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Letter to the Editor

Potential pros and cons of the real-time feedback mechanism embedded in smartwatches



To the Editor,

I read with great interest the article by Lu et al. titled “Using a smartwatch with real-time feedback improves the delivery of high-quality cardiopulmonary resuscitation by healthcare professionals”.¹ Although the smartwatch feedback system could be easily applied on the field, rescuers should be aware of the potential pros and cons of the smartwatch feedback mechanism. I would like to discuss these points for the authors and readers of the journal.

First, a smartwatch measures the chest compression depth (CCD) or rate using an embedded accelerometer sensor. This accelerometer sensor cannot discriminate between the CCD and deflection of the mattress beneath the patient. As a result, it can overestimate the CCD during chest compressions when the patient is lying on a soft surface.² Second, it is possible that the CCD measured by the smartwatch is different from that measured by the Resusci Anne QCPR manikin (Laerdal Medical, Stavanger, Norway) even on a hard surface, because the accelerometer sensor measures the vertical acceleration, which is the sum of the vertical movement of the smartwatch and gravity.³ If the authors compared between the CCD values measured using the smartwatch and Resusci Anne QCPR manikin, the amount of bias could be confirmed. In addition, the differences in measured CCD between the smartwatch and Resusci Anne QCPR manikin might increase with a decrease in the ratio of complete chest wall recoil, because the mechanisms of CCD measurement differ significantly between the accelerometer device and Resusci Anne QCPR manikin.⁴ I was unable to determine the possibility of this bias because the authors did not report the data on chest wall recoils or leaning depth. The latest model of the Resusci Anne QCPR manikin can measure the leaning depths of all chest compressions. If the authors report the data on the actual leaning depths of chest compressions, we can estimate the quality of cardiopulmonary resuscitation (CPR) and the effectiveness of the feedback mechanism simultaneously. Third, although the smartwatch app has mechanisms for both audio and visual feedback, only the audio feedback module might be usable. A rescuer wearing a smartwatch cannot check the screen of smartwatch while performing CPR because chest compressions should be conducted vertically on the lower half of the sternum. If the rescuers attempt to check the smartwatch

screen, they cannot maintain the standard position for chest compressions (straightening their elbow and pushing the sternum vertically). Fourth, the authors modulated the chest compression rate (CCR) as 110/min using a metronome-like sound (CPR prompt). With this modulation, the intervention group could conduct CCR accurately. However, use of a CPR prompt could simultaneously decrease CCD.⁵ Therefore, using a CPR prompt could decrease the positive effect of the smartwatch feedback system. Fifth, the authors developed and tested an audio feedback system for assisting mouth-to-mouth ventilation. However, they did not report the data on ventilation performance. The effect of audio feedback on assisting mouth-to-mouth ventilation has not yet been evaluated. These ventilation performance data might help in confirming the effect of audio feedback on ventilation.

Conflict of interest statement

The author has no potential conflicts of interest to disclose.

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