

# Teaching Experience on the Impacts of COVID-19: Opportunities to Update the Teaching and Learning Process of Bioethics and Scientific Integrity in Human Medicine in Peru.

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## Abstract

Under the context of the Pandemic COVID-19, there have been extreme situations in health that need to be transferred to the processes of medical education. Objectives: To include real cases presented in the pandemic for their analysis as a strategy to update the teaching and learning of bioethics and scientific integrity in medicine. Methods: 150 Peruvian medical students analyzed emblematic historical cases of bioethics and cases related to the COVID-19 pandemic. Interest in analyzing the cases, academic performance, and quality of ethical analysis were compared. Results: Students showed better performance, interest, and quality of analysis, with a significant difference ( $p < 0.001$ ) in the evaluation of COVID-19 cases. Conclusions: Analysis of pandemic-related cases improved critical ethical analysis skills in medical students. The pandemic has provided an opportunity to update bioethics and scientific integrity content in virtual environments.

## Keywords

Bioethics education, scientific integrity, pandemic cases COVID-19

## 1. Introduction

In December 2019, in the province of Wuhan, China, the first cases of a new disease characterized by severe respiratory symptoms were reported [1], and after a few days, the causative agent was identified by the Chinese Center for Disease Control and Prevention; It was a new coronavirus called (SARS-CoV-2), being denominated the disease as COVID-19, by the World Health Organization (WHO), which declared it as Pandemic in March 2020, due to its rapid expansion in 144 countries of the world at that date [2].

In the WHO announcement, it was reported that they were concerned about the alarming levels of the spread of the virus, the severity of the cases, the alarming levels of the inaction of some governments, the lack of capacity, scarce resources, and lack of determination of some countries" [2].

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The COVID 19 Pandemic has since paralyzed the world for more than a year and nine months, causing great uncertainty, political tensions, death, and multiple damages; being the health systems the most affected due to the excess demand for patient care, which exceeds the capacities of infrastructure, medicines, oxygen, medical implements, and devices to treat in high-flow ventilation units or intensive care units, as well as shortages of human resources in health.

According to the COVID-19 Map developed by the Johns Hopkins University (JHU) Center for Systems Science and Engineering, more than five million people have died and more than 250 million have been infected worldwide [3].

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Health professionals faced the COVID-19 pandemic with insufficient health resources for the unlimited care of moderate and severe cases of patients infected with SARS-CoV-2, in health services with serious shortages that made front-line doctors and nurses more vulnerable [4].

Thus, this health emergency has revealed multiple limitations of health services, both in infrastructure and human resources, shortages of medicines, oxygen, ventilators, and other needs that exceed capacity. Hospitals have collapsed in the face of the great demand of patients and the vulnerability of the population has been exposed, due to the chronic gaps of inequitable access to health services.

The COVID-19 pandemic represents a major global health problem, which has not only shaken health systems but also educational systems, due to the conditions of social isolation and virtual teaching to avoid mass contagion as a strategy for containing cases [5].

The Pandemic has meant a serious challenge in medical education, after the suspension of face-to-face classes, since adequate competencies must be achieved in university students under the virtual modality, [6]; this change in the paradigm of teaching and prohibition of theoretical and practical face-to-face classes, arises from the need to comply with the social distancing with the consequent impossibility of using clinical fields and direct contact with patients [7].

On the other hand, there have been different limiting situations in patient's care, which have been worth investigating and communicating through scientific publications, guidelines, ethical recommendations [7], [8], and even national and international policies to address decision making regarding patient care [9] and research with COVID-19 cases [10].

Bioethics is a course included in the curricula of Medical Schools, being an indispensable area of knowledge for the formation of values and ethical principles that prepare students to identify and solve ethical dilemmas that may arise in health care. Likewise, some schools of human medicine have included content related to scientific integrity in their ethics and bioethics courses to promote good scientific conduct in health research.

In Peru, the National Council of Science and Technology of Peru (Consejo Nacional de Ciencia y Tecnología del Perú CONCYTEC), from 2017 to the present, has had several initiatives to incorporate a culture of scientific integrity among researchers. Thus, in 2017, it required among the qualification criteria of the Researcher in Science and Technology of the National System of Science and Technology (Sistema Nacional de Ciencia y Tecnología SINACYT), to have passed the course "Responsible Conduct in Research of CONCYTEC" [11]; in the same year 2017, the National Superintendence of Higher Education (Superintendencia Nacional de Educación Superior SUNEDU), includes within its university quality evaluation standards, compliance with scientific integrity policies in all universities to achieve their institutional licensing [12]; in 2019, CONCYTEC, publishes the First National Code of Scientific Integrity, to promote the adoption of good practices and scientific integrity in all research, identifying the acts considered as scientific misconduct (data fabrication, experiment destruction, data falsification and Plagiarism), also proposes the type of infractions and sanctions to the researcher [13]; finally, in September 2021, CONCYTEC published its new RENACYT regulation, which regulates the procedure for classification and registration of researchers (RENACYT) in Peru, and indicates. "At all levels of classification and regardless of the criteria met, researchers who are part of RENACYT must have forged their career under strict scientific integrity, according to the principles and good practices outlined in the National Code of Scientific Integrity", also indicates that it is an obligation of all researchers, submit to the National Code of Scientific Integrity and related provisions of CONCYTEC;

The "transgression of ethical aspects of research and/or scientific integrity" is a cause for exclusion of a qualified researcher registered in RENACYT [14].

In the field of bioethics, virtualization and this new scenario of an unprecedented health emergency are presented as an opportunity to update both educational strategies and contents.

Medical students and future professionals, in the context of the pandemic, should be prepared to face these situations and be able to solve problems and ethical dilemmas that arise, both in research and in the care of patients.

Medical students and future health science professionals should also be trained to identify ethical conflicts caused by problems of access to vaccines, or problems of adherence to vaccination programs in the general population and especially in vulnerable populations.

It is also necessary to train professionals who internalize ethical principles and values to research with scientific integrity.

The objective of this study was to identify and include real cases presented in the pandemic, for their ethical evaluation, as a strategy to update the teaching and learning of bioethics in students of a medical school in the Southern Region of Peru.

The study was approved by the Research Ethics Committee of the Catholic University of Santa Maria. The students participated voluntarily, with prior informed consent.

## **2. Methods**

### **2.1. Study Design and Participants**

An observational case-control study. 150 medical students of the bioethics course of a school of Human Medicine in the Southern Region of Peru, the students participated as a study group and were also their controls.

### **2.2. Procedures**

This study was developed in two phases, the first phase analysis of emblematic historical cases of bioethics, second phase analysis of real borderline cases presented in the COVID-19 Pandemic. The variables analyzed were interest in case studies, quality of ethical analysis, and academic performance in both phases.

The topics included for case studies were related to scientific integrity in research with COVID-19 projects, inequities and gaps in health services, health care and decision making in scarce resources, allocation of ICU beds, neglect in the primary health care system, rights of health personnel and rights of patients and vulnerable people.

### **2.3. Data Analysis**

Z-test was used to compare proportions of categories between historical cases and cases related to the COVID-19 pandemic, with a confidence level of 95% and a significance level of  $p < 0.05$ .

## **3. Results**

A total of 150 medical students from a Peruvian university enrolled in the bioethics course participated. Fifty-two percent were women and 47.3% were men. Regarding the age of the students, most of them were 17 years old (57.3%) and 18 years old (24%).

**Table 1**  
Student demographics

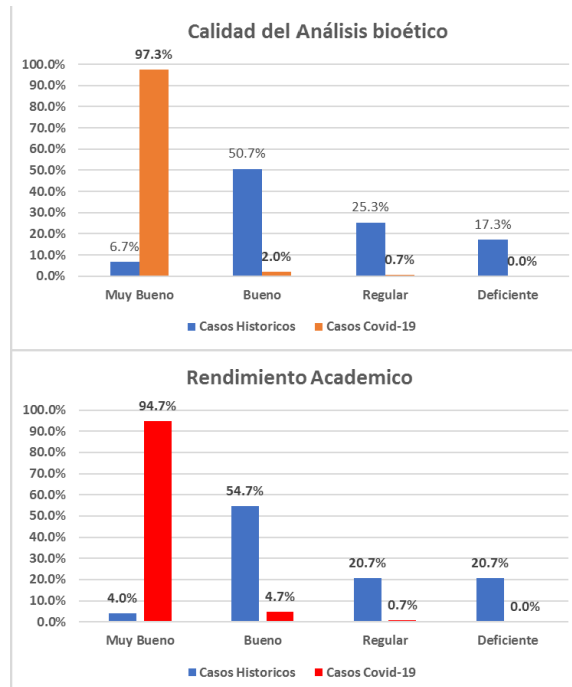
<b>Demographic characteristics</b>	<b>n=150</b>	<b>100%</b>
<b>Age</b>		
16	25	10,7 %
17	86	57,3 %
18	36	24,0%
19	3	2,0%
<b>Gender</b>		
Male	71	47,3%
Female	78	52,0%
Other	1	0,7%

The students' interest in the ethical analysis of cases related to COVID-19 and emblematic historical cases of bioethics (end of life and previous health emergencies) was evaluated. It was evident that the participating students were very interested in the ethical analysis of current cases related to the COVID-19 pandemic; thus, 98% showed interest in analyzing cases related to the assignment of ICU beds by COVID-19 and a similar percentage in analyzing cases related to scientific integrity in research on COVID-19 issues. A 96.7% showed interest in analyzing cases of inequities and gaps in health services in COVID-19, cases that compromise the rights of the most vulnerable patients in COVID-19, lack of respect for the rights of health personnel in COVID-19, and neglect in the primary health care system in COVID-19 (see Table 2).

**Table 2**  
Results of the questionnaire

<b>Interest in ethical analysis of cases related to:</b>	<b>n=150</b>	<b>100%</b>
<b>UCI bed assignments by COVID-19</b>		
Very Interested	147	98,0%
Little Interested	3	2,0%
<b>Scientific integrity COVID- 19 research.</b>		
Very Interested	147	98,0%
Little Interested	2	1,3%
Indifferent	1	0,7%
<b>Inequities and gaps in health services in COVID-19</b>		
Very Interested	145	96,7%
Little Interested	4	2,6%
Indifferent	1	0,7%
<b>Commitment to the rights of the most vulnerable patients by COVID-19</b>		
Very Interested	145	96,7%
Little Interested	4	2,6%
Indifferent	1	0,7%
<b>Lack of respect for the rights of health personnel by COVID-19</b>		
Very Interested	145	96,7%
Little Interested	4	2,6%
Indifferent	1	0,7%
<b>Neglect in the primary health care system by COVID-19</b>		
Very Interested	142	96,7%

Little Interested	8	5,3%
<b>Health care and decision making in resource scarcity by COVID-19</b>		
Very Interested	144	96,0%
Little Interested	5	3,3%
Indifferent	1	0,7%
<b>Landmark cases in the history of end-of-life bioethics</b>		
Very Interested	13	8,7%
Little Interested	86	4,0%
Indifferent	30	20,0%
Not interested	21	14,0%
<b>Landmark cases in the history of bioethics in health emergencies</b>		
Very Interested	12	8,0%
Little Interested	56	37,3%
Indifferent	60	4,0%
Not interested	22	14,7%



**Figure 1:** Differences in proportions on Quality of ethical analysis and academic performance.

Likewise, the quality of the analysis of the cases and academic performance was evaluated, and significant differences ( $p < 0.001$ ) were observed in favor of the COVID-19 case study.

**Table 3**  
Quality of ethical analysis and academic performance

Quality of Bioethical Analysis	Historical Cases	Covid-19 cases	p
Very good	10	146	$p < 0.001$
Good	76	3	$p < 0.001$
Fair	38	1	$p < 0.001$
Poor	26	0	$p < 0.001$

<b>Aca- demic Perfor- mance</b>	<b>His- torical Cases</b>	<b>Covi d-19 cases</b>	<b>p</b>
Very good	6	142	p<0. 001
Good	82	7	p<0. 001
Fair	31	1	p<0. 001
Poor	31	0	p<0. 001

The proportions of historical and COVID-19 case levels are statistically different ( $p < 0.001$ ) at all levels in the participating students.

#### 4. Discussion

In the last decade, bioethics has been considered an essential subject in the curricula of health faculties, mainly in medicine, with the main objective of achieving knowledge, skills, and attitudes in students to identify, analyze and manage conflicts of values within the doctor-patient relationship, in the context of research and scientific communication.

The bioethics courses also prepare medical students to reflect and act in the face of borderline situations that arise in professional life, both at the beginning of life and at the end of life, being an important tool for this analysis and deliberation, the exposure to emblematic cases and daily medical life. Under this premise of problem-based learning, is that this study was proposed, to know if within an extreme situation such as living within a pandemic, could be an opportunity to update some bioethical issues for teaching in medical schools.

Health professionals have faced serious ethical challenges when making decisions in the overwhelming situation of this pandemic, both to save the greatest number of lives and to protect the most vulnerable populations in scenarios that have exacerbated inequities and inequalities [9]; all this experience must be reflected in a serious ethical analysis to face the serious consequences and not repeat the failures of this pandemic [9] or previous pandemics [10].

In the present study, human medicine students showed greater interest in analyzing the ethical dilemmas related to the allocation of UCI beds by COVID-19. Our results coincide with several studies, in which ethical issues related to the prioritization of patients with COVID for UCI beds occupy first place in the analysis, as Robert et al, in the article "Ethical dilemmas due to the Covid 19 pandemic", proposes ten useful elements for the decision making of intensive care physicians to admit or not a patient to the UCI, based on frailty scores, comorbidities, knowledge about the patient's advance directives, assessment of the patient's previous or estimated quality of life, support through collegial decisions and expert consultation [15]. Other studies identify as factors related to the appearance of ethical dilemmas in decision making in intensive care units; the scenario of the extreme shortage of hospital resources and specialists, the high demand of critically ill patients, and the collapse of these services [16].

Likewise, in a study conducted in Spain, with nursing students, to identify the ethical dilemmas and ethical conflicts observed by nursing students who worked during the first outbreak of the COVID-19 pandemic in Spain; the researchers conclude that after the interviews, the themes observed were "coping with patient triage, difficulties in providing end-of-life care and coping with patient death" [17].

Ezekiel Emanuel, in order to avoid inequities in the allocation of ICU beds, proposes taking into account the following criteria: "Maximizing benefits, equal treatment, instrumental value and prioritizing the least favored concerning their clinical condition, as regards instrumental value, he proposes recognizing as a priority for the allocation of ICU beds those who can save others, or rewarding those who saved other COVID-19 patients through their work" [18]. They also agree that ethical analysis in these cases requires treating people fairly [19].

It is necessary that in university health education, ethical competences are achieved in order to face the ethical conflicts that appear in the care of patients at the end of their lives [20], even more so in the

context of pandemics such as the one humanity is currently going through, due to the seriousness in which patients are admitted to intensive care units, the uncertainty about their evolution and the impossibility for relatives to say goodbye to the patient because of the risk of contagion [21].

On the other hand, it is necessary, based on this unprecedented health situation, to achieve ethical competencies for decision making in end-of-life cases with patients with COVID-19, in order to face borderline health situations related to the care of patients in situations of lack of resources, including mechanical ventilation [22]. It is also necessary to strengthen the resilience of future physicians, nurses, and other health personnel to be able to cope with difficult moments in the care of patients under these new pandemic scenarios. There is evidence that health professionals have presented feelings of helplessness, questioning of their abilities, frustration in caring for patients who die alone, deprived of the company, and tension of their own family and friends [22], which could expose students [23] and health professionals to mental health risks, such as post-traumatic stress, anxiety, [24], job burnout and even suicide attempts [25], [26], [27].

In the study, medical students also showed great interest in the analysis of cases related to scientific integrity related to COVID-19 research in 98%, in this regard, in this pandemic some evidence of scientific misconduct has been published [28], even though recommendations have been given [29], [30], conferences [31], international declarations such as the Singapore Declaration on Integrity in Research [32 ] and national ones such as the National Code of Ethics and Scientific Integrity [13], guidelines [33] and policies [34], to avoid scientific fraud, plagiarism, falsification, data fabrication, among other malpractices. This concern arises during the race against time, which the scientific community undertook, since December 2019 and persists today, to identify vaccines and treatments against SARS-CoV-2; being various factors related to scientific misconduct in the conduct of research projects, as well as in scientific communication. One factor, for example, is the publication of numerous articles, "even without peer review, which jeopardizes their integrity" [35], and a chapter on scientific integrity must be included in the process of learning bioethics, ethics, and scientific communication from the first years of medical training. Likewise, it is necessary that, despite the need for timely knowledge published in scientific journals, the acceleration in editorial evaluations, as well as peer review, be meticulous [36], both in the evaluation of ethical aspects and scientific integrity.

In the study, 96.7% of the students were interested in including in the ethical analysis the inequities and gaps in health services under the context of COVID-19 and cases that compromise the rights of the most vulnerable patients by COVID-19. On these issues, the pandemic revealed serious shortcomings in health systems and their access, affecting mainly vulnerable populations. It should be mentioned that at a global level there has been a lack of preparedness of health systems to face a pandemic of these dimensions, with the poor and developing countries being the most affected, as for the populations, those with low economic resources were more affected, exposing them to inequity [37] and social injustice [38].

Another aspect identified by the medical students as important and of great interest for their ethical analysis was related to the lack of respect for the rights of health personnel by COVID-19 in 96.7%. We believe that the rights of health personnel should be incorporated and updated in the training of future health professionals, in order to empower them to defend their rights. Our results are associated with the problems identified regarding mistreatment of physicians in this pandemic in Peru, where 84.5% of the physicians interviewed were found to have suffered some type of mistreatment in health services in the care of COVID-19 patients [39]. It should be noted that even before the pandemic, there was evidence of mistreatment of Peruvian physicians [40] both in hospitals [41], against residents [42], and physicians in primary care services [43], [44].

In the study, it was observed that the emblematic cases in the history of bioethics on the end of life and the emblematic cases in the history of bioethics in health emergencies not related to the COVID-19 pandemic, did not arouse much interest in medical students in these times of pandemic, This finding may contribute to rethink and update the contents of bioethics courses [45] and ethical aspects of research with COVID-19 [46], [47], especially in this health emergency and even more so when a moral and ethical crisis is observed [48], [49].

On the other hand, the SARS-CoV-2 pandemic has also caused numerous collateral damages to the care of other non-COVID-19 programs, both disease care and promotional preventive programs, which have triggered delays in diagnosis and treatment [50].

The quality of ethical analysis and academic performance in case evaluation was evaluated, with significant differences in improvement observed when students analyze current cases related to the COVID-19 pandemic ( $p < 0.001$ ).

Problem- and case-based bioethics teaching has been shown to be effective in positioning students in situations that require sound comprehensive training, both professionally and ethically [51].

Finally, within the evaluation of academic performance, it was observed that medical students, in virtual environments, participated with disinhibition in the presentation and analysis of cases of ethics, bioethics, and scientific integrity; likewise, it was possible to conduct workshops with video forum, without video interruptions or technological difficulties (which occurred in face-to-face environments), as well as better facilities for discussions and work in study groups.

In this pandemic, several problematic situations have arisen, which could be analyzed from clinical bioethics, applying models of argumentation for decision-making in health services, under the context of COVID-19, such as principlism, by Bechamps and Children [52], casuism [53], virtue ethics [54], care ethics [55], among others; is necessary to remember that none of them excludes the other [56]. This proposal requires a deliberation process, which must be based on full knowledge of the case or problematic situation, but also on adequate theoretical management of ethical theories and these models of argumentation. This task should be assumed in medical education and faculties related to health sciences.

## 5. Conclusions

Finally, the results obtained in the study show that these new generations of medical students, trained in virtual classrooms due to the health emergency they had to live, have been very proactive in learning and analyzing new cases of clinical bioethics, research ethics, and scientific integrity, presented in this health emergency; being the current challenge and for future curricula of health sciences teaching schools, to include chapters on these important topics within the bioethics training.

We conclude that the COVID-19 pandemic has caused an unprecedented interruption in medical education, however, in the teaching of bioethics, there have been challenges to provide valid solutions to these times. The Pandemic provides real scenarios for the analysis of real borderline cases allowing updating the contents of the course of bioethics in medicine, being the virtual environments friendly for the uninhibited participation of students, and application of participatory strategies.

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