

Learning in surgical residences during the COVID-19 pandemic in Mexico

Aprendizaje en las residencias quirúrgicas durante la pandemia de COVID-19 en México

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Abstract

Objective: To bring up which was the surgical resident's perception about their learning experience during COVID-19 pandemic and if it interfered or not with their classes. **Method:** Cross-sectional observational study through an anonymous survey conducted among surgical residents. The Mexican Association of General Surgery, through its Women in Surgery Committee, created a questionnaire that included 40 questions. **Results:** 465 participants were included in the survey: 225 women (48.3%), 240 men (51.7%); of 32 entities, only 26 participated. A great part of them said their skills and abilities were affected because elective surgeries were called off. While 303 residents stayed at hybrid hospitals, while a third of them were at 100% Covid facilities. Residents who were on call worked at COVID-19 units. They continued attending class through online platforms and only 134 were able to practice their skills using simulators. 71% of the residents were infected with COVID-19, all were tested to confirm it, and the number of asymptomatic cases was unknown. **Conclusions:** COVID-19 pandemic has affected the learning process of surgical residents in Mexico.

Keywords: Learning. COVID-19 pandemic. Medical education. SARS CoV-2. Learning in México.

Resumen

Objetivo: Citar cuál fue la percepción que tuvieron los médicos residentes quirúrgicos sobre su aprendizaje durante la pandemia de COVID-19 y si continuaron o no con sus clases. **Método:** Estudio observacional, de corte transversal, mediante una encuesta anónima de 40 cuestionamientos diseñada por el Comité de Cirujanos de la Asociación Mexicana de Cirugía General, aplicada a los médicos residentes quirúrgicos. El tamaño de la muestra fue a conveniencia. **Resultados:** Se incluyeron 465 participantes, de los que 225 fueron mujeres (48.3%) y 240 hombres (51.7 %). De 32 entidades, solo participaron 26. La gran mayoría opinaron que sus habilidades y destrezas se vieron afectadas por la suspensión de cirugías electivas. Estuvieron en hospitales híbridos 303 participantes y en hospitales 100% COVID-19 una tercera parte. Las guardias fueron realizadas en áreas COVID-19 y continuaron con sus clases a través de plataformas digitales; solo 134 realizaron prácticas en simuladores. El 71% de los médicos residentes se contagiaron de la enfermedad; el diagnóstico fue corroborado con una prueba y se desconoce el porcentaje de casos asintomáticos. **Conclusiones:** La pandemia de COVID-19 afectó el aprendizaje de los médicos residentes de especialidades quirúrgicas en México.

Palabras clave: Aprendizaje. Pandemia COVID-19. Educación médica. SARS CoV-2. Aprendizaje en México.

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*“What is life? A frenzy.
What is life? An illusion, a shadow, a fiction,
and the greatest good is small;
for all of life is a dream,
and dreams, are just dreams.”*

Pedro Calderón de la Barca

Introduction

When the COVID-19 pandemic hit Mexico on February 27, 2020, we were not prepared to face it. The rapid growth of the virus, which resulted in so many deaths, led to social distancing measures to reduce contagion. This gave rise to “social distancing,” which suddenly forced us to continue the activities of medical residency programs established by universities in a virtual way through online platforms. In January 2021, the United Nations Educational, Scientific and Cultural Organization (UNESCO) reported that more than 800 million students, equivalent to over half of the overall student population, continued to face significant disruptions in their education due to the pandemic. In Mexico, a total of 1720 doctors entered the general surgery specialty through the National Medical Residency Examination (ENARM) in 2020, and 1892 in 2021¹.

Distance electronic learning is defined as the use of computer technology to impart knowledge, including technology-supported learning, whether online, offline, or both². However, for surgical residents, in addition to theoretical knowledge, skills and abilities acquired in the operating room are required. This could be improved by using laparoscopic trainers built by students themselves, or in laparoscopy training centers if available at the hospital, or even better, by using robotic models the resident can use to perform procedures. Furthermore, rotations to other hospitals were postponed from the first peak of the pandemic. Therefore, the COVID-19 pandemic negatively impacted the education of surgical residents³. Nonetheless, it also served as a reason to delve into research on teaching methods⁴.

The Committee of Female Surgeons of the Mexican Association of General Surgery (AMCG) designed and sent an anonymous survey to surgical residents to find out if they continued with their academic programs and how they managed their learning during the SARS-CoV-2 pandemic. The participants agreed to the dissemination of the results.

The aim of this study was to identify the perception that surgical residents had about their learning during the COVID-19 pandemic, and whether they went on with their classes.

Method

This was an observational, cross-sectional study conducted using an anonymous 40-item survey designed by the AMCG, which was administered to surgical residents in most states of the Mexican Republic where a female surgeon was responsible for disseminating information and answering questions from participants. The survey was conducted from April through May 2022, and the sample size was left at the convenience of the participants who agreed to disseminate the results from the research, and were informed of the objective at the beginning of the survey, which included a privacy notice.

Results

A total of 465 participants completed the survey, 225 of whom were women (48.3%); and 240, men (51.7%). There was distribution across different states as shown in figure 1: only 26 out of 32 centers participated, with Nuevo León, Veracruz, and Mexico City leading in the largest number of participants involved (Fig. 1).

The largest age group among respondents was between 25 and 30 years old, and the institution with the largest number of participants was the Ministry of Health (Table 1).

The pandemic damaged all aspects of life and education, and surgical students were not strangers to this reality. When asked on their perception of the learning they received during the pandemic, none considered it appropriate, most considered it barely sufficient, and 7.5% completely insufficient. Many of them did not receive any feedback during classes either (Table 2).

Regarding practices on simulators, women practiced more than men did (Table 3).

Discussion

Several changes occurred during the education of surgical residents during the COVID-19 pandemic. Mexico faced an unprecedented challenge, as did many other countries, according to several authors. A research conducted in Afghan universities found

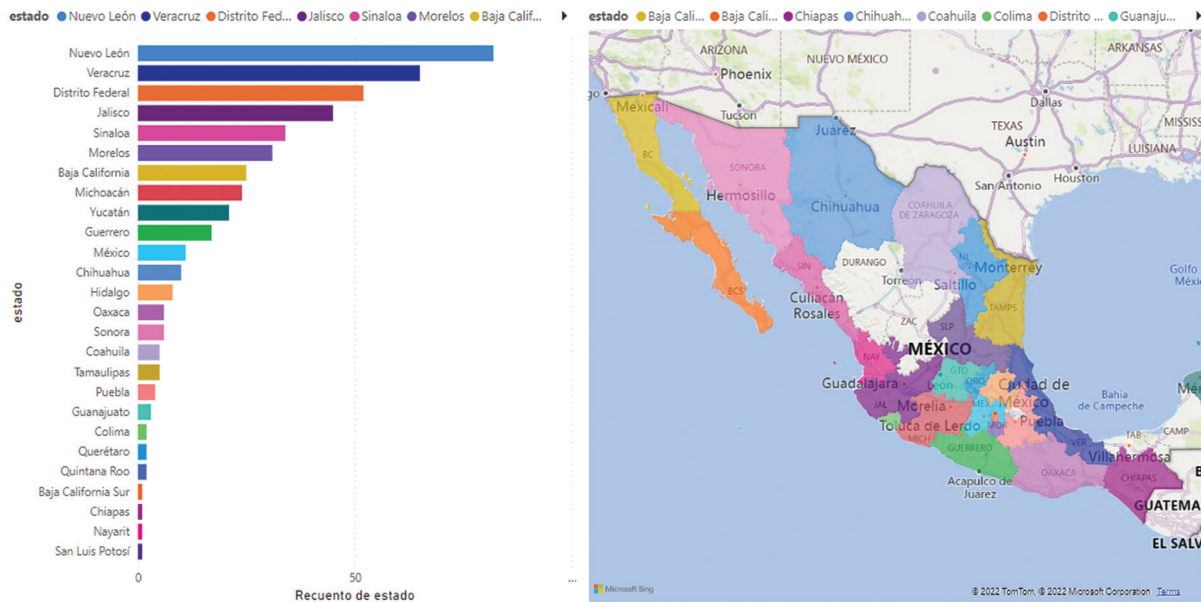


Figure 1. Participation in each state of the "Learning during the pandemic in residencies" survey.

that almost all students still preferred in-person classes even during the chaos caused by the pandemic⁵, while the best health care systems were being put to the test, online learning took on multifaceted forms, grew, and developed, and we ended up learning a wide array of synonyms and meanings for online education^{6,7}.

The fact that most residents were familiar with virtual platforms and had access to technology was helpful because it allowed classes and in-person discussions to transition to an online format, even though most teachers had limited experience with it. In an effort to improve and continue with the educational programs for residents, or at the very least, maintain the level of education, decisions were made simultaneously as the pandemic grew and intensified over weeks, and various adaptations were made abruptly in the learning processes. An example of this is the way in which the survey respondents were evaluated: their exams, which were previously held in person, were conducted via Zoom, challenging the traditional models. Similarly, in a nationwide survey, surgical residents from Singapore reported that this format was highly successful⁸, although this was not the case in our surveyed group. Additionally, students at the Anderson Cancer Center in Texas, United States were satisfied with the speedy internet service provided to them, although we should mention that the survey conducted at this hospital was not anonymous,

potentially limiting honest opinions, unlike our study where anonymity was maintained, and respondents freely expressed their dissatisfaction. Furthermore, 87% of students from the said center reported using group chat and actively participating⁹, whereas in our study, respondents expressed dissatisfaction with the frequent internet service failures during classes and exams. When the problem escalated, they turned off their cameras and microphones to facilitate platform access. A total of 61.5% of the residents did this, citing reasons such as not being visible during online classes, getting distracted more easily, and having limitations in participating during the classes. The students' perception that online teaching did not match in-person teaching was also seen in the United Kingdom in a national survey conducted among medical students¹⁰. Online learning, when well-designed, undoubtedly has significant benefits as described by various authors, including information accessibility, affordability, and flexibility¹¹. However, online classes were rated as unsatisfactory in this study and by several other authors¹². In Canada, it was concluded that the students' perceived ease of using technology is directly proportional to their satisfaction with online learning¹³. Similarly, this perception varies depending on the specialty being taught, and the researchers reported that online teaching was entirely satisfactory in non-surgical specialties like pathologic anatomy^{14,15}. Medical students in Egypt prefer in-person classes¹⁶,

Table 1. Demographic data of participants

	n (%)
Gender	
Man	240 (51.7)
Woman	225 (48.3)
Age group, years	
22-24	4 (0.9)
25-27	180 (38.8)
28-30	200 (43.1)
31-33	74 (15.9)
34-36	3 (0.6)
37-39	1 (0.2)
> 40	2 (0.4)
Degree being pursued	
First	167 (36.0)
Second	118 (25.4)
Third	89 (19.2)
Fourth	78 (16.8)
Fifth	8 (1.7)
Sixth	2 (0.4)
Seventh	2 (0.4)
Hospital where specialization was being conducted	
IMSS	155 (33.4)
ISSSTE	70 (15.1)
PEMEX	6 (1.3)
Private	11 (2.4)
SEDENA	1 (0.2)
Secretary of Health	222 (47.7)
Specialization	
Colon and rectal surgery	4 (0.9)
Endocrine surgery	2 (0.4)
General surgery	358 (76.9)
Oncological surgery	10 (2.2)
Plastic surgery	7 (1.5)
Thoracic surgery	2 (0.4)
Gynecology and obstetrics	42 (9.1)
Neurosurgery	7 (1.5)
Otorhinolaryngology	9 (1.9)
Traumatology and orthopedics	18 (3.9)
Urology	6 (1.3)

considering them better, similar to the preferences of the residents in this study. Recommendations for improving online classes include enhancing student interactivity, which is highlighted as the most significant¹⁷, along with fostering “social presence,” as it was found to positively impact the process^{18,19}. The suspension of elective surgeries in most hospitals further limited the development of skills and abilities, as was the case in other countries³, where elective surgeries were postponed, and only emergency surgeries were performed. A total of 32.7% of the study respondents said that their hospital only treated COVID-19 patients, 65.2% treated both pandemic patients and emergency surgeries, while 1.7% said that their hospital remained

unchanged, which explains why none of the respondents in this study considered learning was appropriate during that time. While most considered it barely sufficient, 7.5% deemed it completely insufficient. This pattern was also seen in ophthalmology residents in Jordan, where 68.2% believed online programs could play a partial role in clinical training, while 31.8% believed no clinical part of medical training could be implemented electronically²⁰. Neurosurgery residents from various medical centers agreed with the perception that limitations on surgeries in their centers affected their learning and skill development²¹⁻²³. However, there was a discrepancy in the opinions of neurosurgery residents in the United States²⁴. We should mention that many surgical specialty teaching hospitals in Mexico do not have training centers. In this survey, 21.8% reported having such centers, but few residents managed to continue their practices, either at the training center in hospitals or at home using simulators built by themselves. Female residents practiced more hours than males did. We should mention that while residents are adults, they are still in training and are required to keep their cameras on. A total of 48% of respondents reported that during online classes, it was inevitable to get distracted when they were not visible. They often engaged in other activities unrelated to the class simultaneously. Some authors recommend improving students' sense of self-efficacy, which can be achieved by measuring goal incentives, emotional stimulation, and competition-cooperation to make the class more successful²⁵. This might have been lacking for our students. We should remember that the role of the teacher is crucial in making the class interesting and engaging and promoting student interaction to achieve meaningful learning, despite the significant stress experienced by residents when facing the SARS-CoV-2 pandemic, as mentioned by the group from Bangladesh²⁶.

Little was written about this important condition. Most respondents were general surgery residents, a total of 358 from the sample, with a predominance of 1st and 2nd-year residents, who are likely the most affected. However, the full extent of the impact will only be known after they complete their training. There was limited participation from subspecialties. Universidad Nacional Autónoma de México proposed extending medical residencies by an additional year to compensate for the lost practice hours, but after extensive surveys, this was not accepted by most residents²⁷.

Surgeons and surgical residents were on the frontlines when the first wave of the pandemic hit,

Table 2. Perception of learning of surgical residents during the COVID-19 pandemic in Mexico

	n (%)	n (%)
Proper learning	92.5% sufficient	7.5% insufficient
Was your hospital turned into a COVID hospital?	Yes 152 (32.7%)	Hybrid 303 (65.2%)
Were your shifts relocated to the COVID area?	Yes 430 (92.5%)	No 35 (7.55%)
Were you already familiar with virtual platforms prior to the pandemic?	Yes 245 (52.6%)	No 220 (47.4%)
Were the classes held online?	Yes 344 (73.9%)	No 121 (26.02%)
Did you remain visible during the online class?	Yes 179 (38.4%)	No 286 (61.5%)
Did you attend online classes while engaging in another activity simultaneously?	Yes 242 (52.0%)	No 223 (48%)
Was there feedback in online classes?	Yes 293 (63.1%)	No 171 (36.9%)
What type of feedback?	Analysis 130 (27.9%) Debate 38 (8.2%) Discussion 140 (30.2%) None 157 (34.0%)	
Does your hospital have a laparoscopy surgery training center?	Yes 134 (28.8%)	No 331 (71.2%)
Was your practice supervised?	Yes 144 (30.9%)	No 321 (69.0%)
Did you contract COVID-19?	Yes 331 (71.1%)	No 134 (28.8%)

Table 3. Number of hours practiced by surgical residents during the COVID-19 pandemic in Mexico

	Women (%)	Men (%)
1-2 hours	39 (16.3)	34 (15.2)
3-4 hours	8 (3.6)	10 (4.2)
5-6 hours	3 (1.3)	6 (2.5)
> 7 hours	9 (5.0)	7 (2.9)
Did not practice	165 (73.3)	183 (76.2)

as evidenced by the chaotic 71.1% of surgical residents who contracted the disease, confirmed by a positive test. Asymptomatic cases are unknown because this group was not tested, and unfortunately, COVID-19 tests were scarce. Mexico had the highest rate of healthcare workers contracting COVID-19 compared to other countries: 36.5% in Canada, 9.6% in the United States, 9.6% in Kuwait, 23.1% in Saudi Arabia, and only 1 resident tested positive for COVID-19 in Italy and Serbia. Approximately 36.5% of the remaining respondents tested negative for the disease, while the remaining 61.5% were not even tested²⁸. We should mention that only half of the respondents treated patients with COVID-19. Medical students and interns were indeed pulled back for most of the

pandemic duration in this sample, something that unfortunately did not happen in other countries. For instance, the University of Birmingham in the United Kingdom sent 700 volunteer students to support doctors during the pandemic in their country²⁹. Additionally, in several countries, students were asked to voluntarily join the ranks of doctors to treat patients with COVID-19²⁹. We do not know the extent of contagion in this group of students and interns, especially in places where they actively participated.

Ensuring the care of health care workers' families would improve their confidence and availability in this workforce. However, until this happens, concerns about virus transmission to family members need to be addressed³⁰. We hope that this will occur soon, as it is considered as important as providing personal protective equipment.

The pandemic caused by SARS-CoV-2, according to the perception of this sample, negatively affected the learning of surgical residents more than other medical specialties, although the extent of this impact is unknown. Future analysis may provide further insight on this regard.

Conclusions

The unprecedented COVID-19 pandemic, according to the perception of this sample, had a negative

impact on the learning of surgical residents in Mexico. Nonetheless, the knowledge gained will better prepare us to face future challenges or pandemics.

Funding

None declared.

Conflicts of interest

None declared.

Ethical disclosures

Protection of human and animal subjects. The authors declare that the procedures followed were in accordance with the regulations of the relevant clinical research ethics committee and with those of the Code of Ethics of the World Medical Association (Declaration of Helsinki).

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors have obtained approval from the Ethics Committee for analysis and publication of routinely acquired clinical data and informed consent was not required for this retrospective observational study.

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