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Mechanical chest compression with the LifeLine ARM device during simulated CPR☆,☆☆

To the Editor,

After sudden cardiac arrest, high-quality chest compressions (CCs) are required to improve the chance of restoring spontaneous circulation [1,2]. Unfortunately, even health care professionals have difficulty in performing effective CC. According to Wik et al [3], CCs are often too shallow, and hands-off time is to long. This is also confirmed from a research conducted by Kurowski et al [4]. Because mechanical CC devices may improve the efficiency of CC, in this study we use a new mechanical CC device—LifeLine ARM (ARM; DefibTech, Guilford, CT)—which was designed to deliver compressions of consistent rate and depth according to European Resuscitation Council guidelines [1,2].

We sought to investigate the effectiveness of manual CCs compared with mechanical cardiopulmonary resuscitation. We simulated an 8-minute cardiac resuscitation situation during ambulance transport using SimMan manikin (Laerdal, Stavanger, Norway). The study was designed as a randomized, crossover trial. Thirty-six paramedics were enrolled. The primary outcome was the percentage of correct CC relative to the total number of CC, which was regarded as correct with pressure point, depth, and pressure release according to the European Resuscitation Council 2015 guidelines [1]. Secondary outcomes were rate of CC, depth, pressure point, and complete pressure release.

The results of manual CC vs ARM data are shown in Table 1. The results with ARM were significantly better than those with manual CC ($P < .05$) for all the analyzed variables (correct CC, CC rate, correct CC depth, correct pressure point, and correct pressure release).

In this manikin-based study, CC with used mechanical CC device LifeLine ARM was more effective than manual CC. Results should be used for further clinical evaluations.

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☆ Conflict of interest statement: None to declare.

☆☆ Authors' contributions: L.S., M.M., T.E., A.K., Z.T., and L.C.—the conception and design of the study; L.S., Z.T., L.C.—acquisition of data, analysis and interpretation of data; L.S., L.C.—drafting the article or revising it critically for important intellectual content; L.S., M.M., T.E., A.K., Z.T., L.C.—final approval of the version to be submitted.

Table 1
Manual vs LifeLine ARM CCs

Parameter	Manual CC	ARM CC	*P*
Correct CC (%)	35 (28-51)	94 (91-98)	<.001
Correct CC depth (%)	41 (33-59)	95 (93-99)	<.001
CC too deep (%)	27 (5-49)	2 (1-3)	<.001
CC too shallow (%)	32 (9-61)	3 (1-5)	<.001
Mean CC rate (min^{-1})	148 (120-155)	100 (99-101)	<.001
Mean CC depth (mm)	45 (41-49)	55 (54-56)	<.001
Correct pressure point (%)	95 (91-100)	100 (99-100)	.045
Correct pressure release (%)	92 (87-100)	100 (99-100)	.011

Data are presented as median (interquartile range).

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The development and experimental application of a new thoracostomy trocar

1. Introduction

In general, a chest tube is inserted for drainage to treat conditions such as pneumothorax, hemothorax, and pyothorax. Because of the