Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Alimentary Tract

Impact of COVID-19 outbreak on clinical practice and training of young gastroenterologists: A European survey

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ABSTRACT

Background: SARS-CoV-2 disease (COVID-19) is a major challenge for the healthcare system and physicians, imposing changes in daily clinical activity.
Aims: we aimed to describe what European trainees and young gastroenterologists know about COVID-19 and identify training gaps to implement educational programs.
Methods: A prospective web-based electronic survey was developed and distributed via e-mail to all members of the Italian Young Gastroenterologist and Endoscopist Association and to European representatives.
Results: One hundred and ninety-seven subjects participated in the survey, of whom 14 (7.1%) were excluded. The majority were gastroenterologists in training (123, 67.7%) working in institutions with COVID-19 inpatients (159, 86.9%), aged ≤30 years (113, 61.8%). The activity of Gastroenterology Units was restricted to emergency visits and endoscopy, with reductions of activities of up to 90%. 84.5% of participants felt that the COVID-19 outbreak impacted on their training, due to unavailability of mentors (52.6%) and interruption of trainee's involvement (66.4%). Most participants referred absence of training on the use of personal protective equipment, oxygen ventilation systems and COVID-19 therapies.
Conclusion: COVID-19 outbreak significantly impacted on gastroenterologists' clinical activity. The resources currently deployed are inadequate, and therefore educational interventions to address this gap are warranted in the next future.

1. Introduction

The worldwide outbreak of the Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) disease (COVID-19), is challenging for everyone, particularly for the healthcare system and physicians [1,2]. Currently, up to 10% of all cases in Italy have been observed among healthcare workers [3]. There is growing evidence of a gastrointestinal tract tropism of the Sars-Cov2-19 virus. confirmed by the detection of viral material in biopsy specimens and stool, even in discharged patients [1,4]. These data may partially provide explanations for the gastrointestinal symptoms and support the hypothesis of a faecal-oral transmission route of the infection [1,4]. Therefore, given the wide range of reported incidences (3–79%) of gastrointestinal symptoms, including diarrhoea, vomiting, nausea, abdominal pain and gastrointestinal bleeding, gastroenterologists and endoscopists are directly involved in managing COVID-19 infections [1,5,6]. As this is a completely new disease, knowledge evolves rapidly day by day and dealing with this complex situation is challenging [7,8]. With the increased need for intensive care units, European hospitals have started to markedly reduce elective activities and endoscopy, and the majority of resources were ed towards the COVID-19 pandemic [7]. These facts led to the resetting of clinical priorities and to a significant change of perspective [9]. Indeed, young gastroenterologists' (GI) train-

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ing and clinical activity are moving from a model based on the concept of patient-centered care toward a concept of community-centered care. Understanding what fellows and young GIs know about COVID-19 and the changes in their daily activity aids to provide a comprehensive picture of the current situation and explores if it is possible to maintain a high-quality standard of training. Establishing the effect of the interruption of elective activity on procedural skills and competency development is essential for addressing the training gap and implementing educational interventions post COVID-19 [10]. Therefore, the rationale of this survey was to better appreciate and support the education of young GI by assessing how factors such as age, country of practice, available equipment and practice setting impact on GI skills [11,12]. Furthermore, fears and feelings were reported, including a lack of availability of facial masks due to limited supplies for the physicians in health-care settings [11,12]. Thus, this survey aimed to assess the impact of the COVID-19 pandemic on the theoretical and practical competency of young GI and fellows. In this way, we emphasized the need for developing further specific activities to support young clinicians and researchers during this difficult time.

2. Methods

2.1. Study design

A prospective web-based survey examining the current status of GI training across Europe during the COVID-9 pandemic was developed through a videoconference meeting by a task force including 4 members representative of the Italian Young Gastroenterologist and Endoscopist Association (Associazione Giovani Gastroenterologi ed Endoscopisti Italiani- AGGEI) and finally approved by all the members of the working group with the endorsement of the Young Talent Group (YTG) of the United European Gastroenterology UEG group.

2.2. Development and content of the questionnaire

The survey consisted of a brief introduction of the project and 4 sections which included a total of 34 multiple-choice questions. The following areas of interest were explored: (a) demographic and professional baseline characteristics of the young GI (b) impact of the COVID-19 outbreak on the practice of Gastroenterology Units (c) impact of the COVID-19 outbreak on the daily activities in terms of residual volume of activities in the practicing center of the participants, feelings about training gaps, reasons related to them and suggestions to address these gaps (d) management of COVID-19 patients and feelings and fears about the infectious risks of COVID-19. Of note, in this last section participants were asked to rate their feelings and fears and the response to each question was reported on a 10-point Likert scale, where 1 indicated not important “ and “10” indicated “very important”. Full survey details are available in Supplementary data.

2.3. Distribution of questionnaire and collection of data

The electronic version of the survey was distributed via e-mail to all the members of the Italian Young Gastroenterologist and Endoscopist Association and to representatives of the Young Gastroenterologists (Young GI) UEG group. All subjects accepted to participate in the Survey through informed consent for the handling and collection of data for scientific purposes. The survey was conducted between March 26th, 2020 and April 7th, 2020 (14 days).

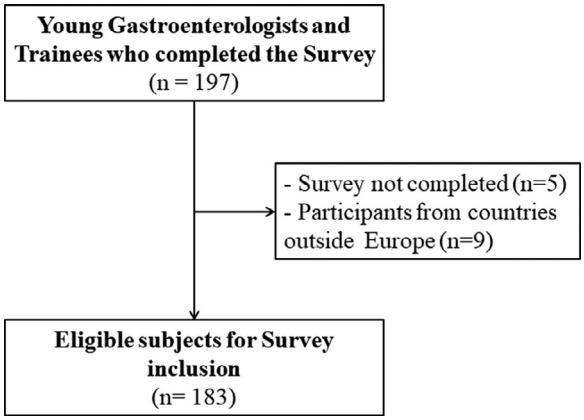

Fig. 1. Flow chart for enrollment of participants in the Survey.

2.4. Statistical analysis

Continuous variables were reported as median and interquartile range (IQR), and categoric variables were summarized as frequency and percentage. Logistic regression models were performed to assess the factors associated with the gastroenterology trainees' feelings of the negative impact of COVID-19 on their training and further with factors associated with the risk of COVID-19 infection among healthcare professionals. The results were reported as an odds ratio (OR) with 95% Confidence Intervals (95% CI). An OR with an entire 95% CI below 1 indicated that the covariate reduced the risk of the event; conversely, when the OR with an entire 95% CI was higher than 1, the covariate increased the risk of the event. An OR with 95% CI across 1 implicated that the covariate did not significantly influence the risk. The probability values were two-sided; a probability value of less than 0.05 was considered as statistically significant. Statistical analysis was performed with STATA 13.0 (College Station, TX: StataCorp LP).

3. Results

3.1. Demographics and professional data

Among all trainees in gastroenterology and/or young gastroenterologist invited, 197 completed the Survey (197/300, 65.7%). Fourteen (14, 7.1%) responses were excluded: 5 for missing data and 9 for participation of trainees currently practicing outside Europe (Fig. 1). Thus, 183 reports were finally included in the analysis. The majority of participants involved in the survey were females (96/182, 52.5%). More than half of the participants (61.8%) were aged < 30 years. The majority of participants in the survey were from Italy (43%), Portugal (19%), Romania (10%), Spain (7%) and France (6%) (Supplementary data). Most of the 183 participants work in Academic Hospitals (138, 75.4%), given that the majority of them are GI in training (123, 67.7%). Regarding trainees, the median length of the overall gastroenterology training reported was 4 years (IQR 4–5) whereas the median current year of training in gastroenterology of the participants was the 3rd year (2nd-4th). Demographics and professional data are detailed in Table 1.

3.2. Impact of COVID-19 on gastroenterology units

One-hundred and fifty-nine participants (159/182, 86.9%) referred to work in an institution admitting COVID-19 patients (Table 2). Most of the participants referred that during the COVID-19 outbreak the activity of Gastroenterology Units was limited to urgent visits and endoscopic exams. About one-third of participants referred to have a COVID-19 positive colleague, with a median rate

Table 1
Demographic data of Trainees in gastroenterology and/or young gastroenterologists accepting to participate in the Survey.

Trainees in gastroenterology and/or young gastroenterologists baseline characteristics n. 183, n (%)	
Gender:	
Male	87 (47.5)
Female	96 (52.5)
Age:	
≤30	113 (61.8)
>30 and ≤35	46 (25.1)
>35	24 (13.1)
Institution	
Academic	138 (75.4)
Not Academic	37 (20.2)
Private hospital /practice	8 (4.37)
Clinical Role	
Trainee	123 (67.6)
PhD	20 (11)
Consultant	39 (21.4)

n.: number; PhD: Doctor of Philosophy.

Table 2
Impact of COVID-19 on Gastroenterology Units.

	N. (%) or median (IQR)
Working in a hospital with COVID-19 patients	159 (86.9)
Gastroenterology Unit activities changes during COVID-19 outbreak	180 (99.5)
All routine activities regularly ongoing even though safer	2 (1.1)
Decreased activity based on hospital decision	44 (24)
Only emergency visits and/ or endoscopy allowed	135 (73.8)
Only emergency visits and/ or endoscopy and oncologic patients allowed	2 (1.1)
Colleagues COVID-19 positive	52 (28.4)
Percentage of COVID-19 positive physician's (in Units referring at least one COVID-19 positive physician)	10% (1%–18.8%)
Survey participants tested for COVID-19	27 (14.8)

COVID-19: SARS-CoV-2 disease; n.: number; IQR: inter-quartile range.

of COVID-19 infected healthcare professionals in the Unit of 10% (IQR 1–18.8%). However, at the time of the survey, only 14.8% of participants had been tested for COVID-19. The univariate analysis (Supplementary data) for identifying factors associated with the reporting of COVID-19 infection in healthcare professionals showed that being employed in a COVID-19 Unit (OR 2.026, 95% CI 1.046–3.926, $p = 0.036$) was a risk factor. A multivariate analysis was not performed since only one factor showed a statistically significant association.

3.3. Impact of COVID-19 on the daily activities of young gastroenterologists

The vast majority (96.7%) of participants referred a change of daily activity in their Units during the COVID-19 outbreak. These changes consisted in a reduced workload (137/183, 75.3%), mainly due to a very low residual outpatients' and endoscopic volume, respectively of 12.5% and 9% (which correspond to a reduction of 87.5% and 91% respectively) if compared to the activity volume before the COVID-19 outbreak (Table 3). The majority of participants (84.5%) felt that the COVID-19 outbreak impacted on the GI training, although only 51.1% of them referred to be employed in COVID-19 Units. The reasons that supported the feeling of a gap in the training were related to the unavailability of mentors in more than half of the cases (52.6%) and to the interruption of trainees' involvement in certain activities or procedures (66.4%), mainly endoscopy (colonoscopy in 32.3% of answers and esophagogastroduodenoscopy in 20.4% of answers). More than half of the participants proposed to address this gap of training by extending the GI training period.

At univariate analysis, the following factors were associated with the feeling of a gap in gastroenterological training: age older than 35 years (OR 0.108, 95% CI 0.039–0.297, $p<0.001$), working in a community and not-academic hospital (OR 0.344, 95% CI 0.140–0.843, $p = 0.020$), being a consultant (OR 0.129, 95% CI 0.053–0.317, $p < 0.001$), small outpatients residual volume during the COVID- 19 outbreak (OR 0.231, 95% CI 0.067–0.791, $p = 0.020$), unavailability of training mentors (OR 3.611, 95% CI 1.316–9.912, $p = 0.013$) and interruption of trainees' involvement in certain activities/procedures (OR 4.573, 95% CI 1.747–11.969, $p = 0.002$). However, multivariate analysis showed that only the outpatients' residual volume during the COVID-19 outbreak and the interruption of trainees' involvement in certain activities/procedures were associated with the feelings mentioned above (Table 4).

3.4. Infective risk of COVID-19, related feelings, and patient's management

One hundred and fifteen (63.2%) participants referred an adequate availability of personal protective equipment (PPE) in the institution of practice. However, 25.8% of the participants referred a lack of training regarding the use of PPE and reported in 34.6% of cases that the Institutions where they worked provided only documents for consultation but no formal training on PPE use. A total of 64.6% and 61.5% of participants referred absence of training on the use of oxygen delivery/ventilation systems and antiviral therapies COVID-19 specific, respectively (Table 5). As regards the feeling about infectious risks, in a rating scale from 1 to 10, participants referred to be afraid of getting infected with a median value of 6 (4–7), whereas the fear of infecting relatives and patients was higher, reaching a median value of 9 (IQR 8–10) (Table 5).

4. Discussion

This survey provides a comprehensive picture of the impact of the COVID-19 outbreak on the current activities of young GI trainees and consultants. Notably, these results reveal that the workload and the pattern of activities of Gastroenterology Units were highly influenced by the COVID-19 outbreak. Indeed, most of the participants referred to work in a COVID-19 hospital or a COVID-19 Unit. The daily GI activity was strongly reduced, i.e. a reduction of up to 91% of the endoscopy volume was registered, corresponding to a residual volume of endoscopies of 9% compared to the activity volume before the COVID-19 outbreak. Accordingly, it is possible to assert that most physicians, even gastroenterologists, have been re-assigned to COVID-19 Units. Residual activities were mainly related to urgent endoscopies and outpatients' visits. This activity reduction could be due both to the re-assignment of gastroenterologists to COVID-19 Units and to the infective risks related to endoscopy; indeed, several position papers highlighted a significant risk of diffusion of respiratory diseases which could be spread via an airborne route, including aspiration of oral and fecal material via endoscopes [13,14]. In addition, it is worth noting the number of participants that referred the presence of a COVID-19 positive colleague (28.4%), with a median reported rate of 10% of healthcare professionals affected COVID-19 in the Gastroenterology Units of practice. Nevertheless, we cannot assess whether the infected COVID-19 physicians were working in COVID-19 Units or not or if there is an overlap of responses from participants working in the same center, thus influencing the estimated infection rate. However, these data are in line with a recent Italian report describing the rate of COVID-19 infected physicians in Gastroenterol-

Table 3
Impact of COVID-19 on daily activities of participants.

	N. (%) or median (IQR)
Survey participants' activities changed during COVID-19 outbreak	176 (96.7)
Inpatients residual volume during COVID-19 outbreak	35% (16.7%–50%)
Outpatients residual volume during COVID-19 outbreak	12.5% (0%–33.3%)
Endoscopies residual volume during COVID-19 outbreak	9% (0%–20%)
Survey participants employed in COVID-19 Units	93 (51.1)
Participant's opinion: rate of patients with gastrointestinal symptoms for COVID-19	10% (1%–20%)
Participant's opinion: COVID-19 will impact the gastroenterological training	153 (84.5)
Proposed modalities to fill in the training gap	
Extend the training period	90 (58.4)
Increase the number of hand-on courses	35 (22.7)
Increase the number of theoretical courses	16 (10.4)
Other proposals	8 (5.2)
Increased workload for COVID-19 outbreak	
No	137 (75.3)
Yes	29 (15.9)
The participant is in quarantine	16 (8.8)
Mentors less available for training due to COVID-19 outbreak	71 (52.6)
Interruption of trainee involvement in certain procedures or activities	89 (66.4)
Colonoscopy	30 (32.3)
Esophagogastroduodenoscopy	19 (20.4)
ERCP	13 (14)
Outpatient visits	11 (11.8)
Other activities/procedures	21.5

COVID-19: SARS-CoV-2 disease; n.: number; IQR: inter-quartile range; ERCP: Endoscopic retrograde cholangiopancreatography.

Table 4
Uni and multivariate logistic regression for the evaluation of factors associated with feelings of gastroenterology trainees of a negative impact of COVID-19 outbreak on the training.

	Univariate logistic regression(OR 95% CI)	P	Multivariate logistic regression(OR 95% CI)	p
Gender (M)	0.444 (0.193–1.026)	0.057		
Age:				
≤30	Reference	–		
>30 and ≤35	0.841 (0.275–2.577)	0.762		
>35	0.108 (0.039–0.297)	<0.001		
Institution of practice:				
Academic Hospital	Reference	–		
Not Academic Hospital	0.344 (0.140–0.843)	0.020		
Private hospital/practice	0.397 (0.074–2.135)	0.282		
Clinical role:				
Trainee	Reference	–		
PhD	1.866 (0.228–15.301)	0.561		
Consultant	0.129 (0.053–0.317)	<0.001		
Training length (years)	0.573 (0.397–0.826)	0.003		
Current year of training	4.862 (0.353–66.926)	0.237		
Working in a hospital with patients COVID-19	0.458 (0.101–2.068)	0.310		
Presence of COVID-19 positive colleagues	0.472 (0.206–1.083)	0.077		
Percentage of infected COVID-19 colleagues	1.015 (0.076–13.581)	0.991		
Participant referring of being tested for COVID-19	0.732 (0.251–2.136)	0.568		
Inpatients residual volume during COVID-19 outbreak	0.722 (0.346–1.508)	0.386		
Outpatients residual volume during COVID-19 outbreak	0.231 (0.067–0.791)	0.020	0.164 (0.034–0.795)	0.025
Endoscopies residual volume during COVID-19 outbreak	0.878 (0.432–1.784)	0.718		
Participant employed in COVID-19 Units	0.697 (0.304–1.598)	0.393		
Increased workload for COVID-19 outbreak	1.054 (0.551–2.016)	0.874		
Mentors less available for training due to COVID-19 outbreak	3.611 (1.316–9.912)	0.013		
Interruption of trainee involvement in certain procedures or activities	4.573 (1.747–11.969)	0.002	6.906 (2.388–19.975)	<0.001

COVID-19: SARS-CoV-2 disease; OR: Odds Ratio; 95% CI: 95% Confidence Intervals; PhD: PhD: Doctor of Philosophy.

Table 5
Training and feelings of gastroenterology trainees and/or young gastroenterologists about infectious risks and COVID-19 patients management.

	N. (%) or median (IQR)
Availability of Personal protective equipment (PPE) in the institution	115 (63.2)
Training on the use of PPE	
No	47 (25.8)
The institution guaranteed some courses	6 (3.3)
The institution guaranteed some meetings	29 (15.9)
The institution has guaranteed some documents	63 (34.6)
Information already known	37 (20.3)
Training on the use of oxygen delivery/ventilation systems	
No	117 (64.6)
The institution guaranteed some courses	8 (4.4)
The institution guaranteed some meetings	14 (7.7)
The institution has guaranteed some documents	24 (13.3)
Information already known	18 (9.9)
Training on the use of antiviral/ therapies to be used for COVID-19 patients	
No	112 (61.5)
The institution guaranteed some courses	4 (2.2)
The institution guaranteed some meetings	6 (3.3)
The institution has guaranteed some documents	56 (30.8)
Information already known	4 (2.2)
Participant's opinion about testing also asymptomatic doctors for COVID-19 (Yes)	117 (64.3)
Participant's opinion about the utility of PPE in preventing contagion (Yes)	140 (76.9)
Feeling and fears of gastroenterology trainees and/or young gastroenterologist (rating from 1 to 10)	
Afraid of getting infected	6 (4–7)
Afraid of infecting family and patients	9 (8–10)
Feeling to be protected from Hospital	5 (4–6)
Satisfaction with the information and the equipment provided	5 (3–7)

COVID-19: SARS-CoV-2 disease; n.: number; IQR: inter-quartile range; PPE: personal protective equipment.

ogy Units [15]. Beyond the risk of transmission related to the management of COVID-19 patients [16], it should be underlined that cautionary measures need to be taken in all gastroenterological settings, especially in the Endoscopy Department [13]. These measures involve a preventive phone call to assess the health state of the patient before coming to the hospital and to explore the possible presence of symptoms or contacts with COVID-19 infected individuals, social distancing in the waiting room, recommendations for the patients to wear a surgical mask and gloves and the correct use from healthcare professionals of gloves, goggles, face shields, gowns, and protective respiratory equipment [13]. However, we believe that our reported rate of infected healthcare professionals is far from being acceptable in Europe and that, as a consequence, additional educational intervention are needed. For instance, on February 20th, 2020, more than 2 thousand healthcare professionals in China were reported to be COVID-19 positive; based on these data the Chinese central government started interventions for improving the correct use of PPE, strengthened logistics, medical supplies and enhanced disinfection [17] so that this model of possible intervention should be applied also in Europe. Interestingly, only 14.8% of participants referred to have been tested themselves for COVID-19 although 28.4% of them reported that a colleague was infected. These facts underline the need for periodical screening programs for healthcare professionals [18,19]. However, even though the participants were tested only in case of close contacts with infected colleagues, our data still show that only 50% of participants with an infected colleague were tested; thus, the conclusion that may be drawn is that this emerging COVID-19 under-testing policy could influence the spread of the infection not only among healthcare professionals but also among patients [19].

As regards the gastroenterological training, the COVID-19 outbreak led to a significant training gap, due to the trainees' employment in COVID-19 Units and to the reduced volume of gastroenterological activities. According to the multivariate analysis, the factors most closely related to this feeling were the reduction in outpatients' activities and the non-involvement of the trainees by mentors in certain activities. Importantly, through this Survey we propose new possible solutions to address the training gap such as extending the training period or increase the number of future hands-on courses in collaboration with academies and societies. It is noteworthy that the training gap reported is even wider than that reported for surgical training programs [20]. One potential explanation is that in most European countries, the clinical activities of gastroenterologists partially overlap with those of internists. As a consequence, gastroenterologists are often involved in COVID-19 Units. Several authors proposed, as a possible solution, the involvement in telemedicine activities of the trainees with a light workload during the COVID-19 outbreak, although evolution of the health systems is necessary to reach this goal [20,21]. Further innovative solutions may be the flipped classroom model, online practice questions, teleconferencing, procedural simulation, and videos, even if the useful hands-on skills remain outside of these solutions [10,22,23].

Finally, our results highlight a slow and incomplete adaptation to the COVID-19 outbreak since PPE were referred to be adequately available only in 63.2% of cases and more than half of the participants referred a sub-optimal training by institutions in the use of PPE, oxygen delivery/ventilation systems and the specific therapeutic management of COVID-19. Indeed, it is widely known that the availability of resources is essential for controlling the epidemic and protecting health workers on the front line in this fight against the COVID-19 [24]. To address the shortage of PPE different solutions have been proposed by several authors, as the rationale use of resources and respirators decontamination [25,26]. Of note, our multivariate analysis failed in finding an association between the availability and the training for PPE use and the presence of COVID-19 infected healthcare professionals; nevertheless, these results may have been biased by the sample size of our study. However, it remains critical to expand training program on the use of oxygen and ventilation systems and on the potential role of antiviral therapy.

Focusing on the psychological perception of participants about the COVID-19 outbreak we found that most of them were afraid to be infected or to infect relatives and patients; moreover, the

trust in the Institutions of practice and the satisfaction about the information received was moderate. This negative point-of-view of participants implies low confidence in the institution of practice that may partly justify the response concerning adequate equipment and training. However, the answers about the COVID-19 feelings and fears are similar to the previous reports for both the general population and healthcare professionals and underline a raised level of anxiety and emotional vulnerability [27]. Thus, measures to minimize the psychological stress of COVID-19 outbreak on healthcare professional are urgently needed [28]; increasing the knowledge about preventing and dealing with the disease through educational activities and providing psychological support may contribute to reduce the anxiety and vulnerability of healthcare professionals [28].

This study has several strengths: it is the first report describing the impact of the COVID-19 outbreak on Gastroenterology Units in Europe; indeed, 57% of participants came from European countries other than Italy, allowing to extend the validity of our results to the whole European setting. Second, we provide real-life data by reporting the current impact of COVID-19 on healthcare professionals infection in Europe, although his may be biased by the fact that this is the exclusive point of view of gastroenterologists and trainees. Finally, most subjects involved were gastroenterologists in training, thus we strongly emphasize the GI training gap by raising attention to the need to address this issue. However, we believe that our findings could be the starting point for Societies and Institutions to find solutions to meet further needs for all clinicians, for GI fellows and young gastroenterologists. On the other hand, this survey has some limits: since this was an anonymous web-based Survey, we were unable to obtain information other than that reported in the questionnaire; in addition, concerning the extraordinary nature of the events, it was not possible for us to use validated questionnaires or to use questions with pre-validated scales. Furthermore, some heterogeneity in our results may be influenced by the different kinetics of the contagion we are witnessing in the various European countries.

In conclusion, the COVID-19 outbreak had a strong impact on the clinical activity of gastroenterologists. The resources currently allocated to implement specific training for the management of COVID-19 patients and the attempts to go ahead with the usual gastroenterological training programs seem to be insufficient. Keeping abreast of the educational needs is the next goal to achieve. The identification of training gaps will help Academies and scientific societies in the near future to develop new resources and programs to meet the needs of gastroenterologists for improving their education.

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Conflicts of Interest

None declared.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.dld.2020.05.023.

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