

MOUTH-TO-MOUTH VENTILATION IN CARDIOPULMONARY RESUSCITATION, IS IT A NECESSITY?

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ABSTRACT

Bystander cardiopulmonary resuscitation (CPR) plays a crucial role in improving survival rates of out-of-hospital cardiac arrest (OHCA), which has become increasingly prevalent and is now among the leading causes of mortality worldwide. Despite CPR being critical for survival, the rates of both lay people and professionals performing it continues to drop, especially since the COVID-19 pandemic. There has been a debate about whether mouth-to-mouth ventilation (rescue breathing) is necessary during CPR. Some believe it has been a major obstacle to people's willingness to perform the life-saving technique. This review explores research suggesting that rescue breathing is unnecessary for CPR.

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INTRODUCTION

Out-of-hospital cardiac arrest (OHCA) is a significant public health issue that affects approximately 55 people per 100,000 annually on a global scale (1). Despite ongoing advancements in medical technology, just 10% of OHCA patients survive to be discharged (1-2). This is mainly due to the unwillingness of laypeople and professionals to perform rescue breathing in CPR. This rate has only dropped since the onset of COVID-19 (3-5). Whether rescue breathing with CPR is necessary has always been hotly debated. This review focuses on research highlighting the cons of mouth-to-mouth ventilation and pros of chest-compression-only CPR.

The Necessity of CPR

CPR is a vital life-saving technique utilized when a person's heartbeat stops. CPR came to light in the 1960s when pioneers Dr. Kouwenhoven, Dr. Safar, and Dr. Jude combined mouth-to-mouth breathing with chest compressions. The likelihood of survival following cardiac arrest can be doubled or tripled by starting CPR right after a collapse (6-7).

What has been the standard?

Traditionally, CPR involves chest compressions and mouth-to-mouth breathing at a 30:2 ratio. Rescuers typically perform chest compressions on adult cardiac arrest victims at a rate of 100-120per/min, to a depth of

at least 5cm, while avoiding excessive compression depths (greater than 6cm) (6). However, there has been an ongoing debate about whether this is the best method, as the inclination of laypeople and medical professionals to execute mouth-to-mouth-chest-compression CPR (MMCC-CPR) has been declining (3-5, 8).

Epidemiology of CPR in bystanders

There has been significant research done on the association between survival rates for OHCA and the provision of bystander CPR. According to Kragholm *et al*, the odds of surviving OHCA were two times higher with bystander CPR compared to no CPR, with bystander CPR reducing the chance of brain injury over a year per Danish national statistics (10).

Despite the role bystander CPR plays in the survival of OHCA patients, their rates have remained low. A bystander witnessed 53% of occurrences OHCA's in a meta-analysis encompassing 147,740 patients; however, only 32% of those events received bystander CPR (11). According to research conducted by Nichol *et al* in North America on 20,520 cases of cardiac arrests, it was found that bystander CPR was administered to only 31.4% of the patients (12). According to a PAROS research, bystander CPR rates were 40.2%, 31.4%, and 24.3% in Japan, Taiwan, and Singapore, respectively (13).

The COVID-19 pandemic had varying effects on bystander CPR rates across different countries. Bystander CPR rates decreased statistically significantly, according to three research from European nations (3-5). The percentage of bystander CPR before and after COVID-19 was similar, according to two North American studies (14-15).

Obstacles to CPR

Apart from the fact that people avoid performing CPR out of panic and lack of confidence, one of the main reasons why people (including laypeople and medical professionals) are reluctant performing CPR is because there is a fear of disease transmission through rescue breathing and the situation is awkward for people (8, 16). Reports show that when rescue breathing is necessary, people's willingness to help dramatically declines (17-18).

Continuous-Chest-compression CPR vs Mouth-to-mouth-chest-compression CPR

Numerous studies have compared the effects of mouth-to-mouth-chest-compression (MMCC-CPR) and continuous-chest-compression (CCC-CPR). Despite being the norm, MMCC-CPR has several potential drawbacks, including the potential to discourage bystanders from performing CPR, the victim's potential for hyperventilation, the use of positive pressure, which is linked to gastric inflation, regurgitation and aspiration, and the potential loss of valuable time to do enough chest compressions (17-19).

Hüpfel et al and Zhan et al revealed that CCC-CPR is associated with a greater likelihood of survival compared to standard MMCC-CPR. Specifically, the risk ratio for survival with CCC-CPR was 1.22, with a 95% confidence interval of 1.01-1.46. This means there was a 14% rate of survival with CCC-CPR, versus a 12% rate of survival with MMCC-CPR. The absolute gain in survival with CCC-CPR was 24%, with a 95% confidence interval of 0-49. This means that 41 people would need to receive CCC-CPR for one additional person to survive, with a 95% confidence interval of 20-1250 (20-21). In contrast, a second meta-analysis of seven observational studies showed no significant difference in survival rates between the two CPR techniques. Both methods had a survival rate of 8% (20-21). The risk ratio for the two techniques was 0.96, with a 95% confidence interval of 0.83-1.11. According to the American Heart Association's (AHA) most recent CPR guidelines, compression-only CPR is recommended for inexperienced bystanders. However, the AHA recommends using the standard MMCC-CPR in cases involving children and asphyxia-induced arrests, such as drowning or drug overdose (6).

CONCLUSION

Bystander CPR is crucial for improving patient survival rates for those with OHCA. However, laypeople and medical professionals have become increasingly reluctant to perform standard CPR. This reluctance is often due to discomfort with the situation and concerns about disease transmission through mouth-to-mouth respiration. However, research suggests that continuous chest compressions alone can increase survival rates compared to traditional CPR, with some studies finding no difference between the two techniques. In the best-case scenario, where survival rates remain unchanged, there would be no discrepancy between standard MMCC-CPR and CCC-CPR. It can therefore be argued that mouth-to-mouth ventilation during CPR is unnecessary.

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