Title: Two-Thumb Encircling Technique Over The Head Of Patients In The Setting Of Lone Rescuer Infant CPR Occurred During Ambulance Transfer: A Cross-Over Simulation Study

Abstract

Objective: The purpose of this study was to determine if the over-the-head two-thumb encircling technique (OTTT) provides better overall quality of CPR compared with conventional two-finger technique (TFT) for a lone rescuer in the setting of infant cardiac arrest in ambulance.

Methods: This simulation study was performed using a prospective randomised crossover design. Fifty medical emergency service students were voluntarily recruited to perform lone rescuer infant CPR for 2 min on a manikin simulating a 3-month-old baby in an ambulance. Participants who performed OTTT sat over the head of manikins to compress the chest using a two-thumb encircling technique and provide bag-valve mask ventilations, whereas those who performed TFT sat at the side of the manikins to compress using two-fingers and provide pocket-mask ventilations. Mean hands-off time, mean compression depth, change of fatigue score, pulse rate, and respiratory rate were assessed during the test, and a survey on the ease of performing the techniques was conducted after the test. The paired t-test was used for comparisons.

Results: Mean hands-off time was not significantly different between OTTT and TFT (7.6 ± 1.1 s vs. 7.9 ± 1.3 s, p = 0.885). OTTT resulted in greater depth of compression (42.6 ± 1.4 mm vs. 41.0 ± 1.4 mm, p < 0.001) and faster rate of compressions (114.4 ± 8.0 /min vs. 112.2 ± 8.2 /min, p = 0.019) than TFT. OTTT resulted in a smaller fatigue score than TFT (1.7 ± 1.5 vs. 2.5 ± 1.6, p < 0.001). In addition, subjects reported that compression, ventilation, and changing compression to ventilation were easier in OTTT than in TFT.
**Conclusions:** OTTT performed by a lone rescuer in the setting of cardiac arrest of an infant in an ambulance resulted in greater compression depth and rate, with no increase in hands-off time compared with TFT. The use of OTTT may therefore be a suitable alternative to TFT in the setting of cardiac arrest of infants during ambulance transfer.

**Keyword:** Cardiopulmonary resuscitation, infant, ambulance, over-the-head CPR