Currents in Pharmacy Teaching and Learning xxx (xxxx) xxx–xxx

Contents lists available at ScienceDirect

Currents in Pharmacy Teaching and Learning

journal homepage: www.elsevier.com/locate/cptl

Review Article

Appraising the role of the virtual patient for therapeutics health education

Lyndsee Baumann-Birkbeck[a], Fiona Florentina[b], Onur Karatas[b], Jianbe Sun[b], Tingna Tang[b], Victor Thaung[b], Amelia McFarland[a], Nijole Bernaitis[a], Sohil A Khan[a], Gary Grant[a], Shailendra Anoopkumar-Dukie[b,*]

[a] School of Pharmacy, Gold Coast Campus, Menzies Health Institute Queensland, Griffith University, QLD 4222, Australia
[b] School of Pharmacy, Gold Coast Campus, Griffith University, QLD 4222, Australia

ARTICLE INFO

Keywords:
Therapeutics
Education
Virtual patient
Simulation

ABSTRACT

Background: Face-to-face instruction, paper-based case-studies and clinical placements remain the most commonly used teaching methods for therapeutics curricula. Presenting clinical content in a didactic manner presents challenges in engaging learners and developing their clinical reasoning skills which may be overcome by inclusion of the virtual patient (VP). Currently there is limited literature examining the use of the VP in therapeutics teaching and learning. This review aimed to determine the role of VPs in therapeutics education, specifically the impact on student experiences, performance, and clinical skills.

Methods: A search of primary literature was conducted with search terms including *virtual patient, education, health,* AND *learning.* Boolean operators were applied to include studies from health relevant fields with article titles and abstracts vetted.

Results: Nine of the 21 included studies were control-matched, and all but one compared VPs to traditional teaching. VPs enhanced the learning experience in all 17 studies that measured this outcome. Fourteen studies measured performance and clinical skills and 12 found VPs were beneficial, while two did not. The VP was not superior to traditional teaching in all studies, but the VP appeared beneficial to the student learning experience. Discrepancy was found between the impact of VPs on short- and long-term knowledge.

Implications: The VP appears to enhance the student learning experience and has a role in therapeutics education, however a blended-learning (BL) approach may be required to account for individual learning styles. Additional investigation is required to clarify the efficacy of the VP, particularly as a component of BL, on longer-term knowledge retention.

Introduction

Therapeutics education, which explores the application of drugs as therapeutic agents, is an integral component in the curricula of various health fields including nursing, dentistry, medicine, and pharmacy.[1,2] At its core is an integral focus on clinical reasoning and decision making skills.[3] Although a variety of teaching strategies are used in therapeutics education, traditional face-to-face

* Corresponding author.
E-mail addresses: l.baumann-birkbeck@griffith.edu.au (L. Baumann-Birkbeck), fiona.florentina@griffithuni.edu.au (F. Florentina), onur.karatas@griffithuni.edu.au (O. Karatas), jianbe.sun@griffithuni.edu.au (J. Sun), tingna.tang@griffithuni.edu.au (T. Tang), victor.thaung@griffithuni.edu.au (V. Thaung), a.mcfarland@griffith.edu.au (A. McFarland), n.bernaitis@griffith.edu.au (N. Bernaitis), s.khan@griffith.edu.au (S.A. Khan), g.grant@griffith.edu.au (G. Grant), s.dukie@griffith.edu.au (S. Anoopkumar-Dukie).

http://dx.doi.org/10.1016/j.cptl.2017.05.012

1877-1297/

approaches, including lectures and tutorials remain the most widely used methods across all of these disciplines.[1,4] These teaching modes can provide a channel for meaningful verbal interaction between instructors and learners, which allows for instant clarification of concepts and extension of knowledge.[5] However, didactic practices may not be conducive to the development of students' critical thinking, problem-solving, decision-making, and lifelong learning skills, as they do not allow them to practice and apply their therapeutic thought process in a clinical setting.[6,7] Educational institutions are faced with the challenge of developing work-ready, competent health professionals who are able to assume their clinical roles confidently upon graduation. Also, once practicing clinicians, health professionals must maintain their practice competency, and complete activities of continuing professional development.[8] Competency encompasses the dynamic integration of knowledge, therapeutic reasoning, skills and experience, applied to optimize patient outcomes.[9] Thus ideally, therapeutics and clinical skills should be taught in a setting that is the same as or as similar as possible to the setting of the student's future profession.[3]

The most effective way to prepare students for therapeutic roles is to allow them to practice and apply their clinical knowledge, as well as experience the clinical environment, however, placing students in clinical settings whenever clinical reasoning and skill education is required is unfeasible. Health education providers have used clinical exams, including *viva voce*, objective structured clinical exams (OSCEs), and simulations to replicate practical scenarios that would normally only be experienced in a clinical setting.[10,11] Use of standardized patients in the oral examinations helps to lend authenticity to the activity. However, these examinations are costly to develop and maintain, and "performance drift" can sometimes occur when the scenario must be repeated several times, sometimes by more than one actor. This can have a negative impact on assessment validity.[12,13]

To overcome these existing limitations to clinical education and further fulfill student learning needs, the use of non-traditional teaching approaches in therapeutics education can be considered.[14,15] Continuous advancements in technology are persistent in modern society and have consequently contributed to the current generation of learners expecting the use of technology in education.[16,17] This has contributed to the emergence of non-traditional educational approaches, such as e-learning and blended-learning (BL). E-learning remedies the health and safety concerns associated with real-life patient interaction in clinical placements.[18] Most modern students have grown acquainted with digital technologies as part of their everyday lives, and are sometimes referred to as digital natives.[19]

To meet these current learner needs, the incorporation of technology-based instruction in higher education has been steadily increasing.[20,21] As digital natives are considered comfortable in simulation-based virtual settings, the virtual patient (VP) may be a beneficial teaching tool for therapeutics education.[22] VPs are computer simulations of real-life clinical scenarios that allow learners to emulate the role of a health professional by applying their skills and knowledge to make therapeutic decisions.[23] Unlike clinical placements, VPs provide students with the opportunity to practice their reasoning and decision-making skills in a safe-fail environment without the possibility of harming a real patient.[24,25] Students can also encounter a wider variety of patient cases and issues in VP simulations than in clinical placements, allowing for more frequent practice.[26] There is limited information regarding the cost-effectiveness of VPs; however, it is likely that apart from the initial costs to develop that once set-up, VPs will likely be more cost-effective as they potentially require less personnel and training resources, such as clinical educators and patients.[24]

The use of VPs may also assist in maintaining validity and standardization of assessments, addressing the pitfalls of standardized patients for oral examinations.[12] However, students' acceptance of technology, their personality and learning style preferences can influence their use of technology-mediated instruction.[27] Reflective learners may find the traditional lecture approach more effective, while active learners may prefer interactive computer-assisted approaches.[28] To date, a number of reviews have investigated the use of VPs for health professional education, however studies focusing specifically on VP use for therapeutics education are limited.[29–34] As such, a better understanding of the impact VPs may have on student performance, clinical skills, and the learning experience is required. This literature review seeks to evaluate the role of VPs in therapeutics education, when used either in addition to, or as an alternative to traditional didactic teaching methods. Specifically, the review aims to assess the impact of VPs on student performance, clinical skills, and the learning experience.

Methods

A search of primary literature was conducted using Ovid MEDLINE, PubMed, and Google Scholar for articles published between January 1, 2006 to April 1, 2016. Article titles and abstracts were vetted per the inclusion criteria. Search terms included *virtual patient, education, health*, AND *learning.* Boolean operators were applied searches in Ovid MEDLINE and PubMed to ensure studies were retrieved from health relevant fields. These include: *medic** OR *pharm** OR *nurs** OR *dent**.

Inclusion criteria:

- Primary studies that investigated the use of VPs in therapeutics education
- Studies that measured the efficacy of VPs with respect to student performance, clinical skills and/or the learning experience, where learning experience encompasses satisfaction, enjoyment and perceived benefit
- Studies involving simulations that met the review definition of VP (i.e., computer simulations of real clinical scenarios that allow learners to emulate the role of a health professional by applying their skills and knowledge to make therapeutic decisions)

Exclusion criteria:

- Studies not related to therapeutics education (e.g., VPs used to teach manual skills in health fields not relevant to therapeutics, VPs used as an assessment tool rather than a teaching tool)