project.

Teaching Material

The students completed at the beginning of the teaching session the multiple-choice questionnaire. After the pre-test the students had a one-hour theoretical class about Cardiac Life Support with different slides and videos explaining individual skills (reanimation in adults, reanimation in kids and other emergencies like unconsciousness, acute hemorrhages and choking) [5-7]. During practical exercises that lasted an average of one hour, the students were divided into small training groups with manikins. They practiced the full sequence of cardiopulmonary resuscitation, including the use of Automated External Defibrillator (AED) and the techniques were corrected by the instructors. Finally they had clinical cases which were needed to be solved in teams. After the practical session the same questionnaire used as post-test was completed.

Instructors

Three medical trainees from Hospital Universitario San Carlos of Madrid, all of them Advanced Cardiovascular Life Support (ACLS) Provider, trained the students. The trainees participated in all the activities, theoretical and practical.

Instrument for analysis

A multiple choice questionnaire comprising 10 questions were provided. Each question had 5 possible answers, with only one correct answer and maximum 10 points (see Appendix).

The questionnaire was based on the theoretical class and assessed the following items: general knowledge of CPR, the sequence of procedures and other emergency situations like acute hemorrhage, epileptic seizure or chokes.

Statistical analysis

Statistical analysis was performed using the SPSS v.22.0 software for Windows. The managing of the primary data obtained through the tests consisted of the application of central and dispersion-tendency statistics. The results of qualitative analysis were descriptive. Quantitative variables have been reported as means and Confidence

Intervals were set at 95 %. The comparison of means and their not overlapping confidence intervals allowed establishing the statistical significance, since the sample size is small.

Results

A total of 85 students completed the CPR training. The composition was as follows: 31 male and 54 female. 90% was between 15 and 17 years-old (Table 1). Previous CPR training had only 10,6 % of students. 65 students had health professional parents. In the pre-test questionnaire students obtained 3.48 points 95% CI (3.47 - 4.13), while in the post-test questionnaire 7.25 points 95% CI (6.94-7.55) (Table 2). In the pre-test women scored less than men (3.48 points 95% CI 3.10-3.87). This difference was lost after the training intervention (Table 3).

The public school scored significant better in the pre-test questionnaire [4.25 95% CI (3.84-4.65) vs. 3.06 95% CI (2.61-3.52)], but after the training a turn-over was observed [7.84 95% CI (7.31-8.38) in private school vs. 6.89 95% CI (6.54-7.24) in public] (Tables 4 & 5).

Finally no significant difference was observed among students with parents who are healthcare professionals (4.0 points vs. 3.75) (Table 6).

Table 1: Frequency tables.

Schools					
		Frequency	Percentage	Valid percentage	Accumulated percentage
	Public	53	62,4	62,4	62,4
	Private	32	37,6	37,6	100
	Total	85	100,0	100	
Sex					
		Frequency	Percentage	Valid percentage	Accumulated percentage
Válids	Men	31	36,5	36,5	36,5
	Women	54	63,5	63,5	100,0
	Total	85	100,0	100,0	
Age					
		Frequency	Percentage	Valid percentage	Accumulated percentage
Válid	14	1	1,2	1,2	1,2
	15	29	34,1	34,1	35,3
	16	29	34,1	34,1	69,4
	17	19	22,4	22,4	91,8
	18	6	7,1	7,1	98,8
	19	1	1,2	1,2	100,0
	Total	85	100,0	100,0	
Previous first aid training					
		Frequency	Percentage	Valid percentage	Accumulated percentage
Válid	no	76	89,4	89,4	89,4
	yes	9	10,6	10,6	100,0
	Total	85	100,0	100,0	
Pre-test					
		Frequency	Percentage	Valid percentage	Accumulated percentage

Válid	1	6	7,1	7,1	7,1
	2	7	8,2	8,2	15,3
	3	28	32,9	32,9	48,2
	4	16	18,8	18,8	67,1
	5	18	21,2	21,2	88,2
	6	6	7,1	7,1	95,3
	7	3	3,5	3,5	98,8
	8	1	1,2	1,2	100,0
	Total	85	100,0	100,0	
Post-test					
		Frecuency	Percentage	Valid Percentage	Acc. Percentage
Válid	2	1	1,2	1,2	1,2
	3	1	1,2	1,2	2,4
	4	2	2,4	2,4	4,7
	5	2	2,4	2,4	7,1
	6	13	15,3	15,3	22,4
	7	31	36,5	36,5	58,8
	8	20	23,5	23,5	82,4
	9	12	14,1	14,1	96,5
	10	3	3,5	3,5	100,0
	Total	85	100,0	100,0	

Table 2: Pre-test and post-test scores.

			Statist.	Error tip.
Pre-test	Mean		3,80	0,164
	95% Confidence Interval	inferior	3,47	
		superior	4,13	
	Mean 5%		3,77	
	Median		4,00	
	Variance		2,281	
	Standard Deviation		1,510	
	Mín		1	
	Máx		8	
	Range		7	
	Interquartile range		2	
	Asymmetry		0,285	0,261
	Kurtosis		-0,020	0,517
Post-test	Mean		7,25	0,154
	95% Confidence Interval	inferior	6,94	
		superior	7,55	
	Mean at 5%		7,33	
	Median		7,00	
	Variance		2,022	
	Standard Deviation		1,422	
	Mín		2	
	Máx		10	
	Range		8	
	Interquartile range		1	
	Asymmetry		-0,857	0,261
	Kurtosis		2,147	0,517

Table 3: Sex.

	sex			Statistical	Error típ.
Pre-test	Men	Mean		4,35	0,276
		95% Confidence Interval	inferior	3,79	
			superior	4,92	
		5% Mean		4,34	
		Median		4,00	
		Variance		2,370	
		Standard Deviation		1,539	
		Mín		1	
		Max		8	
		Range		7	
		Interquartile range		2	
		Asymmetry		0,292	0,421
		Kurtosis		0,172	0,821
		Women	Mean		3,48
	95% Confidence Interval		inferior	3,10	
			superior	3,87	
	5% Mean			3,46	
	Median			3,00	
	Variance			1,990	
	Standard Deviation			1,411	
Mín			1		
Max			7		
Range			6		
Interquartile range		2			
Asymmetry		0,207	0,325		
Kurtosis		-0,258	0,639		
Post-test	Men	Mean		7,32	0,214
		95% Confidence Interval	inferior	6,88	
			superior	7,76	
		5% Mean		7,28	
		Median		7,00	
		Variance		1,426	
		SD		1,194	
		Min		5	
		Max		10	
		Range		5	
		Interquartile range		1	
		Asymmetry		0,577	0,421
		Kurtosis		0,188	0,821
		Women	Mean		7,20
	95% Confidence Interval		inferior	6,78	
			superior	7,63	
	5% Mean			7,32	
	Median			7,00	
	Variance			2,392	
	SD			1,547	
Min			2		
Max			10		
Range			8		
Interquartile range		1			
Asymmetry		-1,181	0,325		
Kurtosis		2,197	0,639		

Table 4: Public school.

			Statist.	Error tip.
Pre-test	Mean		4,25	0,203
	95% Confidence Interval	inferior	3,84	
		superior	4,65	
	5% Mean		4,25	
	Median		4,00	
	Variance		2,189	
	SD.		1,479	
	Min		1	
	Max		8	
	Range		7	
	Interquartile range		2	
	Asymmetry		-0,034	0,327
	Kurtosis		0,266	0,644
	Post-test	Mean		6,89
95% Confidence Interval		inferior	6,54	
		superior	7,24	
5% Mean			6,97	
Median			7,00	
Variance			1,602	
SD.			1,266	
Min			2	
Max			9	
Range			7	
Interquartile range			1	
Asymmetry			-1,317	0,327
Kurtosis			3,822	0,644

Table 5: Private school.

			Statist.	Error tip.
Pre-test	Mean		3,06	0,224
	95% Confidence Interval	inferior	2,61	
		superior	3,52	
	5% mean		3,00	
	Median		3,00	
	Variance		1,609	
	SD		1,268	
	Min		1	
	Max		7	
	Range		6	
	Interquartile range		2	
	Asymmetry		0,888	0,414
	Kurtosis		1,945	0,809
	Post-test	Mean		7,84
95% Confidence Interval		inferior	7,31	
		superior	8,38	
5% Mean			7,93	
Median			8,00	
Variance			2,201	
SD			1,483	
Min			3	
Max			10	
Range			7	
Interquartile range			2	
Asymmetry			-1,106	0,414
Kurtosis			2,260	0,809

Table 6: No healthcare professional parents vs. healthcare professional parents.

No healthcare professionals					
				Statist.	Error tip.
Pre-test	Mean			3,75	0,18
	95% Confidence Interval	inferior		3,39	
		superior		4,11	
	5% Mean			3,73	
	Median			4	
	Variance			2,22	
	SD			1,49	
	Min			1	
	Max			8	
	Range			7	
	Interquartile range			2	
	Asymmetry			0,28	0,29
	Kurtosis			0,08	0,57
Post-test	Mean			7,28	0,16
	95% Confidence Interval	inferior		6,96	
		superior		7,59	
	5% Mean			7,34	
	Median			7	
	Variance			1,70	
	SD			1,30	
	Min			2	
	Max			10	
	Range			8	
	Interquartile range			1	
	Asymmetry			-0,96	0,29
	Kurtosis			3,41	0,57
Healthcare professionals					
				Statist.	Error tip.
Pre-test	Mean			4,00	0,41
	95% Confidence Interval			3,10	
				4,90	
	5% Mean			3,94	
	Median			3,5	
	Variance			2	
	SD			1,41	
	Min			2	
	Max			7	
	Range			5	
	Interquartile range			2	
	Asymmetry			0,69	0,64
	Kurtosis			0,14	1,23

Post-test	Mean		7,17	0,49
	95% Confidence Interval	inferior	6,09	
		superior	8,24	
	5% Mean		7,19	
	Median		7	
	Variance		2,88	
	SD		1,70	
	Min		4	
	Max		10	
	Range		6	
	Interquartile range		2,75	
	Asymmetry		-0,04	0,64
	Kurtosis		-0,31	1,23

Discussion

This study has demonstrated the effectiveness of first aid training among public and private schools. Students improved in both schools their scores in almost 3, 5 points, which is within the range if compared to similar studies [4-9]. What draws our attention is the poor level of CPR knowledge before the training (3, 8 points in the pre-test).

Regarding the social and economical factors (public vs. private) students from the public school scored better in the pre-test questionnaire. We believe such results were due to the previous knowledge of first aid training among some students. After the course the situation was reversed and the private school students showed greater retention of knowledge. We believe this could have been due to reduced number of students in every group in the private school and the higher motivation showed during the training [9,10].

Male students scored better than females at the pre-test, but after training such a significant difference was not found anymore.

It was also thought that having health professional's parents can influence the knowledge of first aid. Such significant difference was not observed in our study.

The BLS training of the general population is an important goal and this study has demonstrated the improvement of knowledge of first aid among school students. Considering that cardiac arrest occurs predominantly in the community, the effects of early community interventions are immense. School students can be educated effectively about first aid [11,12]. They are mature enough to know the importance of such trainings and have the required skills to perform effective cardiopulmonary resuscitation on adults. Additional advantages of such training in this population are the possibility of regular sessions in schools and the potential involvement and transfer knowledge to relatives.

Conclusion

The first aid training provided by medical trainees in schools was an effective learning method for students. With the obtained results in BLS education in schools more studies are needed, even among school teachers [10].

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