Effectiveness of conducting online objective structured practical examination (OSPE) in anatomy among first year medical undergraduates

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Abstract

Objective: To assess the effectiveness of conducting an online OSPE (Objective Structured Practical Examination) in Anatomy for first year medical students.

Material and Methods: Following a 2-week prior notice, 222 first-year medical undergraduates who had undergone exclusively online learning for one semester, were subjected to an online OSPE conducted via conferencing platform. Subsequently, student feedback was obtained via a google form regarding exam environment, prior preparation, clarity of images, and technical problems faced during the exam. SPSS Version 25 was used for descriptive analysis and one-sample T-test was used to compare the results with a previous batch that underwent onsite face-to-face teaching and examinations.

Results: Satisfaction with images of gross anatomy specimens, radiographs, and histology slides were 48.2%, 90.5%, and 76.6% respectively. A majority agreed that the OSPE helped them to improve their knowledge (92.8%) and intrigued interest in the subject, motivating them to study (83.8%).

Compared to a previous batch that underwent onsite teaching and examination, the performance of the students in this group was significantly lower ($p<0.001$).

Conclusion: The lower performance of the students faced with the online OSPE may be due to learning anatomy only using online platforms hindering the three-dimensional understanding of Anatomy, short preparation time, and inexperience at facing online examinations. Even though technology-based learning and examination techniques have developed with the recent COVID 19 pandemic, it cannot yet replace the traditional methods in teaching and examination in Anatomy. However, this study shows that conducting online examinations is feasible with only 34.7% of students reporting minor technical difficulties.

Running title: Effectiveness of Online Anatomy OSPE

Keywords: online examination, medical education, anatomy learning, objective structured practical examination, exam performance

Introduction

Covid 19 pandemic has led to an evolutionary change in the educational sector worldwide. With the travel restrictions and health precautions implemented by the government of Sri Lanka, all universities had to abandon face-to-face teaching and adapt to exclusive online education. The pandemic situation

obligates training of future doctors which cannot be halted amidst any crisis.

Anatomy is the basic foundation of preclinical medical education. Being a highly virtual subject, it requires a good understanding of relationships between structures, often achieved by hands-on experience with cadaveric dissections, prosected specimens, plastic models, and virtual sources.

In the Faculty of Medicine, University of Peradeniya we transferred from the traditional methods of anatomy teaching to more innovative teaching methods based on learning management system such as online lectures, prerecorded dissection videos, interactive discussions via zoom platform, digital 3D Atlas software, online tutorials, etc. to deliver the same curriculum content to students.

With the online teaching process smoothly going on, our next challenge was to conduct the end-semester examinations for students in order to move to the next academic module of the curriculum.

Earlier, the Department of Anatomy conducted steeple chase OSPE stations which consisted of labeled prosected specimens, bones, radiological images with questions posted on each station to be answered at a given time.

With the existing pandemic situation, it was difficult to conduct onsite examination and walk around OSPEs. As the initial step, we conducted an experimental online OSPE and got feedback from the students regarding this online method of evaluation on the practical component.

In time-restricted E-OSPE we adopted a novel method by converting 3D specimens to 2D images. Students' viewpoint with regard to exam environment, prior preparation, clarity of images, technical problems they faced during the exam were evaluated here.

Methodology

A cross-sectional study with descriptive and analytical components was conducted involving 222 first-year undergraduates of the Faculty of Medicine, University of Peradeniya. Following the completion of the first semester, where foundation to human anatomy and anatomy of limbs were taught solely through online methods, the students were subjected to an online OSPE.

The OSPE was prepared by the academic staff of the Department of Anatomy according to the standards of semester exams. A total of 33 questions based on gross anatomy, histology, and radiology were made using photographs of prosections, histology slides, bones, and X-rays. This was pilot tested among 5 pre-intern doctors before finalizing. The OSPE was conducted as a PowerPoint presentation via zoom platform with two minutes given to answer each question.

Following 2 weeks prior notice, the students were divided into 10 groups with one invigilator appointed to each. WhatsApp groups were created for each group, for the delivery of proper instructions and clarification of doubts regarding the OSPE. Each group was given a separate zoom link to join the examination which was conducted at

the same time by the 10 invigilators, with the students instructed to keep videos and observed via web cameras. Following completion, the students were instructed to take clear photos of answer sheets and send them through WhatsApp to the appointed invigilator. Students were observed until all the students in that group submitted the answer scripts.

Following the OSPE, a feedback questionnaire consisting of 5-point Likert scale questions was administered to the whole batch via google forms regarding accessibility, preparedness, content, questions, images, and exam experience. SPSS Version 25 was used for descriptive analysis with one-sample T-test used to compare the test results with those of a previous batch that underwent onsite face-to-face learning and OSPE examinations.

Results and Discussion

A total of 222 responses were received for the feedback questionnaire of which 57.2% were from female students. The commonest devices used for the online OSPE were laptop computers (41.9%), tablets (27.5%) and smartphones (12.2%), and others a combination of devices. Internet access was gained by personal Wi-Fi connections (64%) and personal mobile data (25.6%). Of the respondents, 63.1% were comfortable in taking the test via their devices. Majority (92.8%) agreed that they were given clear prior instructions. Only 46.85% felt comfortable sitting for the exam via the online platform and 30.18% said that they had enough time to prepare for the test.

The majority (92.8%) agreed that the language used in questions was simple and easy to understand and 89.6% said that the question format was clear. Of the respondents, 44.14% felt that the allocated time was enough for each question and only 32.88% said that the questions were too difficult for them.

More than half (63.6%) agreed a comfortable environment and a minority (34.7%) reported technical problems. Majority (90.1%) said that the instructions were heard clearly and 93.2% agreed that exam conductors were available during the exam to guide them. Only 33.78% said that they felt uncomfortable being observed via video camera during the exam.

While 48.2% said that the photographs of gross anatomy specimens were clear enough to identify the structures, 35.59% were neutral regarding this statement. Only 39.19% said that the anatomical orientation of the displayed specimens was clearly understandable, though 90.5% agreed that the given radiographs were clear, and 76.6% agreed that the histology slides were clear and understandable. The effectiveness of virtual microscopy in teaching and assessing knowledge in histology has been shown by a recent study (1).

A percentage of 42.79% were stressed in performing the test via online platforms and 44.2% said that they would have performed better if the test was conducted onsite. Recent similar studies in other countries mention student preference for conventional compared to online anatomy assessment methods (2,3). This is understandable considering the high practicality of the subject.

While 92.8% said that the mock OSPE helped them to improve their knowledge, 83.8% said that it intrigued interest in the subject and motivated them to study during the current pandemic situation. More than half the students (55.41%) recommended the conduction of online mock spot exams in the future.

The average result of the batch who had experienced exclusive online learning with online examination was 54.05% while that of a previous batch that had undergone conventional onsite teaching with onsite examination was 72.92%. One-sample T-test was conducted to compare the mean scores of the two batches which revealed a statistically significant difference (t value- -15.46, $p<0.001$). This may divulge the consequence of learning methods limited to online platforms hindering the three-dimensional understanding of the students. A previous study comparing the scores of similar examinations held online and in the traditional format has found no significant difference between the two (4). The inexperience in facing online examination and imperfections in transforming and understanding actual specimens as two-dimensional images may have had an effect on this outcome. Further, a short time was provided for revision of anatomy since this exam was conducted at short notice as an experiment.

Conclusions

Even though technology-based learning and examination techniques have expanded and flourished especially due to the limitations caused by the recent COVID 19 pandemic, it cannot yet replace the traditional methods. However, during this pandemic, teachers are left with no choice but to revert to online methods.

This to our knowledge is the first study to evaluate online anatomy OSPE examinations and sets the stage for further experiments and conducting online examinations in the future. This experiment can be considered a success since it helped us motivate students and identify the drawbacks and problems in conducting online examinations.

Conflict of interest

None

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