

# Gastroenterologists attitude in various clinical settings in the era of COVID-19 pandemic

## An online Uni-National Israeli Survey

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### Abstract

Coronavirus disease 2019 (COVID-19) pandemic has impacted our clinical practice. Many gastroenterologists have changed their attitudes toward various gastroenterological clinical settings. The aim of the present study is to explore the gastroenterologist's attitudes in several clinical settings encountered in the clinical practice.

An online based survey was completed by 101 of 250 Israeli gastroenterologists (40.5%).

Most of the participants were males (76.2%), and most of them were in the age range of 40 to 50 (37.6%). For all questionnaire components, the 2 most common chosen options were "I perform endoscopy with N95 mask, gloves and gown protection in a standard endoscopy room without preendoscopy severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) testing" and "Tend to postpone endoscopy until SARS-CoV-2 test is performed because of fear from being infected, or virus spreading in the endoscopy suite." Notably, 12 (11.9%) gastroenterologists were infected by Coronavirus disease 2019 during their work. Classifying the clinical settings to either elective and non-elective, most gastroenterologists (77.4%) chose the attitude of "I perform endoscopy with N95 mask, gloves and gown protection in a standard endoscopy room without SARS-COV-2 testing" in the nonelective settings as compared to 54.2% for the elective settings, ( $P < .00001$ ), whereas 32.9% of the responders chose the attitude of "Tend to postpone endoscopy until SARS-COV-2 test is performed because of fear from being infected, or virus spreading in the endoscopy suite" in the elective settings ( $P < .00001$ ).

Gastroenterologists' attitude in various gastroenterological settings was based on the clinical indication. Further studies are needed to assess the long-term consequences of the different attitudes.

**Abbreviations:** CDC = Center for Disease Control and Prevention, COVID-19 = Coronavirus disease 2019, ESGE = European Society of Gastrointestinal Endoscopy, GI = gastrointestinal, PPE = personal protective equipment, SARS-CoV-2 = severe acute respiratory syndrome coronavirus-2, WHO = World Health Organization.

**Keywords:** COVID-19, elective, gastroenterology, settings, various

## 1. Introduction

Coronavirus disease 2019 (COVID-19) is caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). COVID-19

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was declared as a global pandemic by the World Health Organization (WHO) on March 2020,<sup>[1]</sup> affecting 221 countries with about 109 million cases and >2.3 million deaths as of February 13, 2021. As the understanding of the pandemic developed, the Center for Disease Control and Prevention included various gastrointestinal symptoms (GI) as a part of the COVID-19 clinical presentation, including nausea, vomiting, abdominal pain, pancreatitis, enteritis, hepatitis, and colitis.<sup>[2–5]</sup> Gastroenterologists and other endoscopy unit staff members are prone to COVID-19 infection due to the high contagious potential of the virus alongside the nature of the procedures performed where close contact with patient is required. The potential for viral transmission is particularly high during aerosol-producing procedures such as upper GI endoscopy.

Thus fore, workflow at most endoscopy units worldwide was drastically disturbed, resulting in a significant reduction of the global endoscopic capabilities.<sup>[6–9]</sup> Several international professional GI/endoscopy societies and organizations have delivered recommendations directed towards the prevention of viral transmission at endoscopy units and personnel protection.<sup>[10–15]</sup> These recommendations comprised strict measures in endoscopy unit such as; deferring elective procedures, measuring temperature to personnel and patients, a proof of negative COVID-19 testing by polymerase chain reaction, the use of personal protective equipment (PPE), and the need for negative pressure rooms. The effect of these measures on public health and medical training is presently being estimated; however, the

existing data point toward a reduction in colorectal cancer screening and detection rate<sup>[7]</sup> as well as a reduction in fellows' training time in endoscopy procedures.<sup>[16]</sup> Optimistically, data from northern Italy proposed that proper use of PPE and other measures meaningfully diminish viral transmission risk at endoscopy units.<sup>[17]</sup> In the present study we aimed to assess the impact of COVID-19 pandemic on Israeli gastroenterologist's endoscopic practice through delivering an online survey.

## 2. Methods

An online questionnaire that was built for this study was posted online and was distributed by email sent to all gastroenterologists at Israel by the Israeli Society of Gastroenterology. Further, the questionnaire was distributed to every gastroenterology department's managers that send it to all gastroenterologists at their centre. The questionnaire was composed of 30 different gastrointestinal scenarios (supplementary 1, Supplemental Digital Content, <http://links.lww.com/MD/G309>) and was designed to assess gastroenterologist approach to those various clinical settings in the COVID-19 era. Other than the data concerning the demographics and professional characteristics of the participants, all questions had 5 basic options: I perform endoscopy with N95 mask, gloves and gown protection in a standard endoscopy room without SARS-CoV-2 testing, I perform endoscopy with appropriate protection (personal protective equipment-PPE) in a standard endoscopy room without SARS-CoV-2 testing, tend to postpone endoscopy until SARS-CoV-2 test is performed because of fear from being infected, or disease spreading in the endoscopy suite, tend to postpone endoscopy until COVID-19 wanes, as it is an elective, non-urgent indication, I perform endoscopy with PPE and in a dedicated room (negative pressure or special filter) without SARS-CoV-2 testing. Several scenarios had one more option of: I prefer to perform magnetic resonance cholangiopancreatography/magnetic resonance imaging. An ethical committee approval was not necessary in this study given that our study was conducted among gastroenterologists.

### 2.1. Statistical analysis

Quantitative variables are expressed as mean  $\pm$  standard deviation and categorical variables are expressed in percentages. Categorical variables were compared by applying the Fisher exact test. *P* values of  $\leq 0.05$  were considered statistically significant. All analyses were performed by an experienced statistician using the statistical analysis software (SAS Vs 9.4 Copyright (c) 2016 by SAS Institute Inc., Cary, NC).

## 3. Results

In our country, there are almost 250 gastroenterologists. Overall, 101 participated by filling the online questionnaire which account for 40.5% of them. Seventy-seven participants (76.2%) were males and most of them were between 40 and 50 years of age (37.6%). Notably, 91 gastroenterologists (90.1%) were senior physicians and most of them were employed in a high medical center resource (55.4%). Table 1 demonstrates the demographics and the professional experience of all the participants. For all questions within the questionnaire, the common most attitude the participants reported was "I perform endoscopy with N95 mask, gloves and gown protection in a standard endoscopy room without SARS-CoV-2 testing,"

**Table 1**

### Baseline characteristics and professional data of the study participants.

Total no. of gastroenterologist	101
Sex, N (%)	
Male	77 (76.2)
Female	24 (23.8)
Age categories, y, N (%)	
<40	24 (23.8)
40–50	38 (37.6)
51–60	30 (29.7)
>60	9 (8.9)
No. of years in gastroenterology practice, N (%)	
<10	47 (46.5)
11–20	29 (28.7)
21–30	20 (19.8)
>30	5 (5)
Subfield in gastroenterology, N (%)	
Advanced/hepatobiliary	38 (37.6)
Gastro-oncology	6 (5.9)
Motility	9 (8.9)
Hepatology	15 (14.9)
Inflammatory bowel disease	19 (18.8)
Nutrition	8 (7.9)
General	6 (6)
Position, N (%)	
Senior	91 (90.1)
resident	10 (9.9)
Medical center resources, N (%)	
High	56 (55.4)
Moderate	39 (38.6)
Low	6 (6)

followed by "2- Tend to postpone endoscopy until SARS-CoV-2 test is performed because of fear from being infected, or virus spreading in the endoscopy suite." Table 2 demonstrates the distribution of the participants' response. Interestingly, 43 (42.6%) gastroenterologists have been quarantined as a result of exposure to a COVID-19 patient during their work, whereas 12 (11.9%) were infected with COVID-19 during their work (Fig. 1).

### 3.1. Subgroup analysis of gastroenterologist-infected by COVID-19 during their work

Twelve gastroenterologists were infected with SARS-CoV-2 during their work. Eight (66.6%) were males. Half of them were with <10 years in gastroenterology practice. Similarly, most of them are advanced gastroenterologist (4, 33.3%). Half of them were from a high medical resource's centers (Table 3). Notably, the 2 most common attitudes elected by gastroenterologists infected with SARS-CoV-2 were "I perform endoscopy with N95 mask, gloves, and gown protection in a standard endoscopy room without SARS-CoV-2 testing," and "Tend to postpone endoscopy until SARS-CoV-2 test is performed because of fear from being infected, or virus spreading in the endoscopy suite" (Table 4). Subgroup analysis between gastroenterologists who were infected by SARS-CoV-2 to those who were not infected revealed that in urgent nonelective gastroenterological settings (upper gastrointestinal bleeding, lower gastrointestinal bleeding, cholangitis and foreign body ingestion), the most common attitude among infected gastroenterologist was "I perform

**Table 2**  
**Gastroenterologists attitude in various gastrointestinal settings.**

No. (%)	*N95, gloves and gown in standard room	†PPE in standard room	‡Postpone procedure to prevent viral spreading	§Perform electively	PPE in dedicated room	¶Perform MRI
Stable UGIB	71 (70.3)	6 (5.9)	24 (23.8)	0	0	0
Unstable UGIB	87 (86.1)	10 (9.9)	3 (3)	0	1 (1)	0
Stable LGIB	71 (71)	4 (4)	25 (25)	0	0	0
Unstable LGIB	81 (81)	10 (10)	8 (8)	0	1 (1)	0
Stable cholangitis	69 (69.7)	4 (4)	25 (25.3)	0	1 (1)	0
Unstable cholangitis	81 (82.7)	12 (12.2)	4 (4.1)	0	1 (1)	0
foreign body ingestion	82 (81.2)	10 (9.9)	9 (8.9)	0	0	0
Occult fecal blood test	54 (53.5)	4 (4)	38 (37.6)	5 (4.9)	0	0
Abdominal pain	58 (57.4)	2 (2)	36 (35.6)	5 (5)	0	0
Iron deficiency anemia	55 (54.5)	2 (2)	36 (35.6)	8 (7.9)	0	0
Low-grade dysplasia polyp surveillance	50 (49.5)	4 (4)	35 (34.6)	12 (11.9)	0	0
High-grade dysplasia polyp surveillance	58 (57.4)	3 (3)	34 (33.7)	6 (5.9)	0	0
High-risk CRC	55 (54.5)	2 (2)	36 (35.6)	8 (7.9)	0	0
Average-risk CRC	45 (45)	2 (2)	35 (35)	17 (17)	1 (1)	0
PEG insertion	55 (55)	2 (2)	36 (36)	7 (7)	0	0
Suspected CBD stones	44 (44.9)	3 (3.1)	27 (27.5)	3 (3.1)	1 (1)	20 (20.4)
Pancreatic cysts follow-up	37 (37.8)	2 (2)	25 (25.6)	12 (12.2)	0	22 (22.4)
Esophageal varices secondary prevention	61 (62.2)	5 (5.1)	25 (25.5)	4 (4.1)	3 (3.1)	0
Planned stent exchange	55 (56.7)	4 (4.1)	31 (32)	7 (7.2)	0	0
Suspected GIT mass by radiology	62 (62.7)	2 (2)	31 (31.3)	4 (4)	0	0
GIT wall thickening by radiology	63 (62.3)	2 (2)	33 (32.7)	3 (3)	0	0
Suspected IBD	60 (60)	2 (2)	34 (34)	4 (4)	0	0

CBD = common bile duct, CRC = colorectal cancer, GIT = gastrointestinal tract, IBD = inflammatory bowel disease, LGIB = lower gastrointestinal bleeding, PEG = percutaneous gastrostomy, PPE = personal protective equipment, UGIB = upper gastrointestinal bleeding.

\* I perform endoscopy with N95 mask, gloves and gown protection in a standard endoscopy room without SARS-COV-2 testing.

† I perform endoscopy with PPE in a standard endoscopy room without SARS-COV-2 testing.

‡ Tend to postpone endoscopy until SARS-COV-2 test is performed because of fear from being infected, or disease spreading in the endoscopy suite.

§ Tend to postpone endoscopy until COVID-19 wanes, as it is an elective non-urgent indication.

|| I perform endoscopy with PPE and in a dedicated room (negative pressure or special filter) without SARS-COV-2 testing.

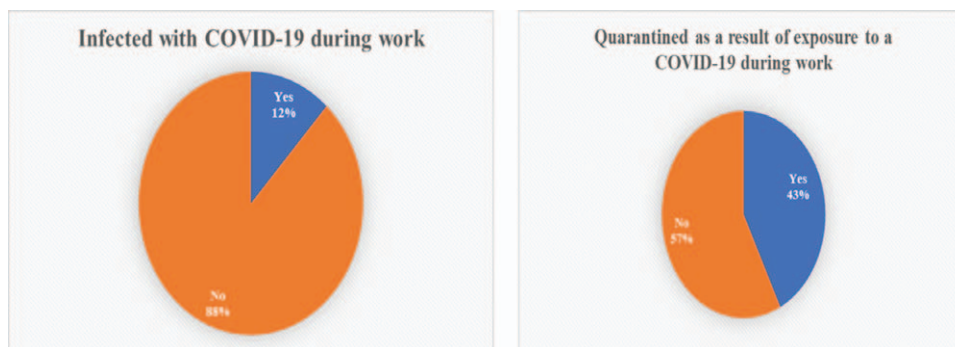
¶ I perform MRI/MRCP.

endoscopy with N95 mask, gloves, and gown protection in a standard endoscopy room without SARS-CoV-2 testing” (Table 5).

**3.2. Subgroup analysis of Gastroenterologist according to setting urgency**

Sub analysis by defining non-elective clinical settings (Stable and unstable upper gastrointestinal bleeding and lower gastrointestinal bleeding, stable and unstable cholangitis and foreign body ingestion) compared to elective settings, revealed that in the nonelective setting, the most common attitude was “I perform

endoscopy with N95 mask, gloves and gown protection in a standard endoscopy room without SARS-CoV-2 testing” in 77.4%, as compared to 54.2% for the elective settings ( $P < .00001$ ). Although most responders (54.2%) chose the same way of action like the majority in the nonelective categories, however, in the elective settings, more gastroenterologists (32.9%) elected “Tend to postpone endoscopy until SARS-CoV-2 test is performed because of fear from being infected, or virus spreading in the endoscopy suite” compared to 14% in the nonelective settings ( $P < .00001$ ). Table 6 demonstrates the responses differences in elective and nonelective clinical settings.



**Figure 1.** Demonstrates the rate of gastroenterologists who were infected with SARS-COV-2 and quarantined during their work.

**Table 3****Baseline characteristics and professional data of the study participants infected with SARS-COV-2.**

Total no.	12
Sex, N (%)	
Male	8 (66.7)
Female	4 (33.3)
Age categories, y, N (%)	
<40	4 (33.3)
40–50	3 (25)
51–60	4 (33.3)
>60	1 (8.4)
No. of years in gastroenterology practice, N (%)	
<10	6 (50)
11–20	4 (33.3)
21–30	2 (16.7)
>30	0
Subfield in gastroenterology, N (%)	
Advanced/hepatobiliary	4 (33.3)
Gastro-oncology	0
Motility	1 (8.4)
Hepatology	3 (25)
Inflammatory bowel disease	3 (25)
Nutrition	1 (8.4)
General	0
Position, N (%)	
Senior	11 (91.7)
resident	1 (8.3)
Medical center resources, N (%)	
High	6 (50)
Moderate	6 (50)
Low	0

**4. Discussion**

Our survey uncovers the attitudes of about 40% of the Israeli gastroenterologists regarding several gastrointestinal clinical scenarios, ranging from elective through semielective to urgent settings. We found that most Israeli gastroenterologists' decisions in the various gastrointestinal cases were mainly based on the urgency of the setting. Although the majority would have made the endoscopic intervention with N95 mask, gloves, and gown protection in a standard endoscopy room, others favored PPE in a standard endoscopy room or postponing the procedure until SARS-CoV-2 test is being performed. This finding was most prominent (77.4% of responders) in the nonelective clinical settings including upper GI bleeding, lower GI bleeding, acute cholangitis, and foreign body ingestion, as compared to elective settings.

Interestingly, 54.2% of responders chose "I perform endoscopy with N95 mask, gloves, and gown protection in a standard endoscopy room without SARS-CoV-2 testing; however, 32.9% chose "tend to postpone endoscopy until SARS-CoV-2 test is performed because of fear from being infected, or virus spreading in the endoscopy suite" for the elective settings. The same option was elected by only 14% of responders in the nonelective settings ( $P < .00001$ ). To the best of our knowledge, this is the first study assessing gastroenterologists' attitudes in diverse elective and nonelective clinical settings. With regard to the timing of performing endoscopic procedures, the results of our study were comparable to those reported in the literature. Recent professional societies guidelines recommend performing urgent endoscopic procedures in the era of COVID-19 in urgent presentations including gastrointestinal hemorrhages and cholangitis.<sup>[3,18,19]</sup> Similarly, recent guideline from the European Society of Gastrointestinal Endoscopy (ESGE), stated that endoscopy

**Table 4****Gastroenterologists infected with SARS-COV-2 attitude in various gastrointestinal settings.**

No. (%)	*N95, gloves and gown in standard room	†PPE in standard room	‡Postpone procedure to prevent viral spreading	§Perform electively	PPE in dedicated room	¶Perform MRI
Stable UGIB	11 (91.7)	0	1 (8.3)	0	0	0
Unstable UGIB	12 (100)	0	0	0	0	0
Stable LGIB	11 (91.7)	0	1 (8.3)	0	0	0
Unstable LGIB	12 (100)	0	0	0	0	0
Stable cholangitis	11 (91.7)	0	1 (8.3)	0	0	0
Unstable cholangitis	12 (100)	0	0	0	0	0
foreign body Ingestion	11 (91.7)	0	1 (8.3)	0	0	0
Occult fecal blood test	5 (41.7)	0	7 (58.3)	0	0	0
Abdominal pain	6 (50)	0	6 (50)	0	0	0
Iron deficiency anemia	5 (41.7)	0	6 (50)	1 (8.3)	0	0
Low grade dysplasia polyp surveillance	6 (50)	0	5 (41.7)	1 (8.3)	0	0
High grade dysplasia polyp surveillance	5 (41.7)	0	7 (58.3)	0	0	0
High risk CRC	5 (41.7)	0	7 (58.3)	0	0	0
Average risk CRC	5 (41.7)	0	6 (50)	1 (8.3)	0	0
PEG insertion	5 (41.7)	0	6 (50)	1 (8.3)	0	0
Suspected CBD stones	3 (25)	0	4 (33.3)	0	0	5 (41.7)
Pancreatic cysts follow-up	3 (25)	0	3 (25)	0	0	6 (50)
Esophageal varices secondary prevention	9 (75)	0	3 (25)	0	0	0
Planned stent exchange	7 (58.3)	0	5 (41.7)	0	0	0
Suspected GIT mass by radiology	7 (58.3)	0	5 (41.7)	0	0	0
GIT wall thickening by radiology	7 (58.3)	0	5 (41.7)	0	0	0
Suspected IBD	7 (58.3)	0	5 (41.7)	0	0	0

CBD = common bile duct, CRC = colorectal cancer, GIT = gastrointestinal tract, IBD = inflammatory bowel disease, LGIB = lower gastrointestinal bleeding, MRI = magnetic resonance imaging, PEG = percutaneous gastrostomy, PPE = personal protective equipment, UGIB = upper gastrointestinal bleeding.

\* I perform endoscopy with N95 mask, gloves and gown protection in a standard endoscopy room without SARS-COV-2 testing.

† I perform endoscopy with PPE in a standard endoscopy room without SARS-COV-2 testing.

‡ Tend to postpone endoscopy until SARS-COV-2 test is performed because of fear from being infected, or disease spreading in the endoscopy suite.

§ Tend to postpone endoscopy until COVID-19 wanes, as it is an elective non-urgent indication.

|| I perform endoscopy with PPE and in a dedicated room (negative pressure or special filter) without SARS-COV-2 testing.

¶ I perform MRI/MRCP.



**Table 5**  
**Demonstrates the responses details of gastroenterologists infected vs not-infected by COVID-19.**

No. (%)	*N95, gloves and gown in standard room		†Postpone procedure to prevent viral spreading	
	Infected with SARS-COV-2	Not infected with SARS-COV-2	Infected with SARS-COV-2	Not infected with SARS-COV-2
Total no.	12	89	12	89
Stable UGIB	11 (91.7)	60 (67.4)	1 (8.3)	22 (24.7)
Unstable UGIB	12 (100)	75 (84.3)	0	3 (3.4)
Stable LGIB	11 (91.7)	60 (67.4)	1 (8.3)	23 (25.8)
Unstable LGIB	12 (100)	69 (77.5)	0	8 (9)
Stable cholangitis	11 (91.7)	58 (65.2)	1 (8.3)	23 (25.8)
Unstable cholangitis	12 (100)	69 (77.5)	0	4 (4.5)
foreign body Ingestion	11 (91.7)	71 (79.8)	1 (8.3)	8 (9)
Occult fecal blood test	5 (41.7)	49 (55.1)	7 (58.3)	30 (33.7)
Abdominal pain	6 (50)	52 (58.4)	6 (50)	30 (33.7)
Iron deficiency anemia	5 (41.7)	50 (56.2)	6 (50)	30 (33.7)
Low-grade dysplasia polyp surveillance	6 (50)	44 (49.4)	5 (41.7)	30 (33.7)
High grade dysplasia polyp surveillance	5 (41.7)	53 (59.6)	7 (58.3)	27 (30.3)
High-risk CRC	5 (41.7)	50 (56.2)	7 (58.3)	29 (32.6)
Average risk CRC	5 (41.7)	40 (44.9)	6 (50)	29 (32.6)
PEG insertion	5 (41.7)	50 (56.2)	6 (50)	30 (33.7)
Suspected CBD stones	3 (25)	41 (46.1)	4 (33.3)	23 (25.8)
Pancreatic cysts follow-up	3 (25)	34 (38.2)	3 (25)	22 (24.7)
Esophageal varices secondary prevention	9 (75)	52 (58.4)	3 (25)	22 (24.7)
Planned stent exchange	7 (58.3)	48 (53.9)	5 (41.7)	26 (29.2)
Suspected GIT mass by radiology	7 (58.3)	55 (61.8)	5 (41.7)	26 (29.2)
GIT wall thickening by radiology	7 (58.3)	56 (62.9)	5 (41.7)	28 (31.4)
Suspected IBD	7 (58.3)	53 (59.6)	5 (41.7)	29 (32.6)

CBD = common bile duct, CRC = colorectal cancer, GIT = gastrointestinal tract, IBD = inflammatory bowel disease, LGIB = lower gastrointestinal bleeding, PEG = percutaneous gastrostomy, UGIB = upper gastrointestinal bleeding.

\* I perform endoscopy with N95 mask, gloves and gown protection in a standard endoscopy room without SARS-COV-2 testing.

† Tend to postpone endoscopy until SARS-COV-2 test is performed because of fear from being infected, or disease spreading in the endoscopy suite.

should always performed in the COVID-19 pandemic in cases of: acute upper/lower GI bleeding with hemodynamic instability, capsule/enteroscopy for urgent/emergent bleeding, anemia with hemodynamic instability, foreign body in oesophagus and/or high-risk foreign body in the stomach, obstructive jaundice and acute ascending cholangitis.<sup>[20]</sup> Regarding the protection measures that should be undertaken in the endoscopy suite, most of our responders elect to perform endoscopic procedures with standard protection of N95 mask, gloves, and gown protection in a standard endoscopy room without SARS-CoV-2 in urgent procedures, whereas only a minority chose to perform the procedures with PPE protection measures. This is in part contrary to the recent ESGE guidelines, that advocates the use of surgical

mask, gloves, shoe covers, disposable hairnet, water proof disposable gowns, and protective eyewear for low-risk patients of COVID-19, whereas recommends the use of PPE for high risk of positive patients.<sup>[20]</sup> However, due to the accumulating evidence of the extremely high contagious potential of SARS-CoV-2 and that its viral loads are high within the gastrointestinal tract and that viral particles persisted a longer duration within the gastrointestinal tract as demonstrated by recent data showing a positive viral ribonucleic acid that persisted for a mean of 27.9 days versus 16.7 days in the respiratory samples coupled with the potential feco-oral transmission,<sup>[21]</sup> PPE use should be strongly considered as the standard protection method used in the endoscopy suite. A very recent consensus recommendation paper

**Table 6**  
**Demonstrates the difference in responses among elective and nonelective clinical settings.**

No. (%)	*N95, gloves and gown in standard room	†PPE in standard room	‡Postpone procedure to prevent viral spreading	§Perform electively	PPE in dedicated room	¶Perform MRI
Nonelective settings (Total of 700 responses)	542 (77.4)	56 (8)	98 (14)	0	4 (0.57)	0
Elective settings (Total of 1497 responses)	812 (54.2)	41 (2.7)	492 (32.9)	104 (6.9)	5 (0.33)	42 (2.8)
P	<.00001	<.00001	<.00001	-	.4	—

**Nonelective setting:** Stable and unstable UGIB and LGIB, stable and unstable cholangitis, and foreign body ingestion. MRI = magnetic resonance imaging, PPE = personal protective equipment.

\* I perform endoscopy with N95 mask, gloves and gown protection in a standard endoscopy room without SARS-COV-2 testing.

† I perform endoscopy with PPE in a standard endoscopy room without SARS-COV-2 testing.

‡ Tend to postpone endoscopy until SARS-COV-2 test is performed because of fear from being infected, or disease spreading in the endoscopy suite.

§ Tend to postpone endoscopy until COVID-19 wanes, as it is an elective non-urgent indication.

|| I perform endoscopy with PPE and in a dedicated room (negative pressure or special filter) without SARS-COV-2 testing.

¶ I perform MRI/MRCP.

from Japan recommends protection with PPE with the patients wearing surgical mask in the outpatient clinic among individuals with unknown status of COVID-19, and protection with PPE in the endoscopy room with negative pressure and ventilation adaptation when treating patients with either negative or positive result of COVID-19.<sup>[22]</sup> Therefore, the present trend to advocate to PPE measures within the endoscopy suite. As stated above, this lower response rate of PPE is probably related to the shortage of PPE measures in the endoscopy suites at our country. Notably, in our cohort, 12 gastroenterologists (11.9%) were infected with SARS-CoV-2 during their work, as most of them elected the attitude of “I perform endoscopy with N95 mask, gloves, and gown protection in a standard endoscopy room without SARS-CoV-2 testing,” whereas none has chosen the attitude of performing endoscopes with PPE use in a standard room or with PPE use in a dedicated room, suggesting that PPE in a standard room is sufficient to virtually eliminate the risk of infection, whereas using dedicated room setting appears not to be necessary to achieve this. After extensive literature search, we could not find studies reporting the rate of gastroenterologists who were infected with SARS-CoV-2. However, further subgroup analysis revealed that more gastroenterologists infected with SARS-CoV-2 chose “I perform endoscopy with N95 mask, gloves, and gown protection in a standard endoscopy room without SARS-CoV-2 testing” in the urgent settings as compared to those who were not infected, in whom, more responders elected to postpone procedure, until SARS-CoV-2 examination, probably because infected practitioner, feel more protected after recovery from COVID-19. However, being past infected with the virus despite N95 mask, gloves and gown protection, might in part strengthen the fact that PPE measures should be used in the endoscopy suite, irrespective of the patients COVID-19 status.

The main limitation of our study is that a relatively small number of one country gastroenterologists completed the survey; however, given that it is the design addressed only in our country with an overall 250 gastroenterologists, we successfully recruited a substantial percentage of them.

In conclusion, since the outbreak of COVID-19 disease, about a year ago, medical personal found themselves in the front line facing this still unknown non compassionate virus. In the early beginning, lot of them sacrificed their life, at least partially as a result of poor knowledge of the new enemy. However, as a rule in such a rolling case, you learn to know your enemy from day to another and develop your armamentarium. Actually, besides the medicines being developed to treat the disease, several defence means have been developed and are advocated to use by international committees to stop disease spreading, including social distancing and face masks for the public and new model for dedicated hospitalization rooms for COVID-19 patients, designed to minimize disease spreading in addition to strict medical personal protection directions including PPE, N-95 face masks, headdress, gloves, water proof plastic gowns, and shoe covers. As the disease spread, other medical problems besides COVID-19 continued to be here, thus forcing medical personal to treat different diseases in COVID-19 patient or patients with unknown SARS-CoV-2 status. Diverse medical committees published guidelines to treat these patients. The implementation of these guidelines depends to a great extent on the resources of the hospitals in different countries. In our country, most hospitals enjoy intermediate to high resources. In this survey, we could show that most Gastroenterologists attitudes in various gastro-

enterological settings are mainly based on the urgency of the clinical indication.

### Author contributions

Tawfik Khoury and Wisam Sbeit contributed to the concept and the design. All authors contributed to building the questionnaire. Tawfik Khoury contributed to data analysis and interpretation. All authors wrote the manuscript and approved it to be published.

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