A Learner-Created Virtual Patient Curriculum for Surgical Residents: Successes and Failures

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OBJECTIVE: To determine the feasibility and effectiveness of a learner-created virtual patient (VP) curriculum for postgraduate year 2 surgical residents.

DESIGN: Using a social-constructivist model of learning, we designed a learner-created VP curriculum to help postgraduate year 2 residents prepare for their in-training surgical examination. Each resident was assigned to create a VP curriculum based on the learning objectives for this examination, and VP cases were then disseminated to all residents for completion. To measure the learning effects of the curriculum, participants completed 2 simulated in-training examinations, both at the beginning and at the end of the intervention. Study participants also participated in a focus group and completed an online questionnaire about the perceived learning value of the curriculum.

SETTING: The study was conducted at the McGill University Health Centre, a tertiary care hospital in Montreal, Canada.

PARTICIPANTS: In total, 24 residents from 7 surgical specialties completed both the pretest and posttest, as well as took part in the creation of a VP curriculum. Of those 24 residents, only 19 residents completed the cases created by their peers, with 7 completing greater than 50% of the cases and 12 completing less than 50%. In all 17 residents responded to the online questionnaire and 11 residents participated in the focus group.

RESULTS: The VP curriculum failed to improve scores from pretest (59.6%, standard deviation = 8.1) to posttest (55.4%, standard deviation = 6.6; p = 0.01) on the simulated in-training examination. Nonetheless, survey results demonstrated that most residents felt that creating a VP case (89%) and completing cases created by their peers (71%) had educational value. Overall, 71% preferred active participation in a curriculum to traditional didactic teaching. The focus group identified time-related constraints, concern about the quality of the peer-created cases, and questioning of the relationship between the curriculum and the Surgical Foundations examination as barriers to the success of the curriculum.

CONCLUSIONS: Despite the fact that a learner-created VP curriculum did not improve scores on a mock in training examination, residents viewed this intervention as a valuable educational experience. Although there were barriers to the implementation of a learner-created curriculum, it is nonetheless important to try and integrate pedagogical concepts into the instructional design of curricula for surgical residents. (J Surg Ed 73:559-566. © 2016 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: surgical education, virtual patients, curriculum design, active learning, constructivism

COMPETENCIES: Patient Care, Medical Knowledge, Practice-Based Learning and Improvement

INTRODUCTION

Medical knowledge is constantly expanding and changing, but the duration of residency training has not changed to accommodate this evolution. Moreover, the implementation of duty hour restrictions has caused residents to have fewer interactions with patients, thus decreasing educational opportunities.[1,2] With the need to achieve the same training goals in a shorter amount of time, the development of new teaching methods that optimize learning outside the clinical environment is more important than ever.

Educational technologies and technology-rich learning environments (TRLEs) are becoming increasingly popular in medical education.[3] Not only do they speak to the strengths and interests of modern-day learners but also provide a multitude of possibilities for the development of novel learning tools that have the potential to address some of the current learning gaps within residency training.[4,5] The TRLEs create realistic learning environments and represent authentic problems; they apply principles of situated cognition that facilitate the transfer of knowledge to real-life settings.[6,7] The TRLEs can also scaffold the learning process through software designs that model problem-solving strategies.[7] Finally, TRLEs can adapt to individual differences in learning styles by offering information via various sensory modalities (text, images, video, etc.), and allowing for learners to control their environment.

Virtual Patients (VPs) are an example of a TRLE specifically designed for medical education. A VP is a "computer-based program that simulates real-life clinical scenarios; learners emulate the roles of health care providers to obtain a history, conduct a physical examination, and make diagnostic and therapeutic decisions."[4] The VPs have been shown to help learners develop clinical reasoning skills through exposure to new clinical scenarios and through modeling of expert reasoning.[8,9] When compared to the use of standardized patients, VPs allowed learners to elicit similar patient information, arrive at the same number of correct diagnoses, and attain the same level of comfort communicating with patients.[10]

Although there is evidence supporting the benefits of VPs in undergraduate medical education,[11-18] research on the implementation of VP curricula in residency training remains scarce.[19] The implementation of a formal VP curriculum is a complex task requiring significant work and resources to create high-quality VP cases. As such, we sought an alternative way of implementing a VP-based curriculum for second-year surgical residents: we asked residents to create VP cases and then share these cases with each other. We based our curriculum in learning theory, encouraging active learning and applying constructivist concepts of cocreation of knowledge to establish a collaborative community of learners, using the enhanced medium of VPs.[20]

The aim of our study was to determine the feasibility and effectiveness of a learner-created VP-based curriculum for postgraduate year (PGY) 2 surgical residents. The secondary aim was to determine whether the completion of this curriculum would improve resident performance on a practice-written in-training surgical examination.

METHODS

Second-year (PGY-2) surgical residents from all surgical subspecialties taking part in the Surgical Foundations (SF) curriculum at a university-affiliated health center were enrolled in the study. Approval was obtained from the Institutional Review Board of McGill University.

Quantitative Methods

Pretest and Posttest Design

At the beginning and at the end of the study, residents were administered a 71-item multiple-choice examination. Examination content was based on the list of objectives for the SF curriculum established by the Royal College of Surgeons and Physicians of Canada.[21] This list was narrowed down to 26 key topics, and a survey was sent out to all third-year (PGY-3) residents who had recently completed their SF examination to determine their perceptions of the relative importance of those topics on the SF examination. A total of 14 residents replied (42% response rate), and responses were used to narrow the list down to 18 key topics and to create an examination blueprint that included weighting according to relative importance (Table 1). The multiple-choice examination questions were adapted from a pre-existing question bank publicly available on the University of British Columbia's SF website.[22] A panel of 3 content experts reviewed the questions, selecting those of the highest quality, optimizing the wording and answer choices, and sorting them by topic. The 2 versions of the examination—preintervention and postintervention—were created based on the test blueprint.

VP Case Creation

After completion of the pretest, PGY-2 residents were assigned to create a VP curriculum on one of the topics from the 18-item list. Participants attended a 2-hour instructional session about VPs from 2 experts in the field (D.F. and N.P.), introducing them to the concept of VPs and reviewing key principles of VP case design. They also received instruction regarding the use of the VP software, DecisionSim,[23] and were provided with appropriate reference materials.[24,25] In a second 2-hour session, study participants had the opportunity to work on their cases with instructor guidance to address any questions about case design or use of the software. They were given 1 month to create their cases (Fig.).

VP Case Assignment

Once all cases were created, a second online assignment was disseminated to all study participants. They were given an additional month to complete all the VP cases created by their peers, with weekly reminders about the assignment sent via e-mail. At the end of the second 1-month period, the residents were administered the postintervention test. Pretest and posttest results were compared using paired t-tests.

Qualitative Methods

After completion of the pretest and posttest, as well as the VP intervention, residents were asked to provide feedback regarding the experience of creating VP curriculum and