Bringing heart failure to life using the *Vimedix* simulator: Augmented Reality (AR)
Aim & Objectives

Aim: To generate discussion and provide a practical demonstration of how the Vimedix simulator might be incorporated into the teaching of heart failure for undergraduate nursing and other healthcare professional students.

Objectives

• Explore the contribution that augmented reality can make to healthcare and undergraduate nursing education
• Demonstrate how augmented reality might be used to transform learning and increase knowledge and understanding of normal and altered cardiac structure and function
• Discuss the potential of the Vimedix simulator in teaching other aspects of the curricula
Augmented reality in healthcare

- AR software generates images onto the users reality

- This technology has been adopted in surgery to guide surgeons in specialities such as neurosurgery, maxillo-facial, orthopaedics

- These approaches have bought mixed results and the evidence base for their effectiveness requires further study (Guha D et al 2017, Bosc et al 2019)
• Growing interest in AR (Foronda et al. 2017)

• Scoping review of AR (Wuller et al 2019.)

• Pilot studies- AR improved access to resources & self-directed learning (Garrett et al. 2015) increased confidence in knowledge & skills (Vaughn et al 2016)

• Mixed methods study (Aebersold et al. 2018)
  ➢ Statistically significant better placement of N/G tube in AR grp compared to usual training (video & didactic content)
  ➢ 86% of participants rated AR superior to other training methods
• Didactic, teacher led-lectures

• *World café: heart failure* enables application of knowledge to a patient scenario

• These sessions are interactive and well evaluated by students

• However, knowledge and understanding can be variable
Teaching the normal structure and function of the heart

• The normal supports learning of the abnormal
• Traditionally physiology is taught using presentations with 1-dimensional images
• Can be difficult for students visualise the 3-dimensional heart
• Animations can be useful, but difficult to control
• Pig heart dissection can be an effective method to support student learning
Demonstration: dissection of Pig’s heart
Transforming teaching of heart failure in the undergraduate nursing programme

- AR can enable the lecturer to control the animation and provide a step by step journey into the heart
- Visualise the interrelation between different organs and structures
- AR excellent to visualise what ECG changes signify in the heart
Teaching the pathophysiology of heart failure via AR

• Pathophysiological changes can be examined using AR, conditions such as:
  
  • Aortic stenosis
  • Cardiomyopathy
  • Valve dysfunction
  • Myocardial infarction
Now for a practical demonstration.......
Application in other areas of the curriculum

• Software modelling within Vimedix allows incorporation into other sessions:
  • Upper and lower GI tract
  • Nasogastric tube insertion
There is a need to expand the evidence base which *evaluates the effectiveness* of AR in student learning.

Comparative research- AR v Standard methods is required (Foronda et al 2017)

Competence and knowledge needs to be evaluated, confidence is not a substitute

Lecture only v Lecture and AR

Explore further possibilities as AR software and hardware develops
References


Collins, E and Ditzel, L 2018. Holograms enhance student learning Kai Tiaki Nursing New Zealand 24 (7) pp 26


Garrett B.M and Jackson, C 2015. Augmented reality m-learning to enhance nursing skills acquisition in the clinical skills laboratory. Interactive Technology and Smart Education 12 (4) pp298-314


Vaughn, J; Lister, M; Shaw, R.J 2016. Piloting Augmented Reality Technology to Enhance Realism in Clinical Simulation. Computers, Informatics, Nursing 34 (9) pp402-405