

SCOPING REVIEW OF THE IMPACT OF COVID-19 ON ASSESSMENT FORMAT IN MEDICAL AND DENTAL INSTITUTES

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ABSTRACT

Objective: Technology enhanced assessment or e-assessment is an emerging approach across the globe and is adapted by almost all medical and dental institutes. The objective of this study is to report on effects of COVID-19 on assessment format of medical institutes. This review seeks to find which methods are being used for a changed assessment format and who is being affected by sudden change in assessment format and what facilitators and/or barriers have been reported related to the success and/or failure of changed assessment format.

Material and Methods: This scoping review followed the methodology outlined by Arksey and O'Malley framework (2005). Data sources including PubMed, Eric, Medline, Semantic scholar and Google scholar were searched for the last 5 years of articles (from 2016 to 2021) related to e-assessment in medical education.

Results: In total, 9 articles met our inclusion criteria. Open book examination was considered to be a new normal keeping in mind its strengths and advantages in an online format. Digital literacy plays an important role in the acceptance of technology enhanced assessment. Faculty needs training to opt for this sudden change in teaching and assessment format. Connectivity issues need to be taken care of, as the whole format depends upon it.

Conclusion: e-assessment was well accepted by most of the students. Future studies should target students inconvenience for online assessment. Also lack of e-learning experience of some staff need attention. Insufficiency of IT technicians should be overcome. High speed internet is the requirement of the day. New software can be developed for a more reliable and valid assessment method

Keywords: technology enhanced assessment, open book examination, digital literacy, scoping review

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INTRODUCTION

Coronavirus Disease 2019 (COVID-19) pandemic made it necessary to shut down physical lecture rooms. Furthermore, teaching of medical education shifted from physical face to face teaching to online system. ¹ This was being a total transformation from tradition method to web based or online learning accompanied with a lot of challenges. ² Recent evidence has explored that e learning enjoys the role as a catalyst in modern era. ³ Assessment is known to be one of the most important element of an educational experience as it not only determines a student's progress

but also provides observable evidence of learning. It helps students to develop necessary skill of autonomous and self-directed learning. ⁴

In modern knowledge-intensive, higher education structure, individual and societal development is strongly directed by technological advances with expectations for amplified access, freedom and involvement in the construction of learning, including assessment methods and protocols. ⁵ Technological advances have taken over the educational sector within last few decades including technology assisted open universities and online lectures. ⁶

Introduction of e-assessment/technology enhanced assessment internationally triggers change in assessment methodology and becomes an important part of e-learning movement which is a global growth industry. ⁷

Whitelock and Reudal identified few main drivers for modern practices in technology enhanced assessment including better student retention, flexibility for distant learners, strategies to cater for large number of students,

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improved quality of feedback, objectivity in marking and effective use of virtual learning environments. In today's era of COVID-19 pandemic where we see a major paradigm shift in medical and dental education, these drivers are among the competing forces shaping today's higher education standards.⁸ Talking about implementation of successful e-assessment methodology in Pakistan, one major determinant is lack of academic staff time and training.⁸

To overcome these technical and procedural hindrances for smooth implementation of e-assessment, all we need to do is to identify the gaps in these areas by reviewing the available data related to this particular topic. This can be done by doing scoping review which is a relatively new approach to synthesis of knowledge.

The topic of our scoping review is impacts of COVID-19 on assessment format in medical and dental institutes which is an emerging topic with very few studies available. Interventions in this area are less known and only few methodologies are being used for new interventions effecting the specific group of people involved in medical education.

The review is guided by the question, "What assessment methods are opted for e-assessment or technology enhanced assessment in these pandemic circumstances of COVID-19 and what are facilitators or barriers to the new examination format?"

We found relatively less number of articles targeting primary research in this area, which was one of our inclusion criteria. Although, we could find only articles related to the impact of COVID-19 but our inclusion criteria had included last 5 years of research related to online assessment so that we can compare what change this pandemic had brought to already present e-assessment or physical assessment methods in medical education.

MATERIALS AND METHODS

After searching Google Scholar, PubMed, Semantic Scholar, and Medline, ERIC, Abstracts on impact of Covid-19 on Technology Enhanced assessment identification of articles addressing the subjects of online learning and medical and dental education was done. Search strategies were developed by MeSH words on PubMed, and keywords on Google scholar, Medline and ERIC.

The Search strategies were transplanted using each database platform's command, language-controlled vocabulary and appropriate search fields. Text words were used for the search concepts of e-learning, Medical Education, Dental Education, and Technology Enhanced Assessment. Searches were completed on 18th October 2021. Limited articles published were of last five years. We were predominantly interested in examining the literature published in last five years. English language limit was applied to all databases. Primary research articles written in English were included if these included online assessment, and whose

primary purpose was to review the impact of covid-19 pandemic on online assessment. Dissertations/thesis, reports or abstracts only, marketing or advertising material, review or editorials and studies based on data from online sources were excluded

All Articles were screened by 2 reviewers through a 2-step process of abstract and full text review to determine eligibility criteria through abstract review for inclusion. The articles that were included underwent full text review. Articles that met the inclusion criteria were then analyzed and charted according to the following iteratively developed categories 1. Author 2. Sample/participants 3. Measures 4. Inclusion.

Flow chart of literature review

DATA CHARTING

A total of 28 articles were shortlisted out of which 25 were searched to check for the impact of COVID-19 on e-assessment out of which 9 articles were selected for scoping review on the basis of inclusion/exclusion criteria.

RESULTS

Planning and rapid implementation of technology enhanced assessment presents next set of novel challenges that must be addressed by academic administrations across the globe.

We identified four key topics related to impacts of COVID-19 on technology enhanced assessment on medical education.

1. Strategies for overcoming challenges related to e-assessment
2. Strategies to overcome challenges related to ICTs
3. Challenges faced by the faculty for implementation of new format
4. Challenges related to internet connectivity issues

Strategies for overcoming challenges related to e-assessment: Traditionally there was a focus on memorisation and usual exam format followed was written CBEs including essay questions and different forms of MCQs mainly focusing on the content but due to pandemic, online exam format has to be adopted which obviously need a change of approach.

Several interesting online methods of assessment were found including Open book exams (OBEs), oral examination through video conferencing, oral presentations, video recording presentations and randomized questions in the virtual learning environment with an established maximum time for its completion.

Subjects in medical and dental institutes that need the development of clinical skills, there has been a paradigm shift to virtual learning environments. For example, the use of an electronic report in which the clinical supervisor

Sr. No.	Study /Author	Title	Sample /Participants	Methods	Conclusion
1	M H.Rajab, Abdalla M. Gazal, Khaled Alkattan 9	Challenges to Online Medical Education During the COVID19- Pandemic	A total of 1289 students and faculty members out of which 208 responded (%54.8 females, %66.8 Medical students, %14.9 masters' students, %18.3 faculty)	Cross-sectional study using self-administered online questionnaire using Google forms having closed and open ended questions	Most (%70.7) respondents believed covid19- pandemic has boosted their confidence in the effectiveness of online teaching and assessment.
2.	S Sarkar, P Mishra, A Nayak 10	Online open book examination of undergraduate medical students-a pilot study of a novel assessment method used during the coronavirus disease 2019 pandemic	A total of 98 students appeared for examination out of which 21.4 percent failed and 78.6 percent passed. 8 students scored above %75 and 55 students volunteered to give feedback	A Pilot study was carried out. An online open book test was conducted and feedback was obtained using pre-validated questionnaire	Online open book exam has the potential to be a new normal form of assessment during and after pandemic
3	Jake Prigoff, Madeleine Hunter, Roman Nowygrod 11	Medical Students assessment in the time of covid 19-	19 students during COVID- interrupted clerkship and 61 students in similarly timed clerkship between 2017 to 2019. Out of 19 surveyed students, 9 responded	Previously validated free response clinical skill exam (CSE) as an open book exam and scores were adjusted based on historic norms	Open book exam and virtually proctored shelf exam can be considered as a reasonable option for clinical assessment during and after pandemic
4	Roumiana Peytcheva-Forsyth and Lyubka Aleksieva 12	Forced introduction of e-assessment during COVID19- pandemic: How did the students feel about that? (Sofia University case	A total of 1102 students from Sofia university took part in study. 853 responded. Female participants in the study were %71 of students. Almost half of the surveyed students (%46) were aged 21 years or less. Another 40 % are between 22 and 30 years old. Between 31 and 40 years old are %7 of the participants and over 41 years old are %5	A descriptive cross sectional study online survey of students at the end of the semester in academic year 2020/2019 was done from all faculties	Participants in the study were asked to define their level of digital literacy. Their responses reveal that over %80 of them consider themselves as experts or feel confident in using different ICT (%19 define themselves as experts, %63 feel confident in using new technologies). %14 need support and directions when using ICT and only %4 do not feel comfortable when using ICT. The revealed level of digital literacy of the respondents provides a good basis for introduction of e-assessment.
5.	Ahmed Elzainy, Abir EL Sadik. 13	Experience of E-learning and online assessment during the covid19- pandemic at the college of medicine, Qassim University.	620 virtual classes were done over 994 hours including theoretical lectures, PBL, seminar, and tutorials. %58 reflected their higher satisfaction towards virtual classrooms, and online assessment.	Cross-sectional study recorded the number and duration of different online educational activities during covid19- pandemic.	The result shows the benefits of the E-learning assessment and observed higher achievements with improvement in their technological skills.

6	Syeda sadia Fatima, romana Idress 14	Online assessment in undergraduate medical education: challenges and solution from a LMIC university.	3 pilot assessments were conducted to identify and process the refinement %80 of the class was unable to launch the lockdown browser. 1st pilot (lockdown browser, and zoom were used). 2nd pilot (MS, and teams were used). 3rd VLE were used.	Cross- section study was conducted between March to August 2020 at agha Khan University. 1st and 2nd year students participate in this study.	In order for effective protocol for online assessment conducting multiple trials about feedback from stakeholders is necessary.
7	S. Snekalalatha, S. Mohamed Marzuk et al 15	Medical students' perceptions of the reliability, usefulness and feasibility of unprotected online and formative assessment test.	100 students of 1st year physiology paper was enrolled in study. Questionnaire was filled online from students. %81.4 to undertake online tests, %73.1 online test helped them in learning	Cross-study was conducted regarding online assessment during pandemic covid19-.	The result showed that medical students who participated, appreciated the usefulness of the online assessment.
8	Kalpna sharma, Joshi A, et al 16	Online learning in the face of covid- 19 pandemic: assessment of students' satisfaction at Chitwan medical college of Nepal.	434 undergraduate and postgraduate students were selected for the survey questionnaire with 31 items covering major student satisfaction domains was distributed to the students in google forms. %53.5 were satisfied with online learning while %29.7 have neutral views.	A web-based cross-sectional survey was undertaken among the undergraduate and postgraduate students from various academic programs who had participated in online in pandemic.	Response of students towards online classes gave a satisfaction response and appears to be good and prioritizing the weak links that could be assessed and improved.
9	Ghosal, Tanwi, and others. 17	Assessment of online learning procedure through the eyes of medical students in covid19- scenario.	Total 54) 200/95 male, 41 female) most students were good at using smartphones (n=%94.7) and mobile internet (n=%82) and most of it agreed on digital educational materials being relevant.	Cross-sectional study was carried out in the first year MBBS students of north Bengal medical college during covid19- pandemic	Most students accepted online education, assessment positively. And most of it still prefer offline mode of education and assessment

Case Processing Summary

	N	%
Cases Valid	11	100.0
Excluded ^a	0	.0
Total	11	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
1.000	2

Intraclass Correlation Coefficient

	Intraclass Correlation ^a	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig.
Single Measures	1.000 ^b	1.000	1.000	44582.094	10.0	10	.000
Average Measures	1.000 ^c	1.000	1.000	44582.094	10.0	10	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.

b. The estimator is the same, whether the interaction effect is present or not.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

assesses the students' skills, the use of an instrument to evaluate clinical skills, online discussion forums and presentations based on cases, assessing critical reflection and the use of literature, construction of simulated interactive cases, mind maps with links to important documents, podcasts, videos and other resources, and a final section for critical self-reflection and connection to clinical settings.

In a more integrated way with clinical practice, practical exams were also found in video conference, where real patients were being replaced by scenarios and images of virtual cases.

Strategies to overcome challenges related to ICTs

Video conferencing was already being a part of tele-medicine but in case of pandemic, it definitely needed a more diverse use as it could be a major assessment tool for clinical e-assessment. Zoom and Skype could be used as videoconferencing platforms. Edmodo, Moodle and Google classroom could be used as digital platforms for formative and summative assessment as a part of TEA.

Challenges faced by the faculty for implementation of new format

Faculty faced lots of challenges to cope with an entirely new exam format within a matter of days. Although, most of the faculty were familiar with use of technology or improved their knowledge by little guidance to combat the struggle related to new exam format. There was a good level of digital literacy among the faculty members but faculty training could be a very good option to overcome the challenges related to TEA.

Challenges related to internet connectivity issues

Countries like Pakistan faced internet issues especially in remote areas and students opting online examination from remote areas faced lots of challenges. Gadgets and high speed internet were found to be necessary to take e-assessment format.

DISCUSSION

Most of the students and faculty were in favour of open book exam format as it combats the problems related to cheating and invigilation issues related to e-assessment.¹⁷ Studies revealed that OBE can be a useful tool for encouraging deep learning and critical thinking in students as compared to CBE which can cause rote learning.¹⁸ The studied data revealed that OBE can be a new normal exam format during and after COVID-19 pandemic as most of the students and teachers were comfortable with this exam format.¹⁹

One of the major impacts of COVID-19 is widespread use of technology in educational sectors whether in the form of online learning or TEA. So, to be digitally literate is the need of the day.²⁰ Out of the three generations (X, Y and Z), generation Y and Z were familiar with ICT and felt confident using new technologies. Most of learners felt themselves expert, few of them needed support and directions while

using ICT while few were not willing to use ICT at all.²¹ The study of level of digital literacy is very important for a better implementation of e-assessment.²²

Reviewing data related to digital literacy revealed that 80% can confidently use new technologies, 16% can use it with help and guidance while only 4% need special attention to cope up with this digital transformation in COVID era. Similar results were seen in study in Australia, which showed 70-80 % digital literacy among healthcare workers.²³

Faculty members of different medical colleges and medical students in Pakistan revealed that this is a totally new educational experience for most of them and hence is very challenging.²⁴ The transition from traditional to online evaluation has its own pro and cons as described by Hiller in his study in North Carolina.²⁵ The majority in Pakistan were not prepared for this sudden transition from in-person exams to a complete online exam format in a matter of days without any extensive planning and faculty training.²⁶

CONCLUSION

e-assessment format in medical education is well perceived by most of the students and appeared to heighten learner awareness. OBEs in online format are preferred over CBEs to avoid risks of cheating and lack of invigilation. Due to limited feasibility of CBEs because of COVID, this is the time for medical educators to explore the use of online OBEs in medical education. But before exposing students to OBEs, learners must be provided with sufficient OBE experience in lower stake settings. Like we can implement a series of formative OBEs before a summative assessment. Faculty needs proper faculty training to adapt to new exam format for both clinical and nonclinical exams. Availability of high speed internet and gadgets like laptops, tablets and smartphones for both students and faculty are need of the day. New softwares need to be developed for successful implementation of TEA.

Keeping in mind the studies under review, theoretical knowledge can be checked with online open book exams. Its advantages can be, no invigilation required, and less chances of cheating but user identity and internet access can be the disadvantages. But the main barrier is still the need to educate the academic staff in the field of e-assessment. Better softwares for online assessment need to be developed. Clinical exams need special attention and new methods need to be developed regarding clinical application of knowledge.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under

Durrani M: Concept and design of study

Irshad S: Concept and design of study

Khan IA: Manuscript writing

Alam A: Writing, review, and references management

Durrani M: Literature search, data collection and review

Akbar Z: Review, proof reading

Gul K: Data collection and review

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.