Brief Communication
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Medical Journal of the Islamic Republic of Iran (MJIRI)

Med J Islam Repub Iran. 2022 (23 May);36.53. https://doi.org/10.47176/mjiri.36.53

Medical Students' Point of View About Virtual Classes, Technological Infrastructures, and Length of Education During the COVID-19 Pandemic: A Cross-sectional Study

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Received: 13 Feb 2021 Published: 23 May 2022

Abstract

Background: Most in-person classes are being held via virtual platforms, and bedside education has faced serious challenges during the coronavirus disease-2019 (COVID-19) pandemic. This study evaluated the Iranian medical students' point of view regarding the virtual classes and length of education during the COVID-19 pandemic.

Methods: We designed a cross-sectional study using convenience sampling about 6 months after the beginning of the COVID-19 pandemic. We formulated 4 questions regarding their satisfaction with infrastructures and contents of virtual classes, length of education, and their perspectives on how clinical and practical education should continue during the COVID-19 pandemic. We designed an online questionnaire and sent it to medical students all over the nation using virtual platforms and groups in social media. The attained data have been coded and analyzed with SPSS version 22 using descriptive and analytic tests.

Results: A total of 1999 medical students participated in the study, and most students were from type 1 universities (50.4%) and were in the clerkship stage (33.3%) of education. Medical interns (mean = 3.34 [SD = 1.29]) were most satisfied with the infrastructures of virtual classes compared with students in basic sciences (mean = 2.93 [SD = 1.18]), physiopathology (mean = 2.62 [SD = 1.26]), and clerkship (mean = 2.56 [SD = 1.31]) stages ($P < 0.001$). Also, students in type 1 and the nongovernmental (NG) type universities were significantly more satisfied with the content, with mean scores of 2.94 and 3.14, respectively, and infrastructures, with mean scores of 2.77 and 2.98, respectively, of virtual classes than students in type 2, with mean scores of 2.59 and 2.42, respectively, and 3 universities, with mean scores of 2.54 and 2.34, respectively ($P < 0.05$).

Conclusion: Infrastructure is a crucial component in virtual learning, and it can also affect satisfaction with the provided virtual content. Also, providing better clinical content should be performed for medical students before their internship during the current pandemic situation.

Keywords: Education, Medical, Undergraduate, COVID-19, Learning

Conflicts of Interest: *None declared*
Funding: *This study was funded by Shiraz University of Medical Sciences.*

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Cite this article as: Nakhostin-Ansari A, Faghihi SA, Hoveidaei AH, Hoveidaei A, Rastegar Kazerooni AA. Medical Students' Point of View About Virtual Classes, Technological Infrastructures, and Length of Education During the COVID-19 Pandemic: A Cross-sectional Study. *Med J Islam Repub Iran.* 2022 (23 May);36:53. https://doi.org/10.47176/mjiri.36.53

Introduction

E-learning has become a crucial component of all schools and universities worldwid e due to the pandemic

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↑What is "already known" in this topic:
E-learning has become a crucial component of all schools and universities worldwide due to the pandemic crisis of COVID-19. During the COVID-19 pandemic, medical education remains controversial and needs further research to reach a conclusive assessment on the risks and benefits of continuing hospital teaching for students versus virtual simulated.

→What this article adds:
In this study, we found that medical interns are more satisfied with the infrastructures and contents of the virtual classes and that interventions should target students in other stages of medical education to enhance their satisfaction and learning from virtual classes. Improving infrastructures can be a feasible approach for this purpose.

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[DOI: 10.47176/mjiri.36.53]

crisis of COVID-19 (1, 2). Although medical knowledge is an essential core competence for a medical student, learning and practicing some skills needs direct contact with the patient (3). During the COVID-19 pandemic, medical education remains controversial and needs further research to reach a conclusive assessment on the risks and benefits of continuing hospital teaching for students versus virtual simulated (4). One of the fundamental questions is whether this program with current technological infrastructures fulfills the goals of educating medical students. To get closer to the answer, we decided to ask about virtual classes, infrastructures, prolonging academic years from the medical students, and becoming aware of their attitude.

Methods

We designed a cross-sectional web-based study about 6 months after the start of the COVID-19 pandemic. We developed a questionnaire with the minimum questions to increase the students' participation in the study. For this purpose, first, the study's objectives were specified, and then questions related to the goals were extracted using the key points indicated in in-person and phone interviews with some medical students and instructors. A draft of the questionnaire comprising demographics and 4 questions related to students' satisfaction with content and infrastructure of virtual education and their point of view on the continuity of virtual study in the pandemic was prepared. The questionnaire had 3 sections. The first section was about education status, including the university's name and stage of education. We used the Ministry of Health and Medical Education (MOHME) triad categorization to categorize the universities. Type 1 to Type 3 from the highest-ranking universities to the lowest, respectively. Azad universities and Shahid universities are not under the supervision of the MOHME, so we added a fourth group named "nongovernmental (NG)" or type-NG for them (5). The second section was specified to assess medical students' attitudes about E-learning during the pandemic; this includes 2 questions about the satisfaction with the present content and infrastructures of virtual classes based on students' experience of virtual programs. These questions were scored on the Likert scale from 1 (least satisfaction) to 5 (most satisfaction). The third section included 2 other questions; in each question, participants should choose 1 out of 3 statements, which they agree with the most, about the continuation of their medical degree program. An expert panel, including 2 professors, 2 medical students, and 1 medical doctor approved the final version of the questionnaire.

We used the convenience sampling method in this study. We sent messages explaining the study's goals and objectives and linked the online questionnaire to medical students' groups on popular social platforms, such as WhatsApp. Participation in the study was voluntary, and we asked those interested in completing the questionnaire. The questionnaire was sent to medical students throughout the country. Our inclusion criteria were as follows: (1) studying medicine in Iranian universities during the COVID-19 pandemic for at least 1 month, and (2) Having Iranian nationality. Medical students from other countries and those studying other fields other than medicine were excluded from the study.

The attained data have been coded and analyzed using the SPSS version 22. We calculated mean and standard deviations for continuous variables and number and percentage quantitative variables. We used the chi-square test to evaluate whether students in different universities and educational stages had different views regarding in-person classes and medical degree program duration. We used the Kruskal Wallis test to compare groups regarding their satisfaction with the content and infrastructures of virtual classes. The Spearman correlation test evaluated the association between students' satisfaction from virtual classes' content and infrastructures. $P \leq 0.05$ was considered statistically significant.

Results

In total, 1999 medical students participated in the study. Most students were from type 1 universities (50.4%, n = 1008) and were in the clerkship stage (33.3%; n = 666) of education (Table 1).

Satisfaction with the content of virtual classes was not significantly different between students in clerkship and physiopathology stages ($P = 1$), but there were significant differences between other groups ($P < 0.001$) (Table 1). According to post hoc analysis, medical interns were significantly more satisfied with virtual classes' infrastructures ($P < 0.001$) than other groups; and there were no significant differences between other groups ($P > 0.05$). In addition, students in type 1 and type NG universities were significantly more satisfied with the content and infrastructures of virtual classes than students in types 2 and 3 universities ($P < 0.05$), but there was no significant difference between type 1 and type NG universities with respect to the student's satisfaction with the content and infrastructures of virtual classes ($P = 1$ and $P = 0.794$, respectively). Similarly, there was no significant difference between types 2 and 3 universities regarding students' satisfaction with the content and infrastructures of virtual classes ($P = 1$). There was a positive correlation between students' satisfaction with the content and infrastructures of virtual classes. (Spearman $r = 0.68$; $P < 0.001$).

Discussion

This study evaluated the medical students' attitude toward virtual classes and the medical degree program duration during the COVID-19 pandemic. To the best of our knowledge, we performed the world's largest study on attitudes toward medical education duration with the largest number of participants (1, 6). Medical students in the internship stage had the highest satisfaction rate with virtual classes' content, while pathophysiology students had the least. Case-based courses have been commonly used for the education of medical interns during the COVID-19 pandemic, which has also been the case in Iran (7, 8). Therefore, medical interns were not supposed to have fewer theoretical lectures, which may be a reason for their higher satisfaction.

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Table 1. Medical students' satisfaction with the content and infrastructure of virtual classes, and their opinion toward the educational duration, and courses that need students to attend university or hospitals

		Number (Percent)	Satisfaction with the content of virtual classes		Satisfaction with infrastructures for virtual classes		Opinions on the MD program Duration				Opinions on in-person courses			
			Mean (SD)	P	Mean (SD)	P	Statement 1[a]- Number (Percent)	Statement 2[b]- Number (Percent)	Statement 3[c]- Number (Percent)	P	Statement 1[d]- Number (Percent)	Statement 2[e]- Number (Percent)	Statement 3[f]- Number (Percent)	P
Educational	Basic sciences	554 (27.7%)	2.93 (1.18)	<0.001	2.64 (1.22)	<0.001	318 (57.4%)	172 (31%)	64 (11.6%)	<0.001	182 (32.9%)	137 (24.7%)	235 (42.4%)	<0.001
	Physiopathology	509 (25.5%)	2.62 (1.26)		2.54 (1.22)		197 (38.7%)	165 (32.4%)	147 (28.9%)		97 (19.1%)	167 (32.8%)	245 (48.1%)	
	Clerkship	666 (33.3%)	2.56 (1.31)		2.45 (1.27)		298 (44.7%)	147 (22.1%)	221 (33.2%)		239 (35.9%)	194 (29.1%)	233 (35%)	
	Internship	270 (13.5%)	3.34 (1.29)		3.03 (1.34)		208 (77%)	41 (15.2%)	21 (7.8%)		191 (70.7%)	25 (9.3%)	54 (20%)	
University	Type 1	1008 (50.4%)	2.94 (1.29)	<0.001	2.77 (1.27)	<0.001	531 (52.7%)	244 (24.2%)	233 (23.1%)	0.041	397 (39.4%)	249 (24.7%)	362 (35.9%)	0.002
	Type 2	589 (29.5%)	2.59 (1.25)		2.42 (1.25)		303 (51.4%)	173 (29.4%)	113 (19.2%)		190 (32.3%)	160 (27.2%)	239 (40.6%)	
	Type 3	317 (15.9%)	2.54 (1.24)		2.34 (1.19)		145 (45.7%)	89 (28.1%)	83 (26.2%)		94 (29.7%)	99 (31.2%)	124 (39.1%)	
	Type-NG	85 (4.3%)	3.14 (1.38)		2.98 (1.27)		42 (49.4%)	19 (22.4%)	24 (28.2%)		28 (32.9%)	15 (17.6%)	42 (49.4%)	
Total			2.78 (1.29)	-	2.61 (1.27)	-	1021 (51.1%)	525 (26.3%)	453 (22.7%)	-	709 (35.5%)	523 (26.2%)	767 (38.4%)	-

[a] I disagree with the prolongation of the MD program, and current education is enough. [b] I agree that the MD program duration should prolong with the current deficits in virtual education, but if these deficits are addressed, I disagree with the prolongation of the MD program. [c] MD program duration should prolong because the current education is inefficient.
[d] Holding virtual courses is the best solution for the current situation, and virtual patient rounds, group-based discussions, virtual laboratory courses, and other similar courses should be held to fill the current gap in education. [e] Some parts of in-person courses cannot wholly be held with online courses and need to be postponed until the end of the pandemic. [f] Some parts of in-person courses cannot wholly be held with online courses, and students should be provided with PPEs to hold these courses.

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On the other hand, the higher satisfaction rate among basic science students compared with the next 2 stages could be based on the difference of content providers in these stages; the basic science content providers are non-clinician PhD professors who were not involved in the CoVID-19 challenges at hospitals (9). In contrast, the 2 next stages' content providers were the clinical professors involved with the challenges of CoVID-19 at hospitals. As a result, they most likely had less time to provide relevant content for medical students (9).

Type 1 and type NG universities are more satisfied with content and infrastructures compared with types 2 and 3 universities. Type 1 universities are the top 10 universities in Iran. Type NG universities are self-supporting and obtain tuitions from the attending students. Hence, these universities have enough resources, which is an important factor in implementing effective virtual courses to provide high-quality infrastructures for their students (10).

There was a positive correlation between students' satisfaction with virtual classes' content and infrastructures (Spearman $r = 0.681$; $P < 0.001$). This finding is in line with previous studies indicating a relationship between infrastructure quality and nonmedical students' satisfaction with virtual learning (11-13). Thus, the finding insists on the importance of infrastructure for medical education, which can be noted for policymakers.

This survey's results indicate that each stage has a different opinion on the duration of the program. Most interns prefer to keep up with the current program and think that educational materials are enough (77%). Clerkship students have experienced the real coronavirus educational situation (14). More than fear of the future, students' agreement on continued education is motivated by concerns for their future and competencies. Yet interns fear the least among all other stages (15, 16). This may be the reason for their desire to graduate as soon as possible and enter their clinical practice.

Conclusion

In this study, we found that medical interns are more satisfied with the infrastructures and contents of the virtual classes and that interventions should target students in other stages of medical education to enhance their satisfaction and learning from virtual classes. Improving infrastructures can be a feasible approach, considering the association between the students' satisfaction with infrastructures and the contents of virtual classes.

Acknowledgments

None.

Ethics

The Ethics Committee of Shiraz University of Medical Sciences approved the study protocol (ethics code: IR.SUMS.REC.1400.362).

Conflict of Interests

The authors declare that they have no competing interests.

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[DOI: 10.47176/mjiri.36.53]