

# Adaptations of Clinical Teaching During the COVID-19 Pandemic: Perspectives of Medical Students and Faculty Members

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**Background:** The COVID-19 pandemic had serious implications on medical schools' programs that necessitated lots of adaptations of teaching, learning, and assessment to guarantee continuity of education in medical schools. Our study aimed to evaluate perspectives of clerkship students and faculty members regarding clinical teaching adaptations implemented during the COVID-19 pandemic.

**Methods:** A descriptive, cross-sectional, survey-based study was conducted and targeted 5<sup>th</sup> and 6<sup>th</sup> year clerkship students and full- and part-time clinical faculty. The survey explored (1) perception of the degree of contribution of implemented adaptations to student achievement of expected clinical competencies, (2) degree of confidence regarding students' achievement of expected clinical competencies through such adaptations, and (3) perception of the effect of implemented educational adaptations on students' learning. Descriptive statistics were used, and statistical significance level was set at  $p < 0.05$ .

**Results:** The survey exhibited high internal consistency. Both students and faculty members felt that most of the adaptations had moderate to high contribution to student achievement of expected clinical competencies. On a 5-point scale, the highest score was given by faculty members to "Interpretation of investigations" ( $3.93 \pm 0.84$ ) while the lowest scores were given by faculty members ( $3.10 \pm 1.21$ ) and students ( $2.57 \pm 1.36$ ) to "Performing clinical procedures". Students and faculty members agreed that the adaptations had positive effect on students' learning except for the statement "Students were able to easily monitor their academic progress" where students gave less scores than faculty members, with a statistically significance difference ( $p=0.029$ ).

**Conclusion:** Students and faculty members had similar perspectives regarding the implemented adaptations and their impact and contribution to student learning and achievement of the basic clinical competencies. Both of them agreed on the need for and importance of the implemented adaptations. Our findings recommend such adaptations during the times of crises, which can be conducted through integrating online teaching with face-to-face teaching.

**Keywords:** COVID-19 pandemic, educational adaptations, medical clerkship

## Background

The coronavirus disease 2019 (COVID-19) has rapidly transitioned into a worldwide pandemic. The impact of such development on medical education was so powerful and unexpected, and led to serious implications and raises countless questions for the medical schools.<sup>1-5</sup> In the current COVID-19 pandemic, some hospitals suspended medical students from attending clinical rounds. This suspension extended to more hospitals as the COVID-19 pandemic continued to develop, which led to clinical medical students receiving reduced exposure in different specialties, causing a detrimental effect to medical students' performance and competency.<sup>6-9</sup>

E-learning satisfaction levels were better among developed countries compared to developing countries. While a USA study found that overall student performance with respect to generating and researching learning issues was similar between online and in-person problem based-learning (PBL) sessions,<sup>10</sup> another study from Pakistan and KSA found that the majority of participants agreed that E-learning was satisfactory in acquiring knowledge, however not effective in acquiring clinical and technical skills and revealed that as the COVID-19 lockdown eases, there will be a need for improvement in the methods employed in E-learning and more blended learning among healthcare students is recommended.<sup>11</sup> Some adopted new educational system that would be safe and sustainable in the long run.<sup>12</sup> In some medical schools, the medical students seemed to be satisfied and adapted to digitalization, but they also seemed to think that their teachers would enhance their digital competencies during the pandemic. Therefore, faculties of medicine need to digitalize their approaches rapidly and adequately to teaching.<sup>13</sup>

Perspectives of medical students from two countries (Germany and Australia) were found to be different, thus, differences between countries could reflect cultural differences or variations in the overt and hidden satisfaction of medical students, hence educational interventions may be needed to improve students' confidence and sense of competence.<sup>14</sup>

The situation is more complex for some clerkships or final year medical students who are in the process of sitting their final assessments. Some medical schools have reduced clinical exposure in the weeks coming up to their final exams to reduce the risk of contracting the virus.<sup>15,16</sup> Others such as United Kingdom, took a different approach and allowed students exposure and stated that there was a surge in medical student volunteers to support medical staff working on the frontlines.<sup>17</sup>

As the change to E-learning is increasingly used during the COVID-19 pandemic, the impact of this change on the medical students at the College of Medicine and Medical Sciences, Arabian Gulf University (CMMS-AGU) is not known. Our current study aimed to evaluate perceptions of 5<sup>th</sup> and 6<sup>th</sup> year medical students and clinical faculty members towards clinical teaching adaptations implemented by the CMMS-AGU staff during the COVID-19 era.

## Materials and Methods

### Type of Study

A descriptive, cross-sectional, survey-based study.

### Study Setting and Context

This study was conducted at the College of Medicine and Medical Sciences, Arabian Gulf University (CMMS-AGU), Manama, Bahrain, during the academic year 2020/2021. During the COVID-19 pandemic and imposition of major restrictions on clinical teaching in hospitals and other training sites, the CMMS-AGU has planned and implemented several adaptations of clinical teaching that were extensively used to guarantee continuity of training and guarantee that the students are exposed to at least the minimum clinical experience. Such adaptations included: live online lectures, live case discussion sessions, posting recorded lectures on Moodle<sup>®</sup> or OneDrive<sup>®</sup>, using social media platforms (eg, WhatsApp<sup>®</sup> for communication of information and materials by students and faculty, online team-based learning tutorials, web-based clinical simulated patient (DxR<sup>®</sup>), online role playing and discussion of clinical cases, decreasing the number of days students go to hospitals, decreasing the time students spend inside the ward for bedside teaching, decreasing the number of students in groups of bedside teaching ( $\leq 5$ ), and using the medical simulation center for physical examination and procedural clinical training.

### Sampling

#### Study Population

The study targeted the 5<sup>th</sup> and 6<sup>th</sup> year medical clerkship students, in addition to the full- and part-time clinical faculty who teach those students.

#### Sample Size

The study used a convenient sample of both clinical faculty members (including both genders, all academic ranks, and all clinical departments) and medical students (including both genders, different nationalities, and major clerkship rotations). The total number of faculty members who responded to the survey within the given timeframe (two weeks) was 42 (27%), while the total number of medical students who responded to the survey within the given timeframe (two weeks) was 97 (22%).

## Instrument

survey was devised by the researchers according to the steps of a) reviewing the relevant literature and similar studies, b) development and revision of the form was devised by the researchers according to the steps of a) reviewing the relevant literature and similar studies, b) development and revision of the survey by all researchers, and c) piloting on a few students.

The survey was divided into three sections. The first section addressed the implemented educational adaptations and the perception of faculty members and students of the degree of contribution of such adaptations to student achievement of the expected clinical competencies. This section adopted a 4-point scale ranging from “Major Contribution” to “No Contribution”. The second section addressed the expected clinical competencies and the degree of confidence the respondents had regarding students’ achievement of such competencies. This section adopted a 5-point scale, ranging from “Highly Confident” to “Highly Unconfident”. The third section addressed the perception of students and faculty members of the effects of implemented educational adaptations on students’ learning. This section adopted a 5-point scale, ranging from “Strongly Agree” to “Strongly Disagree”.

Two versions were prepared; one for the faculty members and another for the students.

Suitability of the developed survey for use was assessed through validity and reliability studies. Reliability was explored through measuring Cronbach’s alpha to assess its internal consistency. Face and content validity were established through revision by three experts from the Medical Education Unit at the CMMS-AGU, who indicated a few modifications in the form of linguistic corrections, reformulation of two items, and deletion of an item that had the same meaning of another item.

## Data Collection

The survey form was converted into an electronic format using Google Forms and distributed to the target population through different communication platforms (like was converted into an electronic format using Google Forms and distributed to the target population through different communication platforms (like WhatsApp<sup>®</sup> groups and official e-mails). Each respondent was given the chance to respond only once. The survey was open for data collection for two weeks.

## Data Analysis

The Statistical Package for the Social Sciences (SPSS) for Windows, version 25 (SPSS Inc., USA) was used for data analysis. Descriptive statistics were used. Means (and standard deviations) and frequencies were calculated. Parametric tests have been used, where means were compared for faculty members and medical students through two-sample *t*-test, while frequencies were compared through Fisher’s exact test. The calculated probability of less than 5% ( $p < 0.05$ ) was considered as the cut-off point for statistical significance.

## Ethical Approval

The study was approved by the Research and Ethics Committee (REC) of the College of Medicine and Medical Sciences, Arabian Gulf University (Approval #: E030-PI-12/20). All participants were given the option of not to respond to the survey without any consequences. Completion of the survey form was considered as a consent to participate in the study.

## Results

Table 1 shows that the internal consistency of the entire survey and its Sections 2 and 3 was excellent ( $\alpha \geq 0.9$ ), while only Section 1 showed an acceptable internal consistency ( $\alpha = 0.782$ ).

Table 2 shows that most of the faculty respondents were males (64.3%). Faculty came from five clinical departments, and the majority of them (88.1%) came from Internal Medicine and Surgery Departments. Regarding their academic ranks, around two-thirds of the faculty (64.3%) were tutors and lecturers, while the remaining one-third were full, associate, and assistant professors. The majority of the faculty respondents (81%) were part-timers.

**Table 1** Reliability Study of the Survey

Section	No. of Items	Cronbach's Alpha
Section 1: Degree of contribution of different adaptations	11	0.782
Section 2: Degree of confidence in achievement of learning outcomes	8	0.900
Section 3: Perception of the implemented adaptations	10	0.966
<b>Total Survey</b>	<b>29</b>	<b>0.949</b>

**Table 2** Demographic Characteristics of Faculty Respondents

Variable	No.	%
<b>Gender:</b>		
Male	27	64.3%
Female	15	35.7%
<b>Total</b>	<b>42</b>	<b>100%</b>
<b>Department:</b>		
Internal Medicine	19	45.2%
Surgery	18	42.9%
Pediatrics	3	7.1%
Obstetrics and Gynecology	1	2.4%
Family and Community Medicine	1	2.4%
<b>Total</b>	<b>42</b>	<b>100%</b>
<b>Academic Rank:</b>		
Full Professor	4	9.5%
Associate Professor	3	7.1%
Assistant Professor	8	19%
Lecturer	12	28.6%
Tutor	15	35.7%
<b>Total</b>	<b>42</b>	<b>100%</b>
<b>Contract Type:</b>		
Full-time	8	19%
Part-time	34	81%
<b>Total</b>	<b>42</b>	<b>100%</b>

Table 3 shows that the majority of the student respondents were females (82.5%). More than half of them (55.7%) were Bahraini, while the remaining percentage were from other nationalities. The higher percentage of students who responded to the survey (40.2%) was from Surgery rotation, followed by Internal Medicine (21.6%) and Family and Community Medicine (20.6%) rotations.

**Table 3** Demographic Characteristics of Student Respondents

Variable	No.	%
<b>Gender:</b>		
Male	17	17.5%
Female	80	82.5%
<b>Total</b>	<b>97</b>	<b>100%</b>
<b>Nationality:</b>		
Bahrain	54	55.7%
Kuwait	23	23.7%
Saudi Arabia	10	10.3%
Oman	7	7.2%
Other Arab Citizens Living in GCC	3	3.1%
<b>Total</b>	<b>97</b>	<b>100%</b>
<b>Clerkship Rotation:</b>		
Surgery	39	40.2%
Internal Medicine	21	21.6%
Family and Community Medicine	20	20.6%
Pediatrics	11	11.3%
Obstetrics and Gynecology	6	6.2%
<b>Total</b>	<b>97</b>	<b>100%</b>

Table 4 shows that both faculty members and students felt that most of the adopted educational adaptations had moderate to high degree of contribution to student achievement of the expected clinical competencies. There were no statistically significant differences between faculty members and students regarding their perception of the degree of contribution of all adaptations except “Online team-based learning tutorials” ( $p = 0.031$ ) and “Web-based clinical simulated patient (DxR<sup>®</sup>)” ( $p = 0.000$ ), where faculty members were more to the side of moderate to high degree of contribution.

Table 5 shows moderate mean scores for all items for faculty members and students. The mean scores ranged from 2.57 ( $\pm 1.36$ ) for students regarding “Performing clinical procedures” to 3.93 ( $\pm 0.84$ ) for faculty members regarding “Interpretation of investigations”. The perceptions of faculty members and students regarding the degree of confidence that the students had achieved the basic clinical competencies through the implemented adaptations were similar for all explored competencies. There was a statistically significant difference ( $p = 0.032$ ) between faculty members and students regarding the “Performing clinical procedures” competence.

Table 6 shows moderate mean scores for all statements for faculty members and students. The mean scores ranged from 2.91 ( $\pm 1.22$ ) for students regarding the statement “Students were able to easily monitor their academic progress” to 3.60 ( $\pm 0.96$ ) for faculty members regarding the statement “Students had sufficient opportunities to discuss approaches to clinical cases”. The perceptions of faculty members and students regarding the effects of the implemented adaptations on the students were nearly similar for all statements. There was a statistically significant difference ( $p=0.029$ ) between faculty members and students regarding the statement “Students were able to easily monitor their academic progress”.

**Table 4** Degree of Contribution of the Educational Adaptations to Student Achievement of the Expected Clinical Competencies from the Viewpoints of Faculty Members and Students

No.	Adaptations	Moderate to High Contribution		Poor or No Contribution		Sig. (Fisher's Exact Test)
		Faculty (n=42)	Students (n=97)	Faculty (n=42)	Students (n=97)	
1	Live online lectures	36 (85.7%)	79 (81.5%)	6 (14.3%)	18 (18.6%)	0.631
2	Live case discussion sessions	36 (85.8%)	83 (85.6%)	6 (14.3%)	14 (14.4%)	1.000
3	Posting recorded lectures on Moodle® or OneDrive®	28 (66.7%)	57 (58.8%)	14 (33.3%)	40 (41.3%)	0.450
4	Using social media platforms (eg, WhatsApp®) for communication of information and materials by students and faculty	34 (81%)	75 (77.3%)	8 (19.1%)	22 (22.7%)	0.823
5	Online team-based learning tutorials	39 (92.8%)	75 (77.3%)	3 (7.2%)	22 (22.7%)	0.031*
6	Web-based clinical simulated patient (DxR®)	34 (80.7%)	37 (38.1%)	8 (19%)	60 (61.8%)	0.000*
7	Online role-playing and discussion of clinical cases	35 (83.4%)	76 (78.3%)	7 (16.6%)	21 (21.6%)	0.646
8	Decreasing the number of days students go to hospital	21 (50%)	33 (34.1%)	21 (50%)	64 (65.9%)	0.089
9	Decreasing the time students spend inside the ward for bedside teaching	22 (52.4%)	43 (44.3%)	20 (47.6%)	54 (55.7%)	0.459
10	Decreasing the number of students in groups of bedside teaching ( $\leq 5$ )	37 (88%)	85 (87.6%)	5 (11.9%)	12 (12.4%)	1.000
11	Using the medical simulation center for physical examination and procedural clinical training	36 (85.7%)	93 (95.9%)	6 (14.2%)	4 (4.2%)	0.066

Note: \*Statistically significant.

**Table 5** Degree of Confidence of Faculty Members and Students Regarding Achievement of the Basic Clinical Competencies Through the Implemented Adaptations

No.	Competencies	Faculty (n=42) Mean ( $\pm$ SD)	Students (n=97) Mean ( $\pm$ SD)	Sig. (t-test)
1	History taking	3.81 ( $\pm$ 0.86)	3.71 ( $\pm$ 0.97)	0.572
2	Clinical reasoning	3.69 ( $\pm$ 0.87)	3.49 ( $\pm$ 1.02)	0.281
3	Conducting physical examination	3.38 ( $\pm$ 1.08)	3.21 ( $\pm$ 1.15)	0.402
4	Performing clinical procedures	3.10 ( $\pm$ 1.21)	2.57 ( $\pm$ 1.36)	0.032*
5	Interpretation of investigations	3.93 ( $\pm$ 0.84)	3.65 ( $\pm$ 0.99)	0.092
6	Management of clinical cases	3.64 ( $\pm$ 0.96)	3.47 ( $\pm$ 1.05)	0.374
7	Communications skills (with patients and their relatives)	3.52 ( $\pm$ 1.19)	3.68 ( $\pm$ 1.09)	0.453
8	Health promotion and preventive aspects	3.64 ( $\pm$ 0.98)	3.66 ( $\pm$ 1.04)	0.929

Note: \*Statistically significant.

## Discussion

This study aimed to evaluate the perceptions of medical faculty members and clerkship students of the adaptations of clinical teaching implemented by the CMMS-AGU during the COVID-19 pandemic. Such adaptations were extensively used during the pandemic as the methods of clinical teaching of the clerkship students.

**Table 6** Students' and Faculty Members' Perception of the Effects of Implemented Educational Adaptations

No.	Statements	Faculty (n=42) Mean ( $\pm$ SD)	Students (n=97) Mean ( $\pm$ SD)	Sig. (t-test)
<b>In adapted clinical teaching/learning,</b>				
1	Students were actively engaged	3.45 ( $\pm$ 1.25)	3.29 ( $\pm$ 1.06)	0.431
2	Students had sufficient opportunities to reflect on what they have learned	3.33 ( $\pm$ 1.12)	3.11 ( $\pm$ 1.05)	0.268
3	Students were able to achieve several clinical competencies	3.19 ( $\pm$ 1.19)	3.18 ( $\pm$ 1.11)	0.942
4	There were sufficient opportunities to collaborate with other students	3.26 ( $\pm$ 1.11)	3.15 ( $\pm$ 1.19)	0.620
5	Students had improved skills in accessing and using information	3.57 ( $\pm$ 1.02)	3.38 ( $\pm$ 1.16)	0.359
6	Students had sufficient opportunities to discuss approaches to clinical cases	3.60 ( $\pm$ 0.96)	3.24 ( $\pm$ 1.26)	0.071
7	Students were able to improve their clinical reasoning and approach to common clinical problems	3.52 ( $\pm$ 1.06)	3.32 ( $\pm$ 1.21)	0.346
8	Assessment of students' academic progress was accurate	3.29 ( $\pm$ 1.17)	3.14 ( $\pm$ 1.20)	0.522
9	Students were able to easily monitor their academic progress	3.38 ( $\pm$ 1.03)	2.91 ( $\pm$ 1.22)	0.029*
10	Faculty members' feedback on students' performance was effective	3.48 ( $\pm$ 1.15)	3.15 ( $\pm$ 1.28)	0.163

**Note:** \*Statistically significant.

Reliability study showed high internal consistency of the utilized survey ( $\alpha \geq 0.9$ ), which gives credibility to the results.

In this study, both faculty members and students felt that most of the educational adaptations had moderate to high degree of contribution to the student achievement of the expected competencies, except for “Decreasing the number of days students go to hospital”, “Decreasing the time students spend inside the ward for bedside teaching”, and using the “Web-based clinical simulated patient (DxR<sup>®</sup>)” software, where the students felt that these three adaptations did not contribute much to the achievement of expected competencies. This might be because the clerkship students prefer longer stays in clinical placements or simulation center for better learning and they believe that computer-based virtual patients are not enough. This agrees with the findings of Halbert et al,<sup>18</sup> who reported that medical students have chosen to remain on clinical placements, even though they had concerns about their personal safety. Also, this is congruent with a study from the same university by Atwa et al,<sup>6</sup> who reported that both faculty members and medical students were in favor for face-to-face and blended learning compared to online learning in the clinical context.

All other adaptations that focused on transforming theoretical teaching and case discussions to the online mode were considered to have moderate to high degree of contribution. This agrees with Lal et al,<sup>19</sup> who reported students' preference of using flipped classroom over Zoom to role-play cases with faculty assessing symptoms and disclosing prognosis.

The current study showed an acceptable degree of confidence among both faculty members and students regarding achievement of the basic clinical competencies through the implemented adaptations. This was true for all competencies except “Performing clinical procedures”, where there was a statistically significant difference as the students showed much less confidence regarding achievement of this competence through the implemented adaptations. This agrees with the results of similar studies that indicated that online learning is not effective in acquiring technical skills and procedures.<sup>6,11,20,21</sup>

Medical students and faculty members perceived that the implemented online educational adaptations, in general, had favorable educational effects on students' learning. Among the most important effects was keeping the students actively engaged during online learning activities. This can be explained by the effectiveness of such adaptations in drawing the attention of the students and also the willingness of the students to achieve the highest benefit and compensate for the missed face-to-face sessions. Armstrong-Mensah et al<sup>22</sup> found that students were still motivated to learn and to complete their assessments and assignments on time in distance online learning during the COVID-19 pandemic. Also, Atwa et al<sup>6</sup>

reported in their study that most of the students felt actively engaged in online lessons during the pandemic and they could also collaborate with other students, which was also found in this study. As well, Kumar et al,<sup>23</sup> found that interactivity among students during online sessions could be maintained, as reported by most of the teachers in their study. Farrell and Brunton<sup>24</sup> indicated that active engagement of students in online learning sessions depends in part on peer community, an engaging online teacher, and student confidence, which were all implied in our implemented adaptations.

Regarding the learning opportunities students had during the online adaptations, they included discussing clinical cases, improved clinical reasoning and approach to common clinical problems, reflect on their learning, and achieve several clinical competencies. Among the adaptations that led to such learning opportunities are the clinical case discussions, role-playing of clinical cases, using the medical simulation center, and, to a lesser extent, the use of the web-based clinical simulated patient (DxR<sup>®</sup>). Furlan et al<sup>25</sup> and Kiesewetter et al<sup>26</sup> reported that clerkship students can benefit from similar web-based case discussion software in increasing their clinical reasoning skills, especially during crises times and impossibility of training on real patients. Furthermore, a scoping review by Park et al<sup>27</sup> showed that most clinical competencies could be learned online or in the virtual setting, which supports the usefulness of our implemented adaptations.

One of the important effects of the implemented adaptations was the improved skills of the students in accessing and using information. This is explained by the increased use of technology in learning and searching for information during online lessons whenever the students need such information. Li and Lee,<sup>28</sup> in their study on computer literacy and online learning attitude, found that students who attended online courses reported higher computer literacy and ability to retrieve and use information than those who had not done so. They found also that those students are more willing to participate in further online courses.

The lowest rated effect by the students was in relation to the ability of the students to easily monitor their academic progress. This might be because the students were feeling detached from the real contact with their school, teachers, and peers, and were also feeling that online teaching and learning were not well-structured due to the sudden shift to the online mode. Almendingen et al,<sup>29</sup> in their study on student's experiences with online teaching during COVID-19 lockdown, found that following the academic progress of the students was affected by several factors including lack of academic contact with their teachers and their peers, lack of social interaction with their peers, and feeling alone in their studies. Furthermore, Coffey et al<sup>30</sup> reported that their students felt anxious and uncertain regarding their education and academic progress during remote medical education in clerkships during the COVID-19 pandemic.

We believe that this study would add to the medical education literature as it explored the possible important adaptations that can be implemented in clinical teaching during crises and suspension of or limited access to clinical training in hospitals and other clinical training sites.

An important limitation of this study was the small sample size. In addition, strengthening the findings with qualitative data through in-depth interviews or focus group discussions with the students and faculty members would have added more value to the study.

## Conclusion

This study showed that both clerkship students and faculty members have almost similar perspectives of the impact of implemented educational adaptations, the degree of contribution such adaptations to student achievement of the expected clinical competencies, as well as the degree of confidence regarding the achievement of the basic clinical competencies. Clerkship students and faculty members agreed on the need and importance of the implemented educational adaptations.

The current study can be considered as a piece of evidence that the implemented adaptations are recommended and are quite applicable through integrating online teaching with on campus teaching in the clerkship years of the undergraduate medical curriculum.

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## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, or analysis and interpretation; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

## Disclosure

The authors declare that they have no conflicts of interest for this work.

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