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## Short Communication

## Contradictory Resuscitation Procedure for Cardiopulmonary Arrest

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## A B S T R A C T

Drawing from a comprehensive Japan-based literature review and the author's personal experience, this article presents findings that highlight potential improvements in clinical outcomes, such as reduced mortality rates, by optimizing the current resuscitation procedure for cardiopulmonary arrest. Many countries have adopted similar procedures for cardiopulmonary arrest. This article presents a prioritized resuscitation method based on scientific evidence, aiming to improve survival rates. The study, which was conducted in Japan, revealed inconsistencies in the current resuscitation procedure for cardiopulmonary arrest. The study did not involve direct participants but relied on literature review for data collection. A literature review was conducted to analyze the survival rates of various resuscitation methods. The interventions reviewed in the literature included cardiopulmonary resuscitation, automated external defibrillator, and automatic mechanical chest compressions. The survival rate of cardiopulmonary arrest in Japan was found to be low. The results of the literature review suggest that cardiopulmonary resuscitation or automatic mechanical chest compressions should be applied before using an automated external defibrillator. The study emphasizes the need to prioritize resuscitation methods with higher survival rates. This article presents a prioritized resuscitation method based on scientific evidence, aiming to improve survival rates. It is hoped that this new approach will lead to a significant improvement in the survival rates of cardiopulmonary arrest patients.

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On October 22, 2022, the author went into cardiopulmonary arrest for 25 minutes while relaxing at home after dinner despite having no signs of dizziness, pains, shortness of breath, or palpitations at all. The 67-year-old male author did not drink or smoke, slept soundly, and was subjectively stress free. The diagnosis was asymptomatic myocardial ischemia of unknown cause. However, the author without vaccination was infected with the coronavirus disease 2019 (COVID-19) variant of Omicron at the end of July 2022 and had mild symptoms such as a sore throat and fatigue.

Within 1 minute of discovering the cardiopulmonary arrest at home, the author's spouse performed cardiopulmonary resuscitation (CPR). Fortunately, she was trained on

CPR in the community. The ambulance arrived at their home within 5 minutes. An automated external defibrillator (AED) was used, but after 8 minutes, it did not restore a heartbeat. Although other alternatives exist for patients without return of spontaneous circulation, such as automatic mechanical chest compression (ACC), these were not used until the ambulance arrived. The patient was successfully resuscitated with ACC before reaching the hospital. It took 15 minutes for the transport from their home to the hospital.

The author wondered why the AED did not restore a heartbeat but the ACC did. Survival rates for AED cardiopulmonary arrest and ACC cardiopulmonary arrest were investigated and compared.

The diagnosis of asymptomatic myocardial ischemia revealed 3 areas of coronary artery stenosis of unknown cause. The author had no known pre-existing medical history. Ischemia is a lack of

blood flow in a part of the body. It is often caused by atherosclerosis, arteriosclerosis with blood clots, or spasm of the coronary arteries. Spasm of the coronary arteries in 3 areas was observed with magnetic resonance imaging.

Through the cardiopulmonary arrest experience, inconsistencies in Japan's resuscitation procedure were identified. This study presents possible contributing factors regarding why the post-cardiac arrest survival rate is so low in Japan.

**Methods**

A literature review was conducted on resuscitation characteristics in the world. It is noted that this study consists of a limited, Japan-based literature review in addition to the author's personal experience as a survivor of cardiac arrest. In accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines, the

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Google search engine with a phrase site command was used. For example, we used the search term “resuscitation ‘impact of COVID-19’ site:nih.gov,” which is designed to retrieve documents from the National Library of Medicine that are associated with the keyword “resuscitation” and the phrase “impact of COVID-19.”

## Results

As of October 5, 2023, the search results revealed that a study conducted by Bielski et al<sup>1</sup> had been referenced in 35 articles. Bielski et al<sup>1</sup> studied and summarized resuscitation characteristics in pre- versus intra- COVID-19 periods. Their study participants were patients over 18 years old who had experienced out-of-hospital cardiac arrest. Their research compared instances of cardiac arrest during the COVID-19 period with those that occurred in the pre-COVID-19 era.

According to their study, the outcome indicates the proportion of survivors.<sup>1</sup> The outcome for cardiac arrest at home in 17 cases was 77.5% during the COVID-19 pandemic compared to 73.3% prepandemic.<sup>1</sup> The outcome for an AED in 14 studies was 8.1% pre-COVID-19 compared with 6.1% during COVID-19.<sup>1</sup> The outcome for ACC in 3 studies was 26.1% during the pandemic compared with 18.5% before COVID-19.<sup>1</sup> The outcome for bystander CPR in 23 studies was 46.2% in COVID-19 compared with 44.1% before COVID-19.<sup>1</sup> Their result is consistent with my resuscitation. In other words, the outcome for ACC in COVID-19 is at least 4 times higher than the outcome for an AED in COVID-19.

A literature review was conducted on the resuscitation procedure in Japan with the Google site phrase search within the Japanese government domain. The resuscitation procedure of cardiopulmonary arrest in Japan was recommended with the 2020 guidelines.<sup>2</sup> In the 2020 resuscitation

guidelines in Japan, AEDs are first applied to patients in cardiac arrest after CPR, but for better results, ACC should be used first instead of an AED. According to official Japanese data publicly available within the “site: go.jp” search domain, it was noted that the survival rate for cardiopulmonary arrest is 14.1% when CPR is administered, and it drops to 7.0% in the absence of CPR.<sup>3</sup> The outcome with CPR alone in COVID-19 has at least 7 times the survival rate of AEDs. Preference should be given to methods with high survival rates, such as ACC after CPR, which has at least 4 times the survival rate of AEDs. Time spent using an AED may decrease the survival rate of resuscitation. Prioritizing the use of resuscitation methods with high survival rates plays an important role in improving survival rates in cardiopulmonary arrest.

## Discussion

The literature review was conducted using the keyword “effectiveness” and the phrase “mechanical chest compressions” with the National Library of Medicine. The literature review results found an article by Chiang et al<sup>4</sup> investigating the effectiveness of ACC cited by 7 articles. They concluded that prehospital use of ACC devices may benefit adult victims of out-of-hospital cardiac arrest in achieving return of spontaneous circulation and survival to admission. Mastenbrook et al<sup>5</sup> compared ACC versus manual-only CPR in adult patients with non-traumatic cardiac arrest and concluded that there was no difference in prehospital return to spontaneous circulation, which was cited by 1 article. The studies by Chiang et al<sup>4</sup> and Mastenbrook et al<sup>5</sup> support the proposed claim.

A literature review on resuscitation in Japan conducted with the National Library of Medicine highlighted a 2023 study by Yoshimoto et al<sup>6</sup> published in the *Resuscitation* journal. Their study analyzed data from

11,402 patients who experienced cardiac arrest between 2005 and 2019 in Japan and were defibrillated by laypeople. The findings showed a significant increase in the use of compression-only resuscitation, which accounted for over 50% of cases from 2012 onward, compared with conventional CPR.<sup>6</sup>

The literature review results suggested that the prioritized resuscitation method (ie, CPR with ACC) should be performed for cardiopulmonary arrest to improve survival rates in Japan.

## Declaration of Competing Interest

The author(s) have no relevant disclosures. There was no grant funding or financial support for this manuscript.

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