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European Resuscitation Council Guidelines 2021: Basic Life Support

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Abstract

The European Resuscitation Council has produced these basic life support guidelines, which are based on the 2020 International Consensus on Cardiopulmonary Resuscitation Science with Treatment Recommendations. The topics covered include cardiac arrest recognition, alerting emergency services, chest compressions, rescue breaths, automated external defibrillation (AED), CPR quality measurement, new technologies, safety, and foreign body airway obstruction.

Keywords: Guidelines, Basic Life support, Cardiopulmonary Resuscitation, Chest compression, Ventilation, Rescue breaths, Automated External Defibrillator, Emergency Medical Services, Emergency Medical Dispatch

Introduction and scope

These guidelines are based on the International Liaison Committee on Resuscitation (ILCOR) 2020 Consensus on Science and Treatment Recommendations (CoSTR) for BLS.[1] For these ERC Guidelines the ILCOR recommendations were supplemented by focused literature reviews undertaken by the ERC BLS Writing Group for those topics not reviewed in the 2020 ILCOR CoSTR. When required, the guidelines

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CPR performance to improve resuscitation systems is addressed in the Systems Saving Lives chapter.[102] Real-time feedback devices for CPR providers will be discussed in this section.

ILCOR updated the Consensus on Science and Treatment Recommendation for feedback for CPR quality in 2020.[1] Three types of feedback devices were identified: (1) digital audio-visual feedback including corrective audio prompts; (2) analogue audio and tactile 'clicker' feedback for chest compression depth and release; and (3) metronome guidance for chest compression rate. There is considerable clinical heterogeneity across studies with respect to the type of devices used, the mechanism of CPR quality measurement, the mode of feedback, patient types, locations (e.g. in-hospital and out-of-hospital), and baseline (control group) CPR quality.

Digital audio-visual feedback including corrective audio prompts

One cluster RCT[103] and four observational studies[47,104–106] evaluated the effects of these devices on favourable neurological outcome. The low-certainty cluster RCT found no difference in favourable neurological outcome (relative risk 1.02; 95% CI 0.76–1.36; $p = 0.9$).[103] While one of the observational studies found an association with improved favourable neurological outcome (adjusted odds ratio 2.69; 95% CI 1.04–6.94),[106] the other three did not.[47,104,105]

One cluster RCT[103] and six observational studies[48,52,104,106,107] evaluated the effects of these devices on survival to hospital discharge or 30-day survival. Neither the low-certainty cluster RCT (relative risk 0.91; 95% CI 0.69–1.19; $p = 0.5$),[103] nor the observational studies found any benefit associated with these devices.[48,52,104,106–108]

The potential benefit from real-time audio-visual feedback would be their ability to improve CPR quality. While the low-certainty cluster RCT showed improved chest compression rate (difference of 4.7 per minute; 95% CI −6.4–3.0), chest compression depth (difference of 1.6 mm; 95% CI 0.5–2.7 mm) and chest compression fraction (difference of 2%; 66% vs. 64%, $p = 0.016$), the clinical significance of these relatively small differences in CPR metrics is debated.[103]

Five very-low-certainty observational studies compared various CPR metrics.[47,52,104,106,107] One observational study showed no difference in chest compression rates with and without feedback.[107] The other four observational studies[47,52,104,106] showed lower compression rates in the group with CPR feedback with differences ranging from −23 to −11 compressions per minute. One observational study showed no difference in chest compression depth with and without feedback.[107] Three observational studies showed significantly deeper chest compressions ranging from 0.4 to 1.1 cm.[47,52,106] Two studies reported statistically significant increases in CPR fraction associated with feedback[104,107] and three studies did not observe a statistically or clinically important difference.[47,52,106] The Couper study demonstrated an increase in compression fraction from 78% (8%) to 82% (7%), $p = 0.003$.[104] This increase is of questionable clinical significance. The Bobrow study demonstrated an increase in chest compression fraction from 66% (95% CI 64 to 68) to 84% (95% CI 82 to 85).[106] Two major caveats with this study include a concern that the observed difference may have not been related to the feedback device, as there were other training interventions and use of an imputed data set. None of the studies showed any improvement in ventilation rates.[47,52,103,104,106,107]

Analogue audio and tactile clicker feedback

The standalone analogue clicker device, designed to be placed on the patient's chest under the hands of a CPR provider, involves a mechanism that produces a clicking noise and sensation when enough pressure is applied. It provides tactile feedback on correct compression depth and complete release between chest compressions.

One very-low-certainty RCT evaluated the effect of a clicker device on survival to hospital discharge and found significantly improved outcome in the group treated with the clicker device (relative risk 1.90; 95% CI 1.60–2.25; $p < 0.001$).[109] Two very-low-certainty RCTs evaluated the effect of a clicker device on ROSC, and found significantly improved outcome in the group treated with the clicker device (relative risk 1.59; 95% CI 1.38–1.78; $p < 0.001$ and relative risk 2.07; 95% CI 1.20–3.29, $p < 0.001$).[109,110]

Metronome rate guidance

One very-low-certainty observational study evaluated the effect of a metronome to guide chest compression rate during CPR before ambulance arrival found no benefit in 30 day survival (relative risk 1.66; 95% CI −17.7–14.9, $p = 0.8$) One very-low-certainty observational study evaluated the effect of a metronome on 7-day survival and found no difference (3/17 vs. 2/13; $p = 0.9$).[111] Two observational studies evaluated the effect of a metronome on ROSC, and found no difference in outcome (adjusted relative risk 4.97; 95% CI −21.11 −11.76, $p = 0.6$ and 7/13 vs. 8/17, $p = 0.7$).[108,111]

Taking these data together ILCOR suggested the use of real-time audio visual feedback and prompt devices during CPR in clinical practice as part of a comprehensive quality improvement programme for cardiac arrest designed to ensure high-quality CPR delivery and resuscitation care across resuscitation systems, but suggested against the use of real-time audiovisual feedback and prompt devices in isolation (ie, not part of a comprehensive quality improvement programme).[112]

Safety

Harm to people providing CPR

This guideline is based on an ILCOR scoping review,[112] the previous 2015 ERC BLS Guidelines[42] and the recently published ILCOR consensus on science, treatment recommendations and task force insights,[3] ILCOR systematic review,[4] and ERC COVID-19 guidelines.[2]

The ILCOR BLS Task Force performed a scoping review related to harm to people providing CPR to identify any recent published evidence on risk to CPR providers. This scoping review was completed before the COVID-19 pandemic. In this review, very few reports of harm from performing CPR and defibrillation were identified. Five experimental studies and one case report published since 2008 were reviewed. The five experimental studies reported perceptions in experimental settings during shock administration for elective cardioversion. In these studies, the authors also measured current flow and the average leakage current in different experiments to assess rescuer safety. Despite limited evidence evaluating safety, there was broad agreement within the ILCOR BLS Task Force and ERC BLS writing group that the lack of published evidence supports the interpretation that the use of an AED is generally safe. Consistent with ILCOR treatment recommendations, the ERC recommends that lay rescuers perform chest compressions and use an AED as the risk of damage from accidental shock during AED use is low.[1,42,112]

As the SARS CoV-2 infection rates have continued to rise throughout the world, our perception of safety during CPR has

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