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Letter to the Editor

AED training with a 3D-printed model and a smartphone app

To the Editor,

Early defibrillation plays a critical role in improving survival after out-of-hospital cardiac arrest (OHCA). Widespread use of public-access automated external defibrillators (AED) improves survival with a favourable neurologic outcome.[1,2] Therefore, as many people as possible must have the knowledge necessary to use an AED.

Although public-access AEDs are widely established in developed countries, it is difficult to reach and train the entire population in defibrillation. The most popular method for teaching basic life support (BLS) is a traditional classroom course with a mannequin and an AED trainer. However, self-directed training was as effective as instructor-led education for BLS,[3] opening the possibility to learn CPR and how to use an AED at home. AED trainers allow to practice and become confident with the AED through simulation. However, high-quality models mimicking all features and audio-visual prompts are often very expensive and restricted to training centres.

To increase the accessibility of AED training, we prototyped a 3D model, printable with a 3D printer, resembling the shape of a real AED trainer (Fig. 1). In addition, we developed a smartphone application that simulates the audio-visual features of an AED of both shockable and non-shockable scenarios. A smartphone, with the app opened, can be inserted inside the 3D-printed model, simulating the electronic part of the AED. Real or training AED electrode pads can be used. Alternatively, a sheet of paper with AED pads drawn can be printed (Supplementary Fig. 2). All the resources, including the 3D model, are available as open-source materials to the resuscitation community on the website (www.resuslab.com/3d-printed-aed-trainer/).

Compared with carton-based AED trainers,[4] a 3D-printed plastic model is more resistant and realistic. Moreover, this 3D model can be printed with any 3D printer at home, online or in stores. The costs could be higher than carton-based trainers but still affordable.

Compared to commercially available AED trainers, the major drawbacks of this solution are the impossibility to detect when the electrode pads are correctly attached, the connector is plugged in, and if someone touches the mannequin during rhythm analysis.

To conclude, the 3D-printed AED trainer is a potential tool to further spread the knowledge of AED and for regular training in the community. Combining an app with a 3D-printed AED trainer could be helpful in the setting of mass training where every participant can use their smartphone, at home for self-directed training or after a standard BLS course for maintenance of skills. The aim should not be to reduce the quality of training but to extend the diffusion into the community, promote continuous education, and teach family members and friends.

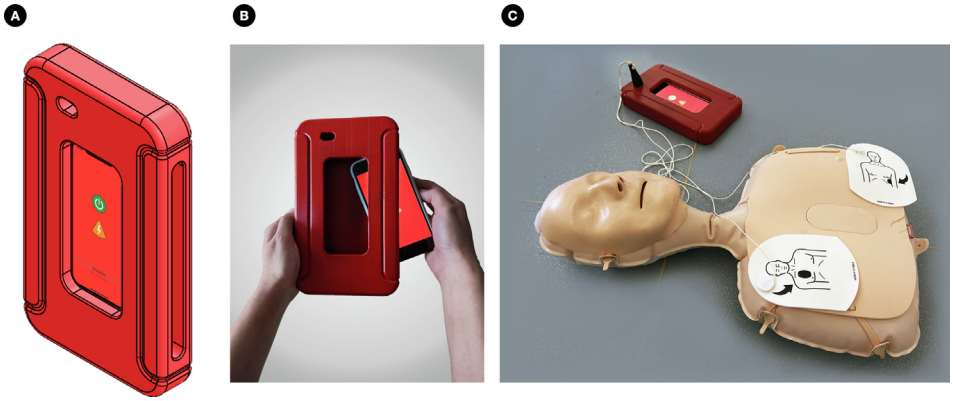

Fig. 1 – 3D-printed model of an automated external defibrillator (AED) trainer. A) 3D CAD drawing; B) action of inserting a smartphone into the trainer; C) training session with a low-cost mannequin and the 3D-printed AED trainer.

Conflict-of-Interest Statement

No relationship exists between any of the authors and any commercial entity or product mentioned in this manuscript that might represent a conflict of interest. No inducements have been made by any commercial entity to submit the manuscript for publication.

All authors do not have conflict of interest to declare.

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Authors' contribution

All the authors have made substantial contributions to conception and design and have been involved in drafting the manuscript and revising it critically.

Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.resuscitation.2021.10.033.

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