Chattogram Maa-O-Shishu Hospital Medical College Journal
Volume 21, Issue 1, January 2022

Original Article

Medical Education Amidst the COVID-19 Pandemic: A Takeaway from Perspectives of Medical Students of Bangladesh

Mosammat Kohinoor Parveen[1]
Md Jafrul Hannan[2*]
Jannatul Ferdoush[3]

[1]Department of Pharmacology & Therapeutics
Rangamati Medical College
Ragamati, Bangladesh.

[2]Department of Pediatric Surgery
South Point Hospital
Chittagong, Bangladesh.

[3]Department of Pharmacology & Therapeutics
BGC Trust Medical College
Chattogram, Bangladesh.

*Correspondence to:
Professor Md. Jafrul Hannan
Department of Pediatric Surgery
South Point Hospital
Chittagong, Bangladesh.
Mobile : +88 01819 34 53 05
Email : jafrulhannan@gmail.com

Date of Submission : 24.11.2021
Date of Acceptance : 15.12.2021

www.banglajol.info/index.php/CMOSHMCJ

Abstract

Background: *The objective of this study was to understand the factors which have positively and negatively affected delivery of medical education in Bangladesh during the COVID-19 epidemic and to apply this knowledge to improve preparedness in the event of future COVID spikes or other pandemics.*

Materials and methods: *A 20-question survey was constructed and responses from over 300 medical students across Bangladesh were received and statistically examined by chi-squared, logistic regression and latent class analysis.*

Results: *Quality of internet connection has the biggest impact on delivery of high-quality online courses. General experience with online course delivery through number of courses attended and year in the program were also impactful. Latent class analysis indicated that two classes of students existed with regards to their answers (Yes/No/Undecided) as to whether they would attend class or sit professional exams if schools reopened. The characteristics of each class were diverse and enabled a glimpse into the psyche of the students.*

Conclusions: *The results demonstrated a need for government to ensure every one has access to a good quality internet. Not only will it improve the perception of online medical courses, it will prevent students from unnecessary travelling increasing the risk of transmission. With experience in developing online curricula, the misconception that it is inferior to classroom equivalent may be reduced. More confidence in the quality of online classes may encourage more students that are apprehensive about the professional exams to regain their self-confidence and sit them and increase the pool of independently practicing physicians in Bangladesh.*

Key words: COVID-19; Medical education; Online courses; Pandemic.

INTRODUCTION

The 2020 global COVID-19 pandemic has had a tremendous impact on all facets of society. Lessons learned in one region of the world are swiftly considered in other regions thousands of miles apart. Effectiveness of lockdowns, resumption of normal education from primary school through to university, necessity of ensuring hospitality businesses remain open, and the effect of large gatherings of people for such disparate occasions such as religious, arts and sporting events, have all been examined in practically every country as a means to mitigate transmission of the deadly virus. The experiences gained from these endeavours are shared globally, with each country and their leadership adopting those that they believe will work best for their citizens.

How to carry on with education during the pandemic is as important in university as it is in primary schools and carries distinct challenges.[1] In Bangladesh, it is especially important for medical students as the country continues to make strides towards making up for a deficit of physicians per capita compared to neighbouring countries, according to a recent WHO report.[2,3] In many countries, university studies

across all faculties have moved to an online curriculum, and this is no different in Bangladesh. As of January 2021, even with the beginning of the roll-out of vaccines, there remains a possibility that this form of curriculum may remain in place for some time. It is thus prudent to extract as much information as we can about the effectiveness of this type of curriculum, while at the same time attempting to understand the psyche of the students. Only with such knowledge can short term changes be implemented for online curriculum improvement providing confidence that the best possible alternative to in-class and applied practice education has been developed as a measure of preparedness for future spikes in COVID or other disasters.

To this end a survey of over 300 medical students throughout Bangladesh was administered to ascertain from their point of view those aspects of the curriculum that are working well and those that are not. Those surveyed represented a cross section throughout metropolitan and rural areas of Bangladesh, and across all years of study within the 5 year program.

MATERIALS AND METHODS

A 20-question survey (See Supplemental Data 1) was constructed to compile simple demographic information about the respondents and their opinions on the effectiveness of their on-line medical education, general information about their institutions and on how computer hardware and software technology had impacted their educational experience. The survey was administered via Survey Monkey (San Mateo CA, USA) and links were sent to all major teaching hospitals throughout Bangladesh between the periods of September – October 2020.

As the surveys are only analyzed if they are complete, there was a 100% completion rate from the 76.25% (305 out of 400) of those invited that chose to complete the survey.

The results were compiled and analysed using JMP Version 15 (Cary NC, USA). Missing data was excluded from analysis and all statistical comparisons were evaluated using Chi-Squared tests based on Likelihood Ratio theory. Contingency analysis was used to interpret multiple response questions and likewise Chi-Squared tests based on Likelihood Ratio theory were used to determine significant associations. Differences were considered significant at $p < 0.05$ unless otherwise noted. Logistic regression analysis was also performed to determine which variables impacted the overall quality of online classes, assessments and students decisions to return to normal classroom education should the colleges reopen within the next month and whether they would consider sitting the professional exams if they could be arranged. Model variables were retained at the $p < .05$ level.

Latent class analysis, a form of clustering the data (Students) into classes based on unobservable (Latent) grouping variables was used to gain further insights into students' thoughts regarding returning to the classroom and sitting professional exams. Variables used were Gender, Year in Education, Location of Residence, Location of School, Quality of Internet, Quality of Online Classes and Number of Classes Attended. Analysis was performed for between 2 and 5 classes and in all cases the best fit (Number of classes) was determined based on minimization of the Bayesian Information Criterion (BIC). In this study, it was used to attempt to define the characteristics of students that would consider returning to normal classroom courses or sit the professional exams should colleges reopen.

Ethical clearance was obtained on August 28, 2020 (No/admin/SPH/198/2020) from the Ethical Committee of the South Point Hospital. Informed consent was obtained from all participants.

RESULTS

Descriptive Statistics of total 305 students responded to the survey are given in Table I.

Table I Descriptive statistics of the demographics of the respondents and their place in the medical education program, and of the college itself

Gender	n	%	Residence Location	n	%
Male	117	38.6	Metropolitan Area	120	39.9
Female	186	61.4	Non-Metropolitan Area	181	60.1
Year in Program			Location of Medical College		
1st	57	18.8	Metropolitan Area	133	43.9
2nd	34	11.2	Non-Metropolitan Area	170	56.1
3rd	59	19.4			
4th	115	37.8	Year of College Establishment		
5th	39	12.8	Before 1971	86	28.6
			1971-2000	38	12.6
			2001-2010	54	17.9
			2011 or older	123	40.9

Over half (50.8%) of the respondents used mobile data to view their online classes, while another significant portion (35.4%) used a portable Wi-Fi router. Most (70.1%) did not have to purchase a new device to view the course material remotely. Unfortunately, twice the number of people (41.7%) found the quality of internet during class to be poor compared to those that found it good (21.5%). Over half of the students used Zoom (53%) to view their class content followed by Facebook Live (24.8%). Zoom was also perceived to be the most effective (57.9%), followed again by Facebook Live (17.7%). It is worthy to note that although only 1.7% used "Other" for their media, 5.7% found it better. Typically, the reason given was that in-class education was perceived to count as "Other" and that there was no adequate replacement for in-school lectures and laboratory practice.

Almost half of the students were studying three subjects online with the majority (69.8%) having attended up to 50 individual classes. The overall perception of the quality of the classes was between satisfactory (39.7%) and good (32.1%). Less than 10% of the cohort identified that they had taken online practical classes, and of those that did, 71.1% indicated that they thought they were about half as useful as the in-class equivalent. Only

one individual thought the online version of the practical class was just as good as the in-lab version. Roughly half (50.8%) of the respondents had had online assessments. Their opinion of the quality of these assessments was split between satisfactory and good (Both 25.8%) and poor (48.4%).

Chi-squared tests were used to examine if there was any association between student demographics such as gender, residence location, year in medical education program and their college location and the year of its establishment with the overall quality of the online courses and assessments. Most striking was the strong association between the student's year in the medical education program and how they perceived the overall quality of both the online courses ($p = .001$) and assessments ($p < .001$). Other very weak associations (90% confidence) were observed between gender and overall quality of online assessments ($p = .089$) and the student's location of residence with the overall quality of online classes ($p = .080$). The year of establishment of the medical colleges was also observed to be very weakly associated with both the overall quality of online courses ($p = .100$) and assessments ($p=.075$).

Chi-squared tests were also used to test for associations between computer and internet hardware and software technologies used with the overall quality of the online classes and assessments. Not too surprisingly, the overall quality of the internet connection available was strongly associated with the overall quality of both the online courses ($p <.001$) and assessments ($p < .001$). Interestingly, an additional strong association was observed between the total number of classes attended and the overall quality of the online courses ($p = .001$) but not with that of the online assessments ($p = .502$). A weak association was observed between the overall quality of online courses and the need to purchase a new device specifically for the purpose of viewing them ($p = .065$).

The overall quality of online classes and assessments as a function of the software platform used (eg. Facebook Live, Zoom, Pre-recorded Video, YouTube links) was also evaluated by contingency analysis grouped by overall quality of internet connection. In general, no associations were observed between quality of courses and software platform used, with one exception. In the case of poor internet quality, there was strong association in quality of courses with use of Facebook Messenger ($p = .004$).Specifically, the probability for good quality courses was greater when it was used, based on the results of Fisher's Exact test.For the overall quality of assessments, in the case of poor internet quality, the was an association with the use of Facebook Messenger and quality of assessments ($p = .036$). The probability of a poor rating for the quality of assessments was greater when Facebook Messenger was not used. The same result was found for pre-recorded video: the probability that the assessment quality was poor was greater when pre-recorded video was not used ($p=.035$).

Logistic regression was also performed for quality of online courses and assessments using many of the variables evaluated by the survey as predictors. Only those dependent variables that were at least significant at the 95% level were included in the model using a backwards stepwise evaluation. The variable with the most impact on good quality online courses is access to good quality internet, with odds for a good quality rating 6.67 times greater if a good internet connection was available. The number of subjects studied and classes attended were also important factors. The odds for a good quality rating ranged from 4.34-10.25 times greater when more subjects were studied ($p < .05$, depending upon the ratio of number of subjects studied), and 5.53 times greater when over 100 online classes were attended as opposed to between 0-50 ($p = .005$).Use of Facebook Liveand gender were also found to be significant. When Facebook Live was used, the odds of a good rating were 2.91 times greater ($p = .002$), and females were 2.19 times more likely to put forth a positive rating ($p = .021$).

The quality of internet was also the most important factor when predicting the quality of online assessments. The odds of a good quality of online assessment were 3.68 times better when a good quality internet connection was available. Furthermore, a good quality rating of the online assessment was more likely (Higher odds ratio) with the more senior students compared to their junior counterparts. The student's year in the education program and whether or not they use Facebook Messenger also were significant predictors.

When using logistic regression to determine which variables were most significant in predicting whether students would return to a normal in-class form of education, an adequate fit was impossible. Of the variables used (Gender, Year in Education, Location of Residence, Location of School, Quality of Internet, Quality of Online Classes, and Number of Classes Attended) no single variable was found to be significant and the R-squared values were less than 0.05 indicating a very poor fit of the data. A similar situation was found when attempting to model students' decisions to sit the professional exams based on these same variables. This indicates that if there were variables that impacted the students' decisions to these questions, they were not covered by the questions in the survey. This led us to performing latent class analysis.

Latent class analysis was performed to determine the latent characteristics of those students that responded either yes, no or undecided to the question of whether they would return to the classroom should colleges reopen or if they would sit the professional exams. In all cases, the minimization of BIC criterion indicated that two classes of students existed for each response (Yes, No, Undecided) as to whether they would return to class or sit the professional exams. The results are presented in Tables II and III, respectively. These summarize the relative overall proportion size of the groups and the relative shares of each characteristic within each group. Particularly strong shares are highlighted in italics.

Table II Results of latent class analysis in response to the question of whether the students would return to the classroom should the college reopen. Numbers represent the share of the class in each category determined from the analysis. Especially distinctive values are italicized

Response and Latent Class	Overall	Gender		Year in Medical College					Residence Location		College Location		Quality of Internet		Number of Classes Attended			Quality of Online Classes	
		Female	Male	1st	2nd	3rd	4th	5th	Metro Area	Other	Metro Area	Other	Good	Poor	0-50	50-100	>100	Good	Poor
	.724	.709	.292	.042	.072	.186	.500	.201	.445	.555	.498	.502	.695	.305	.531	.199	.270	.991	.009
2	.277	.393	.607	.463	.082	.177	.184	.095	.298	.702	.679	.321	.298	.702	.931	.061	.009	.268	.732
No																			
1	.600	.592	.408	.305	.191	.141	.260	.104	.300	.700	.451	.549	.255	.745	.707	.201	.092	.428	.572
2	.400	.602	.398	.028	.088	.348	.465	.071	.577	.423	.370	.630	.941	.059	.704	.094	.202	.978	.022
Undecided																			
1	.630	.671	.329	.172	.149	.201	.377	.101	.020	.980	.158	.842	.619	.381	.749	.127	.125	.672	.328
2	.370	.418	.582	.173	.004	.166	.446	.211	.979	.021	.664	.336	.796	.204	.653	.089	.258	.953	.047

Table III Results of latent class analysis in response to the question of whether the students would sit the professional exams. Numbers represent the share of the class in each category determined from the analysis. Especially distinctive values are italicized

Response and Latent Class	Overall	Gender		Year in Medical College					Residence Locations		College Location			Quality of Internet		Number of Classes Attended		Quality of Online Classes	
		Female	Male	1st	2nd	3rd	4th	5thr	Metro Area	Other	Metro Area	Other	Good	Poor	0-50	50-100	>100	Good	Poor
Yes																			
1	.743	.694	.306	.045	.095	.231	.449	.180	.539	.461	.541	.459	.845	.155	.687	.183	.130	.972	.028
2	.257	.407	.593	.112	.256	.158	.399	.074	.103	.897	.497	.503	.037	.964	.932	.015	.052	.478	.522
No																			
1	.514	.599	.401	.102	.059	.167	.502	.170	.575	.425	.487	.513	.798	.202	.564	.094	.342	.931	.069
2	.486	.531	.469	.381	.183	.141	.214	.081	.256	.744	.449	.551	.220	.780	.737	.220	.043	.351	.649
Undecided																			
1	.687	.603	.397	.021	.128	.377	.349	.126	.169	.831	.012	.988	.663	.337	.768	.131	.101	.766	.234
2	.313	.752	.248	.416	.050	.098	.383	.053	.742	.258	.901	.099	.576	.424	.658	.184	.158	.625	.375

DISCUSSION

The chi-squared tests and results from logistic regression converged on factors that contribute to a high overall quality of online classes and assessments and the results are not singular to Bangladesh.[4-8] For the quality of online classes, a very strong association was observed for the quality of the internet service, which was not too surprising. The year in the education program and the number of classes attended also figured significantly, observed in other countries as well.[6] It might be expected that students might carry a bit more of an acidic attitude towards the quality of online course that they had never anticipated attending when they had to use their hard-earned money to purchase a device to be able to view them. When the quality of internet was good, use of Facebook Live or Pre-recorded Video as the course platform, led to better overall quality. When the quality of internet was poor, Facebook Messenger tended to yield a better quality. The results of these analyses were mirrored in the logistic regression analysis, with internet quality again being the most significant factor with the odds of a good quality course being 6.67 times greater when the internet connection was good. The number of classes, the number of subjects studied and the use of Facebook live were also significant predictors. Previous experience with distance learning was also found to be significant in a recent Jordanian report and a factor in a study of Libyan students.[7,5] More weakly significant was gender, where the odds of a better quality course were greater when rated by females. For the assessments, a strong association was observed between quality of internet and year in the program with the overall quality of assessments. When the internet connection was bad, use of Facebook Messenger and Pre-recorded Video was also associated with overall quality. The results from the logistic regression indicated that the quality of the online assessments was more likely to be higher with a good quality internet connection, the more senior year in the education program and use of Facebook Messenger.

Those students responding that they would return to school were predominantly in latent class 1 (74.3%). There was preponderance for this group to be 4th year females with good quality internet, the opinion that the online classes were of high quality, although with relatively few classes attended. There was nothing distinctive about their location of residence or college. Thus, this group seemed to have all the necessary requirements to satisfactorily study remotely, yet they indicated they would definitely come back to the classroom if allowed. These are possibly a class of students very close to graduation, highly driven to graduate and wish to leave nothing to chance. Having taken relatively fewer courses online, they may be more confident in their abilities in the classroom, though recent studies have shown that a switch to an online curriculum does not have a negative impact on medical students examination performance.[9,10] Their desire for success seems to trump their own health, but the decision may also be driven to some extent by mental health issues driven by the general stress that accompanies being a medical student and exacerbated by the effects of COVID.[11,12] The second class of students responding that they would return are predominantly first year students, not residing in a metropolitan area but whose college is in a metropolitan area, with poor quality of internet, relatively few classes attended and which they believe to be of poor overall quality. These would be the younger students who are increasingly frustrated by the quality of internet and courses and would be happy to risk commuting to the college from their home or living in crowded dormitories close to the hospital, increasing their chance of infection. Possible pressure from parents on these younger students to succeed may also play a role. Mental health may also play a role in their decision as well but given the other factors perhaps less so than those students in the first latent class.

Students responding that they would not return to the classroom were about evenly divided between two groups. The first group was characterized by those residing in non-metropolitan areas, with poor internet quality and relatively fewer online classes attended and with mixed feelings about their overall quality. They may be concerned about their health or have close interactions with family or friends that may be vulnerable to the virus. The second group was comprised mainly of third and fourth year students whose college was not in a metropolitan area but who had good quality internet and believe the online courses were of high quality, though relatively few classes had been attended. This group probably believes that the online course experience is working fine for them. With relatively fewer online classes attended, they may have not yet reached any kind of mental health issues or a computer screen exhaustion point with online classes.

The first class of undecided students was largely fourth year female students whose college and residence were in non-metropolitan areas and whose internet and perception of online course quality may be best summarized as satisfactory. Being in non-metropolitan areas, their risk of infection may be somewhat reduced, which they might be weighing against the online course quality issues. The second group of undecided students was also predominantly fourth year students who reside and attend college in a metropolitan area. They have attended relatively few online classes, but believe they are of high quality and have good internet connections. It would be easy for them to attend class, but they also see that there is no real reason to do so since they seem quite satisfied with the online experience and with few classes attendedand may not be suffering from digital exhaustion. The pros and cons of commuting to class is probably heaviest on their minds.

In response to the question about sitting the professional exams, again two classes were found for each answer. The first group opting to sit the exams comprised mainly of fourth year female students with high quality of internet and perception of online classes. This group displays the same characteristics as those that responded that they would return to school. They are driven, confident and feel well prepared. The second class are also fourth year students, living in a non-metropolitan area with poor quality of internet, relatively few classes attended with mixed reviews about their quality. These are possibly students who are not happy with their current living or social situation, are frustrated with their online experience and want to sit and pass the exams as soon as possible so they may practice independently and begin the next stage of their lives which they feel holds a much greater outlook.

For the negative response, there was an even distribution between the two groups. The first group that responded negatively was similar to the first group of students that responded positively to this question, except there was a slightly more even distribution of gender. Perhaps this represents a second tier of students characterized by all the same attributes but are not as confident in themselves or are apprehensive as to how well the online courses have prepared them for the exams. A recent study of neurological students indicated they were concerned about their performance on board exams to the extent that some were considering delaying by one year.[13] The second group were largely first year students residing in a non-metropolitan area with poor internet and a poor perception of the quality of the online courses. However, their response is negative most likely because, as first year students, they are not yet eligible to sit the professional exams.

The first class of undecided respondents comprises third and fourth year students residing and attending college in non-metropolitan areas and who are perhaps best described as having average internet connections and believe that the quality of the online courses are just satisfactory. They may be questioning their level of preparedness and maybe feel that their experiences are not as great or varied as a result of not being in a metropolitan area where medical case variety will be greater. The second group is more difficult to interpret as it is split between first and fourth year students, so some are not eligible to sit the exams.Attempting to characterize this group, based on the other factors, is difficult.

CONCLUSIONS

It seems clear that government should ensure that everyone has access to a good quality internet connection. Not only will it improve the general perception of online medical courses, it will prevent students from unnecessary travelling. As experience is gained in constructing the online classes, the misconception that they are inferior to their classroom equivalent may be reduced. There is ample evidence in this study that the more online classes a student takes, the more likely they are to be impressed with their quality. More confidence in the quality of online classes delivered out of necessity by a pandemic may encourage more of those students that are apprehensive about the professional exams to regain self-confidence and sit them and increase the pool of independently practicing physicians in Bangladesh.

DISCLOSURE

All the authors declared no competing interest.

REFERENCES

1. Ferrel MN, Ryan JJ. The impact of COVID-19 on medical education. Cureus. https://www.cureus.com/articles/29902-the-impact-of-covid-19-on-medical-education.
2. Alam A. Patient, doctors, nurses ratio: Bangladesh lags far behind its neighbours. Dhaka Tribune. 2019. https://www.dhakatribune.com/health/2019/07/21/patient-doctors-nurses-ratio-bangladesh-lags-far-behind-its-neighbours.
3. World Health Organization. No title theglobal health observatory explore a world of health data. Retrieved 17 January. 2021. https://www.who.int/data/gho/data/indicators/indicator-details/GHO/medical-doctors-(per-10-000-population).
4. Rajab MH, Gazal AM, Alkattan K. Challenges to online medical education during the COVID-19 pandemic. Cureus. https://www.cureus.com/articles/30131-challenges-to-online-medical-education-during-the-covid-19-pandemic.
5. Alsoufi A, Alsuyihili A, Msherghi A, Elhadi A, Atiyah H, Ashini A, Ashwieb A, Ghula M, Ben Hasan H, Abudabuos S, Alameen H, Abokhdhir T, Anaiba M, Nagib T, Shuwayyah A, Benothman R, Arrefae G, Alkhwayildi A, Alhadi A, Zaid A, Elhadi M. Impact of the COVID-19 pandemic on medical education: Medical students' knowledge, attitudes, and practices regarding electronic learning. PLoS One. 2020;15(11):e0242905. doi: 10.1371/journal.pone.0242905. PMID: 33237962.
6. Kim SM, Park SG, Jee YK, Song IH. Perception and attitudes of medical students on clinical clerkship in the era of the Coronavirus Disease 2019 pandemic. Med Educ Online. 2020;25:1809929.
7. Al-Balas M, Al-Balas HI, Jaber HM, Obeidat K, Al-Balas H, Aborajooh EA, Al-Taher R, Al-Balas B. Distance learning in clinical medical education amid COVID-19 pandemic in Jordan: Current situation, challenges, and perspectives. BMC Med Educ. 2020;20:341.
8. Theoret C, Ming X. Our education, our concerns: the impact on medical student education of COVID 19. Med Educ. 2020;54:591-592.
9. Kronenfeld JP, Ryon EL, Kronenfeld DS, Hui VW, Rodgers SE, Thorson CM, Sands LR. Medical Student Education During COVID-19: Electronic Education Does Not Decrease Examination Scores. Am Surg. 2020:3134820983194. doi: 10.1177/0003134820983194. Epub ahead of print. PMID: 33372812;
10. Kim JW, Myung SJ, Yoon HB, Moon SH, Ryu H, Yim JJ. How medical education survives and evolves during COVID-19: Our experience and future direction. PLoS One. 2020;15:e0243958.
11. O'Byrne L, Gavin B, McNicholas F. Medical students and COVID-19: the need for pandemic preparedness. J Med Ethics. 2020;46:623-626.
12. Chandratre S. Medical students and COVID-19: challenges and supportive strategies. J Med Educ Curric Dev. 2020;7:238212052093505.
13. Guadix SW, Winston GM, Chae JK, Haghdel A, Chen J, Younus I, Radwanski R, Greenfield JP, Pannullo SC. Medical Student Concerns Relating to Neurosurgery Education During COVID-19. World Neurosurg. 2020;139:e836-e847. doi: 10.1016/j.wneu.2020.05.090. Epub 2020 May 16. PMID: 32426066.