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Educational Planning in Postgraduate Surgery .

Planeamiento Educativo en Posgrado de Cirugía.

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Summary

Introduction. The objective of this paper is to present the experience of educational planning for a course taught under two delivery modalities in the postgraduate program for General Surgery Specialist. **Subjects and Methods.** A descriptive, observational (non-experimental) study with retrospective analysis was conducted. The course was planned and implemented consecutively in person and online, between August 2017 and August 2025. Second-, third-, or fourth-year General Surgery residents who were simultaneously pursuing a General Surgery Specialist program were included. The course load was two hours per week for twenty consecutive weeks, with a total of 40 theoretical hours (in person or online) and 90 in-person practical hours developed at the residency program's location. The course required the development of a research project and the approval of a summative evaluation through a final multiple-choice exam with four answer options, focusing on research methodology topics. The minimum attendance requirement was 80% of classes. The risk of failing the course was also analyzed based on the delivery method. **Results.** Of a total of 624 participants enrolled, 460 (73.7%) were eligible to take the final exam. In the in-person mode, 112 of 117 participants (95.7%) passed, while in the virtual mode, 269 of 343 (78.4%) passed, with significant differences in favor of the in-person mode. The risk of failing the course was higher among students in the virtual mode. **Conclusion.** Educational planning made it possible to establish basic training standards that were maintained as an effective pedagogical strategy, regardless of the delivery method (in-person or virtual).

Keywords: Postgraduate education; Surgical residency; Research methodology; Planning; In-person; Virtual; COVID-19.

Abstract

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1. Introduction

Educational planning in medicine designs and organizes the teaching-learning process to train competent health professionals adapted to the needs of their context. Therefore, postgraduate education in a specialty such as surgery, beyond residency programs, reflects a need for continuous growth, as it is a process of ongoing development, given that all actions and experiences take place in a specific environment (society as a whole) (1).

As part of the General Surgery Specialist program, running concurrently with residency programs, a course on scientific research methodology and professional ethics was planned and implemented to provide solid comprehensive training for general surgery residents. This planning involves applying guidelines through a process aimed at achieving greater effectiveness and efficiency in educational activities.

The purpose of this study was to complete the training of medical residents and integrate their knowledge of research and professional ethics based on the application of educational planning principles over an eight-year period, and to analyze the results of two implementation modalities.

2. Methods

The design was descriptive, observational (non-experimental) with retrospective analysis. The course was held once per calendar year and lasted 130 hours (40 hours of online theoretical time and 90 hours of practical time at the clinic where each participating physician's residency program was held).

A purposive sample of 624 participants who expressly gave their consent to participate was enrolled in an ad hoc database using a Microsoft 2010 Excel spreadsheet. Inclusion criteria were second-, third-, and fourth-year general surgery residents with simultaneous training as general surgery specialists. Exclusion criteria were being over 30 years of age and/or not having completed a general surgery residency program. Elimination criteria were greater than 20% absence from theoretical classes (4 absences) or failure to pass the final multiple-choice methodology exam.

The teaching modality of the Course was:

1. In-person at the Institute of Applied Anatomy, Faculty of Medicine, University of Buenos Aires, from August 2017 to May 2018, August 2018 to May 2019, and August 2019 to March 2020, interrupted by the COVID-19 pandemic.
2. Virtual via Google Meet from 2021 to 2025 (March to July 31).

The curriculum model was a hybrid model, with research competencies and educational objectives to define essential methodological and ethical conduct. The educational objective initially assessed the quality and quantity of research and ethical knowledge in the student's own educational setting (the location where the student completes his residency program and medical specialist training) in order to design the complementary course program.

The educational content established an organization of 20 theoretical classes of 2 hours each on Tuesdays (40 theoretical hours in total) with lectures on research methodology and basic knowledge of professional ethics.

The resources provided included medical, educational, and bioethicist instructors. The technological environment consisted of in-person lectures with a slide projector and virtual lectures via a "virtual classroom" on Google Meet and a class repository on Google Drive. The strategies and activities developed included a teaching technique with in-person or virtual modalities, access to teaching materials on the course page on Google Drive, discussions with instructors about the topics covered, and a final integrative project on a surgical topic with a demonstration of methodological and ethical knowledge.

The summative assessment consisted of a final comprehensive essay evaluated by the faculty director of the residency program campus. It also included a final written multiple-choice exam with four choices, with only one correct answer, and a pass/fail grade.

To compare the two course delivery modalities, the chi-square test for proportions was used with 2 x 2 contingency tables with Yates' continuity correction, created with Microsoft Excel and SPSS (version 21), with statistical significance at $p \leq 0.05$. The absolute risk of failing the course with the two different modalities and the related relative risk were measured. The effect size was not analyzed using a point estimator or a confidence interval because the actual number of residents wishing to take this methodology and ethics course was unknown.

Table 1. Details of the in-person and virtual Professional Methodology and Ethics course.

Year	Registered	Enabled	Approved	Not Approved	Absent	Proportion No Approved/ Enabled	Proporc. Approved/ Enabled
2018*	69	66	62	0	4	0	93
2019*	51	51	50	1	0	1.59	98.3
2020**	89						
2021	99	88	78	0	10	0	88
2022	69	67	49	2	16	2.00	73
2023	86	64	44	8	12	12.5	69
2024	87	65	45	8	12	12.3	69
2025	74	59	53	2	4	3.38	89
TOTAL	624	460 (73.7%)	381 (83%)	21 (5%)	58(12.6%)		

* In-person course; **: Due to the Covid-19 pandemic, the final exam was not held. Starting in 2021, the course will be held online.

3. Results

Of the 624 students enrolled over the 8 years the course was offered, 460 (73.7%) (referred to as regular students) were eligible to take the final methodology exam by meeting the 80% attendance requirement for the theoretical lectures (Table 1), with 83% passing and only 12.6% absent. Comparing the two types of course delivery methods (Table 2) shows that:

1. The in-person option has a higher pass rate among regular students (95.7%) and a lower number of absences from the final exam. Comparing the number of students who passed with the original number of students enrolled, the rate was 93.3% (112/120).

2. In the virtual format, the passing rate among regular students (269/343) was 78.4%; when analyzing the performance compared to the original number of students enrolled (269/415), it was 64.8%.

There is a significant difference in favor of the face-to-face modality (X2 = 0.014494 and with Yates correction X2 = 0.02183) to the detriment of the virtual modality.

Regarding the risk of failing this course (Table 3), it was observed that the first risk (R1) was lower with the in-person course than the second risk (R2), which was higher with the virtual course. When relating the two absolute risks, the relative risk (RR) indicates how much the risk of failing the course decreases or increases depending on the course delivery method. Thus, medical residents have a lower risk of failing with the in-person course (RR = 0.992 or 99.2%) than with the virtual course. This last way of expressing the reduction in relative risk is called Relative Risk Reduction (RRR) and indicates that the risk of failing the course is much lower with the in-person course.

Table 2. Modality analysis.

Mode	Registered	Enabled	Approved	Not Approved	Missing
In person	120	117/120 = 97.5%	112/117 = 95.7%	1/117 = 0.8%	4/117 = 3.5%
Virtual	415	343/415 = 96.5%	269/343 = 78.4%	20/343 = 5.8%	54/343 = 15.7%

	In person	Virtual	Total Rows
Group 1 Approved	112	269	381
Group 2 Not approved	1	20	21
Total Columns	113	289	402 (Grand Total)

Chi-square = 5.9769. p-value is .014494. Significant at p < .05. Chi-square with Yates correction = 4.8201. p-value is .02813. Significant at p < .05.

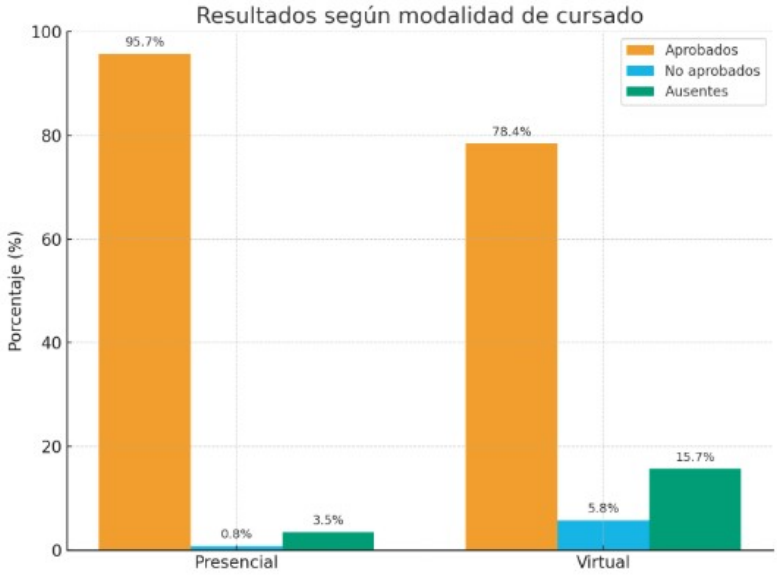

Figura 1. Resultados según la modalidad de cursado.

Table 3. Risk of not passing the course.

Mode	Not approved	Approved	Risk
In person	1	112	0.008
Virtual	20	269	0.069

Relative Risk (R1/R2) = 11.59%; Relative Risk Reduction = 88.41%

4. Discussion

The dizzying daily scientific and technological updating generally neglects aspects of the pedagogical training of residents by ignoring their social responsibilities (2). The existence of countless postgraduate courses with different preparation and scope makes it difficult for medical schools and/or scientific societies to provide coherent responses to this initial complementary postgraduate training. It is possible to put into practice its most appropriate form with a plan that can be conceived as a tool and strategy to provide the necessary answers (3).

Educational planning is known as the application of logical-rational guidelines of human activity in medicine with the objective of obtaining greater efficiency in action. Its bases are diagnosis of situation, programming and evaluation (4). The diagnosis of situation allows to know what are the educational difficulties of general surgery residents, such as insufficient preparation in knowledge of scientific research methodology as well as the most basic competencies of professional ethics that through this course analyzed here tries to be a complement to their training. Programming includes formation of educational objectives, organization of its contents, selection of effective teaching methods and evaluation to know the progress of learning in resident doctors in acquiring skills, knowledge and attitudes at the end of their training, the main objective of a course with educational planning.

The objectives of the expected behaviors of resident physicians from different surgical services had different realities of care complexity: the original proposal for this course was based on the planning to consider this heterogeneity of resident physicians and to become homogeneous with the specialist career in order to improve their daily professional practical skills.

The selected contents are the topics to be studied to achieve the objectives, which should not be a simple list but organized according to complexity, developed sequentially in conferences over 20 weeks. The activities recorded the elaboration of a scientific research that had to deliver a final integrative work of the skills acquired both with the residency program and with the corresponding subjects of the university medical specialist degree. The teachers were chosen according to suitability criteria in the different specialties and informed about the proposed planning methodology. Their training in digital technologies was also required due to the sudden appearance of situations such as the pandemic (5), suggesting ongoing training in the face of unforeseen social changes such as the constant innovation of educational technologies.

Thus, an unforeseen difficulty unexpectedly arose: the initial modality (from 2017 to 2020) contemplated an in-person format for teachers in areas of the Faculty of Medicine and was carried out from August to May of the following year, a cycle suddenly interrupted by the appearance of the COVID-19 pandemic, which forced a switch to a virtual format starting in 2021. Despite this unprecedented situation, the educational planning was maintained in this new communication format as it had been announced in 2017.

Course evaluation, assessing final conduct (acquired or modified) and comparing it with the proposed objectives, allows for diagnosing difficulties during the teaching-learning process, enabling ongoing feedback and reformulating objectives, modifying strategies, and redefining resources. This evaluation of the current Methodology Course was carried out in two stages: the development of a

research paper (or final integrative paper) on a real-life surgical care topic at the center where the student completed their residency program, and a multiple-choice written exam on research methodology, which had to be passed in order to determine graduation from the medical specialist program. This evaluation was valid (it measures what is required to be measured), reliable (it yields similar results in different years), objective (there is only one correct answer), and was not modified when the delivery method was changed (in-person or virtual). There was no exam on professional ethics topics because there are various ethical-philosophical schools with divergent conceptions, and the idea was not to question the ethics of the attending physicians.

The final evaluation was more successful with the in-person modality than with the virtual one, despite having the same educational planning. The lack of innovations prior to the COVID-19 health crisis in the area of surgery made this forced transition during confinement difficult (6), and this is where the significant difference in favor of the in-person nature of this type of complementary course in surgery arises. The requirement of a certain number of absences (no more than 4 absences, in both modalities) was an additional requirement to ensure the quality of the course in terms of student participation. An anonymous and voluntary satisfaction survey was not conducted except in the period 2021 to 2023 (virtual modality) to determine the quality of acceptance of this new modality that was adopted out of necessity.

The practice, initially in person and then virtual, considered the specific educational context, the needs and demands of the non-medical community, and the characteristics of the resident physicians. This ensures that they additionally acquire the knowledge, skills, and attitudes necessary to perform surgery effectively, responsibly, and ethically. Adapting to changing circumstances, such as the emergence of a completely unexpected pandemic, facilitates curriculum updates and the incorporation of new technologies and pedagogical approaches. One of these is the essential requirement of having a specific educational plan for general surgery.

The usefulness of an educational design that includes planning is another instrument in continuing education, an inexcusable moral obligation and a demand of society as a whole, even in the face of new circumstances such as a global pandemic. It is true that in a previous experience that was solely virtual but with planning (7), there were no significant differences with a previous annual surgery course with planning and with few lectures (only 4) on methodology and ethics. When starting at a single location (Institute of Applied Anatomy, Faculty of Medicine, University of Buenos Aires) with a face-to-face format and moving to a virtual format to continue with the complementary training of surgical residency programs due to the pandemic, better results were obtained in the face-to-face modality than in the virtual one. The findings here should be contrasted with courses that were solely face-to-face and planning, unlike other research that found the opposite (better virtual than face-to-face) (8). The important thing is the planning of an exclusive course on Methodology and Professional Ethics during the 8 years analyzed here, similar to that reported by Karpinski (9) in a review where he addresses the Clinical Competence Committees that define well-planned and controlled postgraduate courses by verifying effectiveness and efficiency related to the proposed objectives.

Distance education allowed future professionals to continue learning even in unprecedented adverse circumstances (10). However, as Manrique (11) highlights, the technological paradox reveals that the essence of education continues to lie in human interaction where genuine connections are the right way to stimulate the well-planned educational process: this was also reflected in the present course by existing a greater risk of not passing the course with the virtual modality. The problem with the RR (relative risk) and the RRR (relative risk reduction) is that these parameters do not reflect the true absolutes of risk, hence it is necessary to develop a greater number of courses with the same educational planning and ratify the findings of this research.

Strengths

The main objective was to confirm the design since 2017 in different surgical specialties with the same educational plan and with different modalities in different periods by the same teaching leaders. There was also no selection bias in the participation of resident physicians because it was voluntary.

Limitations

Resident physicians experienced uneven training in the virtual format, which explains their difficulties in improving their performance. This should be addressed by offering a larger number of courses with dedicated educational planning in different formats and examining their differences.

5. Conclusions

- The pandemic transformed academic processes, creating an urgent need for educational policies that ensure technological equity and teacher training to sustain more effective pedagogical methodologies in crisis contexts.
- Educational planning in postgraduate surgery, regardless of the delivery method (in-person or virtual), is essential for ensuring quality complementary education that meets the needs of medical residents, faculty, and the public in the face of unavoidable unforeseen contingencies.

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