Improving Quality of CPR Chest Compressions in Active Compression-Decompression Device

Kloss, Zoe (School: Patrick F. Taylor Science &amp
Technology Academy)

The primary goal of the project was to develop an active compression-decompression (ACD) device for cardiopulmonary resuscitation (CPR) which enables reliable chest compression delivery and minimizes microorganism transmission risks. The methodology involved designing and constructing a modified, original ACD-CPR device, which was tested using a revised FDA evaluation standard, and conducting comparative performance tests with adult participants performing chest compressions both with and without the device. Following the construction of the device, three key performance tests were conducted: determining the silicone cup's ability to decompress with an applied force of less than 4.5 kg, evaluating the device's functionality when it was compressed with at least 49.9 kg of force, and lastly, evaluating the operational integrity after being dropped. Results showed that compressions produced forces between 51 kg and 61 kg. The ACD-CPR technique demonstrated positive performance results compared to the standard CPR (S-CPR). Eight of the 12 participants (ranging in age from 22 to 60) possessed CPR certification while four participants lacked any prior training. The individual performance analysis showed that accurate compressions during ACD-CPR exceeded those of S-CPR by a range of 2% to 6%. After completing CPR procedures, 66.7% of participants expressed a preference for ACD-CPR compared to S-CPR because they experienced less physical fatigue and better sanitary protection. A research gap exists regarding bystander-administered ACD-CPR but positive feedback from participants about the device changes necessitates additional studies involving larger groups and realistic simulation settings to confirm its effectiveness and enhance bystander CPR survival outcomes.

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