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ORIGINAL ARTICLE

Effectiveness of teaching Pediatric Basic Life Support to lay people and health professionals in a community

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Abstract

Accidents like choking and drowning are important causes of death in the children range due to its quickness resulting in a Cardiorespiratory Arrest in the extrahospitalar setting. BLS procedures are importance in these scenarios in a way of improving survival of these patients and its fundamental that the general population is capable of performing those measures, but there is a deficit in populations knowledge of which measures should be adopted in pediatric emergency. In this context, this prospective observational study has the objective of analyzing effectivity of teaching Pediatric BLS techniques for adults that have frequent contact with children. Questionnaires were applied before and after the practical and theoretical activities, after signing the informed term of consent, these questionnaires were then analyzed to appreciate the impacts. 172 answers were obtained in the “pre-training” questionnaire and 122 in the “post-training”. After comparative analyzes, we observed an increase in the number of people that declarated being more capable to apply BLS procedures and to teach someone after performing the activities. We conclude that the teaching of the main basic measures that are needed to be applied in emergency settings is of simple executions and reproduction, and the spreading of this knowledge is ideal in places frequented by large number of populations that are not health workers and have frequent contact with children aiming in a quick recognition of emergency settings with quick implementations of necessary procedures and, consequently, a improval in survival and reduction of neurological sequels.

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INTRODUCTION

According to a document from the American Heart Association (AHA), more than 20,000 infants and children suffer cardiopulmonary arrest (CPA) each year in the United States[1]. Despite good neurological outcomes after pediatric in-hospital cardiac arrest, survival rates for out-of-hospital cardiac arrest remain low. The younger the child, the greater the permanent neurological complications and mortality after cardiac arrest[2].

The most common causes of cardiac arrest in childhood are choking, drowning, accidents, congenital anomalies, and sudden death[3]. Regardless of the cause and age group, prompt recognition and early initiation of resuscitation maneuvers outside the hospital are crucial for survival at any age group[1]. Time to care is the most important factor affecting survival, as brain injury has a rapid onset (approximately 3 minutes without assistance), and for every minute without cardiopulmonary resuscitation maneuvers, the chances of survival decrease by 7 to 10%. Furthermore, after 10 minutes of unassisted cardiac arrest, the chances of return to spontaneous circulation are close to zero.

Thus, for children who are victims of out-of-hospital cardiac arrest, the essential elements for care will be in the community most of the time: lay bystanders must recognize the cardiac arrest or whatever the emergency situation may be at that moment, call for help and know how to initiate the appropriate maneuvers for such a situation until an emergency team arrives at the scene, assumes responsibility and transports the victim to an emergency sector in a more complex unit[4].

However, knowledge of Basic Life Support (BLS) measures—a sequence of actions aimed at restoring respiratory and/or circulatory system functions to keep the patient alive until emergency responders arrive[5] —, the application of maneuvers, and decision-making in emergencies, especially pediatric ones, are substantially low. The main barriers hindering the increase in cardiopulmonary resuscitation (CPR) rates by laypeople are lack of opportunity and time to participate in training, fear of performing the maneuver in public and assuming responsibilities, and, finally, fear of the risk of transmitting infectious diseases[6], issues that could be addressed through adequate training.

In Brazil, the average time between an emergency and the arrival of a medical team in five state capitals ranges from fifteen to thirty-eight minutes, much longer than the ideal arrival time for the Mobile Emergency Care Service (SAMU), which is around 10 minutes[7]. It is noteworthy that even if this time were shorter than the recommended time, brain death would already be setting in. In other words, there is a narrow and crucial window for laypersons present at the scene to initiate appropriate measures[8].

Given the importance of lay knowledge about BLS and its impact on survival and neurological sequelae, it is essential that the community has easy access to information and training in prompt recognition of the occurrence and in the decision-making process that leads to appropriate conduct[9]. Raising awareness among laypeople allows for the implementation of BLS measures and the rapid activation of assistance services, such as SAMU[9].

In order to disseminate this knowledge to as many lay people and local health professionals as possible, we conducted this prospective observational community trial study.

We began activities to train citizens in recognizing choking and cardiac arrest in pediatric patients and in correctly initiating expulsion maneuvers and CPR in children and adolescents, through interactive discussions of the main pediatric emergencies in out-of-hospital settings. This was achieved through teaching the algorithm in schools, primary health care units, and shopping malls with high foot traffic.

After activities carried out in previous years, the importance of documenting the impact of the training programs became clear. To this end, pre- and post-training assessment questionnaires were administered, the results of which were used to understand the effectiveness of layperson training in recognizing pediatric emergencies and making informed decisions.

OBJECTIVES

1- Train lay people and health professionals in close contact with children: teachers, tutors, employees of basic health units, parents and residents on the early recognition of choking and cardiorespiratory arrest and the initiation of expulsion and resuscitation maneuvers in a timely manner;

2- Analyze, through questionnaires applied to participants, before and after the simulations, the impact of the learning acquired about cardiopulmonary resuscitation and choking maneuvers on dummies.

METHODS

Two teaching approaches were used: theoretical and interactive presentation; and simulation on mannequins (of infants, children and adolescents), according to the American Heart Association (AHA) and the SAMU[10] BLS Protocol. The course was delivered by a group of instructors, consisting of medical students and a pediatric resident, supervised by a pediatric emergency physician.

The theoretical training covered the most common pediatric emergencies (Figures 1 and 2). Topics included burns, abrasions, fractures, accidents with venomous animals, poisoning, seizures, drowning, choking, and cardiopulmonary arrest. After the theoretical presentation, using slides in accessible language, training was provided on CPR and choking relief maneuvers on mannequins.

The training sessions were conducted by adapting the instructor team to the schedules of the locations where they

were held, which were the city's public schools and primary health care units. In general, they were held after hours, with prior scheduling so that the local team could organize and participate in the planned activities. A public open day was also scheduled in advance, during which the instructors remained available for a full day at a local shopping mall, with publicity in local media to increase participation.

During the meetings, pre- and post-training questionnaires were administered for subsequent analysis of results (Appendices I and II, respectively). The inclusion criteria were: age over 18, participation in the proposed theoretical-practical training, and agreement to and signing of the Informed Consent Form (ICF). The exclusion criteria were: being under 18 years of age and/or withdrawal or refusal to participate in the study.

The data were subjected to descriptive analysis, calculating the mean, standard deviation, minimum, maximum, and median values for quantitative variables, and frequencies and percentages for categorized variables. Chi -square difference-in-proportion tests were used to assess the impact of the intervention. A significance level of 5% was set at 5%. All analyses were performed using SAS for Windows, v.9.4.

RESULTS

During the activities carried out in 2023, 172 responses were obtained in the pre-training questionnaires and 122 in the post-training questionnaires. The participants were mostly teachers (9.3%), assistants (8.7%), nurses and nursing technicians (8.1%), directors (2.3%), doctors (2.3%), public servants (3.4%), and the rest were individuals with close contact with children, such as mothers and fathers.

In the pre-training questionnaires, 45% of respondents had experienced an emergency situation involving children. The pediatric emergencies most frequently experienced by participants were falls, cuts, and choking, as described in Graph 1.

Of the 172 participants who completed the pre-training questionnaire, 38% had received prior training in exorcism and CPR. When asked about their confidence in responding to an emergency, 46.5% responded that they did not feel confident before the training, 14.5% demonstrated confidence, and 39% responded that they perhaps already felt confident in carrying out the necessary measures. When asked about their confidence in training someone, only 22% of participants felt confident. Participants were also asked about the most important information in an emergency, with the following items assessed: safe place, asking for help, knowing useful phone numbers, and knowing where to report their location. The majority responded "knowing useful phone numbers" (78.48%) and "calling for help" (58.71%).

During the activities, we noted similar fears such as the inability to recognize a CPR, applying inadequate force during CPR, and the issue of being in contact with respiratory infections while performing the maneuvers.

Of the 122 participants who completed the questionnaires after the theoretical and practical activities, 58% said they felt confident training someone. The confidence to perform maneuvers in specific pediatric emergencies after the proposed activities is demonstrated in Graph 2. Most





Figuras 1 and 2. Theoretical and practical teaching with the public.

participants demonstrated confidence to act after the training, in contrast to the pre-training results.

When asked after training what information was essential in an emergency, responses increased across all aspects assessed compared to those in the pre-training questionnaires. Responses varied from 40.11% to 67.22% for "safe place," 58.71% to 73.78% for "asking for help," 78.48% to 86.9% for "know useful phone numbers," and 55.21% to 59% for "know how to inform where you are."

We noted the ease of teaching BLS to the general population, requiring low-level psychomotor skills, and it was possible to reach many people with different levels of education, even with limited trainers and materials. We also observed that, after the training, understanding of the importance of each aspect associated with the success of initial assistance increased significantly.

DISCUSSION

It is known that out-of-hospital cardiac arrest remains a significant cause of death in pediatric patients worldwide, mostly resulting from choking, accidents, and drowning. It is also known that survival depends on early recognition by trained personnel, immediate activation of the emergency system, and the quality of CPR performed at the time[4]. Despite this, simple BLS measures, which have a significant impact on survival and quality of life, are still rarely implemented by laypeople in the community, either due to lack of knowledge or even fear of contamination resulting from exposure[6].

In a study by Martinez-Isasi et al.[11], children aged 10 to 13 received brief teacher-led training (5 minutes of theory, 15 minutes of teacher demonstration, and 30 minutes of practical training) on how to help resolve an upper airway obstruction. After the training, the children's skills were assessed, and the results were considered satisfactory, leading to the conclusion that such training should be included in BLS training programs for school-age children. Another study by Monteiro MLRBP et al.[12], also conducted with school-age children, concluded that just one BLS training session had effects on knowledge and self-efficacy that lasted at least six months. A study by Watanabe K et al.[13], also concluded that school-age children can effectively learn BLS, and high school students can effectively learn how to use an automated external defibrillator.

Another study conducted in Denmark sought to evaluate the effect of BLS training on the rates of maneuver performance and survival after out-of-hospital cardiac arrest. After layperson training, the rate of bystander CPR increased from 22% to 74%, significantly influencing survival rates[14].

This study also revealed that layperson training is easy to perform and that the maneuvers are reproducible by individuals with adequate training. After analyzing the pre- and post-training questionnaires, there was a positive impact on expanding knowledge about CPR and choking maneuvers, with a percentage increase in confidence in responding to pediatric emergencies and in teaching these maneuvers to others.

Among the limitations of this study is the need for frequent and rotating BLS training due to the rapid deterioration of acquired skills, as previous studies have reported that CPR skills decline within 3 to 6 months after initial training and that retraining of at least 15 minutes, 6 months after initial training, can help maintain chest compression skills for up to 1 yea[15-17].

Regarding barriers to training dissemination, the main ones identified in schools by Fuchs SM et al.[18] included time, funding, equipment, instructor training, and difficulties with scheduling classes. However, it has been shown that teachers can be as effective as health instructors, and self-directed learning has been shown to be as successful as instructor-led learning. In another study, Ying- Chih Ko et al.[19] identified that training courses that combine digital resources and short, instructor-led, in-person practical classes can be an alternative method to traditional training, enabling a greater number of people to access such knowledge.

CONCLUSION

Pediatric Basic Life Support training for laypeople proves to be an essential tool in promoting safety and effectiveness in emergency care involving children. Analysis of the questionnaires administered demonstrates a significant improvement in participants' skills after completing the course, demonstrating that the training transforms theoretical knowledge into effective practice. This skill enhancement not only increases laypeople's confidence in critical situations but also potentially saves lives by ensuring a faster and more appropriate response in times of emergency. Therefore, it is imperative that more training programs be implemented and made accessible to the general population to maximize the collective capacity to respond to pediatric emergencies and ensure that more lives are protected and saved.

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ANNEXES

Annex I - Pre- Training Questionnaire

- Personal data: age, sex, profession, origin and contact with children
- Have you ever been in an emergency situation or accident with a child and needed to act? In what situations? (cuts; trauma; burns; drowning; choking; fall; venomous animal; exogenous poisoning)
- What motivated you to seek training? (media, family history, law, others)
- Do you feel confident to put into practice, act in an event safely before the training? (yes, no, maybe)
- Have you ever seen choking maneuvers or cardiac massage? (yes, I've seen both; just choking maneuvers; just cardiac massage; no)
- Have you ever practiced choking maneuvers or cardiac massage? (yes; only for choking maneuvers; only for cardiac massage; no)
- Do you feel confident training someone? (yes; no)
- How important is this training in your opinion? (promoting actions that improve the outcome of children in emergency situations ; assisting and teaching the community to act effectively in emergency situations ; strengthening the bond between the University and the community; others)
- Do you know what the most important information is in an emergency situation? (Safe place; Ask for help; Know useful telephone numbers; Know where the intercourse is taking place; others)

Annex I - Post-Training Questionnaire

- After training, do you feel confident in handling emergencies? Which ones? (cuts; trauma; burns; drowning; choking; falls; venomous animals; exogenous poisoning)
- Do you feel confident training someone? (yes; no)
- How important is this training in your opinion?
- Do you know what the most important information is in an emergency situation?