

## **Automated formative CPR skills testing and retraining: a tool to improve CPR quality**

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### **Introduction**

Cardiopulmonary resuscitation (CPR) is an important skill of medical professionals. As part of a pilot project at Ghent University Hospital a novel educational method called Automated Learning with an Interactive Virtual Environment (ALIVE) was introduced to replace standard CPR training. Using repetitive formative testing followed by feedback and feedforward, CPR skills of ward nurses were evaluated and retrained. Our aim was to assess CPR learning efficacy and user satisfaction with this new method.

### **Methods**

Over a period of 5 months a total of 169 nurses from the cardiology, orthopaedic, psychiatry and gastroenterology wards were enrolled.

The ALIVE method uses a manikin with sensors connected to a computer with assessment and feedback software according to current CPR guidelines. During a four-week period a mobile self-learning station was made available on each ward, allowing unrestricted individual formative testing and/or retraining. A single session consisted of a 2-minutes formative CPR test followed by feedback and feedforward. Competence was established with

a combined score consisting of  $\geq 70\%$  compressions with a depth of  $\geq 50$  mm and  $\geq 70\%$  compressions with complete release and correct rate (100-120/min) and  $\geq 70\%$  ventilations with a volume of 400-1000 ml. Finally a random sample of 20% of participants was surveyed about their satisfaction with the ALIVE assessment/certification method and the difference between their perceived self-efficacy and the objective ALIVE measurements. In view of system adoption, a minimum benchmark of 70% of the participants responding “agree”, “definitely agree” or “strongly agree” on the different items was put forward.

## **Results**

In total 110/138 (80%) nurses passed after repetitive formative testing: 32/35 (92%) cardiology ward nurses passed; all 34 of the orthopaedic ward nurses passed; 20/67 (30%) psychiatry nurses dropped out and of the remaining 37/47 (79%) passed; 11/22 (50%) gastroenterology nurses dropped out and 7/22 (32%) passed. The ALIVE-system was rated easy to use and instructions were felt clear in 84%. It was also perceived as an accurate method to measure CPR skills in 73%. A point of improvement was the limited interactivity during feedback and participants indicated they would prefer more “human-like” coaching.

## **Discussion**

With 80% overall success rate, the learning efficacy was satisfactory. Nurses from high acuity wards performed significantly better. The perceived lack of human interaction indicates the need for more interactive and adaptive software. Serious gaming environments might respond to these needs by enhancing training realism.

## **Conclusion**

The ALIVE formative assessment procedure was well received by the nurses and improved CPR skills of health professionals effectively. Alternative designs of the software environment might open pathways to improve user satisfaction, further quality improvement through life-long learning and electronic human resources (portfolio).