Letter to the Editor

Virtual reality cardiopulmonary resuscitation (CPR): Comparison with a standard CPR training mannequin

Sir,

Virtual reality (VR) may represent a powerful instrument for cardiopulmonary resuscitation (CPR) training. Italian Resuscitation Council (IRC) launched an innovative and challenging project called "VR-CPR",[1] with the aim to create a complete self-directed learning platform for basic life support (BLS) and automated external defibrillation (AED) training in a VR enviroment.[2,3] VR CPR has been developed by the game developer company Studio Evil (Bologna, Italy) with the scientific supervision of IRC. The software supports HTC Vive,[4] a VR headset developed by HTC (Nuova Taipei, Taiwan) and Valve Corporation (Bellevue, Washington, US). With the "room-scale" technology, the VR system can track movements with Six Degrees of Freedom (6DoF) in a three dimensional space, allowing the user to interact with the environment using controllers and other accessories. In a photorealistic VR scenario the cardiac arrest patient is reproduced with high fidelity providing main clinical signs and patient's reactions. During the event, the subject is able to check patient's condition and start the resuscitation procedure. The user performs the CPR maneuvers from a first-person perspective, being translated in a compete immersive situation. We developed a new motion detection technology, which is able to accurately estimate chest compressions quality CPR parameters. We tested this tracking to measure correct chest compression rate (CCR) and depth (CCD) compared

to a standard mannequin. We asked 43 medical students at first year of the School of Medicine to perform a trial of two minutes of chest compression only CPR: 25 of them (58%) were males and 18 (42%) females, with an average age of 21 ± 3 years and BMI 22 ± 2. All students had recently attended an ERC BLS course. The evaluation session involved one student and two instructors with a standardized procedure and scenario. The student was invited to wear the trackers and the headset, and was briefly introduced to the scope of the simulation; the instructor helped the student to get acquainted with the virtual environment in relationship with himself and the virtual patient; the student was asked to perform 2 min of chest-compression-only CPR on a mannequin; the evaluation session was concluded by removing the HTC Vive headset and trackers. For each of the 43 trials, the quantitative data of compressions were simultaneously acquired with VR CPR tracking and with a standard training mannequin (Resusci Anne − RA, Laerdal Medical, Stavanger, Norway). Comparison of CCR and CCD measurements between VR CPR and RA showed equivalent results (Fig. 1: CCD mean difference 3,7 mm and CCR mean difference 1,4 compression).

We believe that the VR CPR can be a valid and acceptable tool for training programs addressing general populations, schoolchildren and healthcare professionals with a gamification approach.
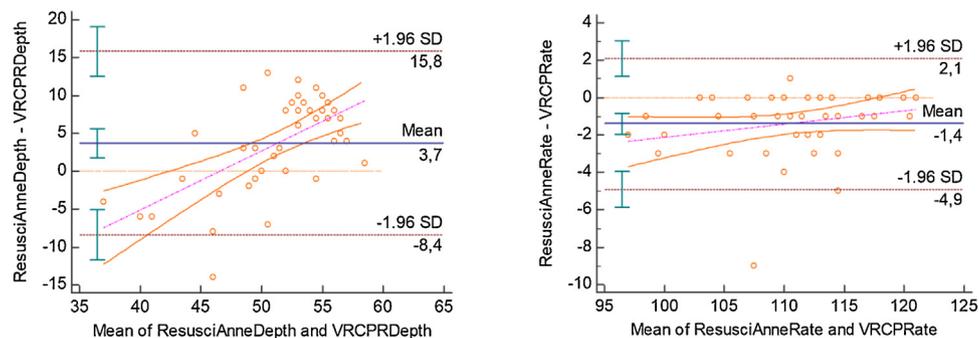
Fig. 1 – The Bland–Altman plot of chest compression depth and chest compression rate (Resusci Anne vs. VR CPR) in the 43 students' performance of 120 s chest compressions only-CPR.

Conflict of interest

Acknowledgement

REFERENCES

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