What is an effective cardiopulmonary resuscitation training mode?

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To the Editor: Out-of-hospital cardiac arrest (OHCA) is a serious threat to people's lives and safety. The annual incidence of OHCA in North America is approximately 55/100,000, and it is approximately 59/100,000 in Asia.[1,2] How can the success rate of resuscitation be improved in patients with cardiac arrest? The American Heart Association (AHA) and the European Resuscitation Council have put forward their own cardiopulmonary resuscitation (CPR) guidelines, which are constantly updated with the latest research evidence. CPR training is also an important part of the guidelines.[3,4] Chinese colleagues also try to improve the success rate of rescuing patients with cardiac arrest based on the experience of their international counterparts and combine it with Chinese characteristics. CPR training is in full swing, which includes the training of first responders and medical staff.

The Chinese County Hospital Emergency Alliance (CCHEA), headed by the chairman of the emergency branch of the Chinese Medical Association and led by the Chinese Journal of Emergency Medicine, is an alliance with nearly 3000 member units. One of its important tasks is to strengthen CPR training for emergency personnel in county hospitals. During the 2 years of CPR training for member units, we found that the level of CPR skills of county medical workers was uneven, which was not enough to deal with the daily rescue work of patients with cardiac arrest. Therefore, we used the feedback teaching mode in >100 training sessions for county hospitals. Feedback CPR training made the CPR technology of trainees more standardized.

The 6th Asia-Pacific Emergency Medicine Forum was held in Haikou on April 23, 2021. The CCHEA, together with YuWell (China) and Pumeikang (Germany), opened up a special venue for 4 hours of CPR training, which was taught by six certified instructors of AHA Basic Life Support (BLS) training. The training equipment was as follows: SimMan BLS (Laerdal, Norway), Primedic AED (Metrax GmbH, Germany), and CPR Feedback Device (PalmCPR, SunLife Science, China). The temperature of the day was 24 to 32°C, humidity was 70%, and indoor temperature was 25°C, which were very suitable for training. All trainees were professional medical staff. Based on the feedback test of the previous training effect, we conducted a test based on the quality of the simulated human pressing before the training and conducted the same test after the training. PalmCPR was used (turn off feedback, only collect data) in both tests, but the training results were not satisfactory.

The training was open-ended, so the number of trainees was not consistent before and after the training. A total of 37 people participated in the first test, the compliance rate of pressing speed was 18.3%, and the compliance rate of pressing depth was 45.9%. A total of 28 people participated in the second test, the compliance rate of pressing speed was 30.6%, and the compliance rate of pressing depth was 42.8%. We did have some estimates of the training effect, but the performance of the trainees in the second test was still surprising, especially in the compliance rate of pressing depth (Supplementary Figures 1–3, http://links.lww.com/CM9/A888).

To clarify the real effect of this training, we checked the background data to determine the feedback data of the two compressions of the trainees who participated in the full training. Among the 25 trainees, the above 16 indicators were monitored. The only indicators that had significantly improved before and after the training were the accuracy rate of compressions (13.5% *vs.* 30.1%) and the compliance rate of compressions frequency (43.3% *vs.* 85.4%). The index of slight improvement before and after the training was the full chest rebound rate (80.8% *vs.* 84.9%). There was no significant improvement before and

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after the training in the compliance rate of pressing depth (42.2% *vs.* 43.4%).

The training data of county-level hospital alliances are available on the Alibaba cloud (http://ctr.sunlifescience.com). As the counties are scattered and the problems reflected by the current data are disappointing, we have not compiled it yet but expect to compare it as the baseline data after the continuous training takes effect.

At present, there are many CPR training sessions. The organizers try to do a good job of training, according to their own conditions. Our training also drew lessons from the training experience at home and abroad. This training was conducted by AHA-certified instructors in strict accordance with the AHA teaching process and quality requirements, using a small class size with a 1:6 teacher–student ratio. However, after completing the full course, the correct rate of CPR compression was only 30.1%. The tests before and after this training were conducted on ordinary simulators, and the quality of CPR was not satisfactory. What is the quality of CPR when these trainees face patients with different characteristics of thoracic elasticity in CPR site. The participants were all professionals engaged in emergency work, and the correct rate of CPR compression was only 13.5% before the training. Considering that the training was open-ended and the trainees were mobile, the results of the secondary analysis showed that the training effect was not significantly improved by selecting the trainees participating in the whole process.

This training model was real-world research. We did not provide too much intervention but analyzed the actual effect of training through the analysis of background data. What we need to reflect on is whether there is a problem with our training methods? What is the quality of all kinds of CPR training (professional and public training) conducted all over the country? Is our training truly effective?

What is the effect of the open training? Is the effect of fixed training guaranteed? The results of our secondary analysis are not satisfactory. The trainees in this paper are emergency/rescue medical staff. What is the quality of CPR training for nonemergency/rescue medical staff or the public? Emergency medical staffs are not only responsible for the rescue of cardiac arrest patients but also undertake the task of training the public.[5] If their actual operation is not up to standard, how can they undertake the responsibility of being a good mentor? To improve the effectiveness of CPR training and the effectiveness of clinical rescue, the AHA has called for the use of CPR feedback devices in training since the 2015 version of the guidelines. We used a feedback device in past training, and the quality of CPR was significantly improved after training. However, after the feedback was turned off, the effect of this training was not significantly improved when the professionals trained with the feedback device were tested again. Feedback resuscitation may be a more effective scheme in practical applications, which coincides with further emphasis on the clinical use of CPR feedback devices in the 2021 version of the guidelines.[4] Carrying out CPR training more effectively to achieve standardized and efficient CPR in practice is worthy of further research.

In this training, we performed CPR training from the previous full feedback training to no feedback training and assessment, and a hierarchical analysis of personnel from the open training to the limited training was conducted. The results found that the training effect was not good. Greater use of feedback tools in first-line rescue work may be able to save more potential lives before we find an efficient training model.

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Conflicts of interest

None.

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