

## Research Article

### A Bumpy Road to Online Teaching: Impact of COVID-19 on Medical Education

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#### Abstract

**Objective:** With sudden onset of online teaching and learning after the lockdown, this study aims to explore how COVID-19 has impacted medical education in Pakistan.

**Methods:** A survey-based research with open versus closed questions format was conducted from April-May 2020. Respondents were medical teachers from private and public-sector medical and dental colleges of Pakistan. An adequate and representative sample was intended therefore data were collected until relevance of the participants, time and data saturation were reached. Closed-ended questions employed descriptive statistics. Whereas, qualitative data was thematically analyzed by all authors independently to ensure analytical triangulation.

**Results:** Responses from one hundred and twenty-five medical teachers highlighted an impact on the stakeholders, assessments, and educational environment. The transition from face-to-face to online teaching went hasty and haphazard therefore, stakeholders found difficulty in adapting. Factors such as rudimentary system, inefficient internet, lack of previous experience further accelerated the situation. It was difficult to teach Anatomy and clinical skills online. Teachers were not satisfied and preferred actual classrooms. Students were non-serious owing to didactic lectures with no interaction. There was uncertainty about online assessments. The climate was too robotic without emotions, eye contact and physical presence.

**Conclusion:** COVID-19 has impacted medical education at different levels. This study has revealed institutional unpreparedness regarding stakeholders training with online modalities. We need to train stakeholders to let them cope well with the present situation. It is therefore suggested to introduce user friendly online teaching modalities in new medical curricula.

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#### Introduction

Coronavirus disease (COVID-19) outbreak in Wuhan, China has affected health education by closure of medical campuses, ceasing face-to-face activities and implementing reorganized strategies by

evolving towards technology.<sup>1,2,3</sup> Cessation of face-to-face teaching and learning activities is causing academic loss for students at all levels.<sup>4</sup> Recognizing the academic loss, Higher Education Commission (HEC) has proposed continuation of education through online courses and lectures.<sup>5</sup> Hence, it is crucial for

medical institutes to provide effective online learning environments to their students so that learning activities would not be interrupted.<sup>1,6</sup>

Medical institutes are creatively using technological advances like google classrooms, videos, podcasts, virtual-reality teaching, computer simulations, games, webinars, and online real time meetings.<sup>7</sup> This has suddenly modified the role of health professionals as an educator. Some are coping well while others are preoccupied with complexity of technology for teaching. For attainment of desired results, “learning engineering” should be devised as highlighted by Horizon 2020 report which encompasses various aspect of designing, implementing, and evaluating a user-friendly technology.<sup>8</sup>

Over years, medical education has transformed from traditional apprenticeship teaching to competency-based medical education which involves regular teaching and learning activities coupled to regular assessment.<sup>9</sup> So, the paradigm shift from face-to-face interactive environment to virtual learning is not merely a straight transition but involves coupled use of technological advancement in various combinations to ensure achievement of desired results.<sup>4</sup> Moreover, the chairman HEC emphasized that formal training of faculty regarding online teaching is need of the hour.<sup>5</sup>

The purpose of this study is to explore how COVID-19 has impacted medical education in Pakistan after sudden transition from on-site to online teaching and learning. This study seems timely as HEC is in the process of establishing and implementing online classes and e-learning across all universities in Pakistan to alleviate educational loss. Hence, our findings will not only help in taking steps to smooth out the bumps faced by the medical education but will also highlight the current need for faculty training prior to implementation of online classes and e-learning to make it worthwhile.

## Methods

A survey-based research with open versus closed questions format was conducted from April-May 2020. Ethical approval was taken from ethical review board of Foundation University Medical College, Islamabad (Ref No. FF/FUMC/215-1 PHY/20, dated April 13, 2020).

Recent literature helped in constructing semi-structured self-administered questionnaire to collect relevant data. A preliminary questionnaire was then validated from five medical education experts and later piloting (n=05) was done for to see any technical errors. After minor corrections and approval by all authors, the survey was executed along with consent forms. Anonymity was ensured by asking the participants to mention only their institute name with designations. Questionnaire consisted of five closed and open-ended items besides demographics. Closed-ended questions included effectiveness of online teaching (Effective/Ineffective) and previous experience with online teaching (Yes/No). Whereas, qualitative questions explored COVID-19 impact on medical education.

The sampling frame included medical teachers of private and public-sector medical and dental colleges of Pakistan. All authors shared questionnaire among teaching faculty of their associated institutes via emails utilizing purposive sampling technique. Moreover, it was also shared to other institutes through institutional faculty WhatsApp groups by snowballing technique. Considering sample size, getting the ‘right’ or relevant respondents with ‘informational redundancy’ was important.<sup>10</sup> Majority of the participants were found thoughtful, reflective, and expressive. The data were collected until time and information saturation was reached.

Analysis of demographics and closed-ended questions were done through descriptive statistics while thematic analysis was employed for open-ended questions. In-vivo analytic codes were developed by carefully reading each line and segment in response to open-ended questions. Later, categorization of codes was done to generate themes. All authors analyzed the data independently. The codes and themes were discussed and agreed upon to get diverse perspectives and to confirm findings hence, ensuring analytical triangulation.<sup>11</sup>

## Results

One hundred and twenty-five medical teachers from various private and public-sector medical and dental colleges of Pakistan responded. Among respondents, majority were females (68%) with age range 30-49

years (78.4%) and designation range from Assistant Professor to Associate professor (57.3%) ((Table 1).

Majority of the participants (52.8%) reported that online teaching was ineffective with no previous experience (67.2%). Moreover, the participants reported impact on stakeholders, assessments, and educational environment within the country after

**Table 1:** Characteristics of the Study Participants (N=125)

Characteristics		Frequency N	Percentage (%)
Gender	Male	40	32
	Female	85	68
Age Groups (Years)	A1: 20-29	16	12.8
	A2: 30-39	53	42.4
	A3: 40-49	45	36
	A4: 50-59	10	8
	A5: 60-69	6	4.8
Designation Groups	D1: Professor	23	18.5
	D2: Associate P	25	20.2
	D3: Assistant P	46	37.1
	D4: Demonstrator	31	25
Workplace	Punjab	86	68.8
	KPK	20	16
	Sindh	19	15.2
Effectiveness of online teaching	Effective	59	47.2
	Ineffective	66	52.8
Previous experience with online teaching	Yes	41	32.8
	No	84	67.2

closure of medical institutes due to COVID-19 pandemic (Table 2). Three main themes and with eleven sub-themes emerged from the data.

### Theme 1: Impact on Stakeholders

Participants said that it was hasty and haphazard transition from traditional system to online teaching and learning after the lock down. Therefore, stakeholders found difficulty in adaptation due to rudimentary system, which was lacking latest technological features, inefficient internet especially in rural areas of Sindh and Khyber Pakhtunkhwa, lack of previous experience of faculty and unfriendliness of older faculty with technology. The participants termed this transition as a “settling phase” for all stakeholders. One of the participants was fearful and said, “continuation of online medical teaching will compromise in developing future seven-star doctors”. Moreover, according to the other participant “poor internet hinders the learning process”. The participants also told that the lack of hands-on-learning activities was hindering cognitive development of students and it

was difficult to teach subjects such as Anatomy without letting students hold structures like bones, models, and specimens. Moreover, teaching clinical skills was also challenging online and majority of the participants told that range of teaching methods was also compromised because bed side teaching, teaching procedural skills, practical demonstrations, use of simulators and interactive sessions were missing during pandemic. Teacher’s self-efficacy was also compromised because of uncertainty with achievement of required learning objectives. Also, the students were lacking interest due to short didactic lectures with no interaction.

### Theme 2: Impact on Assessments

Due to cancellation of routine timetable, teachers were uncertain about the new schedules and conduction of online examinations. Moreover, teachers showed great concern regarding assessment of student’s learning in an online system.

### Theme 3: Impact on Educational environment

Few participants told that online teaching was too robotic due to lack of eye contact, human feelings and physical interaction among teachers and students. They preferred actual classroom atmosphere and said that teaching in-person is better than online teaching. Due to minimal teacher-student contact, lack of discipline was also reported. Moreover, a huge no of participants reported lack of face-to-face interaction because teacher-student and student-patient interaction was a major miss in the transitional phase.

### Discussion

COVID-19 pandemic has globally impacted population, economy, and health care systems. The landscape of medical education has also been changed by closure of institutes and transition to online paradigm of teaching to manage crisis.<sup>12</sup> The study has explored an impact of COVID-19 pandemic on medical education so far in Pakistan regarding online teaching and learning. Well, the transition from in-person to online was necessary to ensure safety of all the stakeholders. The impact was found on all the stakeholders along with assessments and educational climate as reported in literature from United states of America and United Kingdom.<sup>13,14</sup>

**Table 2:** *Impact of COVID-19 on Medical Education*

<b>Code: Haphazard Transition</b>	
<b>Sub-Themes</b>	<b>Themes</b>
	<b>Impact on stakeholders</b>
<b>Difficulty in adaptation</b>	<p>Since it is first experience with the system for faculty, administration as well as students, we all are in sort of getting familiar/settling phase. (F, A3, D2)</p> <p>Online teaching was not being done previously...focus was on maintaining ongoing tradition...now haphazardly same is shifted to online mode. Here system is very rudimentary, lacking features beyond lecture upload and download. (M, A2, D3)</p> <p>On faculty part: no prior experience...lack of training. (F, A3, D2)</p> <p>The entire routine is disturbed. Faculty is not trained for online teaching. (F, A2 D4). Online teaching is not practical for Pakistan...at the moment at least. (M, A1, D4). Teaching online in medical profession if continues, will compromise in developing future seven-star doctors. (F, A5, D2)</p> <p>I am not friendly with technology. I have to first learn the procedure then deliver. (M, A4, D1)</p> <p>We are the organizers of e-learning in coordination with IT Department. For me, it is difficult to get the faculty shift to this change especially the older faculty. (F, A2, D3)</p>
<b>Difficulty in teaching skills</b>	<p>Since our students are not Karachi based ...rather in rural areas of interior Sindh and KPK ... they do not have the Wi-Fi network good enough to support online teaching. (F, A3, D2)</p> <p>Poor internet hinders the learning process. (M, A2, D3)</p> <p>It is very difficult to teach anatomy online. Students want to feel and hold structures/bones in their own hands. (F, A3, D3)</p> <p>Difficult to explain complex concepts. (F, A2, D3)</p> <p>It's not possible to give them clear concepts without actual models and specimen. (F, A5, D1). Some of our teaching is based on hands on experience on models and clinical patients which is difficult to explain theoretically. (M, A2, D2)</p>
<b>Compromised range of teaching methods</b>	<p>Psychomotor skill development is challenging online. (M, A3, D3)</p> <p>Patient interaction and hands-on clinical teaching is badly affected. (M, A2, D3)</p> <p>I am not able to teach the clinical skills part as effectively as I could before. (M, A2, D3)</p> <p>Clinical demonstrations, clinical teaching, patient experience, practical and clinical skill teaching, and learning is all affected. (M, A3, D1)</p> <p>Bed side teaching and procedural skills is affected. (M, A4, D1)</p>
<b>Compromised teacher's self-efficacy</b>	<p>Interactive sessions are being affected. (F, A2, D4)</p> <p>No practical demonstrations and use of simulators. (F, A2, D3)</p> <p>I am not sure either students have understood the concept or not...Low satisfaction level. (F, A2, D3)</p> <p>Not satisfied with online teaching. (F, A3, D2)</p> <p>We had so far, no experience regarding e- learning &amp; teaching...I am not sure whether students are understanding the required learning objectives or not. (F, A3, D2)</p>
<b>Lack of student's interest</b>	<p>Online classes are not interactive...attention of students is compromised. (F, A3, D2)</p> <p>Students are not serious. (F, A5, D1)</p> <p>Poor communication, short didactic lectures with no interaction...cannot maintain interest of students. (M, A2, D2)</p> <p>Crowd participation is poor. (M, A3, D3)</p>
<b>Code: When, What and How?</b>	
	<b>Impact on assessments</b>
<b>Uncertainty with online assessment</b>	<p>Assessments could not be taken according to timetables. (F, A2, D3)</p> <p>How exams will be conducted? (F, A3, D2)</p> <p>It is difficult to assess students understanding. (M, A2, D3)</p> <p>Delivering prerecorded audio lectures makes it difficult to assess students' learning. (F, A2, D3)</p>
	<b>Artificial Climate</b>
	<b>Impact on educational environment</b>
<b>Robotic teaching</b>	<p>Teaching through voice recording lacks feeling...too robotic, no human feelings. Not used to of such learning environment. (F, A3, D1)</p> <p>We should have good eye contact with students as well as their presence also matter. (F, A3, D4)</p>
<b>Lack of discipline</b>	<p>I prefer actual Classroom atmosphere where I can interact with my physical presence and students. This artificial or Zoom Cloud can't be as good as actual classroom feeling. (M, A4, D1)</p> <p>Teaching in person and in proper environment with audiovisual aids is better than online classes. (F, A2, D4)</p>
<b>Lack of face-to-face interaction</b>	<p>There is lack of discipline and effective learning with minimal contact between teacher and students. (F, A1, D4)</p> <p>One-to-one classroom teaching provides a lot of interaction...cannot be achieved through online classes. (F, A3, D2)</p> <p>Traditional way of teaching face-to-face is more feasible, this way teacher keeps eyes on students. (F, A2, D4)</p> <p>Our clinical teaching requires patients and student's interaction, that's not possible online. (F, A3, D1)</p>

\*M-Male, F-Female, A-Age group (1-5), D-Designation group (1-4).

A sudden shift to online teaching after coronavirus crisis initiated some challenges to the institutes because majority of the stakeholders were not pre-

pared. When technology is integrated in teaching and learning, role of instructor and nature of teaching is changed and if instructors are ill-equipped to deal



with online teaching, student's satisfaction is affected.<sup>15</sup> The sudden transition was rudimentary and difficult to adapt by the participants due to inefficient internet in the rural areas and lack of previous experience and technology awareness especially among older faculty. Past studies have also mentioned challenges which are somehow similar to our findings like untrained faculty, presence of inefficient internet connectivity, unfriendliness of teachers and students with new technology, lack of Information and Communication Technologies (ICT) and unavailability of personal computers by students in developing countries.<sup>16,17</sup>

Participants reported compromised range of teaching methods during the crisis. Hands-on-teaching sessions like laboratory procedures, procedural/ clinical skill teaching, bed side teaching and simulations were disrupted during COVID-19. It is the same finding as in the recent literature regarding inefficiency of teaching psychomotor skill by the faculty.<sup>1</sup> Hence, clinical teaching is the cornerstone of medical education that leads to identity formation and professional development.<sup>18</sup>

Participants were not satisfied with online teaching modalities as many experienced teachers consider themselves as apprentices in virtual teaching, which is one of the factors that could result in their dissatisfaction with online teaching. It is need of the hour for course designers to design such strategies that involve active participation offering authentic and deep learning experiences for the students therefore, satisfaction level of the teachers can be achieved.<sup>19</sup> The participants were not sure how assessments would be conducted during online era and showed concerns about assessing the student's learning online. Well, whatever may be the situation, assessments must be feasible, valid, and reliable.<sup>20</sup>

Due to the Covid-19 pandemic, medical universities and institutes replaced face-to-face with flexible online educational environment. In our study, major concerns identified by the participants were lack of human feelings and absence of physical interaction between teachers and students which compromised educational environment. The environment was felt too robotic without any eye contact with students. In a previous study, students and teachers preferred face-to-face teaching rather than online<sup>21</sup> and these find-

ings are in accordance to our study as mismanaged decorum was due to lack of minimal teacher-student contact. In contrast, online learning environment promotes self-directed learning, produces more in-depth discussions, and improve the quality of learning.<sup>22</sup>

**Limitations:** Our study participants were mostly from medical and dental colleges of Punjab and fewer participants from Khyber Pakhtunkhwa and Sindh province. Though the complete impact would take some time, our findings gives an idea how medical education is being affected during the crisis phase.

## Conclusion

During COVID-19 lockdown, though complete impact would take some time to be established, medical education is being affected at different levels. The teachers are not satisfied because the teaching has become too robotic which is lacking human feelings. There is uncertainty with achievement of learning objectives and conduction of online assessments. Moreover, students are not interested with online teaching due to lack of face-to-face interaction. The current study has revealed institutional unpreparedness regarding stakeholders training with online modalities therefore, COVID-19 seems challenging for medical education in near future. Online teaching and learning started haphazardly and is at a nascent stage in Pakistan. Stakeholders need to be trained for using online modalities so that they can cope well with the crisis. Hence, it is suggested to introduce user-friendly online teaching modalities in new medical curricula. Future studies need to explore impact on medical education from other key stakeholders such as students, parents, and administrators. Moreover, a longitudinal study is need of the hour to find out complete impact when pandemic ends.

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