Acute Myocardial Infarction Treatment Training Using Virtual Reality

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BACKGROUND

Ischemic heart disease is one of the major causes of worldwide death, leading to the creation of several initiatives to prepare and improve medical care and response, following current guidelines. Care initiatives include the use of Virtual Reality (VR) tools that allow safely exposing different cases in the same simulator, along with the possible diverse consequences resulting from the decision-making process. VR provides a unique take on immersion, as presence improves the exposure of the trainee to the computer-generated virtual environment (VE).

METHODS

The simulator is based on the American Heart Association (AHA) guidelines for ST Elevation Myocardial Infarction and Non-ST Elevation Myocardial Infarction management, and it presents a VE where a trainee interacts with a virtual patient with acute myocardial infarction (MI).

The VE integrates recorded vital signs from databases related to the patient's condition and the medication required before the Percutaneous Coronary Intervention (PCI) in two parts. The first one presents the theoretical information about the treatment approach and the second one is a training module where the trainee can perform the decision-making based on guidelines. Nine students from last year of medical school used the simulator performing the pharmacological therapy to test the usability of this tool during MI treatment, as usability can inform at an early development stage the simulator problems preventing effective learning using VR.
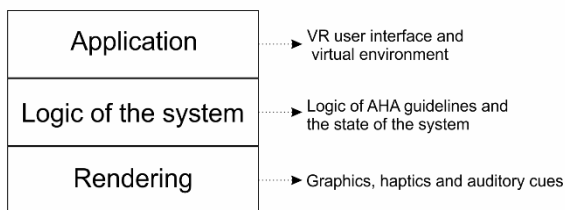
Fig 1. System architecture.

RESULTS

The participants experienced the system using an immersive consumer level VR head mounted display and found it easy to use without specific technical knowledge or previous training. Participants also expressed their interest in employing the simulator as a complementary mean of learning the MI treatment. The usability results show a perception of 83.89%; which according to the System Usability Scale indicates a good quality system above the average

Fig 2. Virtual environment for acute myocardial infarction treatment

CONCLUSION

The developed simulator can be used for MI treatment training following the AHA guidelines prior to the PCI and was perceived usable according to the test performed. Future evaluation will check the trainee skill learning in a controlled environment

ACKNOWLEDGEMENTS

Fig 3. User interacting using an Oculus Rift with touch controllers for haptic interaction and headphones for audio cues