

Distance Learning in Medical Education: COVID-19 Pandemic - Contingency Plan or a Paradigm Shift?

Metreveli Levan¹, Gabunia Luiza², Akhvlediani Leila³, Baramidze Levan⁴, Gumbaridze Lia⁵,

¹Metreveli Levan, MD, PhD, MPH

¹Professor of Public Health, BAU International University, Batumi; Chief of Party, Georgian Medical Group (GMG);
Address: 32 Paliashvili Street, Tbilisi 0179, Georgia;

²Associate Professor, Department of Medical Pharmacology and Pharmacotherapy, Tbilisi State Medical University;
Address: 33a, Vazha Pshavela Ave., Tbilisi 0171, Georgia

³Professor of Immunology, BAU International University, Batumi; Address: 237 Pridon Khalvashi Street, Batumi,
Georgia

⁴Professor, Department of Health Policy, Management and Economics, Tbilisi State Medical University; Address:
33a, Vazha Pshavela Ave., Tbilisi 0171, Georgia

⁵Researcher, Department of Health Policy, Management and Economics, Tbilisi State Medical University; Address:
33a, Vazha Pshavela Ave., Tbilisi 0171, Georgia



Abstract – The ongoing COVID-19 pandemic has dramatically affected virtually all aspects of human life including the domain of education. All tiers of education are in a process of transition to the diverse modes of online teaching/distance learning. Certain geographic regions and areas of study are particularly vulnerable to these challenges. The countries with lower economic development have evident deficiencies in the Internet access, computer literacy and professional qualifications of teachers and students essential for successful implementation of online teaching forms. While certain specialties in higher education (less technologically dense) are still relatively well-off in terms of effectively shifting to distance learning, medical education with its technologically sensitive academic process faces major difficulties. This is especially true about teaching clinical sciences, where immediate supervision and attendance has been considered as a core requirement. By assessing own experiences and published data, it is our belief that the following steps should be made by nations (with the particular reference to low middle income countries) and institutions: 1. More thorough, robust and inclusive research should be done in order to reveal as many technically and “ideologically” fit solutions for ensuring the smooth transition to e-education; 2. Official authorities should think creatively while revising/determining the status of e-education, so that where possible, it may replace traditional modality of education in technically and legally organized ways and bureaucratic resistance has to be meaningfully minimized; 3. The governments need to obligate and incentivize HEIs for introducing realistic and comprehensive “contingency and business continuity plans” especially tailored to the requirements arising from global public health emergencies.

Keywords – Medical Education, Distant Learning, e-education, COVID-19.

I. INTRODUCTION

The ongoing COVID-19 pandemic has dramatically affected virtually all aspects of human life including the domain of education. All tiers of education are in a process of transition to the diverse modes of online teaching/distance learning. Certain geographic regions and areas of study are particularly vulnerable to these challenges. The countries with lower economic development have evident deficiencies in the Internet access, computer literacy and professional qualifications of teachers and students essential for successful implementation of online teaching forms. While certain specialties in higher education (less technologically dense) are still relatively well-off in terms of effectively shifting to distance learning, medical education with its technologically sensitive academic process faces major difficulties. This is especially true about teaching clinical sciences, where immediate supervision and attendance has been considered as a core requirement.

The present paper poses the following central questions:

1. How the existing legislative and regulatory provisions fit the process of transition to online teaching in medical education?
2. In what extent medical schools have been prepared to adopt online teaching from technical, professional and cultural points of view?
3. What are the burning issues in delivering medical education through predominantly online mode?
4. What are the possible solutions for maximally embracing teaching of clinical sciences in distance learning environments?
5. How the ongoing distance learning process influences the quality of medical education as well as the levels of satisfaction of students, administrations, faculty, potential employers and state education authorities?
6. What are the most essential steps to be made by medical schools and countries for ensuring sustainability of achieved results in distance learning and mitigation of evolved pitfalls?

II. DISCUSSION

There is a relatively small mass of published literature around the stated issues, since the pandemic came at once not leaving any time space for more thoughtful preparation. In this situation, medical schools and the Governments have been making *ad hoc* decisions based on the best theoretical assumptions, logical judgement and a scarce empirical evidence available elsewhere. Below, we will attempt to critically review all the major observations made through scientifically well-designed studies as well as other formal and informal communications through the World Wide Web. The following discussion will also embrace the observations either made before the actual COVID-19 pandemic and/or those targeting other than medical education areas, based on the relevance and applicability in answering the central questions of our paper. We plan to infer our findings to lower middle income countries. Therefore, while analyzing the global evidence, we will keep an eye on these countries both in terms of current situations as well as successful solutions being documented elsewhere.

We tried to categorize the findings of different authors under the following six headings: A. Internet connectivity; B. Student satisfaction; C. Faculty/administrators satisfaction; D. Hardware issues; E. Legislative dimension; F. Strategic and operational aspects. These headings effectively correlate with our central questions (the exact correlations are given in the table 1).

Table 1. Correlations between the central questions of the present paper and the literature review findings

#	Research question	The categories of the literature review findings
1	How the existing legislative and regulatory provisions fit the process of transition to online teaching in medical education?	E
2	In what extent the medical schools have been prepared to adopt online teaching from technical, professional and cultural points of view?	A, B, C, D, F
3	What are the burning issues in delivering medical education through predominantly online mode?	F

4	What are the possible solutions for maximally embracing teaching of clinical sciences in distance learning environments?	F
5	How the ongoing distance learning process influences the quality of medical education as well as the levels of satisfaction of students, administrations, faculty, potential employers and state education administrations?	B, C, F
6	What are the most essential steps to be made by medical schools and countries for ensuring sustainability of achieved results in distance learning and mitigation of evolved pitfalls?	E, F

According to the UNESCO (United Nations Educational, Scientific and Cultural Organization) data, for the moment, globally there are 1.5 billion learners affected by school and university closures [1]. The similar number (1.725 billion) is claimed by Wikipedia [2]. Our assumption is that an overwhelming majority of these learners are or will be engaged in some form of e-learning in future. There will be 160 million so called e-students in the World by 2025 (it refers to medical students) [3]. None of the schools of medicine in the world have ever considered constructing contingency plans in response to such a large-scale global public health disaster. The evidence shows that in economically well-off countries, schools of medicine / universities built their COVID-19 pandemic responses on existing electronic portals, software solutions and skills and experiences of students and faculty have already been materialized, while the others are still struggling with poor Internet connectivity, computer illiteracy and even shortages of electricity. Our own experience from within the consortium of 14 medical/health higher educational institutions in 7 countries (Georgia, Bulgaria, Lithuania, Belarus, Moldova, Kazakhstan and Tajikistan) operating under the European Commission Erasmus+ Capacity Building Project in Higher Education (Grant Agreement: 609528-EPP-1-2019-1-GE-EPPKA2-CBHE-JP) displays the both extremes as well as the midway stages in producing responses to the ongoing pandemic. For example, Bulgarian and Lithuanian counterparts have shifted to the total distance education in the most effective and consistent way. Besides the fact that computer literacy, the Internet connectivity or access to high quality equipment does not represent a problem, for a considerable period of time, both universities have been utilizing one of the popular online teaching platforms, such as Moodle. In Georgia and Moldova, the transition was rather hectic, but by now, medical schools are applying one or another form of available e-teaching platforms. In Tajikistan, the semester was extended until the COVID-19 was declared a national public health emergency. Therefore, the immediate need for transition to e-learning has been delayed at least until spring, 2021. One of the reasons, for such development was a very poor or almost no Internet connectivity especially in the remote rural areas of the country, where the majority of local medical students come from. On several occasions, we even witnessed electricity blackouts during the routine communication with our Tajik colleagues, which was immediately resulting into the connection disruptions.

Nevertheless, emergency e-learning protocols have been introduced worldwide [4]. Learning Management System (LMS) is a collective name for a wide variety of online and offline platforms being employed. "There have been three typical scenarios: 1. The college already has a LMS; 2. The college has LMS, but with limited use; and 3. The college doesn't have LMS". The most popular platforms appear to be Moodle and Blackboard. As for immediate verbal communication, Microsoft Teams, Google Meet and Zoom are in most favor. Up to the moment, three main methods of curriculum delivery have been applied: synchronous, asynchronous and blended. [1]. Table 2 displays the summary of the most popular software solutions.

Table 2. Common tools to be used for online/distant learning (some of them are free) [1]

Purpose	Tool	Link
Discussion forum	Blackboard	https://www.blackboard.com/
	Moodle	https://moodle.org
	Slack	https://slack.com/
	Schoology	https://www.schoology.com/
	Edmodo	https://www.edmodo.com/
	Flock	https://flock.com

Online lecturing	Zoom	https://zoom.us/
	Blackboard Collaborate Ultra	https://help.blackboard.com/Collaborate/Ultra
	Skype	https://www.skype.com/
	Google suite	https://gsuite.google.com/products/meet/
	Gotomeeting	https://www.gotomeeting.com/
	Go webex	https://www.webex.com/
	Bluejeans	https://www.bluejeans.com/
	Loom	https://www.loom.com/
	Teamviewer	https://www.teamviewer.com/
	Join.me	https://www.join.me/

Different countries outlined possible scenarios for transforming their modes of curriculum delivery. In Afghanistan, the universities consider 1-2, 3-6 and more than 6 month periods for implementing different-scale transitional actions [5]. Moreover, there are attempts to develop an online learning taxonomy as such [6].

Many schools (medical) have shrank their basic science curricula to 12 or 18 months while integrating clinical medicine within this timeframe and revisiting the basic sciences later in medical school [7]. This experience may somehow suggest to revisit China's initiative regarding introducing a system of "Barefoot Doctors" dating back to mid twentieth century [8].

Austrian medical schools offer a wide array of e-solutions (Good Medical Morning, Rounds, Web Clinics, Peer Learning, General Medical Consultation, Radiology Team Meeting, etc.) [9].

There is a number of publications reflecting on students' satisfaction, problems and opportunities of e-learning. Particularly, a case-control study about introducing blended 5G network-based online teaching in one of the medical schools in China revealed that "...students believed that home-based online educational model can, to some extent cultivate their professionalism and stimulate their motivation in learning and bring more fun to the study amid the pandemic" [10]. Gamification can be a good trigger for students' higher engagement [1].

Another policy research stated that "...these events (the COVID-19 pandemic) could prompt colleges to stop distinguishing between online and classroom programs" and "...there is a sense of inevitability of efforts to normalize emergency e-learning. It would be more surprising if these efforts were not made" [4].

As many other challenges in the contemporary world, the COVID-19 pandemic and a total transition to e-learning create vast opportunities for learners to be taught by a diverse corps of distinguished field experts from elsewhere, those who (with the high probability) would not be otherwise available [11]. The COVID-19 pandemic created an opportunity for educators to reflect, innovate and build ... across the globe [12].

A considerable number of works present more negative influence of e-learning over students' satisfaction and performance. 77% of medical students had negative perceptions toward e-learning. 76% of the students use mobile devices for their e-learning and it had a little impact on students' performance [13]. Several studies revealed that online learning is more stressful for students than face-to-face mode [1]. On the students side, there have been problems with distraction, connectivity and access to adequate equipment [14]. It is also recommended to explore the perceptions of faculty regarding their experience on e-teaching during COVID-19 lockdown [13].

The common sense dictates that in skills-intensive fields, where education can mostly be capitalized through attended, face-to-face communication, the online learning might experience significant difficulties. As some authors state, "Not all parts of healthcare education are suitable for e-learning" [3]. The world of medical education is in a continuous state of "confusion" on how to largely

proceed with teaching clinical sciences. For a while, the majority of medical schools have been providing only theoretical sessions in clinical subjects, while practical skills teaching was suspended until the situation gets cleared. But there is a huge uncertainty about etiological therapy or vaccines against the mutated versions of the Novel Corona Virus. Evidently, it is a high time for producing alternative and creative solutions, which may be partly based on existing sporadic models being successfully applied in some specialized areas of clinical medicine during and even before the onset of the COVID-19 pandemic.

There are diverse instances on the use of hardware and/or software in delivering clinical knowledge [15]. One such approach uses tablet computers which can be cleaned between patients following appropriate infection control protocols. They can be used at sites with a high risk of COVID-19 transmission. Patients can be given a tablet and isolated in an exam room [16]. Web-based teaching of Dermatology has been provided to be elective at the US Albert Einstein College of Medicine [17]. There are offered “on-the-go” downloadable models to train medical students in clinical subjects [18]. Virtual reality model-based teaching was introduced for Gastroenterology/Endoscopy [19]. Another report states that online education in Dermatology should consider developing long-term solutions for transitioning to distance learning [20]. The obesity management e-teaching module has been tested in the United States [21]. *Gaetke-Udager et al.* introduced a computer-based learning module for interpreting non-contrast head computed tomography [22]. The *Society of Teachers of Family Medicine* aggregated the online resources for teaching clinical sciences [23].

The information about responding to the COVID-19 pandemic by medical education institutions is still very asymmetric and mosaic in the world. The World Bank publication attempts to possibly classify where different countries and regions are in this sense. Here, we will mostly concentrate on the countries of interest of this paper. Bulgaria started the e-learning system on March 16, 2020. There is a very limited information on Georgia and absolutely no information on Belarus, Lithuania, Kazakhstan and Tajikistan. In Moldova, an online platform “Studii.md” has been introduced for general schools, but there is no note on HEIs (Higher Education Institutions) [5]. A recent Wikipedia publication enlists the countries with short descriptions of the situation - Bulgaria, schools and universities have been closed; Lithuania, universities implement distance learning; Georgia, no information on closures; Moldova, Belarus, Kazakhstan and Tajikistan are not even enlisted [2]. The character of this information is quite alarming, which for administrators and educators of medical schools and higher education policy makers, on a larger scale translates into tremendous uncertainty in terms of planning effective transitional policies at national, regional and global levels.

The last but not least and probably, one of the most important problem in transitioning medical education into effective and consistent e-learning modes lays in inadequate recognition of distance learning as a legible way of delivering quality higher education. These built-in ineffectiveness is embedded into national legislations of the majority of countries of our interest and in different degrees persists across our target regions (European Union, Eastern Partnership and Central Asia). The good example is a “Law on Higher Education” of Georgia, which recognizes distant learning *per se*, but considers it as a legitimate part of higher education only in conjunction with traditional modes (face-to-face teaching) of education [24]. Until now, the national Governments and Parliaments display a strong ignorance and/or resistance towards granting more legitimacy to distance learning. Besides methodological, cultural and technical aspects, the legislative barriers will be the main hurdles in using e-learning/e-teaching as a major contingency instrument in the times of global public health disasters. A good news came from the International Labor Organization (a United Nations formal agency), which in two different publications explicitly stated “Decision makers ... need to strengthen systems for the recognition and validation of digital learning” [25], [12].

III. IMPLICATION

As the above literature review shows, the world of medical education is trying to address the emerging challenges related to the COVID-19 pandemic in evidently sporadic and inconsistent ways. The only stable trend is the mass introduction of e-teaching, but even this effort is quite diverse in terms of scale, quality and technical design across countries and HEIs. In many developing countries, distance learning displays the signs of discriminatory approach, when those students who can’t afford expensive IT equipment and/or have limited/no access to the Internet receive lower quality education and are simply omitted from the mainstream. Even in developed economies, there is a strong uncertainty observed regarding the future of distance learning, especially in clinical sciences (where the overwhelmingly larger fraction of clinical clerkships has been suspended until the “better times”). To summarize this situation, we may come up with the following pillars in which the named challenges are rooted: 1. The world of medical education had no contingency plan for responding to large-scale global public health emergencies. While the HEIs in many countries are required to have officially adopted so called “business continuity plans”, we suppose that only very few mention global health threats and identify e-learning as a measure of mitigating business disruption; 2. The level of digitalization (including e-skills of

teachers, administrators and students) still remains very low in medical education, especially in the developing world. Moreover, there is no coherent and internationally agreed strategy on the modes of applying IT technologies in teaching and learning. The ongoing COVID-19 pandemic shows that a strong and structured consensus in this area is vital for synchronous and sustainable restoration of “business as usual” in medical education across the globe. It may be argued that countries should take care of their medical education themselves, but especially in case of global emergencies, assurance that doctors across the borders must have relatively comparable competencies may be absolutely existential; 3. Generally, the *renomé* of e-education is still very low at both official and informal levels. In the best possible scenario, it (e-education) is considered as a supplementary element of the mainstream education and in many instances is not seriously regarded as a legitimate and quality replacement of traditional ways of teaching and learning. Therefore, we believe that stronger formalization of e-education (including introduction of corresponding legislative provisions) in parallel with making e-methods of teaching more fit to the quality standards of education in skill-intensive (clinical, etc.) subjects, will lay a solid ground for maintaining “business continuity” in the concerned area.

IV. CONCLUSION

By assessing the own experiences and published data, it is our belief that the following steps should be made by nations (with the particular reference to low middle income countries) and institutions: 1. More thorough, robust and inclusive research should be done in order to reveal as many technically and “ideologically” fit solutions for ensuring the smooth transition to e-education; 2. Official authorities should think creatively while revising/determining the status of e-education, so that where possible, it may replace traditional modality of education in technically and legally organized ways and the bureaucratic resistance has to be meaningfully minimized; 3. The governments need to obligate and incentivize HEIs for introducing realistic and comprehensive “contingency and business continuity plans” especially tailored to the requirements arising from global public health emergencies.

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