



CSMEN – Simulation Publications Update

Bulletin October 2021

Augmented and Virtual Reality in Simulation Based Education

Welcome

Welcome to the Simulation Publications Update a service brought to you by CSMEN in partnership with NES Knowledge Network.

The foci for this Simulation bulletin are augmented and virtual reality from publications between June and July this year.

These articles may be of interest or relevance to your current role in NHS Scotland. The articles may also be of use in your research. These articles are from those journals we currently subscribe to. If there are any articles or journals that you would like us to add/consider please let us know.

If you would like to suggest a focus topic or become a reviewer, please email [CSMEN](#).

The plan is to widen this service to focus on topic areas and to monitor its use and effectiveness so feedback would be much appreciated.

This bulletin was developed by Jean Ker former CSMEN Clinical Lead in partnership with Alan Gillies from NES Knowledge Network.

Access to Journals

Different journals have different processes for login so please follow the instructions for accessing the full text of the articles through the links provided.

On your behalf NES Knowledge Network subscribes to some journals direct and others via aggregators (ie. journal collections or full text databases). We use something called a 'link resolver' to link you via the best route using your NHS Scotland OpenAthens password. Some journals can detect that you're logging in from NHS premises, so won't ask for the OpenAthens password, but if you're accessing from home you may have to login. None of the links should require you to set up a separate login – where there are login boxes for personal accounts, look for an OpenAthens or 'institutional login' option as well, which will accept your OpenAthens password.



FOCUS: Augmented and Virtual Reality

[Virtual boot camps-an emerging solution to the undergraduate medical education-graduate medical education transition.](#) Farr D.E., et al, JAMA Surgery, Vol 156, 3, 282-283. 2021.

Out of the 10 articles identified and available over the two month Simulation Bulletin review period which relate to augmented and virtual reality I thought this one was highly relevant to the Scottish Skills and Simulation Network particularly following the impact of the pandemic on education and also because at postgraduate level Scotland has been leading the use of national boot camps for both surgical and core medical trainees with increasing evidence of success.

This short article published by JAMA Surgery reports an innovation at undergraduate level in relation to the use of virtual reality boot camps in the transition period between undergraduate and graduate surgical practice.

The aim of the virtual bootcamp was to assure all new graduates working in surgery were proficient in suturing and knot tying tasks.

Each graduate was sent a suture trainer with materials and accompanying videos and were able to attend on line instruction sessions in a video conferencing format prior to entering service.

Although the setting was in the USA the use of virtual reality for developing technical skills in this reported transition period needs to be formally evaluated this paper does provide a trigger for simulation-based education researchers to explore

- the use of bootcamps in different contexts
- the use of bootcamps with multi-professional groups of learners
- the impact of bootcamps over time to assess how they enhance reliability of practice.

A more important question would be is this reported innovation really a virtual bootcamp or merely a report of a remote teaching technique? It is important that we have a shared mental model of what we understand by virtual reality.



Use of 360° virtual reality video in medical obstetrical education: A quasi-experimental design.

Arents V., et al, BMC Medical Education, Vol 21, 1, 202. 2021.

This study investigated whether adding a 360° VR video to the internship curriculum leads to an improvement of long-term recall of specific knowledge on a gentle Caesarean Sections (gCS) and on general obstetric knowledge. 89 medical students participated, 41 in the 360° VR video group and 48 in the conventional study group. Watching the 360° VR video did not result in a difference in either specific or general knowledge retention between the intervention group and the conventional study group. However, 83.4% of the 360° VR video-group reported that more videos should be used in training to prepare for surgical procedures. In the 360° VR video-group 56.7% reported side effects like nausea or dizziness. The authors conclude that although the use of 360° VR video did not increase knowledge, it did offer a potential alternative for attending a CS in-person and a new way to prepare the students for their first operating room experiences.

Evolution of augmented reality applications in orthopaedics: A systematic review.

Bagwe S., et al, Journal of Arthroscopy and Joint Surgery, Vol 8, 1, 84-90. 2021.

The aim of this review was to analyse clinical studies for advantages and disadvantages provided by augmented reality (AR) assistance in orthopedic surgeries. 10 publications were included and 3 recent news updates relevant to AR in orthopedics. The authors classified the available AR systems according to the placement of the display technologies into 3 spaces, namely “head space” “body space,” and “world space”.

Virtual reality simulation in plastic surgery training. literature review, Bielsa, V.F., Journal of Plastic, Reconstructive & Aesthetic Surgery: JPRAS, 2021.

The aim of this article is to review the progress of VR simulation in plastic surgery (PS) training. Sixty-four articles were selected from a literature search. The review finds that several attempts have been made to create VR simulators and most of them are non-immersive or partially immersive. Based on the findings the authors conclude that VR simulation has been proven to have a role in PS training, offering many advantages and can be used for safety training, team interaction and decision-making education.

Virtual boot camps-an emerging solution to the undergraduate medical education-graduate medical education transition. Farr D.E., et al, JAMA Surgery, Vol 156, 3, 282-283. 2021.

This article describes a virtual boot camp at a US institution. Since 2006, the institution has hosted a preclinical curriculum for matriculating residents and began with simulation-based suturing and knot-tying tasks. Over time, other high-yield training was added to the curriculum, including high-fidelity simulations. While this has traditionally been done in a large group setting over the 2 weeks prior to matriculation, the institution aimed to transition it to a virtual setting to comply with pandemic restrictions. To this end, each resident was sent a suture trainer, including simulated skin and tissue, needle drivers, Adson forceps, scissors, Fundamentals of Laparoscopic Surgery suture models, silk ties, and Vicryl suture. Videos of the suturing and knot-tying tasks were filmed from 2 perspectives (toward the learner and from the learner's perspective) and then synchronized to be used in a teaching video review. The videos are played and practiced in the video-conference setting in small groups of learners and an instructor. The handoff simulation, root cause analysis simulation, and lectures are done similarly, in a video-conference format.



[Augmented reality in clinical dental training and education.](#) Haji Z., et al, Journal of the Pakistan Medical Association, Vol 71, 1, S42-S48. 2021.

This article gives an overview of the use of augmented reality in clinical dental training and education. Conventional pre-clinical training employed the use of cadavers, but financial, ethical and supervisory constraints have become a major shortcoming. Pre-clinical training has now employed simulation. Augmented reality is commonly being employed in maxillofacial, restorative, tooth morphology learning and mastering technique for administering local anaesthesia in dentistry. Virtual reality is being employed particularly in pre-treatment implant planning and dental education for students. Use of haptic technology, like robotics, is also gaining popularity, and facilitates a two-way communication between the user and the environment to better simulate the clinical setting for learning purposes.

[Virtual reality as a teaching method for resuscitation training in undergraduate first year medical students: A randomized controlled trial.](#) Issleib M., et al, Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine, Vol 29, 1, 27. 2021.

This study compares a conventional cardiopulmonary resuscitation (CPR) training with a Virtual Reality (VR) training. The intervention group received an individual 35-min VR Basic Life Support (BLS) course and a basic skill training. The control group took part in a "classic" BLS-course with a seminar and a basic skill training. The no flow time was significantly shorter in the control group. The intervention group had a higher learning gain in 6 out of 11 items. The authors conclude that the "classic" BLS-course seems superior to VR in teaching technical skills, however, overall learning gain was higher with VR. They suggest that future BLS course-formats should consider the integration of VR technique into the classic CPR training or vice versa.

[Validity of robotic simulation for high-stakes examination: A pilot study.](#) Jarocki A., et al, Journal of Robotic Surgery, 2021.

The construct validity of using simulation performance for high-stakes examinations such as credentialing has not been studied appropriately. Senior cardiothoracic trainees with limited robotic but significant laparoscopic experience ("intermediate surgeons", IS) and practicing robotic thoracic surgeons ("competent surgeons", CS) participating in a thoracic cadaver robotic course were evaluated on three Da Vinci (Xi) simulations. Overall scores did not have a statistically significant difference in any exercise between groups. Simulation exercises do not appear to distinguish intermediate from competent surgeon performance of robotic skills. The authors suggest that without better validity data, the use of simulation for credentialing 'should be thoughtfully considered'.

[An exploratory study to develop a virtual reality based simulation training program for hypovolemic shock nursing care: A qualitative study using focus group interview.](#)

Jeon, J. & Park, S., Healthcare, Vol 9, 4, 2021.

Although patients with hypovolemic shock are common in clinical practice, nursing students have little chance of coming across them during their practicum. The main focus of this qualitative (focus group) study was to explore the elements essential for a virtual reality (VR) based simulation program for hypovolemic shock nursing care. The exploratory research results were classified into five themes: experience of hypovolemic shock nursing care, determinants of patient prognosis, essential nursing competence, scenario construction, and direction for VR simulation program development. The authors propose the development of a VR-based simulation program that reflects the exploratory



research results of this study in order for nursing students to take an interest in hypovolemic shock nursing care and efficiently improve related skills.

[Real-world virtual patient simulation to improve diagnostic performance through deliberate practice: A prospective quasi-experimental study.](#) Kotwal, S., et al, Diagnosis, 2021.

This study examined whether novice clinicians could achieve proficiency diagnosing dizziness by training with virtual patients (VPs). A case library of VPs with dizziness was developed from a clinical trial. The approach (VIPER - Virtual Interactive Practice to build Expertise using Real cases) consisted of brief lectures combined with 9 h of supervised deliberate practice. Residents were provided dizziness-related reading and teaching modules. The study concluded that just 9 h of deliberate practice increased diagnostic skills (both accuracy and testing appropriateness) of medicine interns evaluating real-world dizziness 'in silico' more than ~1.7 years of residency training. The authors suggest that applying condensed educational experiences such as VIPER across a broad range of common presentations could significantly enhance diagnostic education and translate to improved patient care.

[The role of extended reality technology in healthcare education: Towards a learner-centred approach.](#) Logeswaran A., et al, Future Healthcare Journal, Vol 8, 1, E79-E84. 2021.

The use of extended reality (XR) technologies is growing rapidly in a range of industries from gaming to aviation. This review explores the role of XR technologies in learner-driven approaches to healthcare education. This paper aims to evaluate the position of XR technologies in learner-centred pedagogical models, determine what functions of XR technologies can improve learner-centred approaches in healthcare education, and explore whether XR technologies can improve learning outcomes in healthcare education. The authors conclude that XR technologies have unique attributes that can improve learning outcomes when compared to traditional learning methods, but there is currently a shortfall in learner-centred implementation of XR technologies in healthcare education, where these technologies have the capacity to cause a paradigm shift.