

A Virtual Simulation for Cardiac Auscultation training.

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Categories: Cardiology, Medical Simulation

Keywords: simulation

How to cite this abstract

Uribe A, Rojas D, Kapralos B, et al. (October 06, 2016) A Virtual Simulation for Cardiac Auscultation training.. Cureus 8(10): a159

Abstract

Cardiac auscultation requires skills that are hard to acquire and currently in decline given insufficient practice and the shift to the use of techniques that place a greater emphasis on technology (e.g., echocardiography).

Although the use of these newer techniques can provide an objective view of the auscultated heart, they also distance the medical professional from practice with the cost-effective stethoscope which is available in every medical examination scenario (Bank, Vliegen, & Brusckhe, 2016). Traditional auscultation education and training focuses on memorizing heart sounds (associated with both healthy and diseased hearts), and their corresponding diagnosis. A variety of sound-based libraries, websites and mobile apps that help familiarize trainees with the sounds of the heart under normal and diseased conditions are available. More recently, virtual reality and manikin-based simulators have become widely used for training as they allow trainees to practice in controlled scenarios where several procedures can be configured. However, there is a gap between memorizing sounds and manikin-based practices as simulated scenarios provide context required to diagnose a patient. To address this gap, we leverage the engaging, motivational, and interactive nature of virtual reality and video games along with the ubiquitous nature of mobile computing through the development of a mobile-based virtual simulation app that employs game elements and low fidelity multi-modal cues (visual, auditory, and haptic) as a tool to promote analytic thinking and decision making while performing a virtual cardiac auscultation. The goal of the app is for the user (taking on the role of a medical professional) to auscultate the virtual patient by identifying heart rate, rhythm, and sound location, and determine whether the sounds are part of a normal or diseased heart. A video outlining the cardiac auscultation app is available on Youtube via the following link: <https://youtu.be/LIRL7EjETi4>.

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Published 10/06/2016

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