The Effect of Verbal Encouragement in CPR Performance on the Accuracy of CPR Techniques

Wan-Young Yoon*

Department of Clinical Exercise Physiology, Seowon University, 377-3 Musimseoro, Heungduk-gu, Cheongju, Chungbuk, 28674, South Korea; dt5916@seowon.ac.kr

Abstract

Objectives: To investigate the helpful techniques for Cardio Pulmonary Resuscitation by performing a comparative analysis of CPR between an encouragement and a non-encouragement group based on the AHA education program. Methods/Statistical Analysis: This research was carried out by selecting 42 university students as a test group who had acquired a 2011 Health Care-Provider certificate issued by the AHA while attending Chungbuk University in C city. Informed consent was received from all participants in accordance with legal procedures. An average and standard deviation for each variable was calculated using the SPSS 12.0 version statistical program, and the gap between the averages values of each technique was verified using a Paired Samples Test. Findings: The encouragement language used in this study seems to have a tone of assertive sentences because it was directly quoted from the sentences in AHA education video, and it may have restricted a participant from performing techniques with more tension. Therefore, if the encouragement instructions are written using imperative sentences or suggesting sentences, it can be expected to increase concentration on the accuracy of CPR. Applications: This study provides proof that the verbal encouragement improves the accuracy and the speed of CPR; it is hence suggested to apply in the classroom for more efficient education.

Keywords: Accuracy, BLS (Basic Life Support), CPR (Cardiopulmonary Resuscitation), Helpful Technique, Verbal Encouragement

1. Introduction

CPR (Cardiopulmonary Resuscitation) is a treatment technology to keep supplying oxygen into the tissues and recover the cardiac impulse of a patient through the artificial respiration and compression on the heart so that the irreversible damage to the main organs by cardiac arrest can be prevented. For the effective artificial circulation in CPR, the compression of 4-5 cm in depth onto the heart has to be carried out at a speed of 100 times per minute. It is reported that the appropriately performed heart compression can not only recover self-circulation but also affect the neurological recovery, but it is also reported that the quality of heart compression being performed stays at below a proper level. Furthermore, there are many cases where most of patients who had heart arrest before arriving at a hospital did not receive CPR from a witness. Among many other reasons, the order of Airway-Breathing-Compressing is explained as one of them. According to this order, an airway opening and mouth-to-mouth breathing which a rescuer feels the most hard about has to be performed first of all, and this makes it difficult for a quality CPR to be carried out. Accordingly, the American Heart Association distributed revised contents about the A-B-C order, depth of compression,
and number of compression per minute in 2005. The announced 2010 CPR guideline included contents with a more convenient algorithm such as a changed order of C-B-A (Compressing-Breathing-Airway), performance of more than 5 cm depth of heart compression, and the compression number of more than 100 times per minute. Korean Association of Cardiopulmonary Resuscitation (KACPR) also modified its guideline in 2011 toward enhancing a survival rate from cardiac arrest by making it easy for anyone to start CPR with the emphasized importance of heart compression and simplified CPR process. Considering a low distribution rate of CPR and the public perception of mouth-to-mouth breathing, promoting the heart compression resuscitation can be a good CPR distribution strategy to increase the public acceptance of CPR. The national CPR distribution policy also can make a strategic approach to the gradual distribution of a standard CPR guideline after having primarily increased a witness CPR implementation rate by enhancing the public awareness of CPR and education acceptability through the distribution of the heart compression resuscitation.

The American Heart Association 2010 guideline includes main issues such as education of the advanced CPR for Team Work and CPR information provision by a consultant on telephone, and The AHA education video shows a rescuer who assists breathing periodically encouraging another rescuer who is performing the compression by saying “Press strong and fast. Heart has to be compressed at least 5cm in depth and needs to get fully relaxed after compression”.

Accordingly, this study aimed to investigate the helpful techniques for CPR by performing a comparative analysis of CPR between an encouragement group and a non-encouragement group based on the American Heart Association education program.

2. Method

2.1 Participants

In This research was carried out by selecting 42 university students as a test group who had acquired a 2011 Health Care-Provider (BLS-Provider) certificate issued by the American Heart Association (AHA) while attending C University in C city. As for a gender, there were 27 males and 15 females. The tests were performed twice for the same people in the whole test group with the first session of non-encouragement CPR performed between October 10 and October 13 2011 and the second session of encouragement CPR between 14 October and 17 October 2011.

2.2 Study Method

This study was carried out for students of S University who had acquired a BLS-Provider certificate issued by AHA, and referred to the 2010 Guideline education video released by AHA. There were a total of 42 people with 27 males and 15 females, and two sessions were processed for the whole 42 people with the first session of non-encouragement CPR and the second session of encouragement CPR.

In order to reduce possibility that familiarity of encouragement methods can affect the accuracy of the techniques during a test, the non-encouragement CPR was performed first, and each of the techniques was tested without being informed or practiced in advance, based on the judgment that the pre-education of encouragement techniques might affect the outcomes. In addition, to avoid the first test from influencing the second session, the test on the encouragement techniques was carried out three days after the first session of non-encouragement CPR was tested.

As the measurement equipment for the mouth-to-mouth breathing and heart compression test in CPR, Resuscitation Anne w/ Skill reporter of the Leardal Company was used. As for the evaluation items used in the quality measurement tool, ventilation(ml) per minute and the average number of breathing per minute(times/min) were included to evaluate the mouth-to-mouth breathing, and the average depth (mm) and the accuracy (%) were included to examine the heart compression. Right after the encouragement CPR was completed, questions about whether it helped or not and why were asked. Also the questions asking whether the encouragement words interfered with the CPR techniques were invented and evaluated on. The explanation of techniques for Non-encouragement/Encouragement words provision as shown in Table 1.
Table 1. Explanation of techniques for Non-encouragement/Encouragement words provision

| Non-encouragement techniques | Encouragement words provision (Encouragement hereafter) techniques |
|------------------------------|-----------------------------------------------------------------|
| Heart compression versus breathing(30:2), performing five cycles | As is the case in the non-encouraging CPR, the provider performs 5 cycles (30:2). When performing chest compressions, the performer is provided with the verbal encouragement as follows: “Press down the chest fast and strongly in every cycle. Press at least 5cm and allow the chest to come back to the natural position”.

2.3 Data Analysis

In analysis of the collected data, an average and standard deviation for each variable was calculated using the SPSS 12.0 version statistical program, and the gap between the averages values of each technique was verified using a Paired Samples Test. The statistical significance level in all analysis was set at α=.05.

3. Results

3.1 Comparison of Accuracy According to the Difference of Techniques

The comparison result of the accuracy between an encouragement method and a non-encouragement method is shown in Table 2. In the mouth-to-mouth breathing, the encouragement method showed more number of average breathing per minutes(times/min) with 4.21 times, compared to 3.69 times in the non-encouragement method, and it also had a more volume of ventilation per minute(ml) of 2,755.48 ml in comparison to 2,324.52ml in the non-encouragement method. The average compression depth when using the encouragement techniques had a meaningful result of 54.10 mm, compared to 48.98 mm in the non-encouragement method. When evaluating based on the heart compression guideline of the American Heart Association (AHA, 2010), the encouragement method appeared to be more accurate and perform a quality CPR than the non-encouragement method. In the comparison of accuracy (%) of techniques, the encouragement techniques showed a markedly high accuracy of 81.45%, compared with 63.02%. The verification result of the difference of averages in analysis factors between techniques are as shown in Table 2.

3.2 Analysis of Whether the Encouragement Techniques Helped in the Performance Outcomes

The frequency analysis of the questions about whether the encouragement words helped while processing the encouragement techniques is suggested in Figure 1 and Figure 2. Twenty people (47.5%) responded ‘it helped’, 21 people (50%) said ‘it did not help’, and one person (2.4%) answered ‘not sure’. For the reasons why it helped, people said that ‘when losing energy due to fatigue while performing compression, the encouragement words helped them to concentrate more on the compression and relaxation so they could continue to carry out the techniques’. On the other hand, for the reasons why it did not help, people said that ‘the encouragement words can interfere with concentration and prevent them from remembering the number of cycles’. There was no meaningful difference between these two response groups.

Also, for the question asking whether the encouragement helped or interfered with the implementation of

Table 2. The difference in test results for each factor based on skills

| Factor | Method                  | Isolation     | Not isolation | t     | P-value |
|--------|-------------------------|---------------|---------------|-------|---------|
|        | Breathing/min(times)    | 3.69±1.11     | 4.21±.60      | -3.504| .001*   |
|        | Ventilation/min(ml)     | 2324.52±1001.72 | 2755.48±1093.036 | -2.982| .005*   |
| Heart Compression | Compression depth(mm) | 48.98±9.95     | 54.10±4.25    | -3.409| .001*   |
|        | Accuracy (%)            | 63.02±38.389  | 81.45±26.61   | -3.091| .004*   |
techniques, 25 people (59.5%) answered ‘it interfered’ and 17 people (40.5%) said ‘it did not interfere with techniques’. As for the extent of interference with techniques according to the encouragement methods, there was a higher frequency of the response saying that ‘it interferes’ at the statistically meaningful level.

Figure 1. Encouraging language skills helpful to do.

Figure 2. Skills interfere with or without encouragement.

4. Discussions

Emergency situation with cardiac arrest occurs unexpectedly and it causes a lethal brain damage after 4 or 6 minutes. Even a person in absolutely good health with no symptoms of cardiovascular disease may be a victim. Up to now there is no exhaustive answer to the question about the causes of this phenomenon.

The revised 2010 CPR guidelines either removed or modified most of the factors which a rescuer could feel resistant against in implementing CPR. Additionally, this guideline put a focus on ‘how to start quick the heart compression and to shorten time while the compression is stopped during CPR which is one of the most important things in CPR’ even though it was always emphasized in the past. It includes, among the main issues of the American Heart Association (AHA), the education of the advanced CPR for Team Work and the provision of CPR information by a telephone consultant. Also, the AHA education video shows an assistant periodically speaking the encouraging words to the rescuer like ‘Press strong and fast every time. Compress the heart at least 5cm in depth and let it fully relax after compression.’ In the accuracy comparison between the encouragement and non-encouragement methods in CPR, the average depth was 48.98mm in the non-encouragement group and 54.10 mm in the encouragement group, which showed that the encouragement method made the average depth deeper and performed the AHA guideline emphasizing more than 5cm depth of compression more accurately. In the accuracy (%) of the five cycles of 150 times of performance, the encouragement group showed the noticeably high accuracy of 81.45%, compared to 63.02% in the non-encouragement group. According to the previous studies, similarly to the study result arguing that the feedback provided on the side of the knowledge of results causes a participant strong motivation, it is judged that a rescuer could perform accurate techniques because they was imprinted in sounds by the encouragement despite fatigue in the course of continued five cycle of performance. On the other hand, 25 people, which was more than half (59.5%), answered ‘it interfered’ for the question asking whether the encouragement words interfered with the performance, and this seems to be because the unexpected encouragement put a participant under pressure or worked as a barrier to the independent performance habit. However, as proved in this study, since the encouragement method showed more appropriate depth and accuracy than the non-encouragement method, it is believed that this finding has to consider when implementing techniques in the future. When looking at the result of the accuracy comparison showing a predominantly high value in the encouragement group, the encouragement seems to be more effective in realizing the accuracy for compression and relaxation even though it might interfere with concentration. The encouragement language used in this study seems to have a tone of assertive sentences because it was directly quoted from the sentences in AHA education video, and it may have restricted a participant from performing techniques with more tension.

Therefore, if the encouragement instructions are written using imperative sentences or suggesting sentences, it can be expected to increase concentration on the accuracy of CPR. Conclusion section is not required. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.
5. Conclusions

First, in the accuracy comparison between the encouragement method and non-encouragement method in CPR, the average compression depth (mm) was 48.98mm in the non-encouragement method and 54.10 mm in the encouragement method, showing a more average depth value in the encouragement method.

Second, the accuracy (%) for the compression was remarkably high in the encouragement group at 81.45% in comparison to 63.2% in the non-encouragement group.

Third, On the other hand, in a question to find out the degree of interference of the encouragement with CPR techniques, 25 people (59.5%) responded ‘it interfered’ and 17 people (40.5%) said ‘it did not interfere’. This appears that encouragement words accompanying the techniques lowered concentration because participants were not habituated to them.

Fourth, It is supposed that the accurate CPR techniques as well as concentration can be possibly realized if the encouragement language is suggested which does not decline concentration on the techniques through research into the tones and presenting methods of the encouragement language.

Fifth, it is suggested that the education to perform techniques along with encouragement is necessary when providing CPR education because using encouragement words has an effect in implementing more accurate techniques.

6. References

1. American Heart Association (AHA). American heart association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care; 2005.
2. Abella BS, Sandbo N, Vassilatos P, Alvarado JP. Chest compression rates during cardiopulmonary resuscitation are suboptimal: A prospective study during in-hospital cardiac arrest. Circulation. 2005; 111:428–34.
3. Berg RA, Sanders AB, Kern KB, Hilwig RW, Heidenreich JW, Porter ME. Adverse hemodynamic effects of interrupting chest compressions for rescue breathing during cardiopulmonary resuscitation for ventricular fibrillation cardiac arrest. Circulation. 2001; 104:2465–70.
4. Wik L, Kramer-Johansen J, Myklebust H, SØrebø H, Svensson L, Fellows B. Quality of cardiopulmonary resuscitation during out-of-hospital cardiac arrest. Journal of the American Medical Association. 2005; 293:299–304.
5. Ila BS, Alvarado JP, Myklebust H, Edelson DP, Barry A, O’Hearn N. Quality of cardiopulmonary resuscitation during in-hospital cardiac arrest. Journal of the American Medical Association. 2005; 293:305–10.
6. Lee JS, Chung SW, Kim IB, Park YS, Yoe JM, Ko JW. Quality and rescuer’s fatigue with repeated chest compression: A simulation study for in-hospital 2. The Korean Society of Emergency Medicine. 2010; 21(3):299–306.
7. American Heart Association (AHA, 2010). Available from: http://www.heart.org/HEARTORG/
8. Korean Association of Cardiopulmonary Resuscitation. Guideline for Korean Cardiopulmonary Resuscitation; 2011.
9. Baek HS, Park SS. A comparison of accuracy in artificial respiration and chest compression depending on position, gender, and weight of a victim given cardiopulmonary resuscitation. Korean Contents Association. 2011; 11(5):280–90.
10. ParkSS, AnJY. Comparison of Accuracy in Cardiopulmonary Resuscitation (CPR) between group with verbal order and group with non-verbal order in operation of CPR. The Korean Acadimia-Industrial Cooperation Society. 2011; 12(6):2067–615.
11. Min SH. A study on college students’ knowledge and educational experience about basic life support. Indian Journal of Science and Technology. 2015; 8(S1):44–8.
12. Gryaznov NA, Yu K, Vyacheslav VS, Kireeva GSK. Mechatronic hardware tools for external chest compression in cardiopulmonary resuscitation. Indian Journal of Science and Technology. 2015; 8(29):96–102.
13. 2010 American Heart Association Guideline for Basic Life Support. Available from: https://www.heart.org/idc/groups/heart-public/@wcm/@ecc/documents/downloadable/ucm_318152.pdf
14. Park DH, Kim HJ. Factors affecting anxiety after cardiopulmonary resuscitation. Indian Journal of Science and Technology. 2015; 8(5):96–102.