

Article

COVID-19 Pandemic and Its Impact on Training Programs of Medical Residency in Romania

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Abstract: Background: The COVID-19 pandemic has had a negative impact on the training process for resident physicians. The objective of this study was to evaluate the impact of the COVID-19 pandemic on professional training, and also the subjective perception of the levels of stress, anxiety, and depression among resident doctors specializing in gastroenterology in Romania. Methods: We conducted an observational cross-sectional study, for a period of two months, among 180 resident doctors specializing in gastroenterology, working in university hospitals in Romania. A questionnaire consisting of 29 questions distributed through social media platforms was completed in Google Forms. Statistical analyses were performed using IBM SPSS software v.20. Results: A linear relationship was identified between the number of daily hospitalizations in the gastroenterology department and the rate of SARS-CoV-2 infection among resident physicians. In total, 80% of the participants reported an increase in the levels of stress, anxiety, and depression during the COVID-19 pandemic, and 88.3% stated that they were unsatisfied by online courses. Conclusions: The COVID-19 pandemic has had negative effects on both professional training and levels of stress, anxiety and depression of resident doctors specializing in gastroenterology. In the specialty of gastroenterology there may be certain peculiarities, due to the interventional aspects that this medical specialty involves, for example, endoscopic procedures. Thus, the necessity to acquire practical skills in addition to theoretical knowledge increases the negative impact on gastroenterology internship.

Keywords: COVID-19; gastroenterology; endoscopy; performance; stress



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1. Introduction

Coronaviruses are pathogenic microorganisms for both humans and animals. At the end of 2019, a new virus belonging to the coronavirus family, SARS-CoV-2 [1], was identified in Wuhan, a city in Hubei Province, China. The World Health Organization (WHO) called its secondary disease, coronavirus disease 2019 (COVID-19) [1]. The transmission of this virus was fast, resulting in an epidemic in China that culminated in a pandemic in early May 2020 [1–3].

To date, 244,385,444 cases of SARS-CoV-2 infection and, more than 4.9 million COVID-19 deaths have been reported in 223 countries [2]. The only continent where this virus has not been identified is Antarctica [1]. Studies to date suggest that the reported incidence of SARS-CoV-2 infection is underestimated. Given that only some of the cases are diagnosed and reported, the conclusion of experts is that the actual incidence is at least 10 times higher than reported [4,5].

Beyond considerations related to morbidity-mortality induced by SARS-CoV-2 infection, this pandemic has also had a major negative socio-economic impact [6]. Forsythe et al. estimated a cost of approximately \$77 billion to \$2.7 trillion to manage the COVID-19 pandemic [7]. The young generation has been greatly affected by the sudden change in the educational system [8]. The school closures, the absence of social and physical contact between students and between students and teachers that online courses have generated, have not only lead to an increase in stress levels, but also have had some negative consequences on the learning process [8]. All of these led to a decrease in interest in learning and a reduction in the level of accumulated knowledge [8]. Young physicians in training have been deprived of the possibility to perform some interventional maneuvers. This was due to epidemiological conditions that led to a reduction in the number of elective procedures and the implementation of additional protective measures. So, in order to reduce the risk of infection, patients underwent minimally invasive or invasive medical procedures only after receiving the results from a Real Time Polymerase Chain Reaction (RT-PCR) SARS-CoV-2 test. In emergency situations, which need immediate intervention, these procedures were performed in special conditions, the doctors wearing adequate protective equipment. In the pre-pandemic period, the selection of patients who benefited from invasive medical procedures was based only on clinical criteria, not epidemiological ones. It has also become necessary to reduce the time allocated by senior doctors to the teaching process of medical residents. The direct impact of these measures was a reduction in the number of medical procedures, with a negative influence on the learning process of resident doctors.

According to pre-existing data, the COVID-19 pandemic caused an increase in stress, anxiety, and depression among medical personnel [9–11]. In support of this idea comes a study conducted in China, the onset country of the COVID-19 pandemic, on a number of 1257 healthcare workers. A total of 50.4% of the participants reported symptoms of depression, 44.6% anxiety, 34% insomnia and 71.5% reported feeling a sense of danger [9].

In Romania, the health system is organized into two main branches: the national health system and the private health system. In 2014, in Romania, the number of hospitals reached 527, over two third of which were public [12]. The training curriculum for resident doctors specializing in gastroenterology, in Romania, extends over a period of five years. During this period, resident doctors must complete eight modules: gastroenterology, endoscopy, general surgery, internal medicine, imaging, emergency medicine, anesthesia and intensive care, and bioethics. The specialization aims to acquire knowledge and practical skills to European standards, to be able to autonomously practice gastroenterology and hepatology without supervision, but without eliminating consultation with colleagues and teamwork. Training takes place in university hospitals. The training curriculum for resident doctors in gastroenterology has similar purposes, the duration and organization of these modules varying depending on the country.

Resident doctors have been shown to be particularly affected by this pandemic [10]. The whole curriculum has undergone significant changes. Thus, on the one hand, national and international congresses were canceled, which led to a decrease in the volume of accumulated theoretical information. On the other hand, the number of patients who presented to the hospital for treatment of non-infectious diseases was reduced, as well as the number of interventional procedures performed under supervision by resident physicians [10–14]. The time spent at work and the exposure to a potentially infectious environment has led to an increase in their level of stress [11,15]. In Romania, the large number of patients infected with SARS-CoV-2 required the detachment of a significant number of resident physicians to COVID-19-support hospitals, and their direct involvement

in the diagnostic and therapeutic management of patients with a different profile than the basic specialty of the physicians [16].

The interventional aspect of endoscopies imposes the need for resident doctors to learn practical skills in addition to theoretical knowledge [17]. The study by Spier et al., conducted on 11 resident gastroenterologists, states that mastering the ability to perform a complete colonoscopy requires an average of 500 colonoscopies during the residency period [18]. Under these conditions, the reduction of the number of hospitalizations and, implicitly, of the number of interventional procedures, led to a greater negative impact on the gastroenterologists' professional training, compared to resident doctors in other medical specialties.

Another profound effect of the COVID-19 pandemic was the high rate of infection among healthcare professionals. Jeremias et al. reported that approximately 11% of COVID-19 cases were diagnosed in healthcare workers [19]. However, the authors highlighted that the real prevalence of SARS-CoV-2 infection among hospital employees is higher than the reported one. The explanation for the high rate of SARS-CoV-2 infection in medical workers may be the prolonged exposure to a high density of virus [19].

Considering the absence of studies to specifically evaluate the impact of COVID-19 pandemic among gastroenterologists, we prepared a questionnaire to identify the particularities of the training in gastroenterology of resident physicians.

The main objective of this study was to evaluate the impact of the COVID-19 pandemic on professional training and of the subjective perception of the level of stress, anxiety, and depression among resident physicians in the field of gastroenterology.

The secondary objectives included:

1. Assessing the need to interrupt the residency program due to the COVID-19 pandemic, as well as its impact on the level of professional training;
2. Evaluation of the rate of SARS-CoV-2 infection among gastroenterologists living in Romania;
3. Examination of the relationship between the profile of the hospital and the number of patients hospitalized daily, and the number of procedures performed daily by the resident doctor under supervision. Were there correlations between the hospital profile and the percentage of resident doctors infected with the SARS-CoV-2 virus; between the number of infected resident physicians and the number of those who reported the onset of a depressive disorder;
4. Evaluation of the perception of the efficiency of the new methods of continuous medical education. This question indirectly evaluates the effectiveness of online methods of continuing medical education regarding their ability to gain the interest and attention of the physician and, respectively, the impact on the process of accumulating theoretical knowledge.

The results of this study may open new research horizons for improving the learning methods of resident physicians. It is also necessary to establish a protocol to improve the admission of patients to hospitals in crisis conditions. Better access to medical services brings benefits to both patients and young doctors, who are in the process of learning. It is also important for patients to know the problems that young doctors face, to adapt their attitude and reduce the level of stress they exert on them. The goal is to improve the doctor–patient relationship, with bidirectional benefits.

2. Materials and Methods

We conducted an observational cross-sectional study, for a period of two months (1 January 2021–28 February 2021), among 180 resident doctors specializing in gastroenterology. In Romania are approximately 400 resident doctors specializing in gastroenterology, considering all five years of specialization. All participants were resident doctors working in university hospitals from Romania. The study was conducted in accordance with the guidelines of the Helsinki Declaration 1975, as revised in 2008(5), for medical research involving human subjects. Each participant anonymously and voluntarily completed the

questionnaire, thus providing his/her consent to participate in the study. The study received approval by the Research Ethics Committee of the Stefan S. Nicolau Institute of Virology, Bucharest, Romania.

On 16 March 2020, the COVID-19 pandemic imposed a state of emergency in Romania and the adaptation of special preventive measures. Our research evaluated the consequences on professional training and level of stress, anxiety, and depression among gastroenterology residents after approximately one year from the onset of the pandemic in Romania.

The inclusion criteria were represented by the professional degree, namely that of resident doctor in gastroenterology. An exclusion criterion was represented by medical residents training in other specialties. The individuals included in the study were of both sexes, and depending on age, they were divided into three groups: 25–27 years, 28–30 years, and over 30 years. In Romania, the residency program for the gastroenterology specialty includes five years of theoretical and practical training under supervision. According to the year of professional training, we formed five categories, each having a different number of participants, respectively, year 1–21 participants, year 2–51 participants, year 3–42 participants, year 4–30 participants, year 5–36 participants. Regarding the hospital profile, four groups were established: non-COVID-19 emergency hospitals, COVID-19 emergency hospitals, non-COVID-19 chronic disease hospitals, COVID-19 chronic disease hospitals.

The subjects included in the study received an online questionnaire, which was added in the Supplementary Materials. The questionnaire consisted of 29 questions. Before answering the questions, participants were informed about the purpose and implications of the study. They were also assured of their anonymity when answering. In this regard, no personal information was requested. Answering the questions represented the participants' agreement regarding participation in this study. All MDs who accessed the link provided a valid results' report.

The questions were of two types: questions with simple answers and questions with short editorial answers. Of the 29 questions, some examined objective data, such as the number of patients admitted daily, the number of procedures performed daily by the resident physician under supervision, or the rate of SARS-CoV-2 infection among resident gastroenterologists. Another part examined subjective data, such as the perception of the level of stress, anxiety, or depression or the perception of the effectiveness of new methods of continuing medical education.

Google Forms was used to complete the questionnaire, and various social media platforms were used to distribute it. After two months of data collection, they were imported from Google Forms and entered into statistical analysis.

We used the IBM SPSSv.20 software package as a statistical data analysis tool. Alpha level was set to 0.05. Continuous variables were expressed as means \pm standard deviations and ranges or as medians and ranges. Categorical variables were expressed as frequencies/absolute numbers with percentages. The marginal homogeneity test was used to evaluate the statistical significance.

3. Results

The questionnaire was distributed on several social media platforms, and at the end of the two months of data collection, 180 responses were registered.

By sex, of the 180 participants, 111 were women (61.7%) and 69 were men (38.3%). There were 63 individuals (35%) in the age group 25–27 years, 111 individuals (61.7%) in the age group 28–30 years and 6 individuals (3.3%) in age group over 30 years.

According to the year of residency, corresponding to the five years of study, the distribution in the five categories was relatively homogeneous: year 1–21 participants (11.7%), year 2–51 participants (28.3%), year 3–42 participants (23.3%), year 4–30 participants (16.7%), year 5–36 participants (20%).

According to hospital profile, four categories were established: non-COVID-19 emergency hospitals, COVID-19 emergency hospitals, non-COVID-19 chronic disease hospitals, COVID-19 chronic disease hospitals. Most subjects were working in a non-COVID-19 emergency hospital, namely 102 subjects (56.7%), followed by hospitals with a COVID-19 emergency profile, namely 39 subjects (21.7%). Then hospitals with a COVID-19 chronic disease profile, namely 27 subjects (15%) and finally hospitals with a non-COVID-19 chronic disease profile, namely 12 individuals (6.7%).

One of the key questions in our questionnaire was the perception of the level of professional training related to the COVID-19 pandemic. Thus, of the 180 participants, 81.67% answered they felt less well prepared compared to the period before the pandemic, 16.7% responded they felt just as prepared, and only 1.67% responded that they had evolved favorably from a professional point of view during this pandemic period (Figure 1).

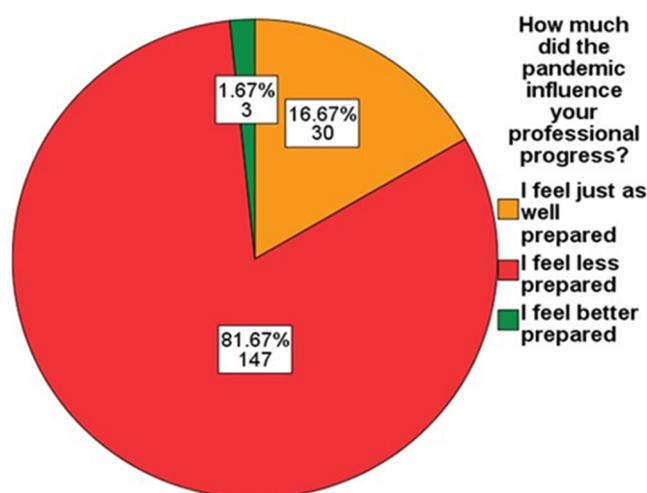


Figure 1. The perception of the level of professional training of gastroenterology residents during the COVID-19 pandemic.

Another main objective of our study was the evaluation of the subjective perception of the levels of stress, anxiety, and depression among resident doctors specializing in gastroenterology during the pandemic, and 80% of study participants reported an increase in the level of stress, anxiety, or depression during this period (Table 1). In addition, the statistical analysis showed no significant correlation between the number of SARS-CoV2 infected residents and those who reported an increase in stress, anxiety, or depression during this period ($p > 0.05$, Chi-Square test).

Table 1. Assessment of the subjective perception of the levels of stress, anxiety, and depression among residents in gastroenterology during COVID-19 pandemic, compared to the period prior to the pandemic. *Do you think that the SARS-CoV-2 pandemic has led to an increase in your stress, anxiety, or depression?*

	Frequency	Percentage
No	36	20.0
Yes	144	80.0
Total	180	100.0

Of the 180 participants, 33 (18.3%) responded that they had to interrupt their professional training, for various reasons, during the pandemic. In all, 41.7% ($n = 75$) of the resident physicians who participated in the study reported being diagnosed with COVID-19. Of these, 68% associated the SARS-CoV-2 infection with in-hospital activity and 58% stated that they were vectors of transmission of the virus among their family and friends.

From 75 confirmed respondents with SARS-CoV-2 infection, 84% had mild or asymptomatic forms of the disease, and 16% had moderate forms of the disease. No subjects included in the study reported severe forms of the disease (Table 2).

Table 2. Distribution of medical residents in gastroenterology diagnosed with COVID-19 according to the clinical form of the disease. *If you have been confirmed to have SARS-CoV-2 infection, what form of the disease did you have?*

Form of the Disease	Frequency	Percentage
Asymptomatic or paucisymptomatic	63	84.0
Moderate	12	16.0
Total	75	100.0

Regarding the number of days of medical leave imposed by COVID-19, 76% answered that they were absent between 10–14 days, 12% between 14–21 days, and another 12% over 21 days. In addition, 56% of them claimed that this absenteeism significantly affected their professional training.

Furthermore, we analyzed the average number of patients hospitalized daily during the pandemic compared to the previous period. By using marginal homogeneity test, we obtained a significant reduction in the number of hospitalizations during the pandemic ($p < 0.05$). Thus, in the period before the COVID-19 pandemic, from the group of non-COVID-19 emergency hospitals, most resident doctors (45) declared an average number of 5–10 daily hospitalizations in the gastroenterology department. In the same group, the highest number of resident doctors (69) declared an average number of 1–2 daily hospitalizations in the gastroenterology department, during the pandemic. A decrease in the number of daily hospitalizations was also observed in the case of COVID-19 emergency hospitals. Before the COVID-19 pandemic, most resident doctors reported an average number of 15 daily hospitalizations in the gastroenterology department. After the pandemic, the same doctors reported 5–10 daily hospitalizations in the same ward, while other 18 doctors reported having under 5 daily hospitalizations. In the case of chronic diseases’ hospitals, non-COVID-19, the highest proportion of resident doctors reported an average number of 10–15 daily hospitalizations in the period prior to the COVID-19 pandemic and during the COVID-19 pandemic less than 5 daily hospitalizations in the same ward. In the case of chronic disease hospitals with a COVID-19 profile, the highest proportion of resident doctors reported >15 daily hospitalizations in the period before the pandemic, and during the pandemic period <5 daily hospitalizations (Table 3).

Table 3. Average number of admitted patients before the COVID-19 pandemic and average number of admitted patients after the COVID-19 pandemic per hospital profile.

Hospital Profile/ Average Patients	Before COVID-19 Pandemic				During COVID-19 Pandemic				p Value
	<5	5–10	10–15	>15	<5	5–10	10–15	>15	
Emergency non-COVID	3	45	27	27	69	21	9	3	0.001
Emergency COVID	3	15	3	18	18	18	3	0	0.001
Chronic non-COVID	0	3	6	3	9	3	0	0	0.002
Chronic COVID	0	12	0	15	18	9	0	0	0.001

Regarding the association between the hospital profile and the average number of endoscopic procedures performed daily by the resident doctor under supervision, there was a reduction in the number of procedures during the pandemic, compared to the previous period (Table 4). Using the marginal homogeneity test, this observation proved to be statistically significant only for the emergency hospitals ($p = 0.001$ for non-COVID and $p = 0.02$ for COVID). Before the COVID-19 pandemic, in the case of non-COVID emergency hospitals, most resident doctors (36) declared that, on average, they performed 3–4 endoscopic proce-

dures daily. During the pandemic, 90 of them declared that they performed 1–2 procedures daily, while 9 reported performing 3–4 endoscopic procedures daily and only 3 reported more than 5 procedures. In the case of COVID emergency hospitals, 18 resident doctors stated that before the pandemic they performed 1–2 endoscopic procedures, 9 resident doctors stated that they performed 3–4 procedures daily, and only 12 doctors reported doing over 5 endoscopic procedures. Residents from hospitals for chronic diseases faced a drastically decrease of procedures performed after the onset of pandemic. During the COVID-19 pandemic, 33 resident physicians reported that they performed 1–2 endoscopic procedures, 6 resident physicians reported that they performed 3–4 endoscopic procedures daily, while no physician performed >5 endoscopic procedures. We identified no association between the hospital profile and the average number of endoscopic procedures performed daily.

Table 4. Average number of daily endoscopic procedures performed by resident doctors under supervision before the COVID-19 pandemic and during the COVID-19 pandemic.

Hospital Profile/ Endoscopic Procedure	Before COVID-19 Pandemic			During COVID-19 Pandemic			p Value
	1–2	3–4	>5	1–2	3–4	>5	
Emergency Non-COVID	36	54	12	90	9	3	0.001
Emergency COVID	18	9	12	33	6	0	0.020
Chronic Non-COVID	9	3	0	12	0	0	*
Chronic COVID	6	15	6	27	0	0	*

*—Not enough valid cases.

In this study, we evaluated several other correlations, such as the hospital profile and the average number of resident physicians infected with the SARS-CoV-2. There was no statistically significant relationship between the hospital profile and the number of resident doctors infected with the virus.

The association between the average number of patients admitted daily and the rate of SARS-CoV-2 infection in resident physicians was analyzed using the Chi-square test. We obtained a statistically significant association $\chi^2 = 13,219$, $p = 0.004$, with a positive relationship between the number of hospitalized patients and the rate of SARS-CoV-2 infection of resident doctors.

The same Chi-Square test was used to analyze the association between the number of resident physicians infected with SARS-CoV-2 and the average number of endoscopic procedures performed by them and the rate of SARS-CoV-2 infection among resident physicians and the increase in stress, anxiety, or depression. In both cases, the p value was higher than 0.05, showing one hand, the rate of SARS-CoV-2 infection is not associated with the number of endoscopic procedures performed daily, and, on the other hand, the diagnosis of COVID-19 is not related to the increased stress, anxiety, or depression among resident physicians.

Testing patients for SARS-CoV-2 infection before performing procedures was not associated with the number of SARS-CoV-2 infected residents ($p > 0.05$, Chi-Square test).

Regarding the process of accumulating theoretical information, most subjects included in the study, namely 159 (88.3%) declared that the online type of congresses and conferences was less efficient, compared to physical meetings (Table 5).

Table 5. Evaluation of the effectiveness of the online type of scientific congresses and conferences by resident doctors specializing in gastroenterology. *Do you consider that the online type of congresses is sufficient for your professional training?*

	Frequency	Percentage
No	159	88.3
Yes	21	11.7
Total	183	100.0

4. Discussion

We conducted an observational cross-sectional study. We used a questionnaire which was completed by 180 resident physicians specializing in gastroenterology in Romania. The demographic analysis of the subjects included in the study showed a predominance of females (61.7% vs. 38.3%), in the age group 28–30 years (61.7%), and of the doctors who worked in emergency hospitals (56.7% non-COVID-19 emergency hospitals; 21.7% COVID-19 emergency hospitals). Considering the five years of professional training, the distribution was relatively uniform. One of the objectives of our study was to assess the perception of the impact of the COVID-19 pandemic on the level of professional training of resident gastroenterologists.

Thus, 81.67% of the subjects stated that they felt less well prepared professionally about one year after the onset of the COVID-19 pandemic, compared to the previous period. The existence in the training curriculum of the medical resident of gastroenterology, in Romania, of some mandatory modules like endoscopy and general surgery requires the accumulation of practical skills beyond the theoretical ones. Under these conditions, the reduction of the contact between resident physicians and patients and, respectively, the reduction of the number of diagnostic and interventional procedures performed by them, because of the measures imposed by COVID-19 pandemic, led to an important negative impact on their professional training. Other data have shown similar results. For example, a study that included 183 physicians, 123 being gastroenterologists in training, reported a significant negative impact of the COVID-19 pandemic on the professional activities of young gastroenterologists. They reported a reduction in the number of endoscopic procedures during the COVID-19 pandemic by up to 91% compared to the pre-pandemic period [20]. In another study, Huntley et al. reported a 67% decrease in surgical experience during the COVID-19 pandemic among maxillofacial surgery resident surgeons, 88.8% of whom reported a negative impairment of professional activity [21]. Another review that evaluated 32 sources, predominantly from surgical journals, highlighted the negative impact of the COVID-19 pandemic on the professional training of physicians in various specialties, predominantly surgical, but also non-surgical specialties [22]. Analyzing the results we obtained, and the data from the literature, we can say that the COVID-19 pandemic had a negative impact on the professional training of young doctors, regardless of medical specialty.

Assessed separately, increased levels of stress, anxiety, and depression were reported by 80% of participants. The author Ong showed an increased risk of burnout among gastroenterologists during the COVID-19 pandemic [23]. Another study highlights the need to implement measures to reduce the level of stress induced by the COVID-19 pandemic among resident physicians [20]. The main stressor factor in this study for young gastroenterologists was the fear of SARS-CoV2 infection [20]. Tsamakakis et al. reported among the stressor factors for medical staff during the COVID-19 pandemic: interruption of basic practice, feelings of loss of control, and fear of disorganization of the medical system [24]. Our study showed an increase in stress levels among the medical staff during the COVID-19 pandemic.

However, we did not specifically identify the stressor factors for the population included in our study. Among the reasons that could lead to the negative effect on professional training is the need to interrupt the residency period because of the transfer to other

health units or even the closure of the clinical departments for epidemiological reasons related to the pandemic. However, our results showed that only 18.3% of participants had to interrupt their internships. These data are also supported by Marasco et al. who reported a reduction in the number of endoscopic procedures during COVID-19 pandemic. This reduction was explained both by the redistribution of resident physicians specializing in gastroenterology into the care centers for patients with COVID-19, and by the risk of spreading SARS-CoV2 during endoscopic procedures [20]. The perception of the negative impact of the COVID-19 pandemic on gastroenterological training was also supported by the reduction of the involvement of resident doctors in certain activities by the mentors [20].

Another possible cause for the negative professional impact could be infection with SARS-CoV-2. Thus, a significant percentage of resident physicians (41.67%) stated that they were diagnosed with COVID-19 during this period. Of these, 68% associated viral infection with in-hospital activity, and 56% said they were vectors of transmission for the virus among people close to them. In terms of the clinical form of the disease, 84% reported mild or asymptomatic forms of the disease, and absence from work for a period of 10–14 days.

According to these results, SARS-CoV-2 infection has contributed to resident doctors' dissatisfaction with professional training.

Compared to the existing data in the literature, the rate of SARS-CoV-2 infection among gastroenterologists living in Romania was very high (41.7%). For example, in a study of 2306 New York City physicians, 4.4% of confirmed cases of COVID-19 were reported [25]. Another study in Saudi Arabia reported a 2.9% rate of SARS-CoV-2 infection among 240 resident physicians [13].

Another objective of this study was the analysis of the association between the hospital profile and the average number of patients admitted daily to a gastroenterology department, reported to the COVID-19 pandemic. Thus, a reduction of the number of hospitalizations during the pandemic period was observed, compared to its previous period in the case of all of the four hospital profiles evaluated. A direct consequence of the decrease in the number of hospitalizations was the decrease in the average number of endoscopic procedures performed by resident doctors. In these conditions, given that it has been shown that there is a direct proportional relationship between the number of endoscopic procedures performed and the endoscopic abilities of a gastroenterologist [17,18], we can emphasize the negative impact of the COVID-19 pandemic on the professional training of medical residents of gastroenterology. Cravero et al., who evaluated 1420 resident physicians in various specialties, found a reduction in training activities among 84.6% of respondents. This percentage has increased to 97% among doctors in surgical specialties [11].

In addition, an association was observed between the average number of patients admitted daily to the gastroenterology department and the rate of SARS-CoV-2 infection of the subjects included in our study. Contrary to expectations, however, the average number of endoscopic procedures performed by resident physicians was not associated with their rate of infection, and COVID-19 diagnosis was not responsible for the increase in stress, anxiety, or depression. Contrary to our findings, a study that included 1102 resident surgeons reported that 55.7% of them experienced an increase in the level of stress about getting COVID-19. The same study reported an increase in the level of stress about potentially transmitting COVID-19 to family/friends of 72.7% [26].

Another important objective of our study was to analyze the perception of resident physicians regarding the effectiveness of new online learning methods. Thus, most of them (88.3%) considered the new methods of continuing medical education less effective. Despite our findings, the study by Iyer et al. reported a good acceptance of online teaching methods, due to their greater flexibility [27]. Seifman et al., after a careful analysis of the literature, supported the perception of a low efficiency of online teaching methods among young doctors, validating our results [22].

The limitations of this study include the small number of respondents and the absence of objective methods for evaluating professional training, and the levels of stress, anxiety, and depression among participants. Another limitation of this study is that although it

reveals several relationships between the variables, it does not necessarily determine the causality between them, as it was conducted at one point in time. In addition, personal information regarding participants (e.g., social life, interaction outside the hospital, safety methods) was not collected in this study, which might have had an impact on the outcomes of some variables, especially on the rate of infection.

5. Conclusions

In conclusion, the COVID-19 pandemic appears to have had a negative impact on professional training, but also on the levels of stress, anxiety, and depression among resident doctors specializing in gastroenterology in Romania. Thus, both the clinical activity and the interventional activity may be negatively affected by this pandemic. Online teaching methods might not have a similar benefit to physical meetings in congresses and scientific conferences. Thus, it is necessary to implement measures to improve the practical and theoretical learning process among young doctors, but also to reduce the levels of stress, anxiety, and depression.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/gastroent13010012/s1>, The questionnaire.

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