

Modifications to the delivery of a gross anatomy course during the COVID-19 pandemic at a Mexican medical school

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SUMMARY

The Coronavirus disease was declared a pandemic this year, causing an impact on medical education. Following the World Health Organization's (WHO) recommendations, Universities around the world implemented social distancing and the use of online platforms. Anatomists lead medical students, most of which are part of Generation Z. Different technological tools have been used in the gross anatomy course in combination with face-to-face classes, but now are forced to move exclusively online. The Human Anatomy Department in the Medical School of the Universidad Autónoma de Nuevo León (UANL) implemented asynchronous sessions as a short-term resolution, transformed to synchronous sessions as the pandemic progressed. It is important to consider the adaptability of the student, the near-peer teacher, and academic staff, with the creation of innovative ideas to facilitate the learning for the student and to maintain the quality of the course. Their role in this modality should be assessed, as it may change medical education and the way to teach in the fu-

ture for the new generation of medical students. Professors' roles are changing and it is necessary to adapt to new situations.

Key words: Medical Education – Covid 19 – Human Anatomy – Coronavirus – Near-peers – Academic staff – Students

INTRODUCTION

Coronavirus disease 2019 (COVID-19) was formally declared a pandemic by the WHO [World Health Organization] (WHO, 2020). It has created a lasting impact on the global economy and work strategies, as well as an educational approach with the implementation of social distancing. One of the more under-recognized and enduring repercussions will be on medical student training. (Baker et al., 2020). In Mexico, the first positive case was reported on February 28, 2020 (Secretaría de Salud, 2020), reaching Monterrey in the next two weeks (March 11th), one of the three major cities, with over 6 million in population. Its state University, Universidad Autónoma de Nuevo León (UANL), with over 140,000 students, acted quickly and suspended courses 3 days later, with the upcoming spring break two weeks away. Some schools and courses with prior experience were able to move to online platforms. However, this was not the case for all, as has been reported for many low- and

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middle-income countries (LMIC) (Cecilio-Fernandes et al., 2020). The UANL's medical school currently enrolls over 7,500 students in its 6-year program, and with an undefined period of time for the pandemic, planning to fully transfer the rest of the semester online, was a challenge.

Recent reports conclude that many educators in diverse settings and institutions have been pleasantly surprised by how quickly they were able to transfer their courses online (Eva, 2020; Fernandez-Altuna et al., 2020; Laohawetwanit, 2020; Taylor et al., 2020). The UANL medical school was not an exception, with a transition of courses and practices (laboratory activities) to an exclusively online platform after spring break. The Gross Human Anatomy course has approximately 1,200 students, which are divided into groups of 45 students, and then broken down to discussion groups of 6-8 students for clinical and imaging sessions. Taking into consideration that most students belong generation Z (2000-present), they have grown up with hyper-connection with widespread access to computers and the internet, making them confident with technology, and prefer self-study using electronic resources to didactic teaching (Kron et al., 2010; Boysen et al., 2016; Ekleberry-Hunt et al., 2018; Ruzycski et al., 2019). In Mexico, 88.1% of the population has access to a Smartphone, with the highest use among young adults and teenagers, although only 56.4% have access to an Internet connection at home, and 96.4% of these users had undergraduate education (Fuentes-Ramírez et al., 2020; INEGI, 2020).

UANL'S PANDEMIC MANAGEMENT

To avoid canceling the semester, the academic staff quickly organized the recording of classes before spring break to continue with an asynchronous course online. Case discussions and laboratory activities could be continued in the already existing "Anatoboard," an online platform developed between academic staff and software engineers with periodical updates during the past decade to meet the specific needs for the UANL's human anatomy course. It facilitates interaction with students creating discussion forums, applications of daily lecture-based quizzes, viewing of prosection images (images avoid body identification and cannot be downloaded; students accept ethical and professional behavior terms and conditions prior to using the platform), identification of anatomical structures, and reasoning of clinical anatomy cases. Video-control questionnaires (questions based on the video content) and forums were developed for discussion of topics. Certainly, this pandemic generates the opportunity and need to update and modify Anatoboard in order to adapt the course to a fully online modality. As a backup plan, all classes for the rest of the semester were recorded and uploaded to the platform. However,

after viewing the severity of the pandemic, and an undefined period for social isolation, the course was redesigned. Pre-recorded videos can be tedious and lack real-time feedback (asynchronous). The course was moved to live-stream (synchronous) using Microsoft's TEAMS (Microsoft Corporation, Redmond, USA) to ensure a real-time interactive platform. The clinical case and imaging sessions were also recorded with the aid of senior (with more than ≥ 3 years of experience) near-peer teachers (NPT), with evaluations and workbook activities included.

Laboratory activities are a valuable element in the course. Dissection and prosection practices are designed not only to review and strengthen anatomical concepts and clinical correlation, but also to promote ethical values essential for medical practice such as humanity, empathy, and respect (Rizzolo, 2002; Lempp, 2005; Pawlina, 2006; Gosh et al., 2017). These are enhanced during a final ceremony session held at the end of each semester, in which the students make a reflection in front of a cadaver that is covered similar to a recently deceased patient, to demonstrate respect and gratitude while reflecting on the value of body donation (Jones et al., 2014; Quiroga-Garza et al., 2017). At the beginning of the 2020 course, students had dissection and prosection practices, which had to be suspended due to COVID-19. However, students continue with prosection activities in our online anatomy platform. The final session will be implemented through live-streaming on Microsoft's TEAMS.

Before the COVID-19 pandemic, many novel tools had been used in medical education. For example, the group chat application WhatsApp (WhatsApp Inc., Mountainview, USA), was and continues to be used by many trainees for both sharing of medical knowledge and collaboration (Kochar et al., 2018). Twitter (Twitter Inc., San Francisco, USA) continues to be an important outlet for many physicians both to learn and disseminate information on a global scale (Alraies et al., 2018). While these tools provide a useful virtual and social outlet for medical education, they often lack the depth and organization to reliably implement an educational curriculum. In the COVID-19 era, the need for innovative solutions to optimize educational endeavors has accelerated. The National Autonomous University of Mexico (UNAM) implemented Telegram (Telegram Messenger Inc., London, United Kingdom), as an instant messaging service to communicate with students at any time (Fernandez-Altuna et al., 2020). At the UANL, Microsoft Teams has facilitated continued fellowship educational activities similar to reported by other institutions. The ExamSoft program (Apple Inc., California, USA) had already been used by the school as a green solution for course assessment. However, it was used within the classroom. This has now been the platform used for assess-

ment with students in their homes, with a time limit set for the exam to avoid misconduct.

Learning through innovative approaches with the current technologies is an important challenge for the academic staff and the NPT. Technology availability has not been a problem in the 21st century, as most students have access to the necessary technologies, software, and programs to integrate online learning. The challenge is to be creative and find innovative ways to meet the students' educational needs and expectations, while effectively teaching gross anatomy with clinical relevance, and maintaining their attention.

Students

COVID-19 pandemic is causing enormous changes in society and health care, especially in Medical Education (Greenhalgh et al., 2020; Michels et al., 2020). Similarly, to our university, the UNAM medical school in Mexico City implemented social distancing and the use of different tools to provide their courses online (Fernandez-Altuna et al., 2020), European medical universities are closed, and distance learning was implemented. However, these activities face obstacles. It is uncertain whether students and trainees will reach all predefined competencies during this pandemic (Ahmed et al., 2020; Cecilio-Fernandes et al., 2020). Medical schools and training organizations have been implementing 'blended learning' during the past 10 to 15 years, using online training alongside traditional teaching activities. However, even with technological advances, many face-to-face activities remain such as classroom teaching, small group sessions, and skills training with or without simulated patients (Rose, 2020). These activities are not always easy to replace, and the collaboration between students, NPTs, and academic staff is an important aspect to maintain. The new generation of students is largely digitally literate, easily interacting with web-based approaches (Durosaro et al., 2008), so a transition to online learning is viable. However, the lack of physically present peers and instructors can lead some to have negative learning experiences. Practicing ethical values such as empathy and respect, speaking in front of large groups, and developing interpersonal relationships, could be affected by this online modality due to the lack of physical interaction. This also raises concerns about the cognitive load placed on students through the change of learning environments, and whether the pace of change during the pandemic leaves little mental capacity to construct knowledge (Schwonke, 2015). Ideally, student learning in this new environment requires explicit monitoring of cognitive processes to minimize cognitive overload (Valcke, 2002). A study by Broadbent and Poon (2015) highlighted four strategies students require for online learning: time management, metacognition, effort regulation, and critical thinking (Broadbent

and Poon, 2015).

Undoubtedly, students' adaption to all implemented changes at COVID is challenging. The students have made comments regarding the advantages and disadvantages of this modality. These include the facility for asking questions at any time using the MS TEAMS platform, more timely access for studying by removing the need for transportation between their home and University, as well as between classrooms. The primary disadvantages include the need for a high-quality internet connection at all times during lecture hours, and the distractions presented at home. Before the transition to a full online semester with synchronous classes, the school performed an internal survey to determine the possibility of students continuing in the proposed modality. A total of 98% of the 7,697 students currently enrolled confirmed a 100% online modality to be viable to their resources. The remaining 2% of students were offered different options, according to their needs (i.e. lending of smart devices, internet access on school grounds with social distancing, suspending their semester, others). A well-designed questionnaire will be needed to evaluate these aspects, to consider in the evolution of medical education post-COVID-19 pandemic.

Near-Peer Teachers

The NPT's role changed in this new modality. With active participation in the class/sessions, NPTs now focus primarily on developing complementary material for the students, to share in the chat activated within MS TEAMS during synchronic classes. They also create quizzes for knowledge and understanding evaluation. Optional synchronic online reviews of the most difficult and confusing topics are made available by NPTs to students on a weekly and monthly basis. These are previously authorized by the academic staff and supervised by senior NPTs or professors.

Students perceive NPTs as an aid in resolving questions that arise in class, a peer that provides academic and emotional support, and someone who helps increase confidence, reduce anxiety and creates a comfortable surrounding (Bulte et al., 2007; Hall et al., 2014; Boyd et al., 2019). In this case, the different NPTs need to have the role of the teacher and to be the communication bridge between the academic staff and the students. They also need to be active during the sessions and help with questions, while providing constructive feedback. In our University, they have an added value, as senior NPTs impart some of the clinical and imaging sessions. The recommendations for interactive online learning to be effective is that the NPT explicitly encourages questions (Slanetz et al., 2020). This can be accomplished by either stating upfront that questions are encouraged at any time or pausing frequently and asking for questions. Sometimes providing prompts, such as

asking for the modality, an imaging view or finding, can engage students more successfully.

Academic Staff

The Academic staff might be the most affected in this new modality because their new role is still unclear, with some points for consideration.

First, the small groups help educators to identify and respond to students' learning needs, especially those at risk of underperforming (Kumar Ghosh and Kumar, 2019). Further, delivering anatomy education solely online or at a distance, if only for a short period, challenges the long-held educational philosophy of many anatomy educators (Pather, 2015). A technological challenge for those of older generations. Additionally, for those who strive to frame their anatomy programs through a lens of ethics and humanism (Štrkalj and Pather, 2017; Evans et al., 2018; Hildebrandt, 2019), there is a need to work harder to connect students to these paradigms when educating solely within the digital realm, and in the absence of a once-living person (Kumar Ghosh and Kumar, 2019).

The students' mental wellness, both before and during the pandemic, is of concern to educators. While academics grapple with how to deliver anatomy education online, there needs to be an awareness that students require support in the transition to learning face-to-face to an online platform (Blackley and Sheffield, 2015; Pather et al., 2020). Educators must be cognizant that many students report feelings of social disconnectedness, missing familiar teacher immediacy, and likewise missing interpersonal interactions and social cues they typically have in "traditional" learning environments (Slagter van Tryon and Bishop, 2009).

The academic staff needs to change the modality to focus the attention of the class. The students watching lecture recordings can also become easily distracted by other activities such as engaging with social media (Zureick et al., 2018), and, unlike in a live lecture, this is not easily addressed by the educator. Instead, such a lecture session should be re-designed to provide a series of short 5-7 minute videos that are engaging in their format and focus on one or two concepts or themes, and which are interspersed with other learning objects such as a mini-quiz, a case study, interactive technology or activity task such as a live discussion (Mayer and Moreno, 2003; Jang and Kim, 2014; Dong and Goh, 2015; Evans et al., 2020; Greene, 2020).

Effective online learning requires all this effort: a pedagogical focus to ensure the best learning opportunities to enable student success must be provided. If anatomists get this wrong, then student learning will suffer as a result, the student experience will be poor and professional reputation will begin to deteriorate. It is already clear that students are questioning whether online learning should cost the same as face-to-face classes

(Turner and Rowan, 2020). One particular challenge for anatomy educators in transitioning to the online world is how to approach assessment and the need to develop assessments that continue to meet quality, access and assurance requirements (Evans et al., 2020)

A formal evaluation of the academic, teaching/learning, psychological, and social aspects for educators are also needed. The transition to an online modality did not consume more time for the academic staff, as the teaching material is edited every semester by a review team, and shared between all staff, to maintain a standardized slide presentation content and quality. However, differences between the younger and older staff, technological availability, working areas in their homes, the presence of small children in the house, among other variables needs to be assessed. Research activities were transferred to online platforms as well, to continue journal club sessions and working sessions with collaborative mentoring (Elizondo-Omaña et al., 2019). However, some experiments and studies have been paused by the social distancing, while online research and activities continue.

Student and academic staff feedback regarding the management during the pandemic is still in early phases at the UANL, as is in many parts of the world. A complete evaluation of the perspective and efficacy of these tools will be needed at the end of the academic year. Systematic revisions will be of great value to analyze published data, to determine the future course of actions and evolution of medical education.

Conclusion

Mexico is currently in phase 3 of the pandemic and will finish its semester courses online. Anatomists are leading the way in teaching the most prevalent generation of medical learners of today, and have been involved in the development of digital resources. The pandemic has challenged education and forced a rapid integration of virtual and experiential learning opportunities. Most institutions have embraced technology as a means to maintain normalcy. In the post-COVID 19 era, we believe the virtual platforms can be an excellent complement to medical education. A virtual learning platform provides a sustainable, high-quality educational infrastructure that fosters participation and collaboration. The effects in student knowledge, understanding, output, and application are still to be determined and compared. Results may very well pave a new path for the education of the new generations. Although the pedagogic/academic staff has always played a vital part in education, COVID-19 may change the role educators play and how to teach in the future. Future studies will be necessary to evaluate the satisfaction and perception of the medical student and academic staff with a complete online modality, as

well as the performance obtained. A review of published articles may also help evidence the outcome across different modalities, for this could be the start of a new era in medical education.

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