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Abstract

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360-Degree Virtual Reality Video to Teach Neonatal Resuscitation: An Exploratory Development Study

Sevag Tachejian ¹, Ahmed Moussa ²

¹. Pediatric Emergency Medicine, University of Toronto, Toronto, CAN ². Neonatology, University of Montreal, Montreal, CAN

Corresponding author: Ahmed Moussa, sevag.tachejian@gmail.com

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Abstract

Introduction: Simulation has been identified as an effective training method for neonatal resuscitation (NR). However, the limitations brought about by the COVID-19 pandemic, and other resource constraints, have necessitated exploring alternatives. Virtual reality (VR), particularly 360-degree VR videos, have gained traction in medical training due to their immersive qualities. In NR, a single small-sampled qualitative study of the use of 360-degree VR videos reported a high level of acceptance and interest in the technology.

Objectives: The primary aim was to create an optimal 360-degree VR video showcasing NR as per the 8th edition NRP algorithm and to evaluate its potential and acceptability as a supplemental teaching tool for NR. We also sought to pinpoint specific NR components that would benefit from the incorporation of such a video in training.

Methods: This was an exploratory development study in two phases. First, we filmed the video with a GoPro MAX™ 6K 360° camera, edited it using Adobe Premiere Pro, and incorporated augmented reality (AR) features. The Unity Editor facilitated VR projection and interactive questions inclusion. Subsequently, participants, categorized based on experience, viewed the video, and completed literature validated user experience and cognitive load questionnaires assessing the video's acceptability, as well as a home-made questionnaire assessing its utility for various NR aspects. Descriptive analytics using means, standard deviations, and one-way ANOVA were used to analyze quantitative data. A qualitative analysis on the open-ended questions was also conducted.

Results: The developed video successfully integrated game and AR elements. Among the 46 participants (10 new trainees, 16 with >1, ≤5 years of experience, and 20 with >5 years of experience), the general appreciation was high (mean scores: 4.9, 4.7, and 4.4 respectively; p=0.11). User experience, gauged using a standardized questionnaire, scored high means (>6) on positive subscales with immersion side effects scoring low means (< 4), regardless of experience levels. The cognitive load, assessed with the Paas Scale, was higher than anticipated with means of 5.7, 5.8, and 4.95 (p=0.17). Our home-made questionnaire revealed the video's potential in enhancing crisis resource management, human-environment interactions, and procedural skills training, with consistent high scores across participant groups.

Conclusions: Our 360-degree VR video presents itself as a promising complementary tool for NR training. Future studies are needed to evaluate learning outcomes, as well as the cognitive load of such immersive videos.