STATISTICAL TREATMENT OF COLLECTED DATA WITH A VIEW TO THE STATISTICAL COMPARISON BETWEEN THE PERFORMANCE OF CARDIOPULMONARY RESUSCITATION MANEUVERS BY THE LAY POPULATION AND BY HEALTHCARE STUDENTS.

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ABSTRACT

This study aimed to compare the quality of cardiopulmonary resuscitation (CPR) between the lay population and healthcare students. Cardiorespiratory arrest (CRA) compromises cellular metabolism and requires a rapid response to increase the chances of survival. Using the Resusci Anne QCPR manikin and computational analysis techniques, the research evaluated 30 laypeople and 32 students from Unievangélica, demonstrating that the students obtained better results, with an average score of 82.5, while the laypeople scored 52.5 (p = 0.0006). The success rate was higher among students (72.5%) compared to laypeople (31.25%), and the time to initiate CPR was significantly shorter for students (32.5 seconds). The research reinforces the importance of formal training, such as BLS and ACLS, and continuous practice in controlled environments to improve performance and increase survival chances. Despite limitations, such as manikin simulation, the study highlights the need for training programs and better training guidelines for the population.

Keywords: Cardiopulmonary Resuscitation; Cardiac Arrest; Resuscitation Training.

INTRODUCTION

Cardiorespiratory arrest (CRA) occurs when the heart is unable to pump blood, resulting in the absence of a central pulse, compromising cellular metabolism and increasing the risk of damage with each minute without intervention (GONZALEZ *et al.,* 2013; NEUMAR *et al.*, 2008). In Brazil, 200,000 cases of CRA are recorded annually, with a 50% survival rate associated with the return of circulation (PEBERDY *et al.*, 2003). Hospital survival ranges from 9.5% to 24.2%, highlighting the importance of first aid training (GONZALEZ *et al.,* 2013). The American Heart Association (AHA) Guidelines recommend a compression frequency between 100 and 120 bpm to ensure adequate circulation (LEE *et al.*, 2013). Poorly performed compressions can compromise neurological and cardiac function, as shown by Sos-

Kanto *et al.* (2007). The objective of this study is to statistically compare the performance of CPR between the lay population and healthcare students, generating comparative graphs and tables.

METHODOLOGY

This cross-sectional study compared the quality of cardiopulmonary resuscitation (CPR) between two groups: 30 lay participants and 32 healthcare students at Unievangélica, using the Resusci Anne QCPR manikin to capture data on applied force and harmonic movement parameters (frequency and amplitude). Data were collected via an Arduino microcontroller and stored in .CSV format, being processed in Python with the NumPy, Pandas, Matplotlib, Seaborn, and Scipy libraries. Statistical analysis allowed for the comparison of CPR performance between the groups, demonstrating the influence of formal training on the execution of maneuvers.

RESULTS

The analysis of CPR maneuvers between the lay population and healthcare students showed significant differences, confirming the importance of formal training and speed in performing maneuvers (FILGUEIRAS *et al.*, 2006; CAVALCANTE e LOPES, 2006). The average score was 52.5 for laypeople and 82.5 for students, with a significant difference (p = 0.0006), highlighting the impact of formal training, such as BLS (CARVALHO *et al.*, 2020). The success rate was higher among students (72.5%) compared to laypeople (31.25%), which can be explained by the efficiency in early defibrillation and correct CPR execution (CANESIN *et al.*, 2001). Students also initiated CPR more quickly (32.5 seconds versus 121.25 seconds), reinforcing the importance of time for survival (CAVALCANTE e LOPES, 2006). Studies by Santos *et al.* (2021) and Filgueiras *et al.* (2006) highlight that formal training, such as BLS and ACLS, improves performance and reaction capacity in emergencies. The comparison confirms that continuous training and practice are essential to improve CPR performance, increasing the chances of survival in cardiorespiratory arrests (ARAÚJO *et al.*, 2022; CAVALCANTE e LOPES, 2006).

Figura 1: Gráfico sobre a comparação entre a amplitude média das compressões torácicas
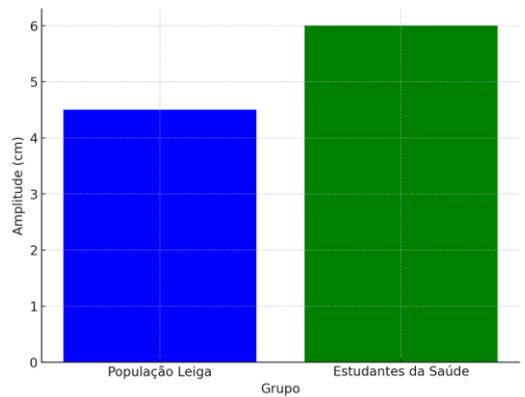
Fonte: autoria própria

Caption: Comparison of the average amplitude of chest compressions between the lay population and healthcare students.

The study, despite limitations such as the small sample size and manikin simulation, highlighted the importance of formal CPR training. It promoted awareness of the need for rapid responses in emergencies and encouraged the development of training programs for the lay population, contributing to improved training guidelines and public policies focused on CPR, increasing the chances of survival in cases of cardiorespiratory arrest.

CONCLUSION

The comparison between the lay population and healthcare students demonstrates that formal training and continuous practice in controlled environments are essential for efficient CPR performance. The speed of execution, theoretical knowledge, and practical experience of healthcare students ensure better performance, a higher success rate, and a reduced response time in cardiorespiratory arrest situations. These findings are consistent with the conclusions of the studies, which reinforce the need for continuous education and the importance of rapid interventions to increase survival chances.

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REFERENCES

ARAÚJO, N. R. *et al*. Nursing training and retraining on cardiopulmonary resuscitation: a theoretical-practical intervention. ***Revista da Escola de Enfermagem da USP,*** v. 56, 2022.

CANESIN, M. F.; GRION, C. M C. A ressuscitação cardiopulmonar. **Arquivos Brasileiros de Cardiologia**, v. 77, n. 2, p. 196-197, 2001.

CARVALHO, T. *et al*. Diretriz Brasileira de Reabilitação Cardiovascular – 2020. **Arquivos Brasileiros de Cardiologia**, v. 114, n. 5, p. 943-987, 2020.

CAVALCANTE,T. M. C.; LOPES, R. S. O atendimento à parada cardiorrespiratória em unidade coronariana segundo o Protocolo Utstein. **Acta Paulista de Enfermagem,** v. 19, n. 1, p. 7-15, 2006.

FILGUEIRAS FILHO, N. M. *et al.* Avaliação do conhecimento geral de médicos emergencistas de hospitais de Salvador - Bahia sobre o atendimento de vítimas com parada cardiorrespiratória. **Arquivos Brasileiros de Cardiologia,** v. 87, n. 5, p. 634-640, 2006.

GONZALEZ, M. M. *et al*. I Diretriz de Ressuscitação Cardiopulmonar e Cuidados Cardiovasculares de Emergência da Sociedade Brasileira de Cardiologia. **Arquivos Brasileiros de Cardiologia,** v. 101, n. 2, p. 1-221, 2013.

GUIMARÃES, J. I. *et al*. Diretriz de apoio ao suporte avançado de vida em cardiologia - Código Azul - Registro de ressuscitação normatização do carro de emergência. **Arquivos Brasileiros de Cardiologia,** v. 81, 2003.

LEE, S. H. *et al*. Does the quality of chest compressions deteriorate when the chest compression rate is above 120/min **Emergency Medicine Journal,** v. 31, n. 8, p. 645-648, 2014.

NEUMAR, R. W. *et al*. Post-cardiac arrest syndrome: epidemiology, pathophysiology, treatment, and prognostication. A consensus statement from the International Liaison Committee on Resuscitation the American Heart Association Emergency Cardiovascular Care Committee; the Council on Cardiovascular Surgery and Anesthesia; the Council on Cardiopulmonary, Perioperative, and Critical Care; the Council on Clinical Cardiology; and the Stroke Council. **Circulation**, v. 118, n. 23, p. 2452-2483, 2008.

PEBERDY, M. A. *et al*. Cardiopulmonary resuscitation of adults in the hospital: A report of 14,720 cardiac arrests from the National Registry of Cardiopulmonary Resuscitation. **Resuscitation**, v. 58, n. 3, p. 297-308, 2003.

PISCOPO, A. Eficácia do treinamento de ressuscitação cardiopulmonar utilizando manequins de baixo custo produzidos com garrafa plástica comparados com manequins comercializados, em escolas públicas de São Paulo, 2022.

SANTOS, E. C. A., *et al*. Simulation for teaching cardiorespiratory resuscitation by teams: setting and performance assessment. **Revista Latino-Americana de Enfermagem,** v. 29, 2021.

SOS-KANTO, SOS-KANTO study group. Cardiopulmonary resuscitation by bystanders with chest compression only (SOS-KANTO): an observational study. **The Lancet,** v. 369, n. 9565, p. 920-926, 2007.