We are IntechOpen, the world's leading publisher of Open Access books
Built by scientists, for scientists

6,900
Open access books available

185,000
International authors and editors

200M
Downloads

Our authors are among the

154
Countries delivered to

TOP 1%
most cited scientists

12.2%
Contributors from top 500 universities

CLARIVATE ANALYTICS
BOOK CITATION INDEX
INDEXED

WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?
Contact book.department@intechopen.com

Numbers displayed above are based on latest data collected.
For more information visit www.intechopen.com

Perspective Chapter: Transforming Continuing Medical Education in the COVID-19

Nikos Christo Secchi Nicolás and Ángel de Jesús Gómez Alarcón

Abstract

Medical education is not immune from the heartaches produced by abrupt contemporary changes in our world, such as the COVID-19 pandemic. Unexpectedly, and on very short notice, people can no longer teach or learn alongside other people. The impact on the heart of the educational processes of the health professions is unprecedented. The key concerns of yesterday, such as the need to enhance bedside learning or to enhance the experience of students in the clinical setting, in the clinical workplace, have a different meaning. Medical educators can leverage technology to enhance medical education at both undergraduate and graduate levels. Although the most recent initiatives, such as remote transmissions, have been introduced for a long time, traditional classes, lectures, and face-to-face didactic tutorials continue to be the most important cornerstone of medical education both in our country and abroad. The COVID-19 pandemic has posed challenges in medical education globally. Each society has responded according to its possibilities and needs to take advantage of this situation as a learning opportunity, continue with education, and incorporate students as health workers in the countries where it was necessary.

Keywords: continuing medical education, COVID-19, pandemic, teachers, videoconferencing, information and communication technologies

1. Introduction

Health science educators were living times of discussion about competency-based education, how this influenced curriculum design, teaching methodologies, and the role of teachers. The beginning of the decade took us in time when medical schools and colleges are incorporating an early approach to the field of practice and have increased the proportion of learning in practice settings. We never assumed a scenario like this. The COVID-19 pandemic is a situation not intended neither for health, nor for the economy, nor medical education. Everything will undoubtedly change during this period. There may be new, moderate forms of quarantine, but the world will certainly not be the same when the pandemic passes.

Medical education is not immune to the heartaches produced by abrupt contemporary changes in our world, such as the COVID-19 pandemic. Unexpectedly, and on very short notice, people can no longer teach or learn alongside other people. The impact on the heart of the educational processes of the health professions is unprecedented. Suddenly, the status quo of undergraduate or graduate medical education has been called into question, perhaps for the better. The key concerns of yesterday,

such as the need to improve patient bedside learning or to enhance the experience of students in the clinical setting, in the clinical workplace, have a different meaning.

2. Continuing medical education during and after the pandemic

The arrival of the COVID-19 pandemic caused medical schools and faculties to interrupt their activities abruptly, recovering institutional capacities and making evident the strengths and weaknesses of each educational institution. The response in the undergraduate courses consisted in the migration of classes to virtual media, and the attendance of students to hospitals was interrupted to prevent them from being infected and could spread the virus in the communities.

In the case of students who were in undergraduate boarding school or in residencies, these were suspended and clinical rotations were replaced by the review of clinical cases by digital means. In graduate school, the resident physicians stayed in the hospitals and carried out a certain degree of theoretical activities and review of clinical cases on the Internet. Residents located in COVID hospitals suspended their scheduled clinical rotations and focused on responding to the pandemic by disrupting academic activities.

However, in contrast to the aforesaid, distance education remains rudimentary in supporting holistic professional learning. With the suspension of internships in colleges, medical educators must be creative in offering meaningful alternatives. Although virtual patients are not universally available and teaching practical procedures online is not yet feasible, clinical teachers can take advantage of the changes that are available in healthcare to adapt to COVID-19 crises. Additionally, COVID-19 can lead to unavailability of clinicians to teach as a result of the intense clinical workload generated by the disease. We may not be equipped with the tools to respond effectively [1].

The first response of most of the institutions in the world is to increase the use of "e-learning", especially online educational platforms and videoconferences. Strategies had already been imposed, more as support systems for face-to-face courses than as real online education. For initial or preclinical cycles, this may be a good answer, but questions immediately arise for which we still do not have an answer regarding the development of professional skills [2]. On the other hand, it highlights the differences in internet accessibility, either due to availability of equipment, connectivity, or the high consumption of data when it is done from mobile devices, which challenge equity in student access. The positive view of these processes is to reflect on how many of our usual face-to-face theoretical classes could be permanently replaced by this modality, accelerating the incorporation of methodologies such as flipped class or team-based learning.

Medical schools and colleges faced the challenge of maintaining their functioning and helping to respond to the pandemic. To this end, the following activities were developed, all of them supported by information and communication technologies (ICT) [3]:

- Maintain the undergraduate training processes: Because undergraduate students had to leave hospitals, training had to be migrated to ICT to assume totally a digital education.

- Preserve postgraduate training: Resident doctors remained in hospitals and many cases were reassigned to COVID areas, regardless of the specialty they were studying. Academic activities were maintained in most cases virtually.

- Strengthen continuing education: Medical schools and faculties implemented courses, webinars, and seminars to update physicians on preventive actions and the management of COVID-19 patients.

- Support the institutional management and coordination of telework: With closed institutions and with teachers and students located in different places, the coordination of activities and the organization of telework became decisive to develop synergistic actions between teachers and students and to maintain communication with the population.

- Promote access to scientific literature and information on COVID-19, and share it with governments, the health sector, and the general public, to guide evidence-based actions, help to reduce public distress, and avoid false news.

- Maintain communication and coordination with national and foreign experts, to keep abreast of the latest advances and set up collaboration networks.

- Generate research projects related to COVID-19: both local and participation in international multicenter studies.

- Establish advisory groups for governments: through interdisciplinary teams of experts made up of epidemiologists, infectologists, mathematicians, biostatistics, computer scientists, georeference experts, sociologists, and others.

- Provide remote medical assistance: through the installation of telephone assistance centers, telemedicine, and virtual hospitals.

- Organize volunteer student brigades, to strengthen health institutions with the care of non-COVID patients and facilitate the continuity of medical care.

- Take care of the physical and mental health of teachers, students, and workers: The faculties and schools implemented actions to assist their community, maintaining regular contact, establishing support units, and developing protocols for action in mental health.

- Produce medical equipment and personal protective equipment, supported by other university entities and businessmen, personal protective equipment was produced and some ventilators were even developed.

- Return to classrooms and clinical practices: A large part of the present effort is directed to organizing the return to face-to-face activities, preparing manuals with standards that include the use of masks, hand hygiene, and maintaining the minimum distance between people, or aspects such as ventilation.

Medical educators can leverage technology to enhance medical education at both undergraduate and graduate levels. Although the most recent initiatives, such as remote transmissions, have been introduced for a long time, traditional classes, lectures, and face-to-face didactic tutorials continue to be the most important cornerstone of medical education both in our country and abroad. In the case of the epidemic, we are experiencing and given the highly infectious nature of COVID-19, but as in most emerging infections in recent years, face-to-face interactions in large groups are sources of spread and transmission diseases and therefore should be avoided.

To avoid this, technology, for example, video conferencing and e-learning platforms, can be used to deliver them remotely *via* handheld devices and PCs. Faculty, residents, and medical students can initiate sessions at designated moments for them. In addition to lectures, teleconferencing is also being used to demonstrate

medical procedures and surgical techniques. In this way, a centralized teaching is carried out, even without the need to hold lectures or face-to-face talks. This is also a good opportunity to encourage medical students and residents to use online resources to facilitate their individual learning. In particular, in specialty residency programs with significant procedural weight, remote training through educational videos or online webinars can be integrated into these residency or training programs [4].

Some technological learning tools are also sure to become massive shortly. It will occur in both undergraduate and graduate degrees. Interactive whiteboards, connected to a computer, will be used even more. There the teachers write, project images or videos, and transmit them in real-time to distant places [5]:

1. Perfecting medical visualizations with 3D images will allow you to learn anatomy or diagnostic imaging.

2. On the other hand, thanks to the use of virtual microscopes, even more about human cells and tissues will be taught.

3. The use of mobile phones or electronic tablets for educational purposes will also increase. These devices will allow—thanks to the download of applications—among other things to receive tutoring for a certain exam.

4. The virtual will allow immersive and augmented reality experiences that will include hospitals, inpatient rooms, or patients. There are already designs that simulate real clinical scenarios, where students assume the professional role, take a medical history, propose diagnoses, and indicate treatments.

Faculties can then set up programs and hold online meetings to continue these types of discussions that further help students and residents consolidate their learning. Courses in subjects such as communication skills, medical ethics, and even clinical or statistical research can also be arranged through these online modalities for medical students or residents. There are already numerous experiences in this regard.

Some countries have shown concern regarding the development of some courses during this pandemic; such is the case of anatomy due to the disposition to cremate the bodies to prevent the spread of the virus, a situation that limits the obtaining of corpses for the development of classes [6]. Furthermore, although virtualization is a viable alternative for many universities, not all have the logistical facilities to implement it. On the other hand, although some contents of the clinical courses can be virtualized, the skills necessary for medical performance—such as performing the physical exam—can only be adequately learned with the patient and virtual adaptations are unsustainable over time; for this reason, some faculties considered it necessary to delay the start of this type of course until the end of the pandemic. While it is true there are many advantages in the virtualization process of courses, it is clear that some universities have and will have limitations to make this process concrete [7].

Advantages and limitations in the virtualization process of undergraduate medicine courses are as follows:

- Advantages

  - Reduces the possibility that students in clinical courses will get sick from COVID-19.

○ Reduces the possibility of contaminating patients and health personnel if they are asymptomatic carriers of the disease.

○ Avoid the use of personal protective equipment on non-essential personnel in hospitals.

○ It allows continuing with academic activities.

○ Facilitates the timely review of academic material, ensuring the delivery of updated evidence-based content to students.

○ It promotes digital learning in the new generations better adapted for it.

• Limitations

○ Not all universities have a digital platform to teach virtual courses.

○ Not all teachers have the ability to build adequate virtual content.

○ Requires a strong sense of self-motivation and good time management skills on the part of students and teachers.

○ The saturation of care work of doctors who are teachers will not allow them to dedicate themselves to virtual class-work.

○ It is not possible to virtualize all the contents of the clinical courses and some non-clinical ones (such as anatomy and the like).

○ Not all students can have access to a laptop, tablet, or smartphone for their classes.

○ Not everyone has an adequate internet or electricity connection; for example, if they are undergraduate students in rural areas.

○ Limits the collaborative learning experience.

○ Limits the presentation experience with live interaction.

○ Limits real-time feedback from face-to-face classes.

○ Unethical behaviors may occur more frequently (e.g., cheating during virtual evaluations).

But there is an unavoidable aspect that puts the development of competencies and their evaluation in tension. The presence of the student in the clinical environment is essential in medical teaching to acquire these skills. Presence that must be supervised requires close contact between teacher and students. The appearance of the coronavirus pandemic, highly contagious, in which the student can be a vector of infection, or can become infected, added to the dramatic change in the care model and the practices of health institutions, makes it necessary to recreate new forms of education combining technology and educational strategies to cushion the impact of the pandemic on the entire education process and continue in some creative way our way of teaching. On the other hand, the student's displays

of commitment and enthusiasm that lead to their participation in volunteering should be evaluated in light of the risks involved, if it brings them into contact with potential patients [8].

But medical education is not just about imparting specific knowledge and skills in a particular domain. A highly qualified surgeon or an experienced physician is not necessarily a good physician. In addition to domain-specific knowledge, holistic non-cognitive attributes such as teamwork, empathy, initiative, and compassion are important qualities to convey to medical students and residents. The participation of these medical students and residents as collaborators, the former, and physicians increasingly involved, the latter, to try to alleviate this crisis is something important not only for that purpose but for their general education as physicians. In this sense, we are not inventing anything new, there are antecedents. In 2003, during the height of the SARS outbreak in Singapore, medical students were asked to help with temperature checks [9].

With the COVID-19 crisis, residents of all medical and surgical specialties in very different locations have also been selected to take shifts on the frontline, where they have assisted with the detection of suspected cases in emergencies and elsewhere. In addition to alleviating labor shortages where labor was scarce, this has helped foster camaraderie among residents as part of the medical community, prompting them to feel like part of the teams fighting this pandemic. This, according to very different testimonies, the residents have been taught important lessons about courage, empathy, and teamwork [2]. It has also provided the opportunity for many residents to review their general medical skills, since in many cases many of them, who belonged to highly technical or specialized specialties, have had to care for patients with this infection. This is a great step in their training and development as medical professionals with more holistic perspectives.

In response to the lack of clinical practice, the first alternative seems to be to alter the academic calendar by postponing the practical load and increasing the clinical reasoning activities at this stage, or the elective activities related to the pandemic. Some institutions incorporate the use of virtual cases, surgical videos, and participation in telemedicine. We must also think creatively, how to maintain contact with virtual and real patients, as well as develop new forms of evaluation. This requires clear indications for students and supervisors because the electronic interface modifies the possibilities of giving feedback and modifies the observed competencies. Nor should we lose contact with the human aspects of pandemics, as literature and film can contribute as triggers for this understanding [10].

The COVID-19 pandemic has posed challenges in medical education globally. Each society has responded according to its possibilities and needs to take advantage of this situation as a learning opportunity, continue with education, and incorporate students as health workers in the countries where it was necessary. A crisis such as the COVID-19 pandemic involves making great efforts to carry out contingency plans that minimize disruptions or profound changes that occur in educational programs.

Many university professors who went through this situation agree that preclinical subjects have been taught, overcoming some inconveniences and without being prepared for such a hasty decision. For others, after this pandemic and forced "natural experiment" something may no longer be strange. Why not think about a preclinical cycle entirely online for future doctors. With users located in various parts of the world, even endowed with the ability to find the best teachers or courses thanks to one click. Exchanging face-to-face classes of 1 hour, for sequences of short videos or podcasts of no more than 15 minutes [11].

However, technology can and should be harnessed to allow students and residents to learn from these experiences and gain extra training in skills such as

clinical communication and medical ethics. Beyond the knowledge of a particular domain, the participation of medical students and residents in the clinical tasks that a pandemic like the one we are experiencing can be beneficial to develop another perspective on medicine and what clinical practice means and what it means. Time about what is expected of them as physicians. This type of crisis should be used to improve or instill non-cognitive holistic aspects such as leadership and adaptability. As medical educators, we can and must meet the challenge of continuing to teach even in times of crisis.

Before the outbreak of the SARS-COV-2 virus, online medical education had acquired some evolutionary features. She used to dealing with healthcare professionals who were geographically isolated and distant but connected through virtual communication. He provided solutions to hundreds of them immersed in demanding work hours, and with little flexibility in the agenda. It was based on collective learning, online collaboration, proactivity, and self-directed training [12].

Online had dispensed with the presence of educational leaders and managed to optimize interaction with them from a distance. It had generated between the participants an exchange—both synchronous and asynchronous—through chats, forums, or emails. COVID-19 has done nothing but selects those cited features of virtual education. Also, during these months, he has polished virtual-friendly technological educational tools. But it should not be repaired only in this present. It should be noted that the future seems to have changed a bit as well. Even the most skeptical no longer conceives the future of medical education, as something in total separates from technology and online.

In general terms, the educational emergency caused by the epidemic made evident the high frequency that the expository technique or oral presentation has in the educational activity by the teacher, who by not having the students in physical presence, perceived a lack of control and authority. In the same way, the student, under the same system, felt free and without directivity, which generated anxiety and anguish in not feeling his physical presence and having his direct surveillance; the teacher's immediate action was to commission homework, homework, and more homework, and the students were overwhelmed and disappointed by not receiving feedback.

Online education requires a differential planning of education with physical presence; the conjunction of a team of experts in various disciplinary areas is desirable, such as pedagogues, educational psychologists, software specialists, interactive, and graphic designers, among others, with which the online educational experience is highly meaningful for students [12].

The characteristics of teaching in virtuality include the following: the management of non-face-to-face asynchronous or synchronous educational organizations, transversal (multi or transdisciplinary) and holistic; student-centered, characterized by being flexible, cooperative, personalized, and interactive; the teacher will be a facilitator, who must be more collaborative than lonely, encourage/promote participation, recognize/accept the fact that they no longer have possession, with organizational skills, open to experimentation, and with the ability/ability to modify.

The use of ICT in teachers ranges from the resistance of its use to its formal use in education, with relative or little use for play, recreation, or social networks, while students use them little as an educational tool and their focus is on the play, entertainment, and especially on social networks. The previous dichotomy leads us to think in three moments about the knowledge, attitudes, and practice of ICT: appropriation, use, and access to ICT [13].

1. Appropriation: There is a difference in conceptualization and use between natives and digital immigrants; the former have grown and have developed

as a priority the playful and recreational aspect of digital technologies, especially social networks; in the case of the educational aspect, the job that is done consists of recovering the information, generally without discriminating the objective sources or of scientific certainty, and carries out its work by copying and pasting. The latter, digital immigrant teachers, can discriminate from sources, but their technological management often leaves much to be desired. Both require training, but not the same training, students to consume relevant information for their training and teachers train and train in the use of technology to strengthen the teaching-learning process.

2. Use: It has to do with knowing the potentialities that it offers in its scope of action, such as contributing to the development of other thinking skills (problem-solving) other than communicative ability. To develop these skills, critical thinking must be forged in the student that allows him to discriminate information on the network, evaluate it, verify its veracity, and be able to build new learning, because when thinking critically, arguments are accepted or rejected that later can be applied in different fields of knowledge, that is, establish a dialog between the student and the information that allows him to assess and abstract the arguments of use to the student, take a position before them, pose questions and answers to his personal and intellectual searches, solve problematic situations of his daily life, apply new knowledge to your life, and seek the improvement of the world around you. Thinking and interpreting in technology entail the creation of new educational scenarios.

3. Access: Two elements are inherent to access to ICT, one is inherent to the institution and the other to the student. ICTs are resources, tools, and programs that are used to process, manage, and share information through technological supports such as computers, laptops, cell phones, that is, hardware and software. The institution must provide resources and reliable means, of easy access and availability for teachers and students, but it must be ensured that the student has the appropriate resources for their distance education.

Face-to-face and virtual education are not the same, for us to be successful in virtual education we cannot directly apply what we do in physical presence and what is applied online, nor can it be replicated in a face-to-face class, each one has its methodologies and materials to make them work properly. So you have to adapt and redesign; in the virtual environment, people compete for attention, time, and space on the screen; in addition, students have greater control over the content and how they work with it and must take responsibility and practice autonomy, reflection, and reasoning.

Educational institutions must have robust, adequate, and sufficient technology, both intangible resources such as servers, computers, printers, and intangibles, such as platforms that allow them to carry out administrative, school, and teaching process management—learning. The platforms must have some characteristics such as centralization and automation, flexibility, interactivity, standardization, scalability, functionality, usability, ubiquity, and integration.

Educational institutions, in general, must carry out a process of technological reconversion that allows them to sustain the processes adjacent to the use of ICT. Thus, educational institutions should be supported by broadening their horizons to an institutional philosophy that considers ICT as fundamental elements in educational work, having financial sustainability that allows them to maintain high costs, recondition, and maintain the academic infrastructure for the good development of educational processes, in addition, with a teaching staff prone to change. The

reconversion must also be carried out in administrative, pedagogical, and institutional management. The training processes in virtual learning environments are essential for the success in the training of students [14].

3. Conclusion

The migration from virtual to classroom education is essential in medical education. It is not a substitute for clinical practice, face to face with the real patient; however, hybrid or mixed strategies and curricular redesigns should be sought in the immediate and mediate future of the training of the medical professional. Among the fundamental elements are not improvising, but planning in hybrid or mixed options; consider the differences between face-to-face and virtual education; managers must be involved in the transformation; carry out adequate and pertinent teacher training about ICT in daily didactic and pedagogical activity. Acquire the relevant technological equipment for migration, including servers, Internet capacity, and diagnosis of the needs of teachers and students to carry out the migration properly.

Students are comfortable with technology-based solutions to support learning and assessment, and with peer communication tools. Pandemic circumstances have pushed teachers to acquire skills in using online resources to teach and meet students like never before. Now, we lack patients and a professional care environment. A lot of work is needed to ensure the privacy of participants, compliance with data protection regulations, quality, inclusion and fairness, support for students and teachers, among other key issues. They can be resolved effectively through intra- and inter-institutional cooperation, preferably on an international scale. The COVID-19 emergency will eventually end. By then, the whole concept and system of medical education will have been reinvented, having served as an *in vivo* experiment. For now, universities and health institutions need to collaborate and promote new forms of distance professional education experiences. COVID-19 will have made us all more aware and interested in participating in this process.

As of this quarantine, every one of the universities, certain policies were generally adopted that were applied throughout the country: Face-to-face classes became virtual; universities have had to offer platforms to include their students and to be able to have classes online. This requires a smartphone that can connect to the respective platform with Internet paid for by the student, or laptop computers or iPad's, owned by the student. In the hospitals where I work (General Hospital of Zone No. 36 of the IMSS and General Hospital of Minatitlán) that are public, residents have all the means such as Internet to carry out their academic care work.

We use ICT a lot, whether for conferences *via* webinars, distance classes, and even on-call delivery. This is because some are rotating in other hospitals. In Internal Medicine, the visit pass, the interaction with the patient and with teachers and colleagues, can never be replaced by the Internet or other digital media. There will be greater and faster access to information through smartphones and computers, but human contact will always be necessary, to be equal to or better than the graduates of the "traditional" programs of medicine depending on the use given to them by each individual.

The new insurance doctors will be different from "the old ones." The simple fact of living in confinement due to the pandemic, implying that they suddenly cut their studies, has made them approach learning issues in different ways. New doctors have to face a "new normal" that we may not know what it will be like once we try to return to the life we had every day. Telemedicine is undoubtedly a tool that has accelerated its use and it seems that it will continue in various ways. They will have

to get used to teaching and learning in new formats, but at this point, the fact of reaching the comprehensive review of a patient live and in-person should be landed (see Section 4).

4. Complementary information

1. Alemán Bermúdez IJ, Vera León E, Patiño Torres MJ. COVID-19 and medical education: Virtuality from the perspective of the teacher and the student of higher education. Internal Medicine, Medical Education and Community 2020;36(3):116–123

2. UNAM School of Medicine. Post-COVID-19 medical education [Video Archive]. Available from: https://www.youtube.com/watch?v=WsytNWRtOdA [Accessed: 21 April 2021]

3. UNAM School of Medicine. Challenges of medical education in times of COVID-19: Institutional decisions in the face of the pandemic [Video Archive]. Available from: https://www.youtube.com/watch?v=RGhn-fW2424 [Accessed: 1 September 2020]

4. TecSalud. Best practices in medical education in time of COVID-19 [Video File]. Available from: https://www.youtube.com/watch?v=olaDLOBaf7U [Accessed: 7 July 2020]

5. National Academy of Medical Education. Medical education, from face-to-face to virtual in times of contingency [Video Archive]. Available from: https://www.youtube.com/watch?v=hmmCBSLCNvI [Accessed: 4 June 2020]

Author details

Nikos Christo Secchi Nicolás[1*] and Ángel de Jesús Gómez Alarcón[2]

1 President of the College of Internal Medicine of Mexico A.C. Board of Directors 2021, Minatitlán, Veracruz, México

2 Sub-Investigator of the Center for Medical Research and Specialized Care, Minatitlán, Veracruz, México

*Address all correspondence to: drsecchi@hotmail.com

References

[1] León Bórquez R, Valdez García J. Problems of medical education in Latin America with emphasis on Mexico in the context of the current crisis. In: Medical Education in a World in Crisis. Mexico City: Mexican Association of Schools and Faculties of Medicine, A.C; 2021. pp. 103-122

[2] Margolis A. Trends in distance continuing medical education. Research in Evaluation. 2013;**2**(1):50-54

[3] Crocker Sagastume RC, Esperón Hernández RI, et al. Medical Education in a World in Crisis. Mexico: Mexican Association of Schools and Faculties of Medicine, A.C. (AMFEM); 2021

[4] Herrera-Añazco P, Toro-Huamanchumo CJ. Medical education during the COVID-19 pandemic: Global initiatives for undergraduate, internship, and medical residency. Acta Médica Peruana. 2020;**37**(2): 169-175

[5] Núñez-Cortés JM. Medical education during the Covid-19 crisis. Elsevier Public Health Emergency Collection. 2020;**21**(3):157

[6] Vergara de la Rosa E, Vergara Tam R, Alvarez Vargas M, Camacho Saavedra L, Galvez Olortegui J. Distance medical education in times of COVID-19. Higher Medical Education. 2020;**34**(2):1-6

[7] Reynés-Manzur JN, Vázquez-Rivera M, Velázquez-Challa S, Kuri-Ayala S, Cravioto-Quintana P, Galván-Castillo F, et al. Learning management in times of COVID-19. Acta Pediátrica de México. 2020;**41**(Suppl 1):S137-S143

[8] Idrovo AJ. First lessons from the COVID-19 pandemic to Colombian medical education. Health UIS. 2020;**52**(2):87-88

[9] Costa MJ, Carvalho-Filho M. A new era for medical education after COVID-19. Medical Education Foundation. 2020;**23**(2):55-57

[10] Díaz Quiñones JA, Valdés Gómez ML. The COVID 19 pandemic and its implications in the conception, design and didactic instrumentation of Cuban higher medical education. MediSur. 2020;**18**(3):1-12

[11] Muñoz Cano JM, Maldonado Zalazar TNJ. Technological resources and the reconfiguration of medical education. Emerging Trends in Education. 2021;**3**(6):1-30

[12] Núñez-Cortés JM, Reussi R, García Dieguez M, Falasco S. COVID-19 and medical education, a look to the future. Ibero-American Forum of Medical Education (FIAEM). Elsevier Medical Education. 2020;**21**(4):251-258

[13] Santos-Peyret A, Durón RM, Sebastián-Díaz MA, Crail-Meléndez D, Gómez-Ventura S, Briceño-González E, et al. Digital health tools to bridge the epilepsy care gap before, during and after the COVID-19 pandemic. Journal of Neurology. 2020;**70**:323-328

[14] Sánchez-Duque JA. Medical education in pandemic time: The case of coronavirus disease 2019 (COVID-19). Educación Médica. 2020;**21**(4):259-260