ACS 2024 Surgeons and Engineers: A Dialogue on Surgical Simulation Meeting

O-04

Research-In-Progress

Acquisition of Cardiopulmonary Resuscitation Skills in Mixed Reality for Effective Discharge Training of the Families of Pediatric Patient

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Introduction: The families of children having traumatic injuries or congenital diseases could be required to start early cardiopulmonary resuscitation (CPR) at home. This study aims to address a significant gap in discharge training of the families who need effective acquisition of essential CPR skills.

Methods: There is ample evidence to support the use of hands-only CPR to effectively save a life. We first identified accurate chest compression and early recognition of symptoms as key CPR skills, and then developed a Mixed-Reality (MR) app to provide real-time learning feedback to chest compression in response to a virtual baby lying on the user environment. The feedback mechanisms implemented were threefold. 1) During compression: The on-screen display that estimates the user's level and rhythm of compression. 2) After compression: The after-effect visualization of the chest deformation and the subsequent blood circulation induced. 3) Patient profiles and outcomes: The animation of diverse body sizes, symptoms, and pre- and post-CPR outcomes.

Preliminary Results: The initial MR app was developed for "thumb"-based compression on mobile devices such as iPhone and iPad. Alternatively, a single and two-"handed" compression was accommodated in a state-of-the-art augmented-reality (AR) glass, Magic Leap 2. Those different simulation modalities and platforms will provide rich evidence base in terms of learning gain and retention for the acquisition of essential CPR skills.

Next Steps: The Internal Review Board (IRB) recently approved the proposed administration of the MR-based training to the family of children admitted to the Children’s Hospital of Illinois surgical service. The current study will measure and compare in-simulation performance and skill retention under the three different simulation modalities (control with no MR training, MR training with thumb-based interaction, and MR training with hand-based interaction). The expected number of participants will be up to 100.