

ORIGINAL

Difficulties faced by medical students during the COVID-19 pandemic

Dificultades enfrentadas por los estudiantes de medicina durante la pandemia de COVID-19

Juan Manuel Invernizzi Prats¹  

¹Universidad María Auxiliadora, Asunción. Paraguay.

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Corresponding author: Juan Manuel Invernizzi Prats 

ABSTRACT

Introduction: during the COVID-19 pandemic, medical education faced a rapid transition to virtual modalities that impacted clinical and theoretical learning. Health restrictions limited access to hospitals and practices, affecting student training. This study analyzes medical students' perceptions of virtual teaching during the pandemic, their main difficulties, and the resources used.

Objective: to identify the problems associated with virtual medical education during the COVID-19 pandemic, evaluate the availability of technological resources, and analyze students' perceptions of the effectiveness of distance learning.

Method: an observational, descriptive, cross-sectional study with a quantitative approach was conducted. The population included 134 final-year medical students from a private university in Asunción. Data were obtained through validated surveys and analyzed statistically.

Results: seventy-three percent of participants were women, with an average age of 24,6 years. Ninety-nine percent had internet access, and 88 % learned to use new educational platforms. Laptops were the main tool used. Sixty-one percent expressed satisfaction with virtual education, highlighting the availability of materials and the increased time available for studying. However, 54 % reported difficulties in maintaining grades, and 60 % considered the clinical knowledge acquired to be insufficient.

Conclusions: students recognize advantages in virtual education, such as flexibility and access to resources, but emphasize the need for in-person practice for comprehensive medical learning and adequate clinical preparation.

Keywords: Medical Education; Virtual Teaching; COVID-19; Medical Students.

RESUMEN

Introducción: durante la pandemia de COVID-19, la educación médica enfrentó una rápida transición hacia modalidades virtuales que impactaron el aprendizaje clínico y teórico. Las restricciones sanitarias limitaron el acceso a hospitales y prácticas, afectando la formación de los estudiantes. Este estudio analiza las percepciones de los estudiantes de medicina sobre la enseñanza virtual durante la pandemia, sus principales dificultades y los recursos utilizados.

Objetivo: identificar los problemas asociados a la educación virtual en medicina durante la pandemia de COVID-19, evaluar la disponibilidad de recursos tecnológicos y analizar la percepción de los estudiantes sobre la efectividad del aprendizaje a distancia.

Método: se realizó un estudio observacional, descriptivo y transversal con enfoque cuantitativo. La población incluyó 134 estudiantes del último año de Medicina de una universidad privada en Asunción. Los datos se obtuvieron mediante encuestas validadas y se analizaron estadísticamente.

Resultados: el 73 % de los participantes fueron mujeres, con promedio de edad de 24,6 años. El 99 % contaba con acceso a internet y el 88 % aprendió a usar nuevas plataformas educativas. La computadora portátil fue la herramienta principal. El 61 % expresó conformidad con la educación virtual, destacando la disponibilidad de materiales y el mayor tiempo para estudiar. Sin embargo, el 54 % manifestó dificultades para mantener calificaciones y el 60 % consideró insuficiente el conocimiento clínico adquirido.

Conclusiones: los estudiantes reconocen ventajas en la educación virtual, como flexibilidad y acceso a recursos, pero subrayan la necesidad de prácticas presenciales para un aprendizaje médico integral y la preparación clínica adecuada.

Palabras clave: Educación Médica; Enseñanza Virtual; COVID-19; Estudiantes de Medicina.

INTRODUCTION

During the COVID-19 pandemic, medical students faced multiple challenges that significantly affected their learning. The interruption of in-person activities and the transition to virtual methods exposed limitations in clinical experience, restricted access to hospitals and clinics, and deficiencies in institutions' technological preparedness, professors', and students'. These barriers led to delays in learning and knowledge gaps, primarily affecting advanced students who required intensive practical training. In addition, high levels of uncertainty and health restrictions affected students' mental health, with an increase in symptoms of anxiety and depression.

In this context, it is crucial to analyze students' perceptions of the difficulties faced and the strategies adopted during this period. This study aims to identify the problems associated with virtual teaching in medicine, evaluate the effectiveness of the measures implemented, and explore the feasibility of maintaining distance learning methods in the future. By providing an informative basis for future educational decisions, the research seeks to contribute to the design of more resilient and adaptable programs that ensure the quality of training for future health professionals.

During the COVID-19 pandemic, officially declared by the World Health Organization (WHO) on March 11, 2020, the world faced an unprecedented health crisis caused by SARS-CoV-2.⁽¹⁾ Since its emergence in Wuhan, China, in late 2019, the virus's rapid spread has highlighted its high contagiousness, attributed to factors such as asymptomatic transmission and globalization Peeri et al.⁽²⁾; Tian et al.⁽³⁾ In response, governments implemented measures such as lockdowns, social distancing, and mass vaccination campaigns to mitigate its impact.⁽⁴⁾ The pandemic profoundly disrupted social, economic, and educational life worldwide, leaving crucial lessons and highlighting the importance of preparedness for health crises.⁽⁵⁾

In Latin America, the pandemic had devastating effects, with high infection and mortality rates, reaching one-third of the global total at times.^(6,7) Paraguay stood out for taking proactive measures, such as declaring a health emergency before the WHO officially classified the pandemic, implementing quarantines early, and designing a "smart quarantine".⁽⁸⁾ These decisions mitigated the initial impact in both epidemiological and economic terms. However, they identified structural challenges, including a fragile health system and inequalities in access to technologies for virtual education.⁽⁹⁾ The crisis drove innovation in education, with the accelerated adoption of digital platforms and the adaptation of teaching strategies to the virtual environment. However, it exposed social and technological gaps that will require sustained attention in the future.⁽¹⁰⁾

METHOD

The materials used must be fully mentioned and described to allow other researchers to repeat the experiment. Review articles should explain in a summarized and structured manner the methods used to locate, select, extract, and synthesize the information. Where appropriate, statistical methods should be described in sufficient detail to allow readers to access the original information and verify the results.

The methodological design of this research was observational, non-experimental, descriptive, and cross-sectional, focused on understanding social facts through their interpretation, describing the environment studied, and examining the experiences of medical students. A quantitative approach was used to address the population of 134 medical students at a private university in Asunción, representing the entire population without sampling. Data were collected through previously validated surveys administered to students, and the results were processed in spreadsheets for statistical analysis; inferential statistics enabled interpretations and generalizations of the findings. The surveys, which focused on specific variables, were pre-verified to ensure their adequacy. The instrument was based on a study by Ladewig et al., which validated educational concerns during the SARS-CoV-2 pandemic.

RESULTS AND DISCUSSION

A total of 134 surveys were processed from final-year medical students at a private university in Asunción. The

results are presented in accordance with the objectives set out: to determine the demographic characteristics of the university's medical students. The average age was 24,6, with 73 % of the population being female and 94 % single.

Table 1. Return to the place of origin	
If you had to return to your place of origin, where was it?	
Caragatatay	2
Chore	2
Coronel Bogado	2
Eusebio Ayala	3
Guarambare	2
Horqueta	1
Itacurubi	3
Itape	1
Piribebuy	2
Pedro Juan Caballero	2
San Ignacio	2
San Juan	4
San Pedro	2
Yaguaron	1
Ypacarai	3
Caaguazu	4
Caazapa	4
Encarnacion	4
La Colmena	4
Santani	4
Villarrica	4
Caacupe	6
Grand total	62

Regarding students' place of origin, 27 % are from Asunción, where the degree program is taught, and 46 % had to return to their home cities due to the pandemic.

To determine the resources available to medical students during the COVID-19 pandemic, almost all students had internet access at home (99 %), and 60 % had both types of internet connection (fixed and mobile). The tools most frequently owned by students are cell phones and laptops.

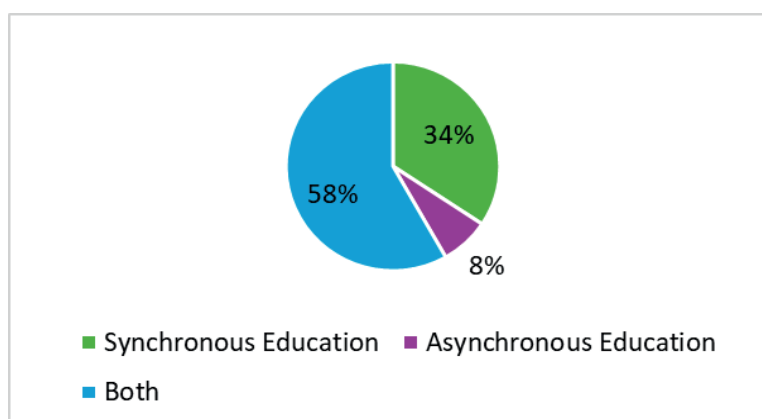


Figure 1. Programs used by teachers for classes during

In terms of skills with available tools, 63 % of students had taken an online course before the pandemic, and 88 % of them had to learn how to use an educational platform. The primary tool they used for classes was the laptop. Although some students had already taken online courses before the outbreak, indicating a certain

familiarity with digital learning dynamics, it is surprising that 88 % of these students had to learn how to use a specific educational platform during the pandemic. This finding suggests that, despite exposure to online education, many students encountered new platforms or digital teaching methods that required additional adaptation. The fact that laptops were the primary tool used for classes is another noteworthy point. This data highlights the centrality of portable technology in the educational environment, with significant implications for learning accessibility and flexibility.

40 % of students had to share technological devices with others, 55 % spent more than 6 hours studying, and 58 % of teachers used both synchronous and asynchronous education during the pandemic. Sixty-one percent of students were satisfied with this modality and suggested it as a tool to be used in the future.

The next objective was to understand medical students' perceptions of the education they received during the COVID-19 pandemic and how the clinical experience changed due to the pandemic. The most notable aspect was the postponement of clinical activities.

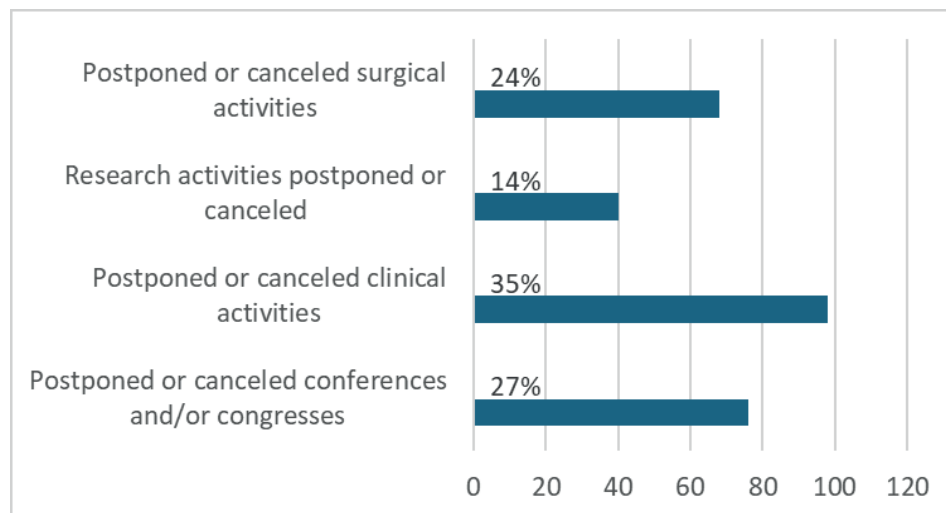


Figure 2. Changes in clinical experience due to the pandemic

54 % of students believe that the pandemic has affected their ability to maintain and/or improve their grades; 60 % believe that the knowledge they acquired was sufficient to address the problems they will face in their clinical practice; and 97 % report that their teachers used teaching materials that facilitated their learning. 82 % report that their teachers covered all the topics indicated in the program. Only 12 % responded that all teachers were up to date with information technology to teach their units through distance learning. It is striking that they mention one of the advantages as having more time to study the subjects, which may mean that, in face-to-face classes, they consider that much time is spent in the classroom, with little time for independent work. However, they mention that among the difficulties presented by virtual learning is the lack of face-to-face guidance from the tutor.

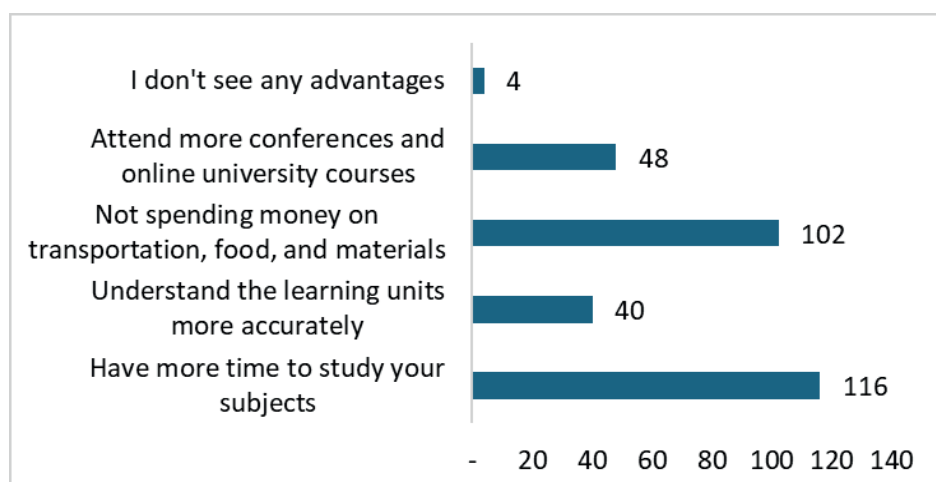


Figure 3. Advantages of taking the semester online

The results regarding the elements they consider essential for distance learning are presented in the

following figure. They mainly mention recorded sessions, perhaps because of their availability according to student needs, as well as the application of clinical cases and personalized learning.

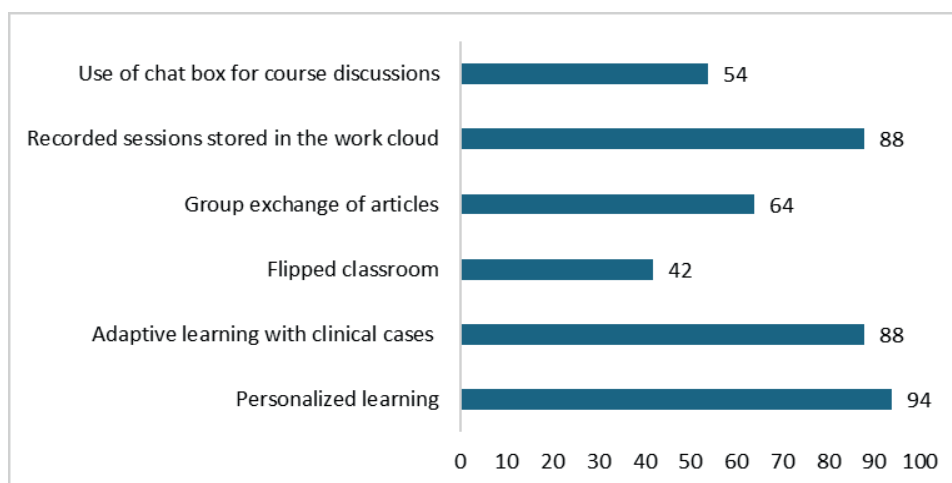


Figure 4. Essential elements for online learning

Responses were obtained from all final-year medical students during their rotating internship. A typical characterization of medical students is observed, as reported in similar texts in the country, such as those by Montiel et al.⁽¹¹⁾ Almost all students had an internet connection at home, either fixed or mobile, via a network; mobile phones and laptops were the devices they used most for the educational process.

It is interesting to note that this majority has the essential connection for the educational process. It would be quick and illogical to assume that having a connection and technological means imply that the connection is of good quality and that there are no connection failures. Of these tools, 80 % of those surveyed said they used them without sharing them with anyone else. This also represents a problem as an educational barrier. This characterization aligns with Ladewig et al.'s observations regarding student connectivity.⁽¹²⁾ Continuing with the line of resources available to them, in addition to tangible technological resources, skills are mentioned. Most students had experience with fundamental distance-learning skills, such as sending and receiving emails and using text and presentation tools. Sixty-six percent of them had prior experience with online courses. However, 88 % of students had to learn to use education-related platforms. This mainly indicates that students had sufficient resources to develop distance learning.

In terms of the modalities used by teachers, the use of both (synchronous and asynchronous) stands out, with 58 % of respondents and 61 % of students reporting that they were satisfied with this experience. This aligns with the opinions of Gutierrez-Soriano et al. in a study on the implementation of an asynchronous classroom and of Urrejola-Contreras on student feedback on these modalities.^(13,14) According to the students, most teachers were sufficiently prepared to teach distance-learning classes, although 43 % of students considered that a few teachers were not prepared. There is evidence of a correlation between age and the ability to adapt to distance learning. The average age of teachers is unknown, but it is clear that, given the urgency of the change at the beginning of the pandemic, a lack of preparation was more noticeable. However, over time, with sufficient technological resources and ongoing training, teachers are improving their distance-learning skills.⁽¹⁵⁾

The most important advantages include more time for studying and lower transportation costs. At the same time, the main disadvantage is the difficulty of understanding the learning units without in-person guidance from a tutor. The latter has also been seen in other experiences, mainly in asynchronous ones.⁽¹⁴⁾ When asked about the essential elements for students, they mention the synchronous modality as very important, including recorded and stored sessions, as well as the asynchronous modality, including personalized learning and adaptive learning with clinical cases. Implementing this work three years after the start of the pandemic has the disadvantage that restrictions have already been lifted, and responses must be made in retrospect on the previous situation. However, under this same criterion, students have had sufficient time to observe the consequences of the changes forced by COVID-19.

CONCLUSIONS

Medical education, despite being a relatively accessible field of research due to its low cost, is underutilized in our environment. The objectives set out have been satisfactorily met, leading to the following conclusions: In response to the objective of determining the demographic characteristics of medical students, it is mentioned that the majority of them were women, single, and a majority percentage were not from the city of Asunción, where the degree was taught. However, only 46 % had to return to their city of origin because of the pandemic.

Of the total respondents, 46 % had to return to their city of origin, notably Caacupé, Villarrica, Santani, and Encarnación, among others, which raises an interesting question: students faced an abrupt change in the educational dynamic and sought options to cope. This can be understood in light of the significant economic changes seen during the pandemic, which forced adaptive changes to cope with this new dynamic.

Regarding the resources available to medical students during the COVID-19 pandemic, it was observed that most had sufficient technological and procedural resources to implement the proposed distance learning. However, they had to learn to use new tools, but with prior knowledge of the concepts.

Medical students' perceptions of the education they received during the COVID-19 pandemic vary. Although most were satisfied with the classes taught, the teaching materials used, and the preparation of the teachers, and even mentioned some interesting advantages, most considered that there were skills necessary for their proper development in the practical clinical field that were not sufficiently achieved, and that the change had made it difficult for them to maintain their grades. However, this may be due to other factors not studied in this work.

The main problems observed by the students are related to the suspension of clinical and surgical activities, which had to be interrupted due to the implementation of health protocols. Although they express satisfaction with the development of distance-learning modalities, 54 % of students report that the pandemic has affected their performance in terms of grades. This should not be assumed to be solely a consequence of the change in educational dynamics; instead, several factors not studied in this work, such as changes in their economic and social circumstances and their environment, could have affected this perception.

Sixty percent also mention that the knowledge acquired in class is insufficient to solve the various problems they would face in their daily clinical practice. This situation is understandable given the reduction in the practical activities required to acquire the proposed skills. Most of them report that the teachers prepared their classes and that the teaching materials helped to facilitate understanding.

In general, students conclude that distance learning in medicine has notable positive aspects that could be sustained, such as the personalization of classes and the availability of teaching materials online at all times. However, on-site practice with real patients or simulation sessions is also important for their personal development as doctors.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHORSHIP CONTRIBUTION

Conceptualization: Juan Manuel Invernizzi Prats.

Research: Juan Manuel Invernizzi Prats.

Methodology: Juan Manuel Invernizzi Prats.

Drafting: Juan Manuel Invernizzi Prats.

Editing: Juan Manuel Invernizzi Prats.