

Knowledge of academics and health professionals on Basic Life Support

Alan Carlos Nery dos Santos^{1,2}, Jefferson Petto², Ramon Martins Barbosa¹, Renata Ferreira de Moura¹, Gabriela Nery dos Santos³, Ana Marice Teixeira Ladeira²

¹Grupo de Pesquisa Ciências da Saúde em Fisioterapia, Universidade Salvador (UNIFACS) – Feira de Santana (BA), Brasil

²Escola Bahiana de Medicina e Saúde Pública (EBMSP) – Salvador (BA), Brasil

³Centro Universitário Estácio da Bahia (ESTÁCIO) – Salvador (BA), Brasil

ABSTRACT

Introduction: Inadequate assessment and lack of knowledge of the applicable procedures in emergencies are factors that can result in greater population morbidity and mortality. **Objective:** To systematically review studies in the national literature on the knowledge of academics and health professionals in basic life support and cardiorespiratory arrest. **Methods:** Systematic review of studies published in journals indexed in SciELO and LILACS databases. Search terms: “Cardiopulmonary Resuscitation”, “Basic Life Support”, “Cardiac Arrest”, “Health Education” and “Knowledge”. Complete articles published until December 2018 were included. They analyzed the knowledge of students and/or graduated health professionals about basic life support and its procedures, as well as teaching strategies. Studies with undergraduate health professionals and/or with hospital conduct and/or advanced life support were excluded. **Results:** Searches identified 60 articles, 16 of which were included. Of these, eleven were observational and five were intervention studies. The observational studies identified the lack of knowledge of 1,178 academics and 335 professionals about the identification of cardiorespiratory arrest, the sequence of basic life support, ventilation/compression ratio, interruption of compressions and use of the automatic external defibrillator. The intervention studies, involving 24 students and 189 professionals, indicated that active learning strategies can improve knowledge. **Conclusion:** Results indicate that students and graduated health professionals have limitations in their knowledge about the cardiopulmonary arrest and basic life support, which may result in great damage and short survival to emergency patients.

Keywords: knowledge; cardiopulmonary resuscitation; heart arrest; life support care.

INTRODUCTION

Cardiovascular diseases (CVD) are one of the most important groups of causes of morbidity and mortality in the Brazilian population^{1,2}. They are responsible for a high number of deaths in adults over the age of 301. Associated with CVD, Cardiorespiratory Arrest (CRA) is one of the most lethal public health problems^{1,3}. In addition, an interesting survey showed that in Brazil, there are approximately 200,000 cases of CRA. Of these, more than half happen outside the hospital environment, a fact that makes basic life support (BLS) fundamental¹.

BLS is a set of procedures and primary actions adopted to save lives^{1,3}. According to the I Cardiopulmonary Resuscitation and Cardiovascular Emergency Care Guideline

How to cite this article: Santos *et al.* Knowledge of academics and health professionals on Basic Life Support. ABCS Health Sci. 2020;45:1276. <https://doi.org/10.7322/abcshs.45.2020.1276>

Received: Jul 15, 2019

Revised: Dec 08, 2019

Approved: Dec 12, 2019

Corresponding author: Alan Carlos Nery dos Santos - Universidade Salvador – Avenida Getúlio Vargas, 2.734 – Parque Getúlio Vargas – CEP: 44075-525 – Feira de Santana (BA), Brasil – E-mail: allannery.santos@hotmail.com

Declaration of interests: nothing to declare



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of the Brazilian Society of Cardiology, however adequate and efficient the advanced support may be, if the BLS is not performed effectively, the survival of the cardiac victim will be extremely low¹. In addition, it was identified that the prognosis of CRA can be positive if assisted by someone properly trained in BLS or by a medical rescue team⁴.

On the other hand, studies have questioned whether academics and health professionals are properly prepared to satisfactorily employ the procedures involved in helping victims of CPA^{1,5}. In addition, other studies have shown that both health professionals and academics have weaknesses in knowledge about BLS, and this can have harmful impacts on the population's health⁵⁻⁸. Thus, because of the lack of studies aimed at monitoring knowledge and identifying BLS training strategies, the objective of this research was to systematically review studies in the national literature on theoretical knowledge and training of academics and health professionals in basic life support and cardiorespiratory arrest in the extra-hospital environment.

METHOD

Study design

It is a systematic review designed based on the recommendations of Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA)⁹, to identify studies of Brazilian literature, which analyzed teaching strategies and the knowledge of students and health professionals.

Eligibility criteria

The inclusion criteria adopted in this review were: a) studies in English or Portuguese; b) published in Brazilian journals; c) developed with academics and/or health professionals from Brazilian institutions; d) who have assessed knowledge about basic life support, and/or cardiopulmonary arrest and/or cardiopulmonary resuscitation, in the out-of-hospital environment, using clearly described knowledge assessment instruments. The following were also considered for inclusion: e) studies that analyzed teaching-learning strategies in basic life support and their correlates. However, the following were excluded: a) studies that analyzed knowledge or, that had carried out interventions with lay people and/or, technical level professionals; b) studies with hospital conduct and/or advanced life support; c) studies carried out with volunteers from other countries; d) review study; e) experience reports, f) articles published in non-indexed journals.

Search strategies

The data collection was developed by independent reviewers, from August to December 2018. For the selection of the studies, the electronic databases were consulted: Google Scholar, Lilacs

and SciELO. The study identification process took place by crossing the following keywords: "Cardiopulmonary Resuscitation", "Basic Life Support", "Cardiac Arrest", "Health Education" and "Knowledge", as described in Chart 1.

Selection of studies and data extraction

The selection of studies was carried out by carefully reading titles and abstracts so that those who met the aforementioned eligibility criteria were selected for the final selection. As shown in Table 1, the eligible studies were selected to read the full text, a new evaluation regarding the criteria for selecting and recovering data regarding: (a) author and year of publication; (b) population; (c) methods (knowledge assessment tool, continuing education, teaching-learning strategies); (d) main results.

To compose Table 2, in addition to the items mentioned above, interventions used to improve knowledge in basic life support and cardiorespiratory arrest were included.

Finally, the references reviewed and included in this review were analyzed to check for the existence of potential unidentified studies in searches of the selected electronic databases. Figure 1 summarizes the strategies for selecting the studies that make up this systematic review.

RESULTS

Electronic searches in the Google Scholar, SciELO and LILACS databases resulted in the identification of 60 studies. However, 10 were excluded due to duplicity between the SciELO and LILACS databases, leaving 50 studies. After analyzing the eligibility criteria, another 34 studies were excluded. The main reasons for exclusion were: validation of questionnaires; studies with lay people; experience reports; review studies; advanced life support and studies with technical health professionals. Finally, 16 studies met the eligibility criteria and were included in this review^{6,7,8,10-21}.

Table 1 shows that all observational studies included analyzed knowledge about BLS and CRP^{6,7,8,10-16}. These had as volunteers: 312 professionals from Nursing, Physiotherapy and Dental Surgeons, in addition to 1,178 students from the Physical Education, Nursing, Pharmacy, Physiotherapy, Speech Therapy, Medicine,

Chart 1: Crossings performed according to the selected databases.

Database	"Crossings"
Lilacs	"Reanimação Cardiopulmonar" OR "Suporte Básico de Vida" AND Conhecimento
	"Parada Cardíaca" AND Conhecimento
	"Reanimação Cardiopulmonar" OR "Suporte Básico de Vida" AND "Educação em Saúde"
	"Parada Cardíaca" AND "Educação em Saúde"
SciELO	"Reanimação Cardiopulmonar" OR "Suporte Básico de Vida" AND Conhecimento
	"Parada Cardíaca" AND Conhecimento

Nutrition and Occupational Therapy courses. Concerning knowledge assessment tools, most of the studies used validated instruments, which addressed information contained in the American Heart Association (AHA) guidelines from the years 2000 to 2015. Regarding the main results, we can see that a small portion of the assessed population has already experienced emergencies. In addition, approximately 41% of those assessed had never completed previous BLS training. It is also noteworthy that in no study with professionals, or with students, did the subjects manage to obtain satisfactory performance in all the evaluated items, a fact that can compromise the performance of high-quality Cardiopulmonary Resuscitation (CPR). Among the points that can compromise CPR/BLS, the following stand out: the difficulty in detecting and performing immediate CPR procedures, time to check the pulse, compression/ventilation ratio, compression frequency/minute, interruption of CPR, management of airways, cardiac rhythms in PCR and use of the External Automatic Defibrillator (AED).

In addition to the data already presented, Table 2 presents a summary of the researches that carried out experiments to improve theoretical and practical knowledge in BLS and PCR¹⁸⁻²¹. In total,

189 professionals, mostly nurses, composed the studied samples. The main results indicate that the strategies used were effective to improve knowledge. Another fact that draws attention is that, the performance in the knowledge evaluation is related to the time of improvement, so that, six months after training, the performance in the evaluation tends to present inferior results. In addition, theoretical training does not seem to be effective in promoting high-quality BLS conducts. Furthermore, in none of the studies did the volunteers' performance reach the cut-off point established.

DISCUSSION

In response to the objectives of this systematic review, we identified evidence that demonstrates limitations in the theoretical and practical knowledge of academics and health professionals about PCR and BLS. These results are in line with other observations, which, like ours, indicate that such weaknesses can have negative implications in the immediate assistance to victims of CPA and the execution of high-quality CPA^{1,3,5}. Among the main weaknesses identified, the ability to recognize and make decisions in PCR, ventilation/

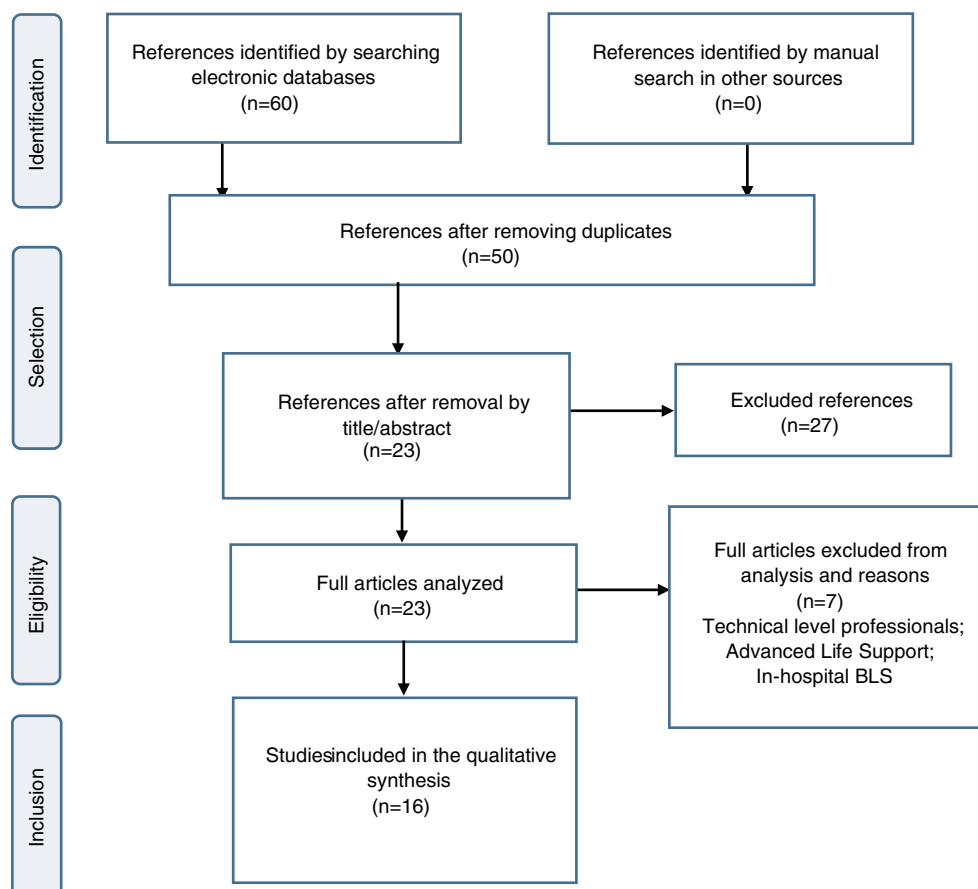


Figure 1: Flowchart for selecting the studies that make up the review.

Table 1: Qualitative synthesis of studies that analyzed the knowledge of academics and/or health professionals on basic life support and cardiorespiratory arrest.

Author/year	Population	Methods	Main results
Gonzaga <i>et al.</i> 2002 ¹⁰	182 Dental Surgeons	Questionnaires on experience and knowledge in PCR and CPR.	Contents and proportion of responses: 59% said they know what PCR is; 46% correctly defined CRA; 54% reported being able to perform CPR; 86% received information about CPR; 100% never did practical BLS training.
Bertoglio <i>et al.</i> 2008 ¹¹	23 Nurses	Structured questionnaire on recognition of electrocardiographic and BLS tracings in the care of PCR.	Contents and proportion of correct answers: Diagnosis of CRP (100%); First measurements in PCR (95%), Ventricular fibrillation (100%); Initial measures for PCR (73%); Ventilation / compression ratio (69%); Charge in Joules (91%); PCR rhythms (34%); Place for cardiac massage (100%).
Boaventura <i>et al.</i> 2010 ¹¹	52 third and fourth-year students of the Nursing course.	Form with 40 objective multiple-choice questions with only one correct alternative, being considered satisfactory 85% of correct answers.	Contents and proportion of correct answers: 42% have already experienced emergency situations; 100% never attended BLS training; Answers and correct answers: Responsiveness (61.5%); Respiratory movements (23.0%); Airway opening (23.0%); Request help by calling the SME (51.9%); Sequence of the mouth-to-mouth breathing maneuver (62.0%); Number of breaths before compressions (65.0%); PCR recognition (46.1%); Positioning of the victim and the rescuer (34.6%); Absence of a carotid pulse (42.3%) and location of the carotid pulse (57.0%); Positioning of hands and arms in compressions (52.0%); Compressions/minutes (61.0%); Use of the AED (26.9%), positioning of the blades (20.0%), conduct for shock not indicated (28.0%), Conduct in patients with excess hair (29.0%) and electric charge used for defibrillation (39.0%).
Neves <i>et al.</i> 2010 ¹²	72 Physiotherapy students and 64 professional physiotherapists (extra-hospital)	The questionnaire was divided into two parts: identification of the respondent, experience and CPR update, with closed and open questions; and closed questions about CPR in practice.	Contents and proportion of correct answers: Diagnosis of CRP (70% students x 47% extra-hospital professionals); Initial care for PCR: (52% students x 40% extra-hospital professionals); Compression/ventilation ratio (4.2% students x 0% extra-hospital professionals); CRP experience: (26% students x 17% extra-hospital professionals); DEA load: (6.9% students x 3.1% extra-hospital professionals)
Almeida <i>et al.</i> 2011 ⁷	73 Nurses	Bellan instrument (4), adapted according to the International Science Consensus - 2005 Guidelines (5) of CPR and cardiovascular emergencies.	Contents and proportion of correct answers: Detection of CRP (38.4%); Immediate behavior after CPA (24.7%); PCR rhythm patterns (12.3%); BLS sequence (32.9%); First aid body posture in external chest compression (20.6%); Compression/ventilation ratio (37.0%); Paddle position in defibrillation (74.0%); Charge in joules in defibrillation (31.5%);
Alves <i>et al.</i> 2013 ¹³	16 Nurses	Questionnaire with questions about PCR and BLS, prepared based on the 2010 AHA guidelines.	Contents and proportion of correct answers: Hand positioning on the victim's chest (56%); Depth of compressions (56%); Compressions per minute (63%); Sequence of use (75%); Paddle position in defibrillation (50%); Procedure after shock (13%); Charge in joules of the single-phase defibrillator (50%); Load in joules of the biphasic defibrillator (44%).
Oliveira <i>et al.</i> 2014 ¹⁴	60 undergraduate students in the last year of the Nursing course.	Questionnaire on theoretical knowledge about BLS in cases of CRP, built according to AHA guidelines (2010). Information was collected on the clinical signs of PCR and sequences of procedures for CPR.	Contents and proportion of correct answers: Loss of consciousness and absence of a carotid pulse (55%); Absence of any pulse and loss of consciousness (38%); Responsiveness (35%); Check breathing (28%); Call for help (22%); Start CPR (15%); Shockable rhythms: TV, FV, AESP and Assístolia (43%); TV and PV (30%); CPR algorithm: CABD (50%); ABCD (27%); BCAD (18%); Compression/ventilation: 30/2 (67%); 15/2 (22%) / 30/1 (8%)
Tavares <i>et al.</i> 2015 ⁸	664 health students: Medicine, Nursing, Physiotherapy, Pharmacy, Nutrition and Occupational Therapy.	Questionnaire based on the AHA 2010 BLS guidelines. Instrument composed of 20 objective questions, each with four alternatives, only one correct. Considered satisfactory 84% of correct answers.	Contents and proportion of correct answers: 54% of the sample had undergone previous training; There was an association between the number of correct answers and the variables: previous training, course and year of formation; The sixth-year medical students had the best performance; Only one participant reached a score equal to or higher than 84%.
Silva <i>et al.</i> 2015 ¹⁵	32 penultimate and senior nursing students.	Questionnaire containing 21 objective BLS questions, according to AHA Guidelines, 2010.	Contents and proportion of correct answers: Chain of survival (84.4%); CPR sequence in adults (100%); Place to perform chest compressions (93.8%); Compressions per minute (81.2%); Airway opening (43.8%); Airway opening with suspected trauma (84.8%); Compression/ventilation (96.9%); Use of the AED is indicated in the BLS (87.5%); Who can use the DEA (21.9%); DEA function (65.39%); On whom the DEA can be applied (28.1%).
Moura <i>et al.</i> 2016 ¹⁶	217 medical students	Structured questionnaire with 27 items, to record sociodemographic characteristics, as well as knowledge of the ILCOR CPR guidelines published in 2010. A 70% correct response rate was considered satisfactory.	Contents and proportion of correct answers: 91% of the participants had not completed any training in PCR; 78% obtained a performance considered unsatisfactory in the evaluation; Pulse check (55%); Compression/ventilation (53%); Compressions per minute (28%); Conduct of health professionals towards PCR (35%); Hypoventilation during CPR (77%); Interruption of CPR maneuvers during ventilation (69%); Importance of minimizing interruptions during cardiac massage (91%).
Silva <i>et al.</i> 2017 ⁶	81 students of the courses: Physical Education, Nursing, Speech Therapy and Physiotherapy.	Structured questionnaire containing 09 multiple-choice questions. Each question had an average of 4 to 5 alternatives, with only one correct.	Contents and proportion of correct answers: Verification of respiratory movements (100%); Airway opening maneuver (79%); Performing mouth-to-mouth breathing (70%); Mouth-to-mouth breathing without personal protective equipment (85%); Objective of cardiac massage (87%); Positioning the victim to perform CPR (89%); Region for application of RCP (80%); Compressions per minute (30%).

CRA: Cardiorespiratory arrest; CPR: Cardiopulmonary Resuscitation; BLS: Basic Life Support; DEA: Automatic External Defibrillator; VT: Ventricular Tachycardia; VF: Ventricular Fibrillation; AESP: Electrical Activity without Pulse.

Table 2: Qualitative synthesis of studies that tested interventions to improve knowledge of basic life support and cardiorespiratory arrest.

Author/Year	Population	Evaluation	Intervention	Main results
Sandro e Sosso, 2008 ¹⁸	24 nursing students	The strategies for data collection were: participant observation; two structured questionnaires for learning assessment (Individual Activity 1 and 2); and a questionnaire to evaluate the educational practice and its methodology.	5 meetings of 03 hours each, structured in: 1st - presentation of the objectives, contents and methodology; PCR/adult problem situation; and CPR content in BLS. 2nd - practice of the BLS on a mannequin; problem situation of airway obstruction. 3rd – educational games for content review; BLS algorithm and discussion of 3 new situations: drowning, electric shock and gas poisoning. 4th - simulation of the initial assistance to the trauma victim through a motorcycle accident. 5th - evaluation of the ability to act in real situations; and assessment of educational practice and learning methodology.	-Practical activities developed from the simulation of a PCR situation, allowed to identify and correct the main difficulties in acting in BLS. -Still, it is emphasized that the active methodology of Problem-Based Learning works as a motivating factor for both the educator and the student because, among other things, it makes it possible to encounter practical reality.
Brião <i>et al.</i> 2009 ¹⁹	34 nurses	Questionnaire with 9 closed questions related to the care of patients with CRP, including: first measures in the detection until defibrillation and administration of drugs in CRP. These questionnaires were applied before training, immediately after and six months later. The success rate was considered satisfactory of 75%.	The training took place from November 2005 to February 2006. The training time was two hours, divided into a theoretical part, based on the knowledge of basic and advanced life support, and a practical part, involving adequate cardiopulmonary resuscitation, monitoring the patient until the arrival of advanced support.	Points assessed and percentage of correct answers before and after and 6 months post-test (% vs.%): First attitude towards PCR: (68.6% vs. 82% vs. 61%); PCR types: (85% vs. 94% vs. 91%); Chest location / compressions: (80% vs. 94% vs. 79%); Compressions / ventilation: (91% vs. 100% vs. 79%); Compressions / minute: (51% vs. 94% vs. 67%). Considering the expected performance of 75% of correct answers in the theoretical test, in the pre-test (62.9%) they reached this percentage. After training, (94.1%) reached 75% and after six months (64.7%).
Lima <i>et al.</i> 2009 ²⁰	76 nurses	Questionnaire with 12 objective multiple-choice questions containing four alternatives, with only one correct answer (pre-test). Such questions addressed points considered critical in the guidelines of the ILCOR (International Liaison Committee on Resuscitation) ⁹ .	The professionals underwent 8-hour training, 4 hours of which were reserved for theoretical training and 4 hours for practical activities. At the end of the course, the assessment was repeated (post-test) with a change in the order of the questions, in order to mask the similarity between both tests.	Points assessed and percentage of correct answers before and after the test (% vs. %): Recognition of the causes of CRP (24% vs. 56%); Handling of the airways in the BLS (7% vs. 46%); Service sequence of the BLS (primary ABCD) (75% vs. 100%); CPR technique (33% vs. 94%); Handling of the AED (40% vs. 74%).
Miotto <i>et al.</i> 2009 ²¹	20 nurses in the BLS theoretical training group and 26 health providers in the BLS theoretical-practical group.	The theoretical assessment used in BLS courses, consisting of multiple-choice questions prepared by the AHA. The practical test was carried out by the same team of instructors, presenting the same clinical scenario, and was recorded on DVD for later scoring, following the checklist of the practical assessments of the AHA courses. The scenario for the practical assessment was the same: "a man was found lying in an empty corridor; he appeared to be unconscious and breathless?"	BLS training, which consisted of a two-hour lecture, followed by a BLS video, both based on the 2005 guidelines of AHA (GA). This group was compared with the GB who participated in a conventional (theoretical-practical) BLS course.	Comparing the average score on the theoretical test, the groups did not differ significantly (80.3 ± 11.5 and 86.3 ± 15.3 respectively, p > 0.05). However, the practical assessment scores in GB were significantly better in the observation of the three examiners compared to GA (7.7 ± 2.3 versus 12.5 ± 2.9; 11.7 ± 1.5 versus 13.9 ± 3.3; 12.3 ± 1.8 versus 14.2 ± 2.2 respectively, p < 0.05). GA students were more inefficient in performing the procedures (p < 0.05). After the arrival of the DEA, GA students found it difficult to turn it on, trigger the rhythm analysis and trigger the shock, although they were able to properly place the blades in comparison with the GB (p < 0.05). Students in the theoretical only group did not adequately provide the 2nd and 3rd cycles of CPR (p < 0.05).

Continue...

Table 2: Continuation.

Author/Year	Population	Evaluation	Intervention	Main results
Bellan <i>et al.</i> 2010 ²²	59 nurses, 21 in the control group and 38 in the experimental group.	Questionnaire with 17 questions addressing PCR/RCP. The training program was carried out in three stages: I- previous assessment and theoretical training of nurses; II- recent theoretical evaluation; and III- late theoretical evaluation. Steps I and II were carried out in sequence, with intervals of one week, and step III after three months of step II.	Theoretical training: 1st: awareness (GE, 30 min); 2nd: application of the instrument (Groups GC and GE, 30min); and 3rd Moment: lecture (Grupo GE, 2h). At first, some aspects of PCR / CPR were addressed for group B. The second was to answer the questions. The approach followed the sequence of the PCR service, to facilitate its understanding (EG). After one week, stage II was performed, and, after three months, stage III, which consisted of a reassessment with the reapplication of the questionnaire for both groups.	Points assessed and (% of correct answers: Detection of CRP: the CG increased the number of correct answers from the first two stages (53%) to (71%) in the third stage. The GE obtained 45% of correct answers in the first stage, with a significant increase in the following two (82 and 84%). Conduct after diagnosis of CRP: there were no differences between groups. Rhythm patterns in CPR: in the three stages, the CG obtained a low percentage of correct answers. In the EG there was an increase in C responses from step I (32%) to II and III (87% and 76%, respectively); BLS: the CG obtained 5 to 14% of correct answers in the three stages of the study; GE 29% of correct answer in the first step, 53% and 47% of correct and partially correct answers respectively in the second step, 50% of correct and partially correct answers in the third step.

CRP: Cardiorespiratory arrest; CPR: Cardiopulmonary Resuscitation; BLS: Basic Life Support; DEA: Automatic External Defibrillator.

compression ratio without an advanced airway, frequency of compressions, hand positioning, minimization of interruptions in CPA and use of the AED stand out. Such weaknesses are known to compromise the BLS. However, despite the results presented, theoretical-practical teaching strategies, both in the traditional format and those of active teaching-learning, seem to improve the knowledge of the evaluated population. Even so, it is worth mentioning that such strategies have produced heterogeneous results, much less than the minimum recommended for quality care.

Therefore, as well as other basic human health rights, the BLS must be provided with high quality and by agents duly trained to act at all levels of health care. This fact leads us to the hypothesis that the knowledge gap may be associated with the absence of a specific discipline, or even, in addressing the theme as a complementary component of other blocks of knowledge. In addition, the absence of a specialist teacher in the content discussed here can also contribute to the results of our study. Another striking fact is that many volunteers from the studies reviewed here never underwent training on PCR and BLS, or, when they did, obtained only theoretical training, in contrast with the recommendations of the AHA³.

Concerning the degree of knowledge in PCR and BLS, seven of the selected studies showed that academics in health areas have a deficit in their training^{6,8,11,12,14-16}. In fact, Boaventura *et al.*¹¹, evaluating a sample of 52 students from the third and fourth year of the nursing course, identified that 45% of the participants had taken a first aid course. However, 100% had no contact with BLS training. For knowledge assessment, the authors developed an instrument containing 40 objective questions about the identification of CRP,

assessment of the level of consciousness, activation of the emergency service, positioning of the rescuer and the victim, handling of the airways, assessment of respiratory movements, checking circulation, CPR maneuvers and proper use of the AED. The cut-off point adopted for sufficiency in the assessment was 84%, as established by the AHA. After evaluation, the authors concluded that the population had insufficient knowledge about BLS and the use of AED. Corroborating this result, Oliveira *et al.*¹⁴ evaluated a sample of 60 students from the last year of the nursing course. In conclusion, the authors stated that the deficient points in the students' knowledge were the therapeutic management of CRP, detection of rhythms treatable by the AED and the depth of the chest massage. This information is known to compromise success in immediate care.

In another study, with a population of 664 students from Medicine, Nursing, Physiotherapy, Pharmacy, Nutrition and Occupational Therapy courses, Tavares *et al.*⁸ applied an objective questionnaire based on the AHA's BLS guidelines, containing 20 objective questions. The minimum number of correct answers was 84%, as recommended by the AHA. Initially, it should be noted that more than 80% of medical students had already undergone previous BLS training. However, in general, only one of the 664 participants scored 84% or more. This demonstrates a low level of knowledge of the assessed population. In addition, the lack of knowledge about BLS procedures is not limited to one area of health, but all of them⁸.

A study with 81 volunteers, being from the Physical Education, Physiotherapy, Speech Therapy and Nursing courses, applied a structured questionnaire containing nine multiple-choice questions about BLS⁶. The results of this study indicate that the studied population

has insufficient knowledge about BLS, a fact that can compromise the assistance provided, favoring the appearance of diseases or, worsening the clinical condition, thus increasing the number of deaths. Also in this line, Neves et al.¹² evaluated 72 Physiotherapy students, who were submitted to a questionnaire to check previous experience and update on BLS/CPR, with closed and open questions; and closed questions about CPR in practice. The results of the study indicate that although students recognize the importance of CPR in their internship environment, they have insufficient knowledge. Still according to the authors, 50% of Physiotherapy students complete their graduation without having undergone any BLS training.

On the other hand, it should be noted that the results presented above were also observed in professional dentist surgeons, nurses and physiotherapists^{7,10,12,13}. In addition, Alves et al.¹³ submitted a sample of 16 nurses to a questionnaire to assess knowledge about CRP and BLS, prepared based on the guidelines for cardiopulmonary resuscitation and emergency cardiovascular care. The results indicate that many nurses, although recognizing the relevance of the topic, did not have adequate knowledge about the procedures recommended by the current guidelines for the management of CRP victims.

Corroborating the aforementioned study, Almeida et al.⁷ analyzed a sample of 73 nurses, who were submitted to a questionnaire addressing knowledge about BLS and CRP. The authors identified that the participants had unsatisfactory knowledge about the analyzed topic. This result seems to be because the evaluated population had a long time without updating (eighteen months), in contrast to what is recommended by the literature (six months). This reinforces the observation of Bertoglio et al.¹⁷ who stated that the shorter the interval between training and the knowledge test, the better the participant's performance, and this result can also be reflected in clinical practice. In line with these observations, Neves et al.¹² submitted 64 physiotherapy professionals to an instrument for checking experiences and training in CPR/BLS, with objective and discursive questions; and objective questions about CPR in practice. In conclusion, the authors stated that although physiotherapists recognize the importance of CPR in their work environment, they have insufficient knowledge and, only a small portion seeks further training to update themselves on the topic. Still according to the authors, 65% of physical therapists remain without any training during their professional trajectory.

Thus, in an attempt to improve knowledge on BLS, Sadro & Sasso¹⁸ submitted a group of 24 academics from the third semester of the Nursing undergraduate course to five meetings of three hours of problem-based teaching. This training structure with problem-based learning proved to be efficient in stimulating academics. In addition, it allowed them to be more active in their learning, thus being better prepared to act following the current world reference protocols.

In agreement with the previous observation, Miotto et al.²¹ selected twenty nurses to participate in a theoretical training in

CPR and use of the AED, using theoretical classes and video used in AHA's BLS courses, compared to another group, which took a regular course theoretical-practical of BLS. After training, the volunteers were submitted to the assessment of theoretical and practical knowledge as recommended by the AHA. The main results indicate that there was no difference between the groups in the theoretical evaluation, however, the practical evaluation was consistently worse in the group that performed only theoretical training. The study concludes that classes played on videos can contribute to good quality CPR, a fact that can improve the outcome of CRP inside and outside the hospital environment. However, only theoretical training was not able to reproduce high-quality CPR, mainly in the opening of airways, proper hand positioning, chest compression, ventilation and adequate ventilation/compression cycles.

Still with regard to learning strategies, two other studies involving nurses, tested theoretical-practical teaching strategies, with traditional methodologies, identified that the researched approaches promoted significant improvements in the knowledge of the evaluated population. However, despite the evolution of knowledge, the lags still presented by the volunteers are significant and may imply low-quality BLS^{20,22}.

Brião et al.¹⁹ carried out a longitudinal study, where training was proposed divided into a theoretical part, based on the knowledge of basic and advanced life support, and a practical part involving adequate CPA and monitoring of the patient until the arrival of advanced support. This experiment resulted in substantial gains in knowledge, reaching the results expected by the researchers. In addition, it also drew attention that after six months of training, the performance of those evaluated decreased significantly, which leads us to question whether the recommendations for updating BLS are consistent with the needs of the Brazilian population.

Finally, this study has some limitations that need to be discussed. First, the cross-sectional nature of most studies does not allow for a cause-effect relationship. Second, there is no standardization of knowledge assessment tools, although this fact can allow for a wide range of information, it does not allow an adequate comparison of results. Third, the regional character of the studies, may not allow extrapolation to all regions of Brazil. In addition, the assessment of theoretical knowledge may not adequately reflect performance in real clinical situations. Another relevant point is the fact that no study determines the impact of knowledge on population survival. Finally, failure to assess the methodological quality of the studies included in this review makes it difficult to exclude the risk of methodological bias.

Implications of the results

Based on a Brazilian study that pointed out that the chances of survival of individuals who suffered CPA witnessed by specialized

professionals or by people trained in BLS are 3.5 and 2.9 respectively when compared to victims who were not assisted by any of the previous years, it is clear that BLS is an important public health strategy. However, the results presented here are worrisome, considering that all studies with academics, as well as those that evaluated professionals, show fragility in the knowledge about the procedures used in the BLS. This fact can reduce the chances of survival, or even increase the health of victims of cardiovascular diseases⁴.

On the other hand, teaching-learning strategies with active methodologies, as well as updates with semiannual periodicity seem to improve the performance and quality of the procedures provided by academics and health professionals to victims of CPA. Taking this information into account, we can question whether the current model used in various centers of academic and professional training, where undergraduates have only one discipline or, the content diluted in various curricular components during health courses and, the recommended professionals updating at two-year intervals, are sufficient for them to be able

to provide high-quality BLS care. In addition, it is necessary to be cautious about the use of distance education strategies, since theoretical training does not guarantee the quality of the procedures used in the BLS and these may not provide information such as those recommended by the I Cardiopulmonary Resuscitation and Cardiovascular Care Directive of Emergence of the Brazilian Society of Cardiology and the AHA^{1,3,5,23}.

Conclusion

The results of this study indicate that academics from different areas of health and professional dentists, nurses and physiotherapists have insufficient knowledge about basic life support and cardiorespiratory arrest. Such a fact may imply a low-quality approach to the victim, thus resulting in a lesser chance of survival. Finally, teaching-learning strategies with active methodologies and updates at intervals of at least six months seem adequate to improve knowledge. However, new studies with adequate methodological rigors and follow-up time are still needed to confirm the results presented.

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