

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



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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 brought mixed results and the evidence base for their effectiveness requires further study (Guha D et al 2017, Bosc et al 2019)

Augmented reality in nurse education

- 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

Teaching cardiac physiology & pathophysiology

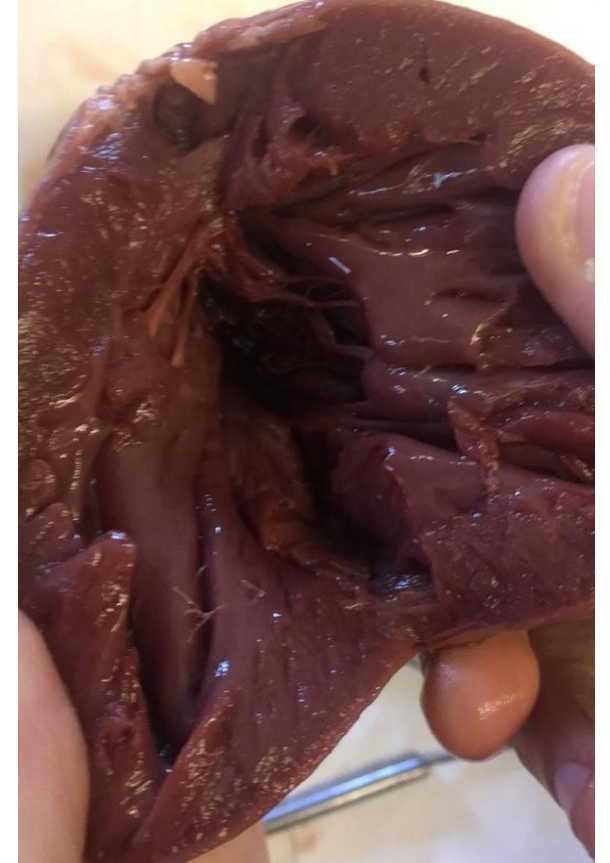
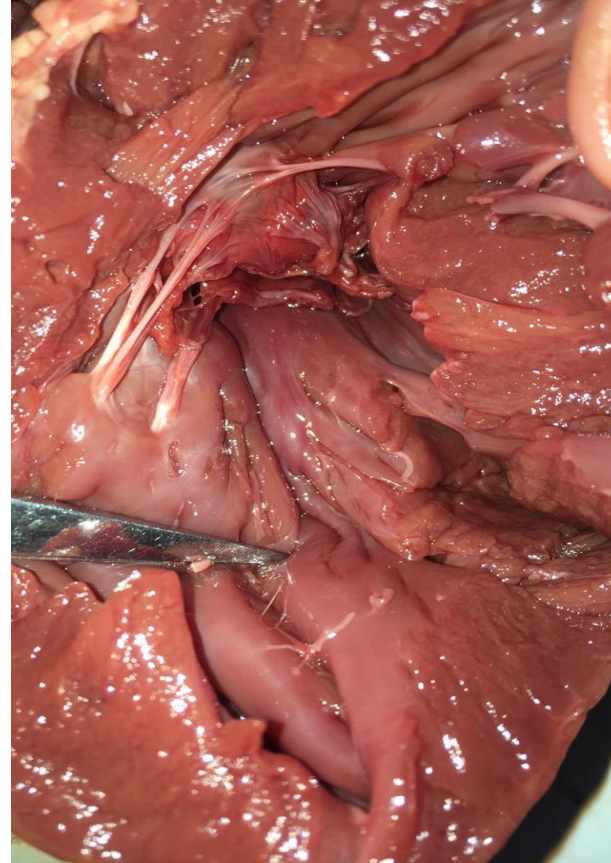
- Didactic, teacher led-lectures
- *World café: heart failure* enables application of knowledge to a patient scenario
- These sessions are interactive and well evaluated by students
- However, knowledge and understanding can be variable



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

Vimedix AR

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

Future developments and research

- 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



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