Letter to the Editor

Charging the defibrillator before rhythm check reduces hands-off time during CPR: A randomised simulation study

Sir,

In the European Resuscitation Council (ERC) 2010 Guidelines for Resuscitation (2010G), minimising interruptions of chest compressions is emphasised and chest compressions during defibrillator charging is recommended to minimise hands-off time between two cardiopulmonary resuscitation (CPR) cycles. Longer preshock pause is associated with defibrillation failure and poorer patient outcome.2-4 Further shortening of the preshock pause may be beneficial and the idea of charging in anticipation of a potentially shockable rhythm has been discussed.2,5

We performed a randomised controlled crossover study to investigate whether charging in anticipation of a potentially shockable rhythm shortens total and hands-off time between the 2-min CPR cycles compared with the ERC 2010G recommendation of rhythm check before defibrillator charging.

Physician volunteers (certified ERC ALS providers) gave written informed consent and were given an introductory talk describing ERC 2010G and the protocol for defibrillator charging before rhythm check (Fig. 1). The participants performed the two protocols in a random order after practicing them with both shockable and non-shockable rhythms. The participants were told that they could be confronted with any rhythm seen in cardiac arrest. The simulated rhythm was always ventricular fibrillation. Chest compressions were delivered by volunteers. The participants performed defibrillator charging and defibrillation. A manikin connected to a computer was used for the simulation and data recording (Ambu Man W-model, OPTI-SAFE ApS, Gadstrup, Denmark). The defibrillator (LIFEPAK 20 Physio-Control, Copenhagen, Denmark) was charged to 200 J.

The sign test was used as significance test and the study was powered accordingly (every participant should be able to shorten the time intervals with the alternative protocol). The number of participants included (significance level 0.05) was 6 (1 woman and 5 men; mean age 32.5 (SD 2.0) years).

Defibrillator charging before rhythm check reduced total time and hands-off time between two CPR cycles (p=0.03 for both, see Fig. 1). With ERC 2010G, the time with compressions during defibrillator charging was 5.8 s (SD 2.1) and the number of chest compressions during defibrillator charging was 11.5 (SD 2.8).

The absolute difference in hands-off time was relatively short. However, the number of interruptions in chest compressions was reduced from two to one, and the shortened compression cycle during defibrillator charging with about 12 compressions was avoided. With ERC 2010G, the recommendation changed from 15 to 30 compressions per compression cycle since a ratio of 30 compressions to 2 ventilations was expected to provide the best compromise between circulation and ventilation. The absolute difference in the time interval between two cycles was larger than the difference in hands-off time and this may be as important as the difference in hands-off time since the compressions given during defibrillator charging may be less effective than those provided during the CPR cycles. Importantly, these compressions, likely to be less

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Fig. 1. Graphical presentation of the rhythm check time course. Panel A: European Resuscitation Council (ERC) 2010 guidelines for resuscitation. Panel B: Defibrillator charging before rhythm check. Average times used for heart rhythm analysis, defibrillator charging, and resuming compressions after shock delivery are given with their standard deviations in parentheses. Difference in total and hands-off time between two CPR cycles estimated with the paired t-test were 7.3 s (95% confidence interval 4.3–10.3) and 1.5 s (95% confidence interval 0.4–2.5).
effective, are given before shock is attempted and may thus decrease the chance of successful defibrillation.

In conclusion, defibrillator charging before rhythm check compared to the ERC 2010G significantly shortened the total time and hands-off time between CPR cycles.

Conflict of interest statement

None.

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