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Research Article

The impact of the COVID-19 pandemic on the quality of higher medical education

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Abstract

The COVID-19 pandemic was an unprecedented test for the whole sociological structure of society, which includes all the basic spheres and main areas of public life. The biggest test was for health systems, as they had to contend with, on the one hand, a hitherto unknown disease and, on the other, reorganize its overall treatment and diagnostic activity in accordance with the anti-epidemic measures introduced by the state authorities. This is inevitable and has influenced and left its mark on the medical training of future health personnel, which is carried out for the most part in the university medical facilities that were on the front lines in the fight against the pandemic. This article presents an analysis of data from empirical research on the impact of the COVID-19 pandemic on the quality of higher medical education.

Keywords

higher medical education, pandemic, medical students, COVID-19

Introduction

The COVID-19 pandemic was an unexpected and unprecedented test for all humanity and affected all social systems, spheres, and activities. The most affected were the health systems, which faced a disease unknown to all of us that overturned their entire organization, regardless of the type and model of funding (Alsoufi et al. 2020; Southworth and Gleason 2021; Kirkov 2023). Health systems, by their nature, represent an extremely wide complex of medical and non-medical activities oriented to the protection and restoration of health at the individual and population levels, as well as the optimization of the quantitative and qualitative aspects of the reproduction of human resources (Grancharova et al. 2009). Affected on the one hand were health institutions with a divisible effect, i.e., those who provide medical care in its various varieties, namely hospital-type medical facilities. They bore the full brunt of the pandemic regarding the need for the sick to be hospitalized and undergo life-saving treatment through their hospital. It was necessary to reorganize the entire medical and diagnostic activity, prioritizing the treatment of patients with COVID-19, and the existing departments and clinics in the hospitals had to cease their main activities and be transformed into COVID units. In some places, entire hospitals were reorganized for the hospitalization of COVID patients. On the other hand, the institutions with an indivisible effect were also affected, i.e., those where the results of their activity affect the entire population, with each individual in the population receiving a fraction of the effect, such as medical universities (Grancharova et al. 2009). Globally, higher medical schools were faced with an unprecedented challenge to move from traditional face-to-face

learning to learning in an electronic environment, which is not inherent to them given the specifics of training for the acquisition of the EQD „Master of Medicine“ in the regulated specialty „Medicine.“ (Alsoufi et al. 2020; Papapanou et al. 2021). This initially made it difficult to conduct theoretical training, which required the creation of electronic platforms and systems in medical universities for online lectures and seminars. But the essential thing is that during the period of the COVID pandemic, in view of the anti-epidemic measures that were introduced by the state authorities, the practical training of future doctors was blocked or suspended, which takes place in the clinical departments of university hospitals, where access was prohibited to outsiders, including medical students (Alsoufi et al. 2020; Papapanou et al. 2021; Southworth and Gleason 2021).

In the Republic of Bulgaria, the training of future doctors is regulated by the state with the Ordinance on the Uniform State Requirements /EDI/ for the acquisition of the OCS (EQD) “Master Doctor,” in which the undergraduate internship of the medical students is defined as fully practical training. This stage of the practical training of medical students who are in their final year of study has suffered the most from the restrictive measures introduced (Law on Public Education in the Republic of Bulgaria 2015; Law on higher education in the Republic of Bulgaria 2020). The undergraduate internship at Medical University-Sofia has a total duration of 240 calendar days and covers, according to the EDI Ordinance, five disciplines (surgical diseases; internal diseases; paediatric diseases; obstetrics and gynaecology and hygiene; epidemiology; social medicine; and infectious diseases) in which an undergraduate internship is held and, accordingly, a state exam is taken, and two disciplines outside the EDI (emergency medicine and general medicine), according to a pre-graduate internship that takes place and certifies at the colloquium level (Regulations for the organization and conduct of educational practices and internships at Medical University-Sofia 2022; Regulations for preparation and organization of the 2020/2021 academic year at MU-Sofia 2022; Regulations for the organization and activities of Medical University-Sofia 2022) For six of the disciplines, the practical classes are held in the clinical departments of the University Hospitals of the Medical University-Sofia, which was impossible during the periods of the COVID pandemic, during which the students’ access to the hospitals was prohibited and their training was organized in an online environment through the solution of clinical cases from practice. The unprecedented transition of medical students’ training to an online environment, as a result of the anti-epidemic measures introduced by the state authorities, led us to compare and analyze the evaluation of the quality of training by the students of Medical University-Sofia before and during the COVID pandemic (Alsoufi et al. 2020; Papapanou et al. 2021; Kirkov et al. 2022a, b; Kirkov 2023).

The aim of this article is to investigate the impact of the COVID-19 pandemic on the quality of teaching in higher medical education through a survey and analysis of the opinions of medical graduate students at Medical University-Sofia.

Materials and methods

A survey was conducted among medical graduate students of Medical University-Sofia through the electronic survey system of MU-Sofia regarding:

- General evaluation of the undergraduate internship
- The lecturers’ care during the training course
- Material facilities
- Organization of the learning process

The assessment is done using the five-grade system. The assessment values are:

1. Poor
2. Sufficient
3. Good
4. Very Good
5. Excellent

Depending on the questions posed in the survey, we specified the object of observation, the units, and their signs.

The object of the present study is graduate students in medicine.

The selection is random; there is no selection of the respondents, which gives reason to claim representativeness of the results.

The logical unit of observation is the surveyed medical students.

The technical unit of the observation is Medical University-Sofia.

Time and place of observation

The survey among the respondents was conducted in 2019, 2020, and 2021 graduations in the city of Sofia (MU-Sofia) with the electronic survey system of the MU-Sofia and covered 769 medical students.

Information processing methods:

Descriptive and analytical statistical methods were used:

1. Descriptive analysis—the frequency distribution of the considered signs, broken down by research groups—is presented in tabular form.
2. Analysis of Variance—to assess the characteristics of central tendency and statistical dispersion.
3. Graphical analysis—for visualization of the obtained results.

The specified methods of conducting the research complement each other, which allows the information to be assessed in many ways.

Quantitative analyses were performed with a statistical package of application programs, SPSS 17.0. Microsoft Office products were used for tabular and graphic processing and presentation.

Results and discussion

The satisfaction of medical students was evaluated through the electronic survey system of Medical University-Sofia; this system collects data anonymously and gives us the opportunity to analyze the organization and quality of education by the time of practical courses and internships.

The study includes 769 medical students, all graduates from the classes of 2019, 2020, and 2021. The distribution of the number of students who took the electronic survey by year is represented in Table 1.

Table 1. Distribution of students who participated in the electronic survey by year.

Year	Number of participated students
2019	236
2020	260
2021	273
Total	**769**

The general evaluation given to the undergraduate internship subjects, which were assessed by the medical students, is presented in Table 2.

Table 2. Average grade of the subjects assessed.

№	Discipline	Assessment 2021	Assessment 2020	Assessment 2019
1.	Internal Medicine	**3.7185**	4.4370	4.5789
2.	Surgery	**3.7389**	4.0492	4.1484
3.	Obstetrics and Gynaecology	**3.2604**	4.2928	4.1910
4.	Paediatrics	**4.4024**	4.1636	4.3919
5.	Hygiene, SM, Epid., and ID	**3.9242**	3.7095	3.6189
6.	General Medicine	**4.6277**	3.9873	3.8917
7.	Emergency Medicine	**3.0523**	3.1704	3.0468

The results presented show that there is a downward trend for the average assessment from 2019 to 2021, which can be observed in all disciplines from the undergraduate internship, excluding paediatrics, general medicine, and the combined discipline in hygiene, social medicine, epidemiology, and infectious diseases, whose assessment has increased. This requires investigating the reasons for this decline and taking corrective measures. It can be argued that a leading reason for this trend is that part of the period analyzed covers the state of emergency resulting from the COVID-19 pandemic, during which there was a shift from traditional face-to-face classes to distance learning. This was an unprecedented test for MU-Sofia and for higher medical institutions in general, given the specificity of the training needed to acquire the qualification "Master-Physician" in the regulated specialty "Medicine" given and the creation of the university's digital system for distance learning.

The next criterion by which the courses are evaluated is the lecturer's care during the training course, which is of utmost importance for the successful acquisition of practical skills by graduating medical students during the internship. When the lecturer shows care and attention to the students, they are more relaxed and feel supported in solving the problems that arise during the training. The results of the questionnaire survey on the criteria of lecturers' care during the training course are presented in Table 3.

Table 3. Average assessment of the lecturers' care during the course of training.

№	Discipline	Assessment 2021	Assessment 2020	Assessment 2019
1.	Internal Medicine	3.7931	4.4611	4.6106
2.	Surgery	3.7892	4.0478	4.2063
3.	Obstetrics and Gynaecology	3.0460	4.2665	4.4040
4.	Paediatrics	4.4685	4.1707	4.5109
5.	Hygiene, SM, Epid., and ID	4.0632	3.7293	3.9076
6.	General Medicine	4.6957	3.9837	4.0267
7.	Emergency Medicine	2.5489	2.2737	3.2737

The results obtained on the criterion of the lecturers' care during the training course for the three-year period researched show a negative trend in the internal medicine, surgery, and obstetrics and gynaecology disciplines. The reason for this decline was most probably the emergency epidemic situation introduced in the country and the changes in training during the COVID-19 pandemic. The disciplines of paediatrics, hygiene, SM, epidemiology and infectious diseases, and general medicine have seen an increase in assessments for this indicator. The emergency medicine discipline had yet another low score on this indicator.

The following criterion presents the graduating medical students' assessment of the facilities in which their practical training in the disciplines included in the undergraduate internship takes place (Table 4). The student's undergraduate internship aims to provide quality professional training in the disciplines studied to improve the practical knowledge and skills acquired during the study, which are crucial to developing the working and theoretical groundwork needed for the independent solving of organizational, prophylactic, diagnostic, therapeutic, and other professional problems. For this reason, the availability of good material facilities is a prerequisite for conducting optimal practical training for graduating medical students.

Table 4. Average assessment of the material facilities criterion.

№	Discipline	Assessment 2021	Assessment 2020	Assessment 2019
1.	Internal Medicine	3.4914	4.3689	4.4602
2.	Surgery	3.5854	4.0534	4.1432
3.	Obstetrics and Gynaecology	3.3448	4.3086	4.1600
4.	Paediatrics	4.3604	4.0305	4.3100
5.	Hygiene, SM, Epid., and ID	3.7895	3.6534	3.5489
6.	General Medicine	4.5109	3.9656	3.8770
7.	Emergency Medicine	3.5870	3.6146	3.5870

The results obtained from the study for the material facilities criterion have the same trend as in the previous two criteria—a decrease in the average score in the disciplines of internal medicine, surgery, and obstetrics and gynaecology. This result is conditioned by the training being conducted in a distance learning environment, a change necessitated by the COVID-19 pandemic, for which there was no organizational and technical preparation, given the specificity and the requirements for face-to-face training in the specialty of medicine as one of the regulated professions. In contrast to the results in these disciplines, in the disciplines of hygiene, social medicine, epidemiology, and general medicine, there is an increase in the assessment scores due to the transition from traditional face-to-face training to online learning, which can be explained by the limited and insufficient material facilities of the departments that conduct training in these disciplines.

The last criterion of the research, which we analyze in this article, represents the opinion of the students regarding the organization of the learning process during the analyzed period (Table 5).

Table 5. Average assessment of the organization of the learning process criterion.

№	Discipline	Assessment 2021	Assessment 2020	Assessment 2019
1.	Internal Medicine	3.6154	4.4262	4.4735
2.	Surgery	3.6456	4.0140	4.1165
3.	Obstetrics and Gynaecology	**2.8851**	**4.2184**	**4.0960**
4.	Paediatrics	4.2946	4.1362	4.3668
5.	Hygiene, SM, Epid., and ID	3.8750	3.6707	3.5272
6.	General Medicine	4.6237	3.9583	3.8556
7.	Emergency Medicine	**3.1706**	**3.6000**	**2.6466**

The data obtained from the survey on this indicator show a tendency for a significant decrease in the average grade of the clinical disciplines included in the undergraduate internship, the teachers of which were most involved in the fight against the COVID-19 pandemic, such as internal medicine, surgery and obstetrics, and gynecology. These results are due to the reorganization of the educational process imposed by the state authorities, in which it moved from traditional face-to-face learning to learning in an online environment. Another possible reason that led to this trend could be the inability of the clinical teachers to fully conduct their classes in the online environment, due to their high commitment in the treatment units of the COVID-19 patients, and also due to their absence during the first few months of the pandemic on a single platform of a medical university for conducting online classes, which had a great impact on the studied indicator.

Conclusion

The empirical research conducted among medical graduate students from MU-Sofia regarding the impact of the COVID-19 pandemic on the quality of higher medical education and the subsequent meta-analyses of the results found that the COVID-19 pandemic affected practical training the most for the future doctors in the clinical disciplines included in the pre-diploma internship. This negative tendency to decrease the assessment of clinical disciplines on the studied indicators is explained by the unprecedented test that the teaching doctors of the university hospitals faced, namely their commitment to the treatment of a hitherto unknown disease, which led to an unprecedented reorganization of the entire treatment-diagnostic process, part of which is the clinical training of the students. According to the researched criteria, regarding the impact of the pandemic on the quality of medical education, an upward trend of results is observed in the theoretical disciplines included in the internship, in which the classes are not held in a clinical environment but are of a seminar type and use the methods of problem-based learning and clinical case studies. These results could be explained by the fact that the departments that conduct this training have a limited material and technical base, and the students were more satisfied with the training in an electronic environment.

The quality of medical education includes good theoretical training on the basis of which medical students can hone their practical knowledge and skills acquired in the course of study. All this theoretical and practical knowledge they will need in their immediate work activities as future doctors is necessary for the self-solving of organizational, promotional, prophylactic, medical, diagnostic, and therapeutic activities. As evident from the empirical study, the COVID-19 pandemic has inevitably affected and left its mark on the production of health personnel who are called upon to meet the current and future health needs of society.

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Conflicts of interest

None declared.

Author notes

This study was approved and supported by the authorities of the Medical University in Sofia. Medical University, as a higher education institution, is subject to regular external quality assurance by an agency that has successfully demonstrated that it meets the standards and guidelines for quality assurance in the European Higher Education Area (EHEA) through a registration with the European Association for Quality Assurance in Higher Education (EQAR).

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