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Original Research Article

Are we ready to replace physical mock exam with an online mock exam? a survey-based comparison

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ABSTRACT

Background: Mock exams have become an integral part of urology training, presently conducted in a real classroom (physical mock exam- PME). We conducted a mock exam in a virtual classroom (online mock exam- OME) for 130 urology residents. A survey was conducted to compare OME and PME.
Methods: Questionnaire was developed, consisting of 16 questions, of which two question were matrix, others had options. For the matrix questions the candidates had to rate the components of the PME and OME on a scale of 1 to 5.
Results: Out of the 130, 103 (86.55%) were eligible for analysis. Regarding, ease of understanding the question and fulfilling the expectations both modalities were rated highly (95.15% versus 93.2%, p=0.552 and 89.32 versus 83.5%, p=0.221). OME fared better than PME, with regards to the questions addressing; ease of understanding the explanation (p=0.000), fluency of interaction (p=0.000), ability to concentrate (p=0.002), feeling of involvement (p=0.000), logistic convenience (p=0.001), ability to network and ability to balance commitments (p=0.000). PME was superior in interacting with peers (p=0.000), and peer motivation helping them concentrate better (p=0.001). Out of the 103 respondents 79 (66.39%) recommended an OME for future.
Conclusions: Online platform can be effectively used to conduct a mock exam. It is not only noninferior to PME but also has many advantages. This survey shows OME has a potential to replace PME.

Keywords: Online mock exam, Online teaching, Online training

INTRODUCTION

Online teaching and training is not new to the field of medicine. After covid pandemic, several online platforms are available for teaching, training & to have interactions. It has become an important tool for dissipation of knowledge.[1] An online teaching classroom has the potential to address larger number of students, it allows senior professors to conduct elaborate courses, and these online courses can be accessed by students all over the world.[2-4] But the question that remains to be answered is that, how effective is online platform compared to physical teaching and does it impact the quality of teaching.[2]

Mock exam is a special session conducted over 3 days, to prepare students to appear for final practical exam. For past many years, we conducted physical mock exam (PME), wherein students and teachers gather in one center, some students are selected to present cases and teachers ask questions. Discussion is done exactly in the same format as final exam like- long and short cases discussion, ward round cases and viva, voce. All other students listen to the discussion taking place. This year we conducted on virtual platform (OME). After completion of OME, it was decided to compare OME versus PME by taking survey.

Surveys have become an important tool in the armamentarium of a health care provider and have answered several issues in the past.[5-7]

Hence, we decided to conduct a questionnaire-based survey, as per the guidelines described by Nabi, with an aim to compare OME and PME on various parameters.[8]

METHODS

This study was a prospective based survey conducted at Muljibhai Patel Urological Hospital, Nadiad in March 2020 for a period of four days. 130 students were registered for OME. We conducted Online mock exam on Microsoft Teams™ (US Microsoft Corporation, Redmond, Washington USA) platform, a virtual classroom was created. OME lasted over 4 days, 6 hours a day split into 2 sessions. The ingredients of the program were kept same namely, discussions on cases, instruments, operative surgery, radiology and pathology specimens and few lectures. Like PME, Cases were presented on power point slides and two-three students were invited to discuss the case and a set of 3-4 examiners asked the questions, All the other students listened to the discussion and put their queries, doubts and comments in a chat box. All the question in the chat box were answered by the examiners at the end of discussion.

A structured survey questionnaire was designed by the faculty of OME, who also had participated in various PME's in the past. The survey was prepared on the Survey Monkey™ (San Mateo, CA, USA) platform. The questionnaire was validated by a research methodology and language expert, to check if the language of the survey was suitable, easy to understand and whether bias existed in any question towards a particular answer. A pilot survey was conducted which was answered by 15 urological residents, who were not a part of 130 students enrolled for the OME. After completion of survey, they were asked to comment on: i) phrasing of the questions and responses; ii) if some question/answers created confusion; iii) was the time taken to complete the survey acceptable?

All questions were closed ended and had pre-fixed answer options.

The survey was sent to all the 130 candidates. All the participants who consented to fill the survey were included in the study. All the individual responses were exported to an excel sheet and from the excel sheet to SPSS software. SPSSTM (IBM, Armonk, New York, USA) version 25 was used for statistical analysis.

An association study was done between the responses to OME and PME using chi square test. Proportion test was also applied to know if there was a significant difference in the proportion of responses to the questions posed for physical and online mock exam, with level of significance, p=0.05.

For analysis, in case of the matrix questions response 1-2 was considered unfavorable, 4-5 was considered favorable and 3 was considered equivocal.

Ethical considerations

Survey was anonymous and basic demographic data was not collected. Identity of the participants was not revealed. Participation in the survey was voluntary. There was neither reward for participation nor punishment for non-participation. All participants were mature adults and participation in survey did not cause any informational or psychological harm to them. Hence as per the guidelines described by Whicher et al, ethics committee clearance was not required.[9] The study was done in accordance with Declaration of Helsinki and its amendment. All the original data reported in this study is available with the authors, for access.

RESULTS

The pilot survey was validated by calculating the Cronbach's alpha value which was 0.871 suggesting its reliability. The demographic data of the participants was as in Table 1.

Table 1: Demographic data (n=130).

Parameter	
Age	31±2 years
Sex (M:F)	125:5

Of the 130, 119 (91.5%) completed the survey. Out of the 119 respondents, 103 (86.55%) had attended a PME in past. The 16 (13.45%) respondents who had not attended the PME were excluded from the evaluation.

In response to the factor pertaining to, ease of understanding the question posed by the examiner, 95.15% (98/103) responded positively for OME (scored 4 or 5) and 93.2% (96/103) also responded positively for PME (p=0.552) (Tables 2 and 3). Ability to understand the explanation given by the examiner was highly rated in favour of OME (92.23% versus 62.14%, p=0.000) (Table 2). Similarly, for the question pertaining to, fluency of interaction with the examiner, ability to concentrate and feeling of involvement, were all in favor of OME and statistically significant (93.2% versus 73.79%; p=0.000, 81.55% versus 62.14%; p=0.002, 83.5% versus 31.07%; p=0.000 respectively) (Table 2).

When it came to ability to interact with peers, 100% of the candidates favored the PME with only 85.44% candidates favoring OME (p=0.000).

Distraction during the mock exam was viewed as a hinderance by only 18.45% (n=21) in OME and 46.60% (n=56) in PME, this was statistically in favour of the OME p=0.000 (Tables 2 and 3).

Table 2: Comparison between the replies for PME and OME.

Question No.	Question Statement	Online (Yes %)	Physical (Yes %)	P value	95% CI for Diff.	In favour of
Q_2_a	Ease of understanding the question posed by the examiner:	95.1	93.2	0.552	(-0.0445,0.0833)	Both
Q_2_b	Ease of understanding the explanation given by examiner:	92.23	62.14	0.000	(0.1940, 0.4080)	Online
Q_2_c	Fluency of interaction between examinee and examiner: (fascial expressions, grasping ability examiner understanding the reply)	93.2	73.79	0.000	(0.0963, 0.2920)	Online
Q_2_d	Ability to concentrate for a long time (attention time)	81.55	62.14	0.002	(0.0742, 0.3141)	Online
Q_2_e	Feeling of involvement in the course for full duration	83.5	31.07	0.000	(0.4097, 0.6388)	Online
Q_2_f	Ability to interact amongst peers	85.44	100	0.000	(-0.2138, -0.0775)	Physical
Q_3	Distraction	18.45	46.60	0.000		Online
Q_4_a	Logistic convenience (travel/cost/time spent)	93.2	13.59	0.001	(-0.2138, -0.0775)	Online
Q_4_b	Ability to balance commitments while attending course (workplace emergencies, family commitments, leave sanctions):	81.55	32.04	0.000	(0.3780, 0.6123)	Online
Q_4_c	Peer motivation to concentrate during the course	62.14	82.52	0.001	(-0.3229, -0.0849)	Physical
Q_4_d	Ability to network with peers and examiners	83.5	54.37	0.000	(0.1713, 0.4112)	Online
Q_4_e	Fulfilling the expectation	89.32	83.5	0.221		Both

Table 3: Frequency for replies to the matrix questions.

Questions	Against (response =1-2)		Equivocal (response =3)		In favour of (response =4-5)		Total
	Online	Physical	Online	Physical	Online	Physical	
Ease of understanding the question posed by the examiner	0	1	5	6	98	96	103
Ease of understanding the explanation given by examiner	1	4	7	35	95	64	103
Fluency of interaction between examinee and examiner (fascial expressions, grasping ability examiner understanding the reply)	1	6	6	21	96	76	103
Ability to concentrate for a long time (attention time)	1	9	18	30	84	64	103
Feeling of involvement in the course for full duration	5	42	12	29	86	32	103
Ability to interact amongst peers	5	0	10	0	88	103	103
Logistic convenience (travel/cost/time spent)	6	44	1	45	96	14	103
Ability to balance commitments while attending course (workplace emergencies, family commitments, leave sanctions)	4	34	15	36	84	33	103
Peer motivation to concentrate during the course	17	6	22	12	64	85	103
Ability to network with peers and examiners	7	19	10	28	86	56	103
Fulfilling the expectation	3	4	8	13	92	86	103

The question addressing the logistic convenience was rated 93.2% versus 13.59% by OME and PME respectively (p=0.000). For the questions pertaining to ability to balance commitments and ability to network, 81.55% (84) and 83.5% (86) favored OME while 32.04% (33) and 54.37% (56) favored PME. Both the answers were statistically in favour of OME (p=0.000, p=0.011 respectively) (Tables 2 and 3).

When asked if the peer motivation helped the trainees to concentrate 62.14% in the OME and 82.52% in the PME

group felt that peer motivation had a positive impact (p=0.001 in favour of the PME).

The respondents were asked if mock exams fulfilled their expectations, for the online exam 89.32% rated it 4 or 5 and for the PME 83.5% rated it 4 or 5 (p=0.221).

Seventy-six (63.87%) participants rated technical glitches and internet speed as an important factor determining the outcome of an online course. Lastly, the respondents were asked what would they recommend OME or a PME, to which 66.39% (79) recommended an OME and 33.61% (40) recommended PME.

DISCUSSION

The survey group was composed of 130 exam going urology residents, all were due for their practical exams in next 3 months, all of whom had attended a PME 3 weeks back. Hence memories were fresh, thus not resulting in recall bias- should be part of discussion

Online teaching module have been around for some time now. Online exams for different subspecialties and subjects are generally conducted via a multiple-choice question and answer format. While, for conducting an online practical examination several dimensions need to be considered, this includes the ability of the examinee and the examiner to interact and the ease of understanding the questions and answers by one another.

The PME's are conducted by many institutes and associations including urological society of India, to make students proficient for final practical exams of DNB or MCh courses. In these PME's real time exam situation is simulated and 3-4 examiners ask questions to candidates. The students are assessed and trained in all aspects of final practical exam like case discussion, instruments, pathology specimens, radiology and operative procedures. However, at the end of each session, examiner summarizes learning objectives and gives feed back. Same pattern was followed in OME. For every segment of discussion 2-3 students are invited as frontline participants for discussion. We tried to replicate this pattern in the online mock exam. By conducting this survey, we attempted to compare various aspects PME and OME.

Surveys are attractive tools in scientific research methodology to compare various issues. Our survey was conducted as per the standard guidelines.[8] The questionnaire was internally validated by the group of examiners and then was subjected for external validation. After that a pilot test was conducted with 15 participants (11.5% of the target population) as per the guidelines these participants were different than the study population, suggestions at each step were accepted and accordingly the original questionnaire was modified.[10] The final questionnaire was then circulated. The response to our survey was very good, out of 130 invitations 119 candidates (91.5%) responded to the survey, response rates >60% is considered adequate to overcome non-responder bias.[11]

Our results showed that when it comes to questions like, ease of understanding the query posed by the examiner and fulfilling the expectation, both the platforms (online and physical) were found to be effective (p=0.552, p=0.221) and were highly rated (95.15% versus 93.2% and 89.32% versus 83.5%). If the ease of understanding questions of an examiner in physical environment is considered as benchmark, then in this survey online platform was found to be equally effective. The online platform with the present-day technology allows fluid interaction between the examiner and examinee.

The questions which highlight the validity of online platform as a good medium, included the ability to understand the explanation given by the examiner, fluency of interaction, ability to concentrate and feeling of involvement. On all these grounds the OME fared better than the PME. This may be because a student sitting alone is able to focus more. One may assume that feeling of being involved is much more in a physical environment as you are amongst a group of people whom you can talk to and discuss various issues, however this survey proved otherwise. This may be due to the "Q and A" feature of the online platform, where the questions and the doubts posed by the trainees were answered by the examiners. This probably helped students feel more involved in OME.

The survey showed that, the ability to interact with peers was significantly (Q2f) more in the PME as compared to the OME (p=0.000). This is one of the clear disadvantages of virtual classroom where the students are sitting alone and not able to interact with their friends. Obviously, inability to socialise is a disadvantage of all online platforms, which was evident here also. When you are amongst your peers you can get motivated by them and motivate them too, this phenomenon is unlikely to happen in OME. We could conclusively prove this in our survey as PME was rated highly when it came to peer motivation as an inspiration (Q4c) during the mock exam (p=0.001, in favour of PME).

It is generally believed that, focusing on digital screen for 6 hrs in a day, may cause eye strain. Sitting alone may lead to decreased motivation, inability to concentrate and grasp the subject. All these doubts regarding the online platform were disproved during our survey, as the ability to concentrate during the course of the mock exam was found higher in the OME as compared to the PME (81.55% versus 62.14%, p=0.002). These finding can be attributed to the fact that; present day trainees are used to a longer screen time per day and do not find it difficult to concentrate for a long time even when sitting alone.

For an OME the candidate doesn't have to travel, stay arrangements and food arrangements need not be made, this premise was proven by the fact that 93.2% respondents found the online course to be logistically convenient while

only 13.59% of the respondents thought that a physical course was logistically efficient (p=0.001).

While attending an OME, the candidate in the remaining time of the day can fulfil his other commitments, like doing his residency duties, fulfilling his family commitments and would require lesser or no leaves. This was evident by the fact that, the candidates clearly favoured the OME over PME (p=0.000) when they were asked about their ability to balance commitments while attending a mock exam.

During PME, students can meet the examiners, ask them some questions and often discuss things unrelated to exams or academics. This way they establish rapport with their teachers. It was thought that, OME will clearly lack in this aspect. However, this belief was unfounded in our survey as respondents believed they could network better on an online platform as compared to a physical (p=0.000). This can be explained by the fact that many students may be inhibited to approach the teachers and discuss things in person. While on an, online platform, they find it easy to ask questions or discuss non-exam or non-academic issues (availability of fellowship, recommendations and suggestion regarding career). Candidates have option to communicate with examiners through private chat box provided by online platforms or through social media and email.

Issue of distraction is pertinent in both PME and OME. In OME, family members, kids at home and television etc. can cause distraction. In the PME the students can get distracted by the discussion happening amongst other students. In this survey it was found that moderate or severe distraction occurred only in 18.45% students in the OME while it occurred in 46.60% students in the PME. This implies that if student is motivated, then he has minimum chance to get distracted in OME.

In the last summarising questions, out of the 103 respondents, 79 (66.39%) recommended an OME as oppose to 40 (33.61%) who preferred a PME. These figures imply that almost twice the number of people were in the favour of OME as compared to the PME, as this was a closed ended absolute question, therefore a proportion test cannot be applied, but these numbers speak for themselves.

Surveys are very good tool to understand opinions of the people. Often these opinions are taken into consideration to make or change the policies. Wander et all conducted survey to understand lipid metabolism practice to see whether physicians follow international guidelines.[12] A survey to understand safety and ethical issues involved in semi-live and live surgical demonstration has been reported. The outcome translated into several changes in policies about live surgery demonstrations by various associations across the world.

Data suggests that the online teaching programs may bend the cost curve favorably.[1,13] The respondents in our survey also felt the same. It has been proven in metanalysis that skill and knowledge retention may be effective in online training and when compared with physical teaching, it is at least non inferior.[14,15] In our survey also OME fared better than PME in most aspects.

What does the future hold for us, can our mock exam pattern be one day shifted to an online platform? For shifting from a physical to an online model we will have to overcome the cultural resistances, an infrastructural upgradation needs to be done and institutional strategies have to be laid down.[12,15,16]

In our survey 63.87% respondent felt that technical glitches and internet speed determine the outcome of OME. Creating a user friendly platform and high internet speed are necessary for successful conduct of OME.

All the training courses have formative assessment programs. Based on this data, as a pilot trial, the formative assessment exams can be shifted on to the online platform. Various institutions including urological society of India conduct PME, looking at the outcome of the survey there is a scope to change from PME to OME.

Limitation of the study is that the questionnaire was formulated by the group of examiners who were part of OME.

CONCLUSION

Online platform can be effectively used to conduct a mock exam. It is non inferior to PME in the realms of understanding the two-way discussion and fluency of interaction. OME definitely holds an edge when it comes to ability to concentrate, fluency of interaction, feeling of involvement, balancing commitments and logistic convenience. This survey shows, online mock exam has a potential to replace the physical mock exam.

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APPENDIX

Questionnaire

1a. Have you attended any classroom mock (real time) in the past?
a. Yes b. No
1b. If yes then how many mock exams have you attended:
a. 1 b. 2 c. 3 d. >3
2. Rate the following experiences during the online mock exam and physical mock exam on a scale of 1-5 (5 being the best and 1 being the worst):
a. Ease of understanding the question posed by the examiner: b. Ease of understanding the explanation given by examiner: c. Fluency of interaction between examinee and examiner: (fascial expressions, grasping ability examiner understanding the reply) d. Ability to concentrate for a long time (attention time) e. Feeling of involvement in the course for full duration f. Ability to interact amongst peers
3. How would you rate the distraction caused in physical mock exam and online mock exam?
a. Maximum distraction b. Moderate distraction c. Minimum distraction d. No distraction
4. Rate the following experiences while considering an online mock exam and physical mock exam on a scale of 1-5 (5 being the best and 1 being the worst):
a. Logistic convenience (travel/cost/time spent) b. Ability to balance commitments while attending course (workplace emergencies, family commitments, leave sanctions): c. Peer motivation to concentrate during the course d. Ability to network with peers and examiners e. Fulfilling the expectation
5. Do you think internet speed and technical glitches are an important variable in achieving the outcomes of online course:
a. Yes b. To some extent c. Not at all
6.What would you recommend an online crash course or real time mock Exam to others?
a. Online Crash course b. Real Time mock exam