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Comparison Of The Effectiveness Of Mechanical And Manual Cpr On The Events Of Return Of Spontaneous Circulation (ROSC) In Cardiac Arrest Patients

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Abstract

Purpose: Cardiac arrest is a condition where normal blood circulation stops suddenly which is marked by the disappearance of arterial blood pressure. Pulmonary Resuscitation (CPR) is an action that consists of giving chest compressions and breathing assistance to restore and maintain the function of vital organs in victims of cardiac arrest and respiratory arrest. The return and survival of vital organ function in cardiac arrest victims given CPR action are marked by the occurrence of Return of Spontaneous Circulation (ROSC). **Methods**: Retrospective research. The number of samples was 60 respondents. Data analysis using Mann-whitney test **Results:** results that compared the effectiveness of mechanical CPR and manual CPR against ROSC events obtained Sign value. (2-tailed) mechanical CPR was 0.001 smaller than the Sign value. (2-tailed) Manual CPR was 0.043 with a significance level <0 , 05 **Conclusion:** so that it can be concluded that mechanical RJP is more effective than manual RJP for the incidence of Return of Spontaneous Circulation (ROSC) in cardiac arrest patients.

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INTRODUCTION

Coronavirus (COVID-19) has emerged as a global health threat due to its accelerated geographic spread over the last two decades (Umakanthan et al. 2020). The COVID-19 epidemic started from the city of Wuhan in China towards the end of December 2019 and It has since spread rapidly to Thailand, Japan, South Korea,

Singapore, and Iran entered the early months. This recent emergence of a previously unknown coronavirus in China has had huge impacts globally. Covid-19 is a challenge to the global public health (El Zowalaty and Jarhult 2020). In Indonesia, from 3 January 2020 to 26 March 2021, there have been 1,482,559 confirmed cases of COVID-19 with 40,081 deaths (WHO 2021)

Most patients infected with COVID-19 have a history of contact with a surface virus or infected patients or carriers of the virus. In addition, infected patients have common symptoms relative to the common cold, such as fever, cough, fatigue, and shortness of breath in severe cases. The most common complication in infected patients is pneumonia, respiratory distress, and rare shock(China 2020). According to China's National Health Commission (NHC), about 80% of deaths were reported among patients over 60 years of age, while 75% had previous health problems, including diabetes and cardiovascular disease. In line with WHO Situation Report No. 7 issued on 27 January 2020, cases detected outside China had a mean age of 45 (2-74 years). Male predominant among detected patients (71%).

A study of 138 hospitalized patients with pneumonia infected with the COVID-19 showed that the mean age was 56 years (interquartile range: 42-68 years; range: 22-92 years) and 75 (54.3%)) were male while 63 (45.7) were female (Wang et al. 2020). Older people, especially those with previous health problems such as asthma, diabetes, or heart disease, are more likely to die from COVID-19 (CCDC 2020). PCR detection for SARS-CoV-2 mRNA on nasopharyngeal swabs is the standard for diagnosing active Covid-19 disease in asymptomatic subjects and symptomatic patients without characteristic radiological findings. Nasopharyngeal swabs appear to be a simple procedure, still imprecise nasopharyngeal sampling, performed by untrained operators, can be the cause of the false-negative conclusions relevant to clear negative impact on epidemic control efforts and, if PPE is not used correctly, this can expose healthcare workers and patients to a risk of transmission (Piras et al. 2020).

Patients undergoing a nasopharyngeal swab for Covid-19 detection often feel anxious. The level of anxiety of each patient is different. This is caused by several factors, including the patient's age.

METHOD

In this study, patients who have experienced ROSC will be selected either mechanically or manually with medical records. The instruments used in this study are: (1) Respondent's Medical Record Liability Sheet, i.e. the researcher's liability sheet in keeping the confidentiality of the patient's medical record data made as respondents. (2) Medical Record Data Takeover Agreement Sheet (i.e., a sheet of evidence of approval by the hospital, to provide and authorize researchers to take medical records data. This sheet includes the initials of the respondents, age/date of birth, gender, weight, date of performance of the RJP action, type of RJP doing, and appearance or absence of ROSC.

RESULTS AND DISCUSSION

Table 1. Distribution of Respondent Characteristics (N=120)

Characteristic		N (%) or M±SD	p
Age	40-50 51-60 61-70 71-80	8 (13.3) 14 (23.3) 26 (43.4) 12 (20)	.256
Gender	Man Women	41 (68.3) 19 (31.7)	.142

M=mean;SD=standar deviation

Table 1 above shows that the majority of respondents are age 61-70 or 26 (43.3%), based on gender, the highest number are man 41 (68.3%).

Table 2. ROSC frequency distribution in cardiac arrest patients with mechanical and manual RJP (N= 120)

RJP	ROSC				Total
	Not Visible		Visible		
	Frequency	percentage	Frequency	percentage	
Mechanic	21	70	9	30	30
Manual	26	86,7	4	13,3	30

Table 2 of Test-T results obtained mechanical RJP T-value of 3,525 and manual RJP t-values of 2,112, whereas T-Values are both larger than T-Table (2,045). Meanwhile, the mechanical P-Value of RJP is 0,001 and the manual P-Value of R JP is 0,043, both of which are smaller than 0,05. Then Ho was rejected or Ha accepted, so it can be concluded that mechanical RJP is more effective than manual RJP against the Return of Spontaneous Circulation (ROSC) incidents in cardiac arrest patients in the Jakarta Hospital IGD room.

Table 3. Comparison of ROSC distribution in cardiac arrest patients with mechanical and manual RJP (N= 120)

ROSC						T-Count	p
RJP	Not Visible		Visible		Total		
	Frequency	Percentage	Frequency	Percentage			
Mechanic	21	70	9	30	30	3,525	,001
Manual	26	86,7	4	13,3	30	2,112	,043

Based on the results of the research, data were obtained for the distribution of gender frequency in patients with cardiac arrest undergoing RJP operations: 41 male respondents with a percentage of 68.3% and 19 female respondants with a percent of 31.7%. This is in line with the study of Santosa, Wihastuti and Haedar, (2015) that the rate of heart arrest patients with a gender of men is higher compared to women. Cigarettes are more identical to men than to women. To this day, smoking among women is still taboo. Smoking is a major risk factor for heart disease and has a strong link to cardiac arrest. Smoking can be a contributing factor in the onset of coronary heart disease due to nicotine content, which can result in a narrowing of blood vessels due to discharge that causes atherosclerosis. (Saesarwati dan Satyabakti, 2017).

In Indonesia, most heart failures are caused by coronary heart disease. (Ngirarung, 2017). According to research that men have more heart failures than women, it can occur due to smoking habits that lead to heart disease, which is a risk factor for heart failure. The highest percentage of respondents in the age group of 61-70 years is 26 patients (43.4%) and the lowest is in the 40-50 years age group is 8 patients (13.3%).. This is in line with the study (Santosa, 2015) that indicates that the average of cardiac arrest patients is within the age range of 45-75 years. Age can be a risk factor because of the decline of all body functions including heart function as you age. Individuals with adult or older age have many problems and stressors, as well as risk factors that accumulate as you get older so that it can affect the quality of life that can lead to decreased body function. (Hamzah, Widaryati, & Darsih, 2016).

ROSC frequency distribution with mechanical RJP is 21 respondents do not appear ROSc with a percentage of 70% and 9 respondents appears ROSK with a percent of 30%. Whereas for the distribution of frequencies in ROS C with manual RJP, there are 26 respondents does not show ROSB with a rate of 86.7% and 4 respondents emerge ROSP with a proportion of 13.3%. According to the results of the study carried out by (Santosa, 2015) in Tulungagung which stated that, out of a total of 45 patients who have had cardiac arrest, 40 patients of them performed manual RJP and 5 other patients performed RJP mechanical action. Based on the results of the T-T test, the mechanical RJP T-value is 3,525 and the manual RJP t-values are 2,112, whereas the two T-Values are larger than the T -Table (2,045). The mechanical P-Value RJP is 0,001 and the manual RJP P -Value is 0,043, both of which are smaller than 0,05. The mechanic RJP R-Vvalues are 0,001 smaller compared to the manual P-valuer RJP of 0,043. Thus, it can be concluded that mechanical S-RJP is more effective than manual RJP against the

Return of Spontaneous Circulation (ROSC) incidents in cardiac arrest patients in the IGDUD Hospital Market Sunday room. The results of this study are supported by the results of a study conducted by Santosa, Wihastuti and Haedar, (2015) in Tulungagung mentioned that there is a link between the use of mechanical RJP and the occurrence of ROSC in cardiac arrest patients in RSUD IGD Dr. Iskak Tulungaagung. However, the AHA stated that there was no benefit of using mechanical RJP devices compared to manual RJP for chest compression in patients suffering a heart attack. The statement is based on three large-scale randomized controlled trials that compared mechanical RJP devices that showed no improvement in out of hospital cardiac arrest (OHCA) results for patients compared to manual chest compression. (American Heart Association, 2015).

The discrepancies in the results of the study may be derived from differences in the patient's condition, such as the time interval between cardiac arrest and RJP intervention, in line with the statement in (Mokhtar, 2016) that the success of resuscitation is influenced by a certain time period between clinical death and biological death. Clinical death occurs when two vital functions, respiration and circulation, fail completely. If this situation is not dealt with quickly, then there will be biological mortality. After three minutes of clinical death without oxygenation, resuscitation can cure 75 percent of the clinical cases with no remaining symptoms. After four minutes the percentage becomes 50 percent and after five minutes it becomes 25 percent. Then, of the rest of the time, make good use of it.

The quality of the given RJP affects the success of the RJP, to the Return of Spontaneous Circulation (ROSC) is done using the foundation in the resuscitation of the High – quality CPR (HQCPR). However, the survival rate can be increased by 2-3 times if HQCPR is given as the basis of cardiac arrest treatment algorithms. From the statement, there is a possibility of a difference between the results of this study and the previous results due to the differences in the quality of the manual RJP given by each nurse. (Mokhtar, 2016).

There are some limitations in this study, among them the limitations of secondary data that exists in the IGD Hospital, such as not recording the beginning of the action of RJP and the time of the appearance of ROSC properly. In the medical records there is no description of what RJP was given to a cardiac arrest patient. In the distinction between mechanical and manual RJP action given, this study is based on information sources from nurses IGD RS, which explains that mechanical RJP is always given to adult cardiac arrest patients or to child patients with the size of the body as an adult, while for the manual RJP is given to every heart arrest patient who has just arrived while waiting for the mechanic RJP device to be prepared, then it will be continued with the mechanical rjp device. In addition, manual Rjp is also given to children's patients as well as when there is a heart attack patient comes to the Jakarta Hospital IGD at the same time. Because the data on the use of mechanical or manual RJP in patients is based only on the description of interviews with IGD nurses and there is no physical evidence like the RJP form, then the basic data is less valid.

CONCLUSION

Based on the analysis of the results of the study, the following conclusion was obtained: A picture of the characteristics of 60 cardiac arrest respondents, showed that the gender of patients with cardiac arrests who performed RJP operations was 41 male respondents with a percentage of 68.3% and 19 female respondants with a percent of 31.7%. The highest age of respondents in the age group of 61-70 years is a total of 26 patients (43.4%) and the lowest patient is in the aged group of 40-50 years is 8 patients (13.3%), for the distribution of ROSC frequency with mechanical RJP is 21 respondents do not appear with 70% and 9 respondents appear ROSc with 30% percent. For future researchers, it is expected to add some variables to the factors that influence RSOC.

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REFERENCES

"Editorial Board" (2015) *Circulation*. American Heart Association, 132(18_suppl_2), hal. S313–S314. doi: 10.1161/cir.0000000000000307.

Lenjani, B. *et al.* (2014) "Cardiac Arrest – Cardiopulmonary Resuscitation," *Journal of Acute Disease*. Hainan Medical College. E-edition published by Elsevier (Singapore) Pte Ltd., 3(1), hal. 31–35. doi: 10.1016/S2221-6189(14)60007-X.

Mokhtar, J. (2016) "Literature Review Strategi Menjaga High Quality Cpr (Hqcpr) Pada Setting Pre, Intra, Dan Post Attempts," *Jurnal Kesehatan Hesti Wira Sakti*, 4(1). Tersedia pada: https://jurnal.poltekkes-soepraoen.ac.id/index.php/HWS/article/view/118.

Ngirarung, S. A. A., Mulyadi dan Malara, R. T. (2017) "Pengaruh Simulasi Tindakan Resusitasi Jantung Paru (Rjp) Terhadap Tingkat Motivasi Siswa Menolong Korban Henti Jantung Di Sma Negeri 9 Binsus Manado," *e-Journal Keperawatan (e-Kp)*, 5(1). Tersedia pada: https://www.neliti.com/publications/108532/pengaruh-simulasi-tindakan-resusitasi-jantung-paru-rjp-terhadap-tingkat-motivasi#id-section-content.

Riskesdas (2018) *Laporan Nasional Riset Kesehatan Dasar 2018*, *Badan Penelitian dan Pengembangan Kesehatan*. Jakarta: Lembaga Penerbit Badan Penelitian dan Pengembangan Kesehatan (LPB). Tersedia pada: http://labdata.litbang.kemkes.go.id/images/download/laporan/RKD/2018/Laporan_Nasional_RKD2018_FINAL.pdf.

Rolston, D. M. *et al.* (2020) "Mechanical, Team-Focused, Video-Reviewed Cardiopulmonary Resuscitation Improves Return Of Spontaneous Circulation After Emergency Department Implementation," *Journal of the American Heart Association*, 9(6), hal. 1–12. doi: 10.1161/JAHA.119.014420.

Saesarwati, D. dan Satyabakti, P. (2017) "Analisis Faktor Risiko Yang Dapat Dikendalikan Pada Kejadian PJK Usia Produktif," *Jurnal Promkes: The Indonesian Journal of Health Promotion and Health Education*, 4(1), hal. 22–33. doi: 10.20473/jpk.V4.I1.2016.22-33.

Sandroni, C. *et al.* (2007) "In-hospital Cardiac Arrest: Incidence, Prognosis and Possible Measures to Improve Survival.," *Intensive care medicine*. United States, 33(2), hal. 237–245. doi: 10.1007/s00134-006-0326-z.

Santosa, W. R. B., Wihastuti, T. . dan Haedar, A. (2015) "Analisis Faktor Yang Berhubungan Dengan Terjadinya Return Of Spontaneous Circulation Pada Pasien Henti Jantung Di Igd Rsud Dr Iskak Tulungagung," *The Indonesian Journal of Health*, 6(1). Tersedia pada: http://jurnal.unmuhjember.ac.id/index.php/TIJHS/article/download/31/26.

World Health Organization (2016) *Global Report on Diabetes*. French. Tersedia pada: https://www.who.int/gho/publications/world_health_statistics/2016/en/.