International Journal of Cardiovascular Sciences. 2016;29(6):443-452

ORIGINAL ARTICLE

Basic Life Support Knowledge and Interest Among Laypeople

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Abstract

Background: Laypeople can save lives and reduce sequelae in certain emergency situations if they have enough knowledge on Basic Life Support. Nonetheless, laypeople's knowledge of Basic Life Support has been little investigated in Brazil.

Objective: To investigate laypeople's knowledge, possible barriers and interest regarding Basic Life Support.

Methods: A questionnaire containing 30 questions was applied to a sample of 377 individuals. Chi-square and unpaired *t* test were calculated to assess the possible association between socioeconomic variables and the knowledge of Basic Life Support.

Results: Approximately 41.1% of the sample affirmed they knew what Basic Life Support was, but only 5.8% felt prepared to perform it, if needed. Nearly the whole sample considered the knowledge of Basic Life Support important and 89.9% would be available to take a Basic Life Support learning course. The average of correct answers was 37.8% ± 18.1%. This value was higher among subjects with higher level of education (38.6% ± 18.3%; p = 0.014) and among those who reported previous training in Basic Life Support (43.5% ± 17.8%; p = 0.002).

Conclusions: Laypeople recognize their role in the immediate care given to victims of certain emergency situations. Even though laypeople lack training, they show interest in learning Basic Life Support. (Int J Cardiovasc Sci. 2016;29(6):443-452)

Keywords: Cardiopulmonary Resuscitation; Data Collection; Health Education; Emergency Medical Services.

Introduction

Initial emergency care is known as Basic Life Support (BLS) and its application is crucial to save lives and prevent sequelae until a specialized team arrives at the event site.[1]

BLS includes Cardiopulmonary Resuscitation (CPR) maneuvers in Cardiopulmonary Arrest (CPA) victims, defibrillation using Automated External Defibrillators (AED) and airway clearance maneuvers due to the presence of a foreign body.[1,2] The recognition of these situations and the basic immediate care can be performed by laypeople, if they are appropriately informed and trained.[1-3]

According to North-American literature, four of five CPAs occur in the home environment and in over 80% of cases, victims die before reaching the hospital.[4] Although there are no solid statistics on these facts in Brazil, it is estimated that approximately 100,000 cases of CPA occur annually in non-hospital environments in the country.[5]

Due to the increasing number of deaths from cardiovascular causes, schools in several countries have been training thousands of first responders regarding the BLS basics.[6,7] In the national literature, there are few studies with specific statistics regarding the knowledge of the lay population about BLS.[8] However, as it involves risk situations that could be managed, with the potential

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DOI: 10.5935/2359-4802.20160064

Manuscript received July 28, 2016; revised manuscript September 30, 2016; accepted October 07, 2016.

to reduce morbidity and mortality caused by accidents and emergencies, it becomes necessary to deepen the knowledge of this subject in the country.

Failure to rescue is considered a crime under Art. 135 of the Brazilian Penal Code.[9] By definition, providing rescue means to protect, defend, or seek help and, more than an obligation, it is a matter of citizenship.

Given the potential of the matter involved (saving lives), the objective of the study was to investigate laymen's knowledge about the fundamentals of BLS, as well as their availability and interest in learning it; identify any impediments to its performance; and to know some factors (gender, level of schooling, income, and previous training) that may be associated to knowledge about BLS.

Methods

This is a cross-sectional, exploratory, and descriptive study, with quantitative characteristics.[10] This is an original applied research, carried out in the city of Juiz de Fora (MG), Brazil.

The municipality of Juiz de Fora has 561 census tracts distributed in seven demographic regions, according to the Demographic Census of the Brazilian Institute of Geography and Statistics (IBGE), 2010. The census tracts with the lowest population density were excluded from the sampling process, resulting in 341 Sectors, which comprised 70% of the city's total population. According to the estimated sample size, a rate of 4.5% was calculated, corresponding to 15 sectors to be surveyed. To guarantee sample homogeneity, three sectors of the central region and two sectors of each of the other regions were selected, and the selection of the census tracts was carried out with probabilities proportional to their size (resident population according to data from the 2010 Demographic Census).

In each sector, the two streets with the highest density of commercial centers, according to information provided by the Municipal Secretariat of Urban Development of the municipality, were selected. In each street, the questionnaire was applied to employees of commercial centers with an estimated minimum daily influx of 100 people, until the minimum calculated sample was reached. This approach strategy was determined by the greater likelihood of a possible emergency situation occurring in places with a higher number of circulating people. When the researcher did not find the qualified person in the sector for the interview, up to three visits were made at different times. In cases where the two streets covered in each census sector did not meet the minimum calculated sample number, surrounding streets were systematically addressed. Considering also that the interviewed individuals could reside in different streets or sectors of the commercial centers where they worked, this sample is widely distributed in the urban territorial area of the municipality and representative of the city population.

To calculate the sample size, the prevalence of knowledge about BLS was estimated at 30.0%, based on data from the literature.[8,11] The maximum accepted error was 4.5% and the confidence level was 95% for finite populations. Thus, the sample size was initially estimated at 365 people. Subsequently, 12% were added for possible losses due to refusals, totaling 410 individuals to be assessed. This sampling spectrum met the criteria and statistical needs.

The inclusion criteria were: to be a resident of the city of Juiz de Fora, to be 18 years of age or older, to work in places with an estimated daily influx of 100 people or more, and to be a lay person, that is, to have no special knowledge about BLS. Individuals who had already received some previous instruction or training in BLS, such as in Driver Training Centers (CFC), were considered laymen and maintained in the sample. On the other hand, health professionals or firefighters were not included, as they have specialized knowledge about BLS.

The questionnaires interrupted for any reason, those with incomplete data and non-return of the signed Free and Informed Consent Form (FICF) were considered as sample loss.

The data collection tool was a structured questionnaire consisting of 30 questions, including open-ended and multiple-choice questions. Part of the questions were adapted from the questionnaire validated by Pergola and Araújo[8] and part was incorporated based on the revised literature.[1-3,5] The questionnaire consisted of six fields for identification and socioeconomic characterization, 11 general questions addressing the participant's opinion and previous experience on the subject and 13 specific questions on BLS and first-aid, aiming to identify whether the individual knew the principles of BLS and the initial measures recommended in common emergency situations. For each of these 13 questions, there were three categories of possible answers: correct, incorrect

and "I do not know". Correction of the questions was performed based on the American Heart Association (AHA) BLS guidelines for adults of 2010,[2] being used at the time of the questionnaire application.

Participants were approached in a standardized manner by trained researchers, received detailed knowledge about the study and were invited to participate, voluntarily consenting to this participation by signing the FICF.

The researchers were trained to apply the research by conducting a pilot study with 12 individuals, not included in the sample, to identify problems regarding the understanding of questions, aiming to guarantee the quality of data collection and to attain better adherence of the interviewees.

Statistical Analysis

A descriptive and exploratory data analysis was performed using absolute frequencies (n), relative frequencies (%), Measures of Central Tendency (mean and median) and of variance (standard deviation). After the analysis of the frequencies, the sample was stratified according to age (≤ 29 and > 29 years), gender (male and female), income (≤ 5 and > 5 minimum wages) and level of schooling (up to complete Elementary School or complete High School or College/University).

To verify the association between the answers to each question and the socioeconomic variables, 2x2 contingency tables were generated, containing the absolute (n) and relative (%) frequencies and the chi-square test of independence (without correction) was performed. To verify the association between the level of knowledge about BLS (total mean of correct answers) and the socioeconomic variables and the presence or not of previous training, the unpaired t test was used, as the latter variable showed a normal distribution at the Kolmogorov-Smirnov test. The level of significance adopted in all tests was a p-value of 0.05 for a 95% confidence interval. The Statistical Package for Social Sciences (SPSS), version 15.0, of 2010 was used for the statistical analysis.

Participation in the research carried a minimal risk to the participants, that is, there was no interference by the researcher in any aspect of physical, psychological, and social well-being, as well as the privacy of participants, according to the parameters of Resolution 196/96 of the National Health Council / Ministry of Health, which deals with research involving human beings.

The research was carried out in the months following approval of the project by the Research Ethics Committee of Universidade Federal de Juiz de Fora (UFJF), under CAAE Opinion # 36153914.8.0000.5147.

Results

A total of 410 individuals were approached and, of this total, 18 (4.4%) refused to participate in the survey (refusal rate). Of the 392 interviewees, 15 (3.8%) met the criteria of sample loss, resulting in a sample of 377 individuals.

Regarding the sample characterization, the mean age was 31.9 ± 8.5 years and the median, 29. The distribution according to sex showed 59.7% of women and 40.3% of men. In relation to income, 71.1% reported having a family income equal to or less than five minimum wages and 28.9%, higher than this value. As for the level of schooling, 10.6% had completed Elementary School, 64.7% had finished High School, and 24.7% had finished College or University.

Of the total sample, 5.8% stated that, in fact, they felt prepared to apply BLS if they were faced with a possible emergency situation.

Most of the interviewees would not perform mouth-to-mouth resuscitation in a stranger and without protective equipment, mainly because they were unaware of the technique and for fear of contamination. Other reasons, such as "transmitting diseases to the victim," "fear" or "disgust" were also mentioned. On the other hand, most of the interviewees would do the chest compressions (Table 1).

The most often mentioned vital sign was heart rate ("pulse"), followed by respiration, blood pressure and temperature.

Regarding the position of the victim to have CPR performed, 47.5% answered correctly, noting that the victim should be "lying on his/her back, on a flat and hard surface", but 28.1% answered that the correct action is to "leave the victim in the position where he/she fell" or "in any position".

After the report of a situation in which an adult "choked and continued coughing," the interviewees were asked about the most appropriate course of action. Only 6.4% answered correctly, saying that it would be better not to intervene while the victim was still coughing. Most (84.1%) would perform some type of intervention not recommended by BLS, such as "patting their backs" (46.2%) and "trying to remove the object" (23.1%).

Regarding how to recognize CRA, 27.3% answered correctly, "unconscious individual without breathing", as recommended by the BLS algorithm for lay people.[2,4]

The question with the highest percentage of correct answers, 76.9%, was about the usefulness of the AED. Most pointed out that the AED should be used in the patient in CRA, while a minority answered it should be used in "stroke cases" or claimed they did not know.

Participants were also asked what would be the first action to be taken in an emergency on a highway, such as after "a collision between two vehicles." Only one-third of respondents checked the alternative that contained site safety verification, while 40.5% would do some intervention prior to this stage, including "cardiac massage" and "mouth-to-mouth" resuscitation.

Table 1 – Distribution of answers to general questions on Basic Life Support (BLS)

Questions	Answers n (%)			
Have you ever heard of BLS?	Yes 155 (41.1)			No 222 (58,9)
Have you witnessed any situation you considered an emergency?	Yes 194 (51.5)			No 183 (48.5)
If you have, what did you do?	SAMU 107 (55.2)	Firefighters 27 (13.9)	Nothing 18 (9.3)	Other 39 (20.2)
How do you feel in the face of an emergency situation?	Calm 153 (40.6)	Very nervous 162 (43.0)		Nervous 162 (43.0)
Would you do mouth-to-mouth resuscitation without protective equipment?	Yes 152 (40.3)			No 225 (59.7)
If not, for what reason?	Does not know how 103 (52.3)	Disease transmission 78 (39.6)		Other 12 (6.1)
Would you do cardiac massage on an unknown person?	Yes 214 (56.8)			No 163 (43.2)
If not, for what reason?	Does not know how 201 (94.0)			Other 13 (6.0)
Have you received any kind of BLS training?	Yes 75 (19.9)			No 302 (80.1)
If so, do you feel prepared to use it in an emergency situation?	Yes 22 (29.3)			No 53 (70.7)
In what situation, did you receive training on BLS?	CFC 34 (45.3)	Work environment 21 (28.0)	Army 12 (16.0)	Other 8 (10.7)
Should BLS only be performed by health professionals or firefighters?	Yes 59 (15.7)			No 318 (84.3)
Do you consider it important to learn BLS?	Yes 371 (98.4)			No 6 (1.6)
Would you participate in an SBV training?	Yes 339 (89.9)			No 38 (10.1)
If yes, why??	Help people, save lives 148 (45.3)			Learning 130 (38.3)
If not, why?	Not interested 13 (37.1)			Lack of time 10 (38.6)

SAMU: Mobile Emergency Care Service; CFC: Driver Training Center.

When questioned about what they would do if they found a patient who was unconscious and not breathing, 75.5% answered that they would call the Mobile Emergency Care Service (SAMU). Although this is, in fact, the recommended practice, only 52.4% of these individuals correctly mentioned the correct service number.

Regarding the correct moment to interrupt chest compressions, 44.0% stated that they would only do so if the victim "woke up" and / or "when a health care professional requested", but a significant portion would delay the compressions for other reasons, although the literature demonstrates the importance of not interrupting them during CPR for optimization of its effect.[2] Regarding the compression depth, 14.1% correctly indicated "at least 5 cm" and approximately 17.0% answered that the "thorax should sink as little as possible to avoid rib fractures". Additionally, only 1.3% answered that the frequency of chest compressions should be at least 100 compressions / minute, and most of the individuals answered that they did not know the value. It is worth mentioning that, according to the new 2015AHA guidelines, the depth of the compressions should be between 5 and 6 cm, and the frequency between 100 and 120 compressions per minute.[12]

If we consider only the 13 questions for which there were correct, incorrect answers and the "I do not know" option, that is, the questions that assessed the knowledge about the BLS, the mean number of correct answers in the sample was 4.9 questions, which corresponds to 37.8% ± 18.1%. Additionally, only 50 subjects (13.3%) correctly answered more than 60% of the questions, and 109 (29%) got less than 30% of them. Table 2 represents the performance of the sample for each of these questions.

When the sample was stratified by age, based on the median value (29 years), three questions showed statistically significant differences in response patterns. One of them was about having already witnessed some type of emergency. While 46.3% of individuals aged ≤ 29 years answered "Yes", this value was 56.7% among older individuals (PR = 66%, p = 0.044). Younger individuals more frequently offered a correct answer on how to differentiate a CRA from a syncope (32.6% vs. 21.9%, PR = 72%, p = 0.02), and the first attitude one should take in the presence of an unconscious person in a safe place (87.4% vs. 79.9%, PR = 76%, p = 0.044).

Regarding gender, four questions were statistically different between the groups, with three of them showing men had greater knowledge of BLS. It was observed that 34.9% of the men and 22.2% of the women knew how to recognize a CRA (PR = 87.0%, p = 0.007); 84.2% of the men and 72.0% of the women knew in which situation to use the AED (PR = 107%, p = 0.006); and 53.3% of the men and 37.8% of the women knew when to stop the cardiac massage (PR = 88.0%, p = 0.003). On the other hand, 87.6% of the women would call the SAMU in the presence of someone unconscious and not breathing, while 77.6% of the men would intervene in other ways, such as initiating CPR or changing the victim's position (PR = 51%; P = 0.011).

3Regarding the level of schooling, when asked about what they would do in the presence of an "adult choking and coughing", 15.1% of individuals that had finished High School or College/University answered correctly, against a 4.6% of correct answers among those with lower levels of schooling (PR = 27.0%, p = 0.001).

Three questions were statistically significant when the sample was stratified among those who declared family income less than or equal to five minimum wages and those with higher income. The first one refers to what they would do in the presence of a " adult choking": 11.9% of the individuals with higher income answered correctly, compared to 5.2% among those with lower income (PR = 40.0%, p = 0.022). Regarding the usefulness of the AED, 85.3% of the individuals with higher income answered correctly, compared to 73.5% of respondents with lower income (PR = 47.7%, p = 0.014). The latter referred to the position of the victim for the CPR procedure, with 57.8% of correct answers among those with higher income and 43.7% among those with lower income (PR = 55.7%; p = 0.011).

Regarding the mean total performance in the different groups, greater knowledge was observed among males, with higher level of schooling, higher income and those that had received some type of previous training in BLS, with these differences being statistically significant. There was no difference in BLS knowledge according to age (p = 0.798). The results of the t-test are shown in Table 3 and summarized in Figure 1.

Table 2 – Distribution of answers on the actions to be taken in urgency or emergency situations

SAMU telephone number	192 199 (52.79%)	193 62 (16.45%)	190 35 (9.28%)	Others 28 (7.43%)	I don't know 53 (14.06%)
Correct vital signs	None 186 (49.34%)	1 104 (27.59%)	2 78 (20.69%)	3 8 (2.12%)	4 1 (0.27%)
Situations			**Correct**	**Incorrect**	**I don't know**
Verify the place safety before starting BLS			126 (33.4%)	153 (40.6%)	98 (26.0%)
Choking adult who keeps coughing			24 (6.4%)	317 (84.1%)	36 (9.5%)
Differentiate CRA from syncope			103 (27.3%)	36 (9.6%)	238 (63.1%)
What to do in the presence of an unconscious patient that is not breathing			286 (75.6%)	58 (15.4%)	33 (8.8%)
Place the individual on a hard surface to initiate the compressions			161 (42.7%)	211 (56.0%)	5 (1.3%)
Position of the victim's body to perform the compressions			179 (47.5%)	106 (28.1%)	92 (24.4%)
Area of the body where to perform the compressions			193 (51.2%)	95 (25.2%)	89 (23.6%)
Depth of compressions			53 (14.1%)	98 (26.0%)	226 (60.0%)
Frequency of compressions			5 (1.3%)	44 (11.7%)	328 (87.0%)
When to interrupt the compressions			166 (44.0%)	99 (26.8%)	112 (29.7%)
Usefulness of AED			290 (76.9%)	79 (21.0%)	8 (2.1%)

SAMU: Mobile Emergency Care Service; CRA: cardiorespiratory arrest; AED: automated external defibrillator.

Table 3 – Results of the unpaired *t* test in relation to knowledge about Basic Life Support (BLS)

Variables		n	Mean correct answers (%)	Standard Deviation (%)	t test	p value
Age	≤ 29 years	189	37.5	18.4	0.26	0.798
	> 29 years	188	38.0	17.8		
Gender *	Male	152	42.0	17.3	3.76	< 0.001
	Female	225	35.0	18.1		
Level of schooling*	Elementary School	40	31.2	14.8	2.46	0.014
	High School or College / University	337	38.6	18.3		
Income*	≤ 5 MW	268	36.2	17.8	2.72	0.007
	> 5 MW	109	41.7	18.3		
Previous training*	Yes	75	43.5	17.8	3.10	0.002
	No	302	36.3	17.9		

**Statistically significant difference at the unpaired t teste ($p < 0.05$). MW: minimum wages.*

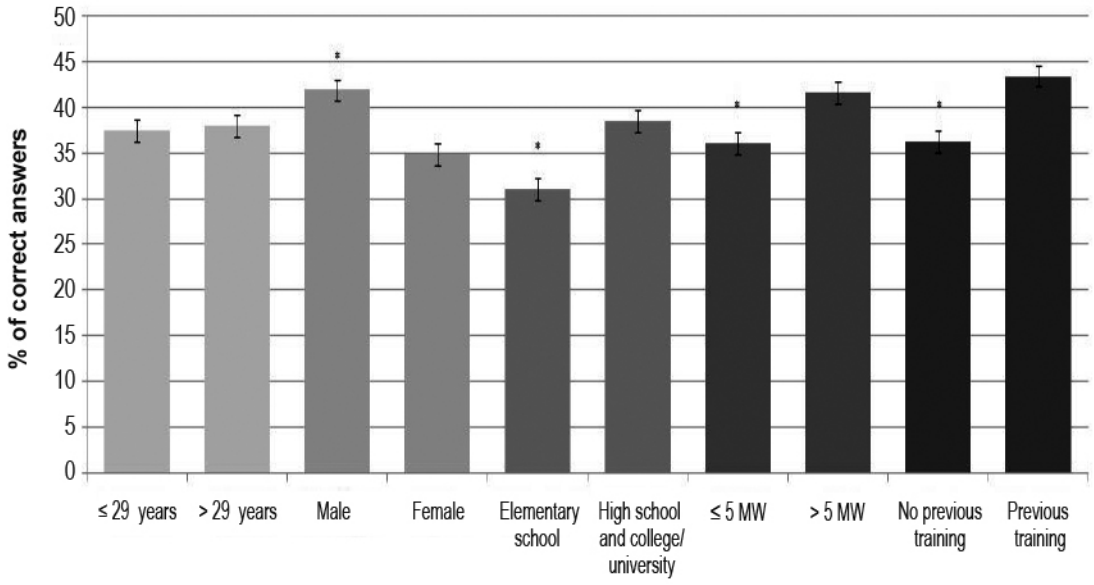

Figure 1 – *Comparison of the knowledge on Basic Life Support (BLS) according to the variables addressed in the study. Values expressed as mean ± standard error. Statistically significant difference by unpaired t test ($p < 0.05$). MW: minimum wage; BLS: Basic Life Support.*

Discussion

Even though most respondents stated they had already witnessed an emergency situation, a very small proportion showed satisfactory knowledge about the BLS, reinforcing the special attention that this subject deserves in our country.

To verify whether an unconscious individual is breathing is crucial to recognize a CRA and, thus, to call the emergency care service and initiate chest compressions.[2] Four of five participants did not mention breathing as a vital sign, implying that in a real emergency, lay people are not prepared to identify a CRA, delaying or even preventing prompt and appropriate care, so important in such cases.

Although many participants answered they would call the Fire Department or the Military Police, instead of the SAMU number, calling an established department already represents an advantage for those who would not call any place for help. In many cities, there is a partnership between the Fire Department and SAMU, allowing interaction between services and greater agility in rescue services for the population. It is important to remember that the activation of SAMU not only allows rapid dispatch of specialized rescue, but can also provide important guidance for lay rescuers, facilitating victim care.[11]

In relation to airway obstruction by a foreign body, it is recommended that the rescuer does not interfere while the victim is still coughing, but remain attentive if any action becomes necessary, such as airway-clearing maneuvers.[1] Most of the sample would perform some early intervention, such as "patting on the back" of the person and "trying to remove the object," which would be harmful by interfering with the mechanism of coughing. These data show that the sample had insufficient knowledge and even some incorrect information for the initial response in emergency situations.

Regarding cardiac massage in CRA victims, most participants had a basic notion of the technique, such as the positioning of the victim and the part of the body where the compressions should be performed. However, regarding the depth and frequency of compressions, for instance, the rate of correct answers was minimal. In this sense, as shown by some national studies,[13,14] it is emphasized that training with dummies can significantly improve knowledge about CPR and the quality of chest compressions.

Given the importance of defibrillation in the context of CRP, the AHA recommends the installation of

portable defibrillators in crowded public places such as airports, bus stations, shopping malls, drugstores, and supermarkets.[15] A positive result of the study was the acknowledgement by a large part of the sample about the usefulness of the AED. However, in Brazil, there is still no national legislation regulating this measure, so that only one of the commercial centers where data collection was carried out for this study had an AED.

Overall, the number of correct answers from the sample was unsatisfactory. The greater degree of knowledge observed among individuals with higher levels of education emphasizes the importance of addressing this matter in educational institutions, as in developed countries.[7] In Brazil, some studies have shown that there is an immediate and late increase in BLS knowledge among high school students after theoretical-practical training.[16]

Less than a fifth of the sample had already received some type of training or course on BLS. This number is similar to that found in a study carried out in the Portuguese population, where this value corresponded to 17.8% of the sample.[17] This percentage is still small, considering that the effectiveness of these courses has already been widely demonstrated as a way to reduce morbidity and mortality associated with emergencies.[7,18]

Knowledge about BLS showed no association with age, suggesting that the new generations remain without adequate training. Therefore, there does not seem to be an expectation of increasing knowledge about BLS over the years, requiring that measures be taken to modify this trend.

Despite not being aware of the currently followed guidelines, the sample, in general, showed solidarity to help provide care, even if this attitude exposes the individual to certain risks. One example is that, although mouth-to-mouth resuscitation is no longer recommended by BLS for laymen,[2] 40.3% of the sample answered that they would perform it in a stranger, even without protective equipment and among those who would not, the predominant justification was the lack of knowledge on the technique.

A promising aspect was the acknowledgement of almost the entire sample on the importance of learning about BLS. Additionally, a large portion answered they were interested in having some training and declared that BLS should not be performed exclusively by health professionals. These results show that the sample lay people recognize their relevance in the initial care of victims in risk of death situations, that they are interested in it, but lack training and guidance.

The courses offered by the AHA, a worldwide reference for their quality and reliability, appear as a model of training to be implemented or followed.[2] However, for this idea to become a reality in Brazil, it is necessary that educational institutions, companies, and public agencies come together to implement programs to offer these courses.

The focus of such training could include individuals working in places with a large influx of people, as they have a greater chance of witnessing an emergency. The offer of BLS courses could become a requirement of companies when hiring these employees. Subsequently, the initiative could be extended to representatives of neighborhoods, educational institutions, etc.

In addition, as demonstrated in the national and international literature,[19-21] and corroborated by our study of poor performance even among those who reported having received some training on the subject, skill retention is a major problem in BLS courses, since its maneuvers are not often used and, therefore, are forgotten. Consequently, the training should be constantly recycled to consolidate knowledge. For this purpose, training dummies could be used, which guarantee a greater proximity to reality, as well as video courses and printed materials for consultation, which would increase knowledge, as well as time of contact of the participant with the subject.

This study was limited to the evaluation of theoretical knowledge of lay people about BLS, not being able to verify their practical skills. Therefore, studies that evaluate beyond the theoretical knowledge are necessary. The online platform training appears as a new training option, requiring future studies that can demonstrate the effectiveness of this type of approach.

Conclusions

The study sample disclosed an important lack of knowledge regarding Basic Life Support, with small differences according to socioeconomic variables. The main obstacle to early care by lay people in emergency situations seems to be the lack of guidance and training, considering that they recognize their role and have shown an interest in learning Basic Life Support techniques. Thus, training measures would probably have great adherence and repercussion, making the

layperson able to act in the initial care of emergencies in extra-hospital environments.

Author contributions

Conception and design of the research: Chehuen Neto JA, Brum IV, Pereira DR, Santos LG, Moraes SL, Ferreira RE. Acquisition of data: Chehuen Neto JA, Brum IV, Pereira DR, Santos LG, Moraes SL, Ferreira RE. Analysis and interpretation of the data: Chehuen Neto JA, Brum IV, Pereira DR, Santos LG, Moraes SL, Ferreira RE. Statistical analysis: Chehuen Neto JA, Brum IV, Pereira DR, Santos LG, Moraes SL, Ferreira RE. Writing of the manuscript: Chehuen Neto JA, Brum IV, Pereira DR, Santos LG, Moraes SL, Ferreira RE. Critical revision of the manuscript for intellectual content: Chehuen Neto JA, Brum IV, Pereira DR, Santos LG, Moraes SL, Ferreira RE.

Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

Sources of Funding

There were no external funding sources for this study.

Study Association

This study is not associated with any thesis or dissertation work.

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