FUNDAMENTAL AND MANAGEMENT NURSING JOURNAL
Vol. 5, No. 1, April 2022

Laman jurnal: https://e-journal.unair.ac.id/FMNJ
http://dx.doi.org/ 10.20473/fmnj.v5i1.39717

Literature Review

Factors Affecting Successful CPR in COVID-19 Patients: A Systematic Literature Review

Arista Maisyaroh*, Eko Prasetya Widianto, Syaifuddin Kurnianto and Riris Lailatul Fitria

Diploma Nursing Study Program, Faculty of Nursing, University of Jember, Lumajang, East Java, Indonesia

ARTICLE HISTORY

Received: October, 11 2021
Revised: March, 20 2021
Accepted: April, 2 2022
Available online: April, 30 2022

KEYWORDS

cardiac arrest; COVID-19; cardio-pulmonal-resuscitation; nursing care

CORRESPONDING AUTHOR

Arista Maisyaroh
aristamaisyaroh@unej.ac.id
Diploma Nursing Study Program, Faculty of Nursing, University of Jember, Lumajang, East Java, Indonesia

ABSTRACT

Introduction: Cardiac arrest is a sudden cessation of ineffective pumping. Cardio-pulmonal-resuscitation (CPR) applied to save the life among those with cardiac arrest. During the pandemic COVID-19 patients, cardiac arrest was found as the major causes of death Even cardio-pulmonal-resuscitation (CPR) applied to save the life, a few of them was survived. The purpose of this review is to determine the quality of life in COVID-19 patients with CPR post cardiac arrest.

Method: The paper research was reviewed regarding their inclusion criteria and quality assessment using the Joana Briggs Institute's critical appraisal checklist. Three academic databases; PubMed, Springerlink, and Science direct were comprehensively applied to collect the published article from 2017 to 2020. They are Articles were selected by PRISMA 2020 flow diagram for systematic review.

Results: A total 10 studies were yielded in the final analysis. Factor affecting successful CPR in COVID-19 patient post cardiac arrest were; duration of CPR was delivered between six to 20 minutes. In comparison to the situation before the pandemic COVID-19, less neurological function improvement was signed of lowering quality of life of CPR patients with COVID-19.

Conclusion: This study highlighted the quality of life in COVID-19 patients with cardiac arrest and conducted CPR was poorer compared to those before the pandemic. Findings considered COVID-19 placed cardiac arrest survivor in a higher risk of morbidity and mortality. Future study determines factors associated with higher probabilities of surviving after CPR delivered among patient with COVID-19 post cardiac is highly recommended

Cite this as:

Maisyaroh, A., Widianto, E.P., Kurnianto, S. & Fitria, R. L. (2022). Factors Affecting Successful CPR in COVID-19 Patients: A Systematic Literature Review. *Fundam Manaj. Nurs. J.* 5(1), 29-36. doi.org/10.20473/fmnj.v5i1.39717

1. INTRODUCTION

The global pandemic COVID-19 infected not only humans but also animals (Velavan & Meyer, 2020). COVID-19 is also a respiratory disease of varying severity in humans and animals (Couper et al., 2020). According to Baldi et al., (2020), some evidence suggests that COVID-19 can also cause an increase in mortality and cardiac arrest. An analysis found some disruption in the quality of life chain in cardiac arrest survivors during the pandemic and this may have contributed to the visible results (Lim et al., 2020).

Hospitalized cardiac arrest (IHCA) is relatively common in COVID-19 patients and often results in poor outcomes. A multicenter cohort study from the United States reported that 701/5019 (14.0%) critically ill patients with COVID-19 had cardiac arrest in-hospital, with 400/701 (57.1%) receiving CPR, and only 7% of patients receiving CPR. those who survived and survived to hospital discharge with normal neurologic status or mild impairment (Sutton et al., 2021). Quality of life to hospital discharge differed by age, with 21.2% (11/52) of patients

younger than 45 years surviving compared to 2.9% (1/34) of those 80 years or older (Hayek et al., 2020).

Cardiac arrest in COVID-19 patients, some of which occur in critical patients who are in isolation rooms and also in the ICU. High disease infectivity and an environment containing high concentrations of virus and a health environment must have principles and strategies. The quality of successful CPR and preventing infection in health workers is a challenge when performing CPR (Atmojo et al., 2020).

The success of CPR action on COVID-19 patients is also influenced by several action strategies that must be met to improve the quality of life of COVID-19 patients and the safety of rescuers such as PPE used by health workers when performing CPR, namely using PPE Level 3, such as N95 masks, coveral , gowns, boots and rubber boots with shoe protectors, google, face shields, disposable handscoons, headcaps and aprons (Atmojo et al., 2020). Chest compressions at a rate of 100-120 beats per minute and a chest compression depth of 5 cm (2 inches) minimize interruptions and avoid excessive ventilation (American Heart Association, 2020). Emergency tracheal intubation for COVID-19 positive patients should be performed by a healthcare professional who is most familiar with the use of Rapid Sequence Intubation (RSI) technology and video laryngoscope (where available) in the team. Guidance on fibrobronchoscopy and use of barrier aerosols or boxes where possible (American Heart Association, 2020). Although the effectiveness of prone CPR is uncertain, supine movements should be avoided in pronational patients with advanced airways unless there is a risk of airway obliteration or aerosolization. Place your hands in the standard position of the T7 or T10 vertebral bodies and perform anterior-posterior and CPR in pronation (American Heart Association, 2020).

CPR action was carried out for 30 minutes according to the cause of the cardiac arrest and the mechanism of injury and the number of health workers who would perform CPR, which had been combined with ethical factors. Discontinuation of CPR should be considered after performing CPR for more than 30 minutes in the absence of return of spontaneous circulation, no vital signs during CPR, except under the support of extracorporeal membrane oxygenation (EMCO) and extracorporeal circulation (American Heart Association, 2020). Based on this background, researchers are interested in conducting a review of the literature on the success of CPR in COVID-19 patients with cardiac arrest.

The main purpose of the research Factors Affecting the Success of CPR in COVID-19 Patients: is that researchers want to study and find out about what factors affect the success of CPR in COVID-19 patients who experience cardiac arrest using a systematic literature review.

2. METHODS

2.1 Research Design

In this study to conduct article quality using Joanna Briggs Institute (JBI) for articles with Cohort Study research design, Systematic Review or Meta Analysis. Of the 10 articles reviewed, all use an assessment Joanna Briggs Institute (JBI). At the Joanna Briggs Institute (JBI) with Cohort Study and Systematic Review there are 11 questions by answering "Yes", “No”, “Unclear” and “Not Applicable” (Joanna Briggs Institute, 2019). From this, it was found that the 2 articles with the systematic review design had mostly met the 11 questions on the JBI, but there were 3 articles of this systematic review that did not meet the 11 questions but the score was still above 50% and could meet the requirements. Meanwhile, in the assessment using the Cohort design The 5-article study met 11 questions using the JBI assessment.

2.2 Search Methods

The literature review in this study is a comprehensive summary of several research studies with certain themes that have been previously determined by other researchers. The search for literature sources was carried out in February – May 2022 in several electronic databases.There are several electronic databases that have been used in the search for sources for this literature review, such as PubMed, Springer Link, ScienceDirect.

2.3 Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Population / problem	Patients COVID-19 with Cardiac Arrest, Adult Patients	In addition to COVID-19 patients who experience cardiac arrest, in addition to adult patients such as neonates, children and pregnant women,
Intervention	CPR	Besides CPR
Comparation	-	-
Outcome	Return of spontaneous circulation, neurologis good	Besides Return of spontaneous circulation, neurologis good
Study design	*Systematic review, meta analysis,cohort studies*	Besides *Systematic review, meta analysis,cohort studies*
Publication Years	Post-2017	Pre-2017
Language	Bahasa Inndonesia, Bahasa Inggris	Besides Bahasa Inndonesia, Bahasa Inggris

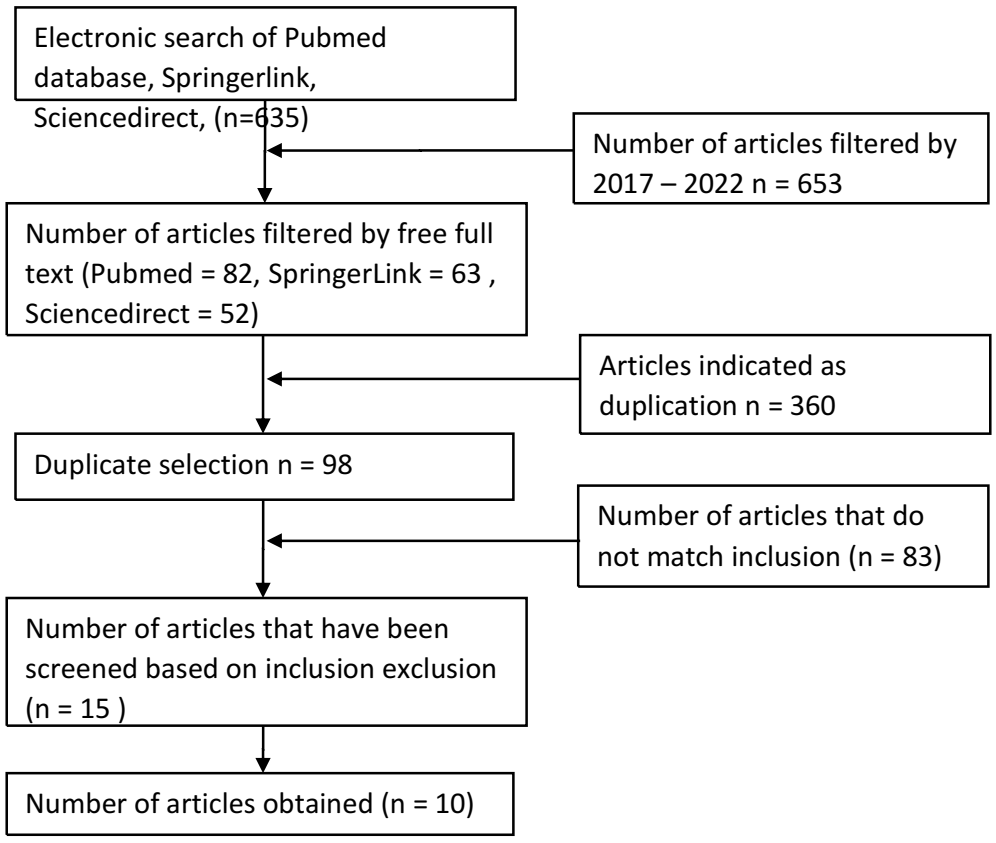

Figure 1. PRISMA 2020 flow diagram for new systematic reviews

2.5 Research Outcomes

The search in this literature study uses several electronic data bases including Springer link, Pubmed and sciencedirect. At the initial search stage for journal articles, 635 articles were found, journal articles with Pubmed results = 243, Springer link = 261 and sciencedirect = 131 which were filtered by year, namely 2017-2021, based on study area and based on language, namely using English. and Indonesian. Of all the articles found, there were 537 journal articles that were irrelevant to the title and abstract. After that, select the articles based on the outcome, if there is no spontaneous circulation then the article will be excluded. The total number of journal articles that can be reviewed is 10 journal articles.

2.6 Data Abstraction and Synthesis

This review used data extracted as follows: Researcher, Year, Title, Design, Sample, Intervention, and Outcome. The data was extracted into a summary table using Excel. See in Table 3 for the results of the data extraction of Factors Affecting the Success of CPR in COVID-19 Patients.

3. RESULTS

Instrument for assessing the success of CPR in COVID-19 patients

The instrument for assessing the success of CPR in COVID-19 patients who experienced cardiac arrest using the Return of spontaneous circulation (ROSC) instrument and also improved neurology. However, according to Bielski et al. (2021) that patients with confirmed COVID-19 did not have a significant impact on ROSC success and neurological return after CPR was performed. The return of improved neurological function which is one of the criteria for successful CPR in COVID-19 patients according to (Holm et al., 2021) and the clinical condition that most often occurs just before cardiac arrest, is breathing showing hypoxia before cardiac arrest. This may highlight an opportunity to improve the outcome of successful CPR. Measures to prevent hypoxia and correct it immediately can reduce the risk of heart attack in COVID-19 patients.

CPR success time in COVID-19 patients

The time span needed to achieve ROSC in COVID-19 patients with cardiac arrest is around 6-20 minutes. According to the study of Hayek et al (2020) Return of spontaneous circulation or ROSC was achieved at an average time of 6 minutes after CPR was performed, whereas in those who died after ROSC it was 7 days after receiving CPR. This is because the probability of surviving until discharge from the hospital decreases with older age. ROSC less or more than 6 - 20 minutes can not be said to be effective. So CPR requires an appropriate time to go to ROSC. The effective time for return of spontaneous circulation or ROSC lasts up to 20 minutes. Research Provisions Szarpak et al. (2021) said that where continuous ROSC was found, it was defined as a stable circulation for at least a 20-minute span. If the ROSC does not return within 20 minutes, this occurs as a result of the COVID-19 patient not only having problems with his heart but also with his respiratory system, thereby slowing the return of spontaneous circulation.

4. DISCUSSION

The success of CPR in COVID-19 patients with cardiac arrest who experienced cardiac arrest

experienced significantly lower ROSC and

Teble 1. The outcomes of JBI Critical Appraisal Systematic Review.

No	**JBI** Critical Appraisal Systematic Review	(Ippolito et al., 2021)	(Mir et al., 2022)	(Szarpak et al., 2021)	(Bielski et al., 2021)	(Lim et al., 2021a)
1	Is the review question clearly and explicitly stated?	Yes	Yes	Yes	Yes	Yes
2	Were the inclusion criteria appropriate for the review question?	Yes	Yes	Yes	Yes	Yes
3	Was the search strategy appropriate?	Yes	Yes	Yes	Yes	Yes
4	Were the sources and resources used to search for studies adequate?	Yes	Yes	Yes	Yes	Yes
5	Were the criteria for appraising studies appropriate?	Yes	Yes	Yes	Yes	Yes
6	Was critical appraisal conducted by two or more reviewers independently?	Yes	Yes	Yes	Yes	Yes
7	Were there methods to minimize errors in data extraction?	Yes	No	Yes	No	Yes
8	Were the methods used to combine studies appropriate?	Yes	No	Yes	No	Yes
9	Was the likelihood of publication bias assessed?	No	No	Yes	No	Yes
10	Were recommendations for policy and/or practice supported by the reported data?	Yes	Yes	Yes	Yes	Yes
11	Were the specific directives for new research appropriate?	Yes	Yes	Yes	Yes	Yes
		90%	70%	100%	70%	100%

No	**JBI** Critical Appraisal cohort studies	(Miles et al., 2020)	(Hayek et al., 2020)	(Roedl et al., 2021)	(Murphy, Charles G. et al., 2022)	(Holm et al., 2021)
1	Were the two groups similar and recruited from the same population?	Yes	Yes	Yes	Yes	Yes
2	Were the exposures measured similarly to assign people to both exposed and unexposed groups?	Yes	Yes	Yes	Yes	Yes
3	Was the exposure measured in a valid and reliable way?	Yes	Yes	Yes	Yes	Yes
4	Were confounding factors identified?	Yes	Yes	Yes	Yes	Yes
5	Were strategies to deal with confounding factors stated?	Yes	Yes	Yes	Yes	Yes
6	Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)?	Yes	Yes	Yes	Yes	Yes
7	Were the outcomes measured in a valid and reliable way?	Yes	Yes	Yes	Yes	Yes
8	Was the follow up time reported and sufficient to be long enough for outcomes to occur?	Yes	Yes	Yes	Yes	Yes
9	Was follow up complete, and if not, were the reasons to loss to follow up described and explored?	Yes	Yes	Yes	Yes	Yes
10	Were strategies to address incomplete follow up utilized?	Yes	Yes	Yes	Yes	Yes
11	Was appropriate statistical analysis used?	Yes	Yes	Yes	Yes	Yes
		100%	100%	100%	100%	100%

neurologic levels compared to non-COVID-19 patients 9 which was caused by several factors such as patients having poor neurological status and having complications (mild disturbance). This is in accordance with the fact from the study of Hayek et al (2020) where the ROSC rate was significantly lower than that of Non-COVID-19 patients (p = 0.001), resulting in the overall mortality of COVID-19 patients and significantly higher. Research from Ippolito et al., (2021) confirmed that the success of ROSC and normal neurological function in COVID-19 patients is indeed low in success in performing CPR although one in three patients with COVID-19 can achieve ROSC after IHCA with CPR efforts only one in ten can survive 30 days or until discharge from hospital and 6% survive with good neurologic status. The patient's clinical condition was poor, aged over 60 years (elderly), had comorbidities (chronic lung disease) and strategies for performing CPR (Lim et al., 2021). It is less likely that people will experience ROSC in COVID-19 patients due to the worsening of the patient's condition which only has no problems with the heart but also a worsening of the respiratory system which causes oxygenation to decrease faster in COVID-19 patients than in non-COVID-19 patients. This becomes a complication when CPR is performed on COVID-19 patients in accordance with the opinion of Szarpak et al. (2021) the success of CPR in COVID-19 patients with Cardiac Arrest is lower than the success of CPR for non-COVID-19 Cardiac arrest patients this is because COVID-19 patients with Cardiac Arrest have problems not only with their cardiovascular system but also on their respiratory system so they have a heavy disease burden. So the results of CPR in COVID-19 patients may have a lower chance of survival than non-COVID-19 patients. cardiac arrest.: explanation of results, references to previous research, deductions, and hypotheses.

5. CONCLUSION

The instrument for assessing the success of CPR in COVID-19 patients uses 2 assessment instruments, namely the return of ROSC and the assessment of good Neurological results in COVID-19 patients.. The time of success of CPR in COVID-19 patients can be characterized by the appearance of ROSC and improved neurological function with a range of 6 minutes to 20 minutes. The success of CPR showed (p < 0.001) which means that there was a low significant change in the success of CPR in COVID-19 patients with cardiac arrest.

6. REFERENCES

Association, A. H. (2020). Kejadian Penting American Heart Association Tahun 2020 Pedoman CPR dan ECC. *Hospital Management*, *86*(2). https://cpr.heart.org/-/media/CPR-Files/CPR-Guidelines-Files/Highlights/Hghlghts_2020ECCGuidelines_Indonesian.pdf

Atmojo, J. T., Arradini, D., Ernawati, E., Widiyanto, A., & Darmayanti, A. T. (2020). Cardiopulmonary Resuscitation in the COVID-19 Pandemic Era. *Jurnal Keperawatan*, *12*(3), 355–362. https://doi.org/10.32583/KEPERAWATAN.V12I3.781

Baldi, E., Sechi, G. M., Mare, C., Canevari, F., Brancaglione, A., Primi, R., Klersy, C., Palo, A., Contri, E., Ronchi, V., Beretta, G., Reali, F., Parogni, P., Facchin, F., Bua, D., Rizzi, U., Bussi, D., Ruggeri, S., Visconti, L. O., & Savastano, S. (2020). Out-of-Hospital Cardiac Arrest during the COVID-19 Outbreak in Italy. *The New England Journal of Medicine*, *383*(5), 496–498. https://doi.org/10.1056/NEJMC2010418

Bielski, K., Makowska, K., Makowski, A., Kopiec, T., Gasecka, A., Malecka, M., Pruc, M., Rafique, Z., Peacock, F. W., Denegri, A., & Szarpak, L. (2021). Impact of COVID-19 on in-hospital cardiac arrest outcomes: An updated meta-analysis. *Cardiology Journal*, *28*(6), 816–824. https://doi.org/10.5603/CJ.A2021.0168

Couper, K., Taylor-Phillips, S., Grove, A., Freeman, K., Osokogu, O., Court, R., Mehrabian, A., Morley, P. T., Nolan, J. P., Soar, J., & Perkins, G. D. (2020). COVID-19 in cardiac arrest and infection risk to rescuers: A systematic review. *Resuscitation*, *151*, 59–66. https://doi.org/10.1016/J.RESUSCITATION.2020.04.022

Hayek, S. S., Brenner, S. K., Azam, T. U., Shadid, H. R., Anderson, E., Berlin, H., Pan, M., Meloche, C., Feroz, R., O'Hayer, P., Kaakati, R., Bitar, A., Padalia, K., Perry, D., Blakely, P., Gupta, S., Shaefi, S., Srivastava, A., Charytan, D. M., … Leaf, D. E. (2020). In-hospital cardiac arrest in critically ill patients with COVID-19: multicenter cohort study. *BMJ (Clinical Research Ed.)*, *371*, m3513. https://doi.org/10.1136/bmj.m3513

Holm, A., Jerkeman, M., Sultanian, P., Lundgren, P., Ravn-Fischer, A., Israelsson, J., Giesecke, J., Herlitz, J., & Rawshani, A. (2021). Cohort study of the characteristics and outcomes in patients with COVID-19 and in-hospital cardiac arrest. *BMJ Open*, *11*(11), 1–10. https://doi.org/10.1136/bmjopen-2021-054943

Ippolito, M., Catalisano, G., Marino, C., Fucà, R., Giarratano, A., Baldi, E., Einav, S., & Cortegiani, A. (2021). Mortality after in-hospital cardiac arrest in patients with COVID-19: A systematic review and meta-analysis. *Resuscitation*, *164*(February 2021), 122–129. https://doi.org/10.1016/j.resuscitation.2021.04.025

Lim, Z. J., Ponnapa Reddy, M., Afroz, A., Billah, B., Shekar, K., & Subramaniam, A. (2020). Incidence and outcome of out-of-hospital cardiac arrests in the COVID-19 era: A systematic review and meta-analysis. *Resuscitation*, *157*, 248–258.

https://doi.org/10.1016/J.RESUSCITATION.2020.10.025

Lim, Z. J., Ponnapa Reddy, M., Curtis, J. R., Afroz, A., Billah, B., Sheth, V., Hayek, S. S., Leaf, D. E., Miles, J. A., Shah, P., Yuriditsky, E., Jones, D., Shekar, K., & Subramaniam, A. (2021a). A Systematic Review of the Incidence and Outcomes of In-Hospital Cardiac Arrests in Patients with Coronavirus Disease 2019∗. *Critical Care Medicine*, 901–911. https://doi.org/10.1097/CCM.0000000000004950

Lim, Z. J., Ponnapa Reddy, M., Curtis, J. R., Afroz, A., Billah, B., Sheth, V., Hayek, S. S., Leaf, D. E., Miles, J. A., Shah, P., Yuriditsky, E., Jones, D., Shekar, K., & Subramaniam, A. (2021b). A Systematic Review of the Incidence and Outcomes of In-Hospital Cardiac Arrests in Patients With Coronavirus Disease 2019. *Crit Care Med*, *49*(6), 901–911. https://doi.org/10.1097/CCM.0000000000004950

Miles, J. A., Mejia, M., Rios, S., Sokol, S. I., Langston, M., Hahn, S., Leiderman, E., Salgunan, R., Soghier, I., Gulani, P., Joshi, K., Chung, V., Morante, J., Maggiore, D., Uppal, D., Friedman, A., Katamreddy, A., Abittan, N., Ramani, G., … Faillace, R. T. (2020). Characteristics and Outcomes of In-Hospital Cardiac Arrest Events during the COVID-19 Pandemic: A Single-Center Experience from a New York City Public Hospital. *Circulation: Cardiovascular Quality and Outcomes*, *November*, 825–831. https://doi.org/10.1161/CIRCOUTCOMES.120.007303

Mir, T., Sattar, Y., Ahmad, J., Ullah, W., Shanah, L., Alraies, M. C., & Qureshi, W. T. (2022). Outcomes of in-hospital cardiac arrest in COVID-19 patients: A proportional prevalence meta-analysis. *Catheterization and Cardiovascular Interventions*, *99*(1), 1–8. https://doi.org/10.1002/ccd.29525

Murphy, Charles G., M., Mia S. Nishikawa, M., Steven T. Char, B., Samantha K. Nemeth, MA, M., Madhavi Parekh, M., William A. Bulman, M., Caroline Wu, B., Gerald W. Neuberg, M., Irene K. Louh, MD, P., Neil W. Schluger, M., Kenneth M. Prager, M., Katherine N. Fischkoff, M., & Kristin M. Burkart, MD, Ms. (2022). *In COVID-19 Patients Who Suffer In-Hospital Cardiac Arrest, Cardiopulmonary Resuscitation Outcomes May Be Impacted by Arrest Etiology and Local Pandemic Conditions*. https://doi.org/10.1097/CCE.0000000000000605

Roedl, K., Söffker, G., Fischer, D., Müller, J., Westermann, D., Issleib, M., Kluge, S., & Jarczak, D. (2021). Effects of COVID-19 on in-hospital cardiac arrest: incidence, causes, and outcome – a retrospective cohort study. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine*, *29*(1), 1–11. https://doi.org/10.1186/s13049-021-00846-w

Sutton, L., Goodacre, S., Thomas, B., & Connelly, S. (2021). Do not attempt cardiopulmonary resuscitation (DNACPR) decisions in people admitted with suspected COVID-19: Secondary analysis of the PRIEST observational cohort study. *Resuscitation*, *164*, 130–138. https://doi.org/10.1016/J.RESUSCITATION.2021.04.028

Szarpak, L., Borkowska, M., Peacock, F. W., Rafique, Z., Gasecka, A., Smereka, J., Pytkowska, K., Jachowicz, M., Iskrzycki, L., Gilis-Malinowska, N., & Jaguszewski, M. J. (2021). Characteristics and outcomes of in-hospital cardiac arrest in COVID-19. A systematic review and meta-analysis. *Cardiology Journal*, *28*(4), 503–508. https://doi.org/10.5603/CJ.a2021.0043

Velavan, T. P., & Meyer, C. G. (2020). The COVID-19 epidemic. *Tropical Medicine & International Health : TM & IH*, *25*(3), 278–280. https://doi.org/10.1111/TMI.13383

Table 2. Theoretical Mapping

No	Researcher,Year	Title	Design	Sample	Intervention	Results
1	(Hayek et al., 2020)	In-hospital cardiac arrest in critically ill patients with COVID-19: multicenter cohort study	cohort study	>18 years with 400 patients respondents	*Cardiopulmonary resuscitation (CPR)*	Success time or ROSC returns in patients who have performed CPR within 6 minutes and continued with neurological improvement.
2	(Ippolito et al., 2021)	Mortality after in-hospital cardiac arrest in patients with COVID-19: A systematic review and metaanalysis	systematic review and meta-analysis	61 – 69 years with 179 patients respondents	*Cardiopulmonary resuscitation (CPR)*	Indicators of the success of CPR in COVID-19 patients are characterized by experiencing ROSC and good neurological return.
3	(Szarpak et al., 2021)	Characteristics and outcomes of in-hospital cardiac arrest in COVID-19. A systematic review and meta-analysis	systematic review and meta-analysis	> 18 years with 234 patients respondents	*Cardiopulmonary resuscitation (CPR)*	Success time or ROSC returns in patients who have performed CPR within 20 minutes and continued with neurological improvement.
4	(Bielski et al., 2021)	Impact of COVID-19 on in-hospital cardiac arrest outcomes: An updated meta-analysis	meta-analysis	18 - 66.9 years with 33 patients respondents	*Cardiopulmonary resuscitation (CPR)*	Time of success or ROSC returns in patients who have performed CPR within 20 minutes and continued with neurological improvement.
5	(Mir et al., 2022)	Outcomes of in-hospital cardiac arrest in COVID-19 patients: A proportional prevalence meta-analysis	meta-analysis	>18 years with 202 patients respondents	*Cardiopulmonary resuscitation (CPR)*	Success time or ROSC returns in patients who have performed CPR within 10 minutes

No	Researcher,Year	Title	Design	Sample	Intervention	Results
6	(Miles et al., 2020)	Characteristics and Outcomes of In-Hospital Cardiac Arrest Events During the COVID-19 Pandemic	Cohort study	>18 years with 125 patients respondents	*Cardiopulmonary resuscitation (CPR)*	The time of success or ROSC returns in patients who have performed CPR within 9 minutes and continued with neurological improvement.
7	(Roedl et al., 2021)	Effects of COVID-19 on in-hospital cardiac arrest: incidence, causes, and outcome – a retrospective cohort study	Cohort study	>18 years with 12 patients respondents	*Cardiopulmonary resuscitation (CPR)*	Success time or ROSC returns in patients who have performed CPR within 20 minutes and continued with neurological improvement.
8	(Lim et al., 2021)	A Systematic Review of the Incidence and Outcomes of In-Hospital Cardiac Arrests in Patients With Coronavirus Disease 2019	Systematic Review	60 years with 20 patients respondents	*Cardiopulmonary resuscitation (CPR)*	Indicators of successful CPR the patient is experiencing spontaneous circulation or ROSC and neurological improvement.
9	(Holm et al., 2021)	Cohort study of the characteristics and outcomes in patients with COVID-19 and in-hospital cardiac arrest	Cohort study	patients respondents	*Cardiopulmonary resuscitation (CPR)*	Indicators of successful CPR the patient has spontaneous circulation or ROSC and neurological improvement
10	(Murphy, Charles G. et al., 2022)	In COVID-19 Patients Who Suffer In-Hospital Cardiac Arrest, Cardiopulmonary Resuscitation Outcomes May Be Impacted by Arrest Etiology and Local Pandemic Conditions	Cohort study	>18 years with 103 respondents	*Cardiopulmonary resuscitation (CPR)*	Success time or ROSC returns in patients who have performed CPR within 20 minutes and continued with neurological improvement.