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LETTER TO THE EDITOR

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IMPACT OF A CPRMETER FEEDBACK DEVICE ON CHEST COMPRESSION QUALITY PERFORMED BY NURSES — A RANDOMIZED CROSSOVER STUDY

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Dear Editor,
Cardiac arrest still remains a major public issue, a leading cause of death worldwide, while outcome after a cardiac arrest is still poor [1]. The American Society of Cardiology (AHA) guidelines for cardiopulmonary resuscitation recommend that high-quality chest compressions should be performed during resuscitation [2]. Many studies indicate that the quality of chest compressions directly correlates with the effectiveness of cardiopulmonary resuscitation [3–5]. AHA guidelines outlined the conditions necessary for high-quality chest compression as a compression depth of at least 5 cm (no more than 6 cm) at the rate of 100–120 compressions per minute, allowing for full chest relaxation with minimal interruptions in its provision [2].

As Sugerman et al. [6] indicated that chest compression efficiency rapidly decreased with the time of performance, the guidelines recommend a 2-minute cycle of chest compression with a change of paramedic after each cycle. However, in the case of prolonged resuscitation, and in the event of limited human resources necessary for rotating in performing chest compressions, it may be necessary to use CPR feedback devices [7]. Sutton indicated that the use of feedback devices improves cardiopulmonary resuscitation quality and the rate of return of spontaneous circulation [8]. These devices have been designed to show in real time the frequency and depth of chest compressions, as well as the degree of relaxation of the chest. This information allows for adjustments in the way of performing compressions in real time, which enables the person providing the chest compressions to perform high quality chest compressions even with prolonged cardiopulmonary resuscitation.

The aim of the study was to assess the impact of the CPRMeter device on the quality of chest compressions provided by nurses during simulated cardiopulmonary resuscitation.

The study was conducted during Advanced Cardiovascular Life Support courses based on the current guidelines for cardiopulmonary resuscitation. The courses were conducted by accredited AHA instructors. A total of 69 nurses were enrolled in the study, who after a short training session in the use of the CPR feedback device were asked to perform 2-minute cycles of resuscitation. During the scenario, the participants performed only uninterrupted chest compressions — to verify the quality of chest compressions. Participants performed chest compressions with and without CPRMeter (Laerdal, Stavanger, Norway; Fig. 1) device. After performing a 2-minute CPR cycle, the participant had a 10-minute break and resuscitation was performed with another method. Both the order of study participants and the methods of resuscitation were randomized with ResearchRandomizer software.

Sixty-nine nurses were enrolled in this study as volunteers. None of the participants had prior experience in cardiopulmonary resuscitation with the use of CPR feedback or mechanical chest compression devices. The parameters of chest compression measured in this study are summarized in Table 1. Mean

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FIGURE 1. Chest compressions with CPRMeter device

chest compression depth in the control group was 44 ± 4 mm vs. 52 ± 5 mm when using a CPRMeter (p = 0.003).

When performing chest compressions without the use of a CPRMeter, the frequency of chest compressions was 135 ± 11 compressions per minute (CPM), while this was 105 ± 7 CPM ($p < 0.001$) when using the CPRMeter device. The degree of full chest relaxation when using a CPRMeter was 57% vs. 23% when not using the device, the difference being statistically significantly higher ($p < 0.001$).

During simulated cardiopulmonary resuscitation performed by nurses, the CPRMeter device significantly increased the effectiveness of chest compressions compared to standard manual chest compressions. Further studies are required to confirm these findings in clinical practice.

Conflict of interest: None declared.

Table 1. Chest compression parameters

Compression parameter	Without CPRMeter	With CPRMeter	p-value
Compression rate [/min]	135 ± 11	105 ± 7	< 0.001
Adequate frequency (%)	43	79	< 0.001
Depth [mm]	44 ± 4	52 ± 5	0.003
Adequate depth (%)	21	63	< 0.001
Full release (%)	23	57	< 0.001

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