

Knowledge of cardiorespiratory arrest of health professionals in a public hospital: cross-current study

Conhecimento de parada cardiorrespiratória dos profissionais de saúde em um hospital público: estudo transversal

Sarah Fernanda Gonçalves de Oliveira¹, Sandra Maria Belmonte Pereira Moreira², Liana Lima Vieira³, Giulliano Gardenghi⁴

¹Hospital of Emergencies of Goiânia (HUGO / LIFECARE). Goiânia, Goiás, Brazil. ORCID: 0000-0002-0312-1276. sarah.fgo@gmail.com

²State Department of Health of Goiás, Estácio de Sá College. Goiânia, Goiás, Brazil. sandroesandra@terra.com.br. ORCID: 0000-0002-2648-9380

³Clinical Hospital/UFG and Hospital of Emergencies of Goiânia. Goiânia, Goiás, Brazil. ORCID: 0000-0001-7001-4780. liana_vieira@hotmail.com

⁴Corresponding author. FMUSP, ENCORE Hospital / GO, Hospital of Emergencies of Goiânia (HUGO / LIFECARE) / GO, Hospital and Maternity São Cristóvão, São Paulo, SP, Brazil. ORCID: 0000-0002-8763-561X. coordenacao.cientifica@ceafi.com.br

RESUMO | INTRODUÇÃO: A Parada Cardiorrespiratória é a interrupção súbita da atividade mecânica ventricular útil e suficiente, e da respiração. O sucesso na reversão desse quadro depende da qualidade do atendimento que a equipe oferece e uma resposta rápida e hábil pode fazer a diferença entre mortalidade e ausência/installação de sequelas. **OBJETIVO:** avaliar o conhecimento teórico de profissionais médicos e enfermeiros no diagnóstico e tratamento da parada cardiorrespiratória em adultos em um hospital público de Goiânia – GO. **MÉTODOS:** Trata-se de um estudo observacional e descritivo. Aplicou-se questionário próprio específico contendo perfil do profissional e avaliação de conhecimento teórico sobre parada cardiorrespiratória e ressuscitação cardiopulmonar no adulto, fundamentado nas recomendações da American Heart Association de 2015. **RESULTADOS:** De 147 participantes, 89,80% foram reprovados em seus conhecimentos e apenas 10,20% da amostra foi aprovada. Quando associado o padrão de aprovação com as categorias profissionais observou-se que 4,41% dos enfermeiros e 15,19% dos médicos foram aprovados com $p=0,031$. **CONCLUSÃO:** o estudo evidencia uma deficiência no conhecimento dos profissionais sobre manejo na Parada Cardiorrespiratória. Sugere-se padronização do atendimento e otimização do treinamento em serviço para que haja maior capacitação e atitude profissional, paralelamente ao progresso científico e tecnológico.

PALAVRAS-CHAVE: Conhecimento. Parada cardíaca. Ressuscitação cardiopulmonar. Hospitais.

ABSTRACT | INTRODUCTION: Cardiorespiratory arrest is the sudden cessation of useful and sufficient ventricular mechanical activity and respiration. The success in reversing this situation depends on the quality of care the team offers and a quick and skilled response can make the difference between mortality and absence/installation of sequelae. **OBJECTIVE:** to evaluate the theoretical knowledge of medical professionals and nurses and in the diagnosis and treatment of cardiorespiratory arrest in adults in a public hospital in Goiânia - GO. **METHODS:** This is an observational and descriptive study. A specific questionnaire containing the professional profile and theoretical knowledge evaluation on cardiorespiratory arrest and cardiopulmonary resuscitation in adults, based on the recommendations of the American Heart Association, 2015, was applied. **RESULTS:** Out of 147 participants, 89.80% were failing their knowledge and only 10.20% of the sample was approved. When associated with the standard of approval with the professional categories, it was observed that 4.41% of the nurses and 15.19% of the physicians were approved with $p= 0.031$. **CONCLUSION:** the study evidences a deficiency in the professionals' knowledge about management in Cardiorespiratory Arrest. It is suggested standardization of service and optimization of in-service training so that there is greater training and professional attitude, in parallel with scientific and technological progress.

KEYWORDS: Knowledge. Heart arrest. Cardiopulmonary Resuscitation. Hospitals.

Introduction

Cardiorespiratory arrest (CRA) is the sudden cessation of useful and sufficient ventricular mechanical activity and respiration. An individual in cardiorespiratory arrest loses 7 to 10% chances of survival every minute. In order to artificially maintain the arterial flow to the brain and other vital organs until spontaneous circulation returns, Cardiopulmonary Resuscitation (CPR) increases the chances of survival, reducing the loss per minute to 3 to 4%. This maneuver, when performed incorrectly, is associated with a survival rate of 4%, rather than 16% when performed correctly.¹⁻³

In Brazil, it is estimated that around 100,000 cardiopulmonary arrests occur every year in an in-hospital setting. The exact scale of the problem is still unknown because of the lack of robust statistics and the disparities in training, records and results.^{1,4} Questions related to CPR should be known and performed competently by all health professionals involved in care for being responsible for maintaining the standards of care and exercise of managerial activities in health institutions.⁵

The success of the cardiorespiratory arrest reversion depends on the quality of the patient's care and a quick and skilled response can make the difference between mortality and absence / sequelae.⁶ In this context, the objective of this study was to evaluate the theoretical knowledge of medical professionals and nurses in the diagnosis and treatment of cardiorespiratory arrest in adults in a public hospital in Goiânia - GO.

Methodology

This is an observational and descriptive study. The sample selection process was a simple trial, carried out in an emergency hospital in Goiânia, Goiás, Brazil, between May and August 2016. The survey included medical assistants and nurses, regardless of gender, age, employment signed the Informed

Consent Form and completed the questionnaire. We excluded the professionals in the Hospital Surgical Center due to the difficulty of approaching the questionnaire.

The data were collected by physically trained residents, with an approach to professionals in an individual interview, according to the scale of work in each sector. The questionnaires, after being answered, were deposited in a sealed box in order to guarantee the confidentiality and anonymity of the participant.

The research was authorized by the institution and approved by the Research Ethics Committee of the Emergency Hospital of Goiânia (CAAE: 52743815.0.0000.0033). A pilot study was carried out to calibrate the instruments of data collection.

The following data were collected through a specific questionnaire: professional profile and theoretical knowledge assessment with seven objective multiple choice questions about CRA and cardiopulmonary resuscitation in adults, based on the American Heart Association (AHA) recommendations of 2015.⁷

In order to categorize and classify the professionals according to the use of the questionnaire, the cut-off point was based on the study by Madden, 8 where the theoretical knowledge about CRA and CPR of Irish nursing students was evaluated with a questionnaire based on evidence and validated by consensus of American Heart Association experts, using an 85.7% approval standard, and AHA courses, which require 84% success in the theoretical evaluation. With the average of these two cut-off points, this research used as a standard of approval 84.85%, minimum 6 hits, thus using a "failed" concept for hits <6 and "approved" for hits ≥ 6, terminologies similar to studies above mentioned.

Statistical analysis

The data analyzes were processed in the STATA / SE version 12.0 program. A descriptive analysis was carried out, in order to know the behavior of the

studied variables. Kolmogorov-Smirnov Normality Test was performed. Student's t-test and ANOVA were used to compare the means, and a level of statistical significance of $p < 0.05$ was considered. For the comparison of proportions, the Pearson's Chi Square test was used, Chi Square of Fisher's exact and linear tendency.

Results

We evaluated 147 health professionals, as characterized in Table 1.

Table 1. Sociodemographic characterization of medical assistants and nurses.

Variables	n	%
Occupation		
Nursing	68	46.26
Medicine	79	53.74
Age		
20-39 years	95	64.63
40-59 years	46	31.29
> 60 years	6	4.08
Gender		
Female	82	55.78
Male	65	44.22
Time of professional experience		
< 5 years	57	38.78
5 a 10 years	36	24.49
> 10 years	54	36.73
Year of hospital admission		
1991-1999	8	5.44
2000-2009	30	20.41
2010-2016	109	74.15
Department		
Emergency Room	44	29.93
Intensive care unit	54	36.73
Nursery	49	33.33
Shift		
Daytime	73	49.66
Night	55	37.41
Both	19	12.93

% - percentage of total sample; n - number of individuals.

The evaluated professionals answered their own specific questionnaire with seven objective questions based on the summary of components of a high quality CPR for health professionals according to the recommendations and guidelines of the AHA, 2015. Table 2, refers to the main topic addressed in each question and the percentage of hits.

Table 2. Percentage of correct answers by medical assistants and nurses

Questions	Percentage of hits		
	Nursing	Medicine	Total
1. CRA Recognition	45.59	50.63	48.30
2. In-Hospital Survival Chain	35.29	58.23	47.62
3. CPR Sequence	55.88	67.09	61.90
4. Advanced airway compression-ventilation ratio	52.94	63.29	58.50
5. Compression speed	45.59	40.51	42.86
6. Compression-ventilation ratio after advanced airway	33.82	25.32	29.25
7. Depth of compressions	66.18	72.15	69.39

CRA- Cardiorespiratory arrest; CPR - Cardiopulmonary resuscitation.

Regarding the recognition of a victim in CRP, it was found assertive in 48.30% of the total sample according to the updates of the last guidelines. However, 42.86% considered as true the alternative that describes a victim in CRP only by not being responsive and absence of defined pulse sense in ten seconds, without considering the absence of breathing or gasping.

The chain of in-hospital survival was correctly identified by 47.62% of professionals. It was observed that 34.69% marked the question that brought the Survival Chain described by the AHA in 2010, where there was no differentiation between in-hospital and extra-hospital care.

When questioned about the cardiopulmonary resuscitation sequence, 61.90% correctly pointed out the CAB sequence (chest compressions, airway, respiration). The ABC order was the choice of 27.21% of respondents. This recommendation has changed since the 2010 updates.

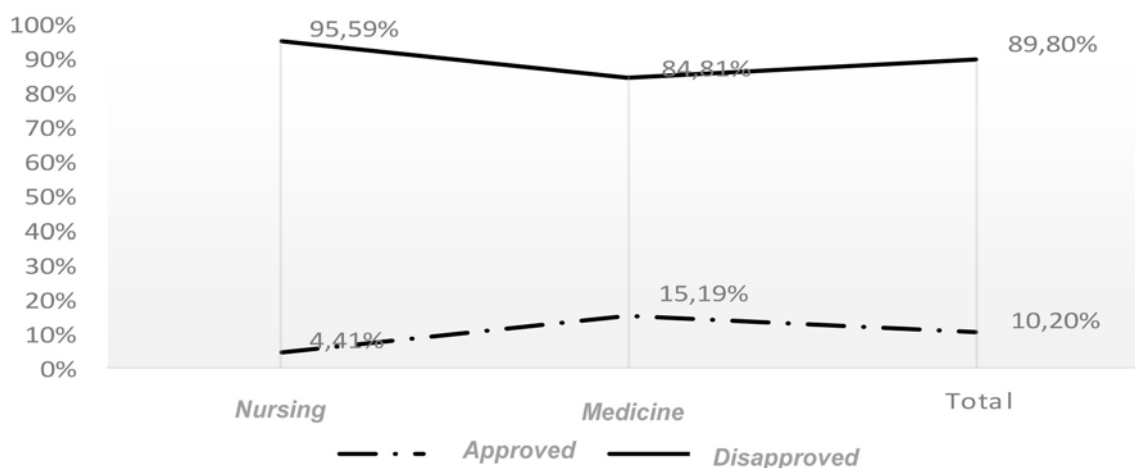
In a scenario with a victim in CRA without advanced airway, 58.50% of the professionals would

perform 30 chest compressions for 2 ventilations, independently of the number of health professionals attending CRP. In the environment with patients with advanced airway, only 42.86% correctly believe in the need to restrict the number of ventilations to 10 per minute.

The rate of chest compressions per minute restricted between 100 and 120 / min was gauged by 29.25% of participants. Almost 26% considered compressions above 100 / min without restriction. The depth of chest compression between five and at most six centimeters was correctly marked by 69.39% of the participants. It is noteworthy that 7.48% of the sample reported that the depth is at the discretion of the professional.

The average of hits found for the studied population was 3.57 ± 1.49 , where the minimum was 0 hits and the maximum 7 hits. When associated with the standard of approval with the professional categories, it was observed that 4.41% of the nurses and 15.19% of the physicians were approved with $p = 0.031$, as demonstrated in Graph 1.

Figure: Graph 1 - Approval / disapproval ratio by professional area and total sample.



According to gender, the average hit rate for women was 3.58 ± 1.46 and for men, 3.56 ± 1.54 ($p > 0.05$). When gender was associated with the pattern of approval, it was observed that men had almost twice as much approval as women, but there was no significance ($p = 0.194$).

Regarding the age group, the means of correct answers were 3.94 ± 1.32 between 20-29 years, 3.02 ± 1.58 between 40-59 years and 2.00 ± 1.09 for 60 years or more ($p = 0.000$). There was a difference between the means of the 20-29 age group with 40-59 years ($p = 0.002$) and the age group of 20-29 with 60 years or more ($p = 0.005$). The association between the approval pattern and the age variable appears to be younger, but there was no significance ($p = 0.609$).

In relation to the average of hits and the time of professional experience, those who had less than five years of experience had an average of 3.84 ± 1.44 , with experience between five and ten years of 3.77 ± 1.33 and above of ten years of experience, 3.16 ± 1.57 ($p = 0.037$). There was a difference in the threshold of significance among those who had less than five years of experience in relation to those who were older than ten years ($p = 0.057$). There was no significant association between the approval pattern and the time of professional experience ($p = 0.955$).

Similarly, when comparing the average number of hits with admission time in the hospital, the mean was 2.25 ± 1.38 for those admitted between 1991-1999; 3.53 ± 1.69 for those admitted between

2000-2009 and 3.68 ± 1.40 for those admitted between 2010-2016 ($p = 0.03$). There was a difference between those admitted between 1991-1999 and those between 2010-2016 ($p = 0.031$). There was no significant association between the standard of approval and the year of admission ($p = 0.540$).

When comparing the average of hits with the sector of activity, it was observed that professionals of the Emergency Department obtained an average of 3.25 ± 1.38 , those of the Intensive Care Units of 3.81 ± 1.42 and those of the Infirmary with 3.61 ± 1.63 , with no significance ($p = 0.174$). There was no significant association between the standard of approval and the year of admission ($p = 0.607$).

Also, comparing the average of hits with the work shift, it was observed that daytime professionals obtained a mean of 3.73 ± 1.56 , those of the night of 3.34 ± 1.45 and those who worked in both with 3.63 ± 1.30 , without significance ($p = 0.333$). There was no significant association between the standard of approval and the year of admission ($p = 0.625$).

Discussion

We identified in this study a deficiency in knowledge about Basic Life Support (BLS) among the professionals evaluated. Only 10.20% obtained approval, which may show that a large part of the studied population did not have knowledge about some procedures recommended by the current CPR guidelines, as

well as the ideal sequence of care. Other studies that considered different professionals regarding their theoretical knowledge on the diagnosis and treatment of CRA evidenced a deficiency in the approach of health professionals.¹⁰⁻¹¹

In this study, the median accuracy of the medicine was 53.85% (3.77 questions), a similar result was observed in other studies that evaluated medical professionals and their knowledge in CRA¹⁰⁻¹² with a mean of 50% and 55%; which, in the same way, demonstrate insufficient theoretical knowledge in the professional category in question.

The recognition of the victim in CRA was correctly identified by 50.63% of the physicians of this study, which compared to the findings of Barbosa et al.,¹³ in which 76.9% were able to identify CRA, is considerably low. According to this author, the use of sophisticated instruments for the diagnosis of CRA is unnecessary and should be a clinical trigger for the initiation of CRA, suggesting that the clinical signs of a CRA victim may not be clearly elucidated in the sample studied.

Compared to a study that evaluated 220 physicians at a university hospital in Jamaica, 77.7% of the participants answered the question,¹² differently from our study that only 40.51% of physicians answered correctly.

Regarding the compression-ventilation relationship without advanced airway, in our study, physicians obtained 63.29% of the use, a result superior to those found in other studies^{10,12} with findings of 46% to 47.8% of use.

In consideration of the compression-ventilation relationship, after advanced airway, there was a low assertion of the physicians in relation to the other questions with only 25.32% of correct answers. This data corroborates the findings of Duarte & Fonseca,¹⁰ in which only 29.5% of physicians correctly stated the relationship. However, in Howell's study,¹² was approximately doubled (51.5%). In our research, the low number of correct answers in the question may be associated with the ventilatory function being commonly assumed by the professional physiotherapist in the hospital under study.

In a study¹⁴ that sought to trace the professional profile of the students who spontaneously sought the Advanced Life Support in Cardiology course, it was observed that among the 173 students, physicians constituted the majority of the sample studied (90.7%), followed by nurses (7.5%) and other professionals (1.7%). The highest number of successes in the medical profession in the present study, of 15.1% approved, compared to the other profession, may be associated with the fact that this category seeks more capacity to fully exercise its attributions, mainly in compliance with the principle of non-maleficence, a topic dealt with in an article on medical liability of Netto & Alves.¹⁵ When they violate this principle, it may be through malpractice, recklessness and negligence, the former being characterized by lack or lack of technical knowledge of the profession, since the management of CRA / CPR requires a medical professional because he / she is conducting invasive procedures and drug prescription, in addition to generally coordinating CPR.

Nursing obtained approval in only 4.41% of its professionals. In the study by Saramma et al.,¹⁶ 35.5% of the nurses had approval before the application of CPR training, however, the score considered for approval was 60%, below that required in this study. Cunha et al.,¹⁷ found mean scores of 64.54% ± 26.82. Already another study¹⁸ in the evaluation of the performance before and after training, obtained a score of 62.9% in the pre-training. However, Madden,⁸ when assessing the knowledge of nursing students, before undertaking CPR training, found approval in 6% of the interviewees.

Some studies have observed a significant improvement in knowledge after CPR training in nurses, however, there was a slight decrease in knowledge after three months.¹⁹⁻²⁰ Madden⁸ also showed that after 10 weeks of CPR training, there was deterioration in knowledge and reanimation skills among nursing students. It should be noted that irregular and / or extensive periodicity of training may have negatively reflected the findings of the present study. It seems appropriate to recommend periodic training every three months according to the reality of the institution.

In a study by Lima et al.,²¹ that sought to evaluate the impact of a permanent training program on BLS and Advanced Life Support in the knowledge of nursing

professionals, found that the longer the graduation time, professionals presented lower approval scores. In the present study, there was no association between less time of professional experience with better standards of approval.

Landers²² stresses that there is often poor training since graduation, where knowledge related to CRA and CPR maneuvers have been delivered in a non-supportive way to the needs of the student that later reflect in the professional experience, without providing subsidies for the harmonious correlation between theory and practice. This analysis may justify the scores obtained by the nurses in this research.

The recognition of a victim in CRA was correctly marked by 45.5% of the nurses. This result is different from the studies,^{5,17,23} which addressed the same theme in which nurses were able to correctly identify between 76.9-92% of their samples. According to Landers,²² we can extract from the compiled data that the category of nurses needs preparation before a cardiac arrest event because most of the time it is the nurse member of the team who first faces the CRA situation.

Regarding the sequence of attitudes in the adult survival chain, it was found that the overall proportion of correct answers in a single study¹⁷ that addressed this issue was 54%. In our study, nurses were only 35.2% successful. Practical non-compliance and / or lack of knowledge related to flowcharts and protocols may justify the low number of hits on the chain of in-hospital survival. According to an integrative review of the literature between the years 2010 and 2014²⁴ that aimed to identify the evidence on the survival of in-hospital CRA, it was observed that survival has increased in recent years and attributed this fact to the research and consequent adequacy of the protocols assistance. Errors related to prevention and diagnosis are the most common, mainly due to non adherence to protocols.^{25,26}

Although not statistically significant ($p = 0.194$), it can be observed that even with female predominance, of 55.78% of the sample, the male obtained greater approval with 13.85%, in detriment to 7.32% of the female. This is related to the fact that the medical

category, which had the highest approvals, was composed of 69.6% of men.

It was opportune to evaluate that there was no statistical difference between the professionals who attended critical areas, Emergency and Intensive Care Units (ICU), in relation to those who attended non-critical areas, such as the wards. The professionals that work in ICUs had greater approval but was not significant. These data are in agreement with the study by Bertoglio et al.,²⁷ who evaluated the theoretical knowledge of 56 nurses regarding cardiac arrest care and observed more correct answers in the group that worked with equipment access, such as cardiac monitor and defibrillator, in comparison to the group of non-critical areas without access to equipment, but there was no statistical difference. The finding of greater knowledge in the ICU is related to the greater severity of hospitalized patients and greater recurrence of the CRA event when compared to the ward, which provides more experience to the assistant teams.

In view of the above, it is suggested standardization of the service and optimization of in-service training so that there is greater training and professional attitude, paralleling scientific and technological progress, with the opportunity to guarantee the quality of the assistance provided and to have a favorable impact on survival.

The research limitations include a simple random sample, so the results can not be generalized due to possible bias inherent in the sample selection process. The study addressed only theoretical knowledge and the application of a questionnaire does not constitute, as exclusivity, an ideal method to evaluate the professionals' knowledge, but it is an interesting alternative as an initial step for future research.

Conclusion

The results of this study show a relevant deficiency in the knowledge of medical professionals and nurses about the diagnosis and treatment of CRA in adults in a public hospital, with approval of only 10.20% of the participants.

Author contributions

Oliveira SFG participated in the conception, design, research and statistical analysis of the research data, interpretation of the results, writing of the scientific article. Pereira SMBM participated in the participated in the design, design, interpretation of the results. Vieira LL participated in the statistical analysis of the research data. Gardenghi G participated in the interpretation of the results, writing of the scientific article and final revision of the manuscript.

Competing interests

No financial, legal or political competing interests with third parties (government, commercial, private foundation, etc.) were disclosed for any aspect of the submitted work (including but not limited to grants, data monitoring board, study design, manuscript preparation, statistical analysis, etc.).

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