



Technique

## Over the head and lateral position technique for cardiopulmonary resuscitation: which one is better?

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### A B S T R A C T

**Background:** A high rate of cardiac arrest requires high-quality CPR. A valuable CPR rescuer has lower success than two or more rescuers, especially with the use of BVM. There is a complexity encountered with lateral CPR position as a commonly used position, which is the difficulty of position movement from compression to ventilation. On the other hand, over the head CPR position is used as an alternative position, which is considered more effective than a lateral position. It is also considered to be able to overcome the obstacles found in CPR with a single rescuer using BVM ventilation in the lateral position so that study is required to compare the quality of CPR between the two CPR positions.

**Technique:** The quality of CPR between over the head position CPR and Lateral position CPR is compared. The technique testing was carried out on 24 students using a mannequin. CPR quality components include compression ratios: ventilation, speed, depth, hand placement, chest recoil, and the amount of time of chest compression interruption were observed strictly. The overall CPR quality score, particularly in terms of compression speed and the minimum interruption time of chest compression on over the head position, is better than lateral position CPR.

**Conclusion:** Over the Head position, CPR significantly produces a better quality of CPR than Lateral position CPR.

### INTRODUCTION

The occurrence of cardiac arrest causes high mortality and morbidity rates worldwide.<sup>1,2</sup> The survival rate of cardiac arrest can be improved through the quality of cardiopulmonary resuscitation (CPR).<sup>3-7</sup> A rescuer performs CPR action with a shallow survival rate compared to CPR performed by two or more persons.<sup>8,9</sup> The low survival rate in CPR with single-rescuer is as a result of the difficulty of moving from compression to ventilation.<sup>10</sup> The cause of the difficulties is because rescuers must provide ventilation assistance either directly or using a Bag Valve Mask (BVM) in addition to heart massage. Another difficulty found in CPR with a single-rescuer using BVM in the lateral position is the difficulty of providing ventilation using BVM. These difficulties can be overcome by adjusting to the correct position by the rescuer to assist the movement from compression to ventilation.<sup>11</sup>

A lateral position is a commonly used position. However, this position complicates when CPR is performed in a limited place and when the rescuer has to perform the transition from chest compression to ventilation movements.<sup>11</sup> Over the head position, CPR has been developed to overcome these difficulties and is considered a comfortable position for ventilation and compression to assist a single rescuer to overcome the difficulty of moving from the compression to ventilation movement.<sup>12,13</sup>

A study found that single-rescuer CPR using BVM ventilation in a lateral position had a lower CPR quality than CPR performed by a rescuer using BVM with over the head position.<sup>8</sup> However, there was another study stated that there was no significant difference in CPR quality between over the head and Lateral position.<sup>10</sup> Previous studies mentioned that errors were found in chest compression techniques by single-rescuer CPR using BVM ventilation in both the head and lateral positions, as evidenced by faster chest compression time than recommended one.<sup>8</sup> In other studies, different results emerged were more respondents

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performed chest compressions correctly on Over the head position CPR compared to respondents who performed Lateral position CPR.<sup>14</sup>

This study analyzed the distinctions in CPR quality between the Head position and Lateral position on Nursing Students at Universitas Muhamadiyah Malang.

## TECHNIQUE

### *Description Technique Over the Head Position*

The steps of over the head position technique CPR is 1). The rescuer positions him/herself over the patient's head; 2). The rescuer's knees are between patient's head, as shown in (Figure 1); 3). The rescuer's hands are in the lower half of the patient's sternum; 4). The rescuer performs chest compression movements first; 5). Perform chest compression with up to 5 cm depth; 6). Perform chest compressions with a speed of 100-120 x / minute; 7). CPR has carried out as many as five cycles with a compression ratio: 30: 2 ventilation or 30 compressions then continued with two times ventilations followed by 30 more compressions and so on up to 5 cycles; 8). The rescuer performs



**Figure 1.** Over the Head position CPR

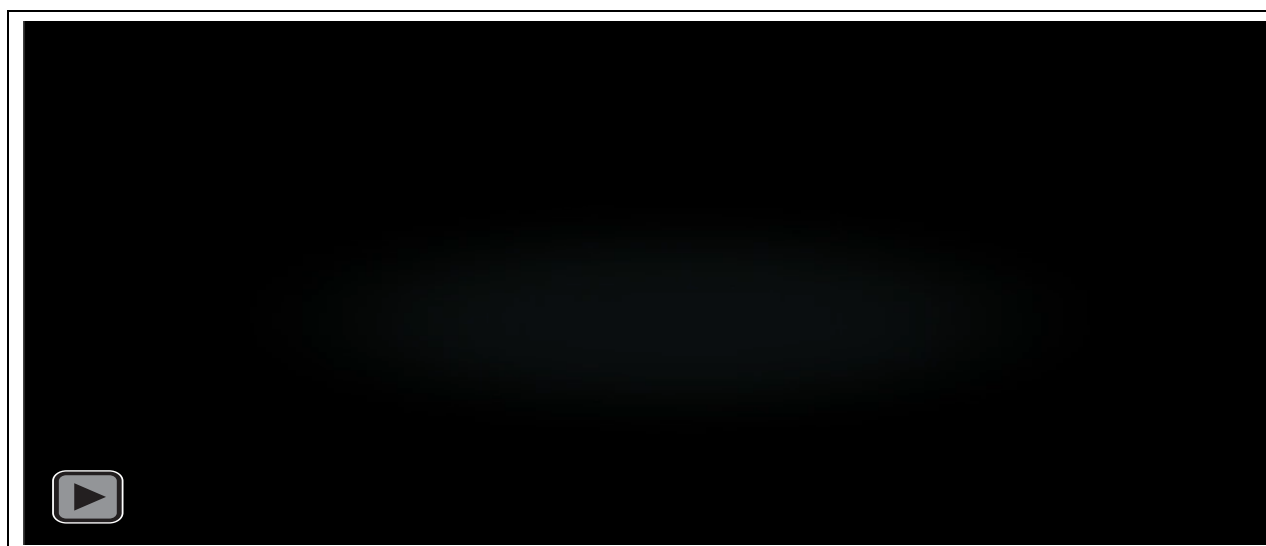
full chest recoil after each compression by both hands not resting on the patient's chest after each compression; 9). After completing 30 compressions, two ventilation aids with BVM are provided with a rescuer position that remains above the patient's head; 10). Attach the BVM mask tightly to cover the patient's mouth and nose; 11). During the ventilation procedure, the non-dominant hand fixes the mask on the patient with the thumb and forefinger, forming the letter C while the other fingers lift the patient's lower jaw to keep the airway open while the dominant hand pumps air in the bag; 12). Rescuer limits the interruptions of chest compressions to anything, including ventilation activities to less than 10 seconds in 5 CPR cycles; 13). After providing ventilation two times, continue giving chest compression 30 times and so on to 5 cycles of compression and ventilation.

### *Description Technique Lateral Position*

The steps of lateral CPR are similar to the over the head position CPR except for the CPR position. The rescuer's position him/herself next to the patient, as shown in (Figure 2).



**Figure 2.** Lateral Position CPR



**Video 1.** The difference over the head and lateral position technique  
(Use Adobe Flash Player to view videos)

## DISCUSSION

Over the head and Lateral technique CPR was tested to 24 students by using observations on the compression ratio: ventilation, pace, depth, hand placement, chest recoil, and the minimum time for chest compression interruptions using observation checklist sheets arranged according to AHA 2015.<sup>15</sup> CPR quality observations involved two enumerators who were lecturers in a nursing emergency at the University of Muhammadiyah Malang and had a BCLS certificate. Validity and reliability tests had been conducted on enumerators using Kappa tests and had been proven to have a high level of agreement. This study proves that the over the head position produces better CPR quality compared to Lateral position on CPR with a single rescuer using BVM ventilation.

Over the head position, CPR produced more precise compression speed significantly (91.67% of respondents) than compression speed resulting from Lateral position CPR. The interruption time on over the head position's CPR was minimal compared to the lateral position. More over the head position CPR respondents who run five cycles CPR with interruption time of fewer than 10 seconds was the evidence. This was supported by previous research, which stated that the compression speed produced by respondents with over the head position is better because it produces much fewer errors and also did not relate to other factors such as arm length and weight other than CPR position factor. Other research stated that over the head position CPR resulted in a more minimal interruption time compared to the lateral position because the over the head position was the ideal position to ventilate BVM so that the change of compression movement to ventilation became easily performed and did not cause much interruption time due to changes in movement.<sup>10</sup>

Respondents stated that with over the head position CPR, the transition from chest compression to ventilation using BVM was effortless, especially with the hands fixating the BVM mask and lifting the patient's lower jaw to open the airway. From Figure 2, we can see that the hand in the lateral position CPR when ventilating BVM is not comfortable, in contrast to Figure 1, where it is clear that the BVM ventilation in over the head position CPR appears more comfortable. In the item compression depth, it was also discovered that there were more respondents in the over the head CPR group performing compression with the right depth compared to the lateral position. This was also mentioned in previous studies.<sup>14</sup>

The overall CPR quality score for over the head position was significantly better than the Lateral position. Based on this study, it indicated that the CPR quality on over the head position group obtained an average CPR quality score of 4.75 (79% of the maximum range) with a standard

deviation of 1.36. In comparison, the Lateral position group has a lower average CPR quality of 4.58 (76% of the maximum range) and obtained a standard deviation of 1.08. The 95% CI score of the CPR quality score was 4.19 - 5.55. From the results of unpaired t-test CPR quality, it is found that the p-value was 0.00 ( $p < 0.05$ ), which meant that there was a significant difference between the quality of CPR on the two groups where over the head position produced better CPR quality. This study was in line with previous studies that explained that the quality of CPR with one rescuer using BVM ventilation in over the head position was better than lateral position CPR, as evidenced by a lower error rate than lateral position.<sup>6</sup> In other studies, it was also acknowledged that respondents affirmed it was easier to perform the transition from compression to ventilation at the over the head position CPR.<sup>10,11</sup>

## CONCLUSIONS AND RECOMMENDATION

Over the head position, CPR performed by a single rescuer using BVM ventilation has been proven to produce better CPR quality compared to Lateral position. Over the head position, CPR can be further scrutinized directly to the patient because it is proven to have a more minimal interruption time and produce a better compression speed. This study's results can be utilized as a consideration material regarding the selection of CPR positions with single-rescuer using BVM ventilation into AHA policies and algorithms since there is no regulation from AHA regarding the selection of positions in its guidelines.

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