Endoscopy units and the COVID-19 Outbreak: A Multi-Center Experience from Italy

Alessandro Repici, MD, Fabio Pace, MD, Roberto Gabbiadini, MD, Matteo Colombo, MD, Cesare Hassan, MD, PhD, Marco Dinelli, MD, on behalf of The ITALIAN GI-COVID19 Working Group, Roberta Maselli, MD, PhD, Marco Spadaccini, MD, Massimiliano Mutignani, MD, Armando Gabbrielli, MD, Clementina Signorelli, MD, Cristiano Spada, MD, Piera Leoni, MD, Carlo Fabbri, MD, Sergio Segato, MD, Nicola Gaffuri, MD, Benedetto Mangiavillano, MD, Franco Radaelli, MD, Raffaele Salerno, MD, Stefano Bargiggia, MD, Luca Maroni, MD, PhD, Antonio Benedetti, MD, Pietro Occhipinti, MD, Federico De Grazia, MD, Luca Ferraris, MD, Gianpaolo Cengia, MD, Salvatore Greco, MD, Costanza Alvisi, MD, Antonella Scarcelli, MD, Luca De Luca, MD, Fabrizio Cereatti, MD, Pier Alberto Testoni, MD, Roberto Mingotto, MD, Giovanni Aragona, MD, Gianpiero Manes, MD, Paolo Beretta, MD, Georgios Amvrosiadis, MD, Vincenzo Cennamo, MD, Fausto Lella, MD, Guido Missale, MD, Pavlos Lagoussis, MD, Omero Triossi, MD, Mauro Giovanardi, MD, Giuseppe De Roberto, MD, Paolo Cantù, MD, Elisabetta Buscarini, MD, Andrea Anderloni, MD, PhD, Silvia Carrara, MD, Alessandro Fugazza, MD, Piera Alessia Galtieri, MD, Gaia Pellegatta, MD, Giulio Antonelli, MD, Thomas Rösch, MD, Prateek Sharma, MD

PII: S0016-5085(20)30466-2
DOI: https://doi.org/10.1053/j.gastro.2020.04.003
Reference: YGAST 63349

To appear in: *Gastroenterology*
Accepted Date: 2 April 2020

Please cite this article as: Repici A, Pace F, Gabbiadini R, Colombo M, Hassan C, Dinelli M, on behalf of The ITALIAN GI-COVID19 Working Group, Maselli R, Spadaccini M, Mutignani M, Gabbrielli A, Signorelli C, Spada C, Leoni P, Fabbri C, Segato S, Gaffuri N, Mangiavillano B, Radaelli F, Salerno R, Bargiggia S, Maroni L, Benedetti A, Occhipinti P, De Grazia F, Ferraris L, Cengia G, Greco S, Alvisi C, Scarcelli A, De Luca L, Cereatti F, Testoni PA, Mingotto R, Aragona G, Manes G, Beretta P, Amvrosiadis G, Cennamo V, Lella F, Missale G, Lagoussis P, Triossi O, Giovanardi M, De Roberto G, Cantù P, Buscarini E, Anderloni A, Carrara S, Fugazza A, Galtieri PA, Pellegatta G, Antonelli G, Rösch T, Sharma P, Endoscopy units and the COVID-19 Outbreak: A Multi-Center Experience from Italy, *Gastroenterology* (2020), doi: https://doi.org/10.1053/j.gastro.2020.04.003.

Endoscopy units and the COVID-19 Outbreak: A Multi-Center Experience from Italy

Short title: COVID-19 and Endoscopy Units: results of a Survey from a High Risk Area

Alessandro Repici, MD[1,2], Fabio Pace, MD[3], Roberto Gabbiadini, MD[1,2], Matteo Colombo, MD[1,2], Cesare Hassan, MD, PhD[4], Marco Dinelli, MD[5], on behalf of The ITALIAN GI-COVID19 Working Group.

Affiliations:
[1] Humanitas Clinical and Research Center, Digestive Endoscopy Unit, Rozzano (Milan). Italy.
[2] Humanitas University, Department of Biomedical Sciences, Rozzano (Milan). Italy.
[3] Bolognini Hospital, Gastroenterology Unit, Seriate (Bergamo). Italy.
[4] Nuovo Regina Margherita Hospital, Digestive Endoscopy, Rome. Italy.
[5] San Gerardo Hospital ASST Monza, Endoscopy Unit, Monza (Monza-Brianza). Italy.

Corresponding author:
Alessandro Repici, MD
Humanitas Research Hospital and University, Rozzano, Italy
Via Manzoni 56
20089 Rozzano (Milano) Italy
Tel: +39 (0)282247493
Fax: +390282247493
e-mail: alessandro.repici@hunimed.eu

Conflict of interest statement/disclosure(s): None

Acknowledgements: None

Paper word count: 999

Study contribution: AR, RM, RG, MC, MS, SC, AA, TR, and PS designed the study. MS RG, GA, CH, PS, TR, and AR drafted the manuscript. All the Authors participated in the data collection. All the Authors revised and approved the final manuscript.

List of abbreviations: COVID-19: COronaVIrus Disease 19; **EDs:** Endoscopy Departments; **HCP:** HealthCare Personnel; **PPE:** Personal Protective Equipment; **ICU:** Intensive Care Unit; **IPC:** Infection Prevention and Control**;** **HHD:** Hospital Healthcare Direction; **ER: Emergency Department; EEP**:**Emergency Endoscopic Procedures;**

Background

Up to 20% of Healthcare Personnel (HCP) were found to be COVID-19 infected[1] in the outbreak in Northern Italy [2]. Recommendations on patients' and HCP protection have been recommended, such as postponing procedures, triage, Personal Protective Equipment (PPE), and differentiated in-hospital pathways [3,4]. However, several barriers against the adoption of these strategies exist, including cultural factors and shortage of medical resources and there are few reports of real-world experiences and outcomes for their adoption[5].

The aim of this survey was to investigate the burden of COVID-19 on endoscopic activity in a high-risk area of COVID-19 outbreak, approaches to evaluating patients, adoption and compliance of HCP with protective measures, and initial possible viral transmission outcomes from endoscopy units within a large, community-based setting (both between patients and healthcare personnel and between healthcare personnel).

Methods

The study was conducted as a survey between 03/16 to 03/21, 2020. Directors of EDs in high-risk areas of northern Italy were invited by e-mail to complete a questionnaire (**Supplementary Table 1, Figure 1**). Participation was voluntary. Additional methodology is in **Supplementary Material**.

Results

3.1 Characteristics of Endoscopy Units

42 endoscopy units were invited, of which 41 participated (97.6%). Most respondents (n=37, 90.2%) were high-volume endoscopy units for a total of 968 endoscopy personnel, including 323 endoscopists, 496 nurses and 149 healthcare assistants.

3.2 *Changes in Endoscopy activity related with COVID-19*

All endoscopy units had patients diagnosed with COVID-19 in their Hospital. All but one center (40/41, 97.6%) reduced normal endoscopic activities due to COVID-19**.** Quantification of reductions is shown in **Figure 1.** After COVID-19 outbreak, 39 endoscopy units (95.1%) continued to perform urgent procedures, 39 endoscopy units (95.1%) inpatient procedures, 28 endoscopy units (68.3%) screening colonoscopy for colorectal cancer (FIT+), 9 endoscopy units (22.0%) outpatient therapeutic procedures, while 7 endoscopy units (17.1%) performed all procedures.

3.3 *Procedures in COVID-19 positive or high-risk patients*

Thirty-five (35) endoscopic procedures, performed in 14/41 (34.1%) endoscopy units, were performed on COVID-19 patients. All procedures were urgent or non-deferrable and none were for COVID-19-related gastrointestinal diseases. In addition, 99 endoscopic procedures, performed by 20/41 (48.8%) endoscopy units, were performed on suspected COVID-19 patients of whom 40 (40.4%) were subsequently diagnosed positive. Only 11/41 (26.8%) endoscopy units performed a direct follow-up on suspected patients. No cases of health care personnel infection/transmission directly related to endoscopic procedures in COVID-19 positive patients were reported.

For all asymptomatic patients, only one endoscopy department performed follow-up for the development of respiratory symptoms in the next 14 days, while 18 endoscopy units were only informed of COVID-19 positive patients.

3.4 Infection Prevention and Control measures for COVID-19

Regarding the preventive measures taken after the first Italian case (February 18th, 2020), 5 endoscopy units (12.2%) did not take any measure, 29 endoscopy units (70.7%) adopted a triage for risk stratification of COVID-19 infection, 7 endoscopy units (17.1%) decreased EPs, 13 endoscopy units (31.7%) modified use of PPE, 3 endoscopy units(7.3%) modified the waiting room, 1 ED (2.4%) performed nasopharyngeal swabs to inpatients before endoscopy, 2 endoscopy units (4.9%) prohibited entrance in endoscopy to caregivers. Furthermore, 31 endoscopy units (75.6%) further modified these measures since March 9th, 2020: in detail, adoption of a phone-triage for COVID-19 (6, 14.6% endoscopy units), reduction of staff or procedures (12, 29.3% endoscopy units), updated on PPE use (19, 46.3% endoscopy units), providing PPEs to patients (2, 4.9% endoscopy units), and establishing specific Hospital protocols (2, 4.9% endoscopy units).

When considering changes in emergency endoscopic procedures), 27 endoscopy units (65.9%) made modifications (PPEs for COVID-19 patients themselves; emergency endoscopic procedures in the operating room, in the emergency department (ER) or in patient's room; post-emergency endoscopic procedures disinfection of the room, nasopharyngeal swabs before the emergency endoscopic procedures, and/or different endoscopic station).

Regarding PPE availability, surgical masks were available in 37 endoscopy units (90.2%), N95/FFP2-3 in 39 endoscopy units (95.1%), gloves in 39 endoscopy units (95.1%), hairnet in 37 endoscopy units (90.2%), goggles/face-shield in 39 endoscopy units (95.1%), and long-sleeved water-resistant gown in 35 endoscopy units (85.4%). Additionally, 33 endoscopy units (80.5%) provided PPE to patients who had to undergo endoscopic procedures. When performing procedures on positive COVID-19 patients, a surgical mask was used in 9 endoscopy units (22.0%), N95/FFP2-3 in 40 endoscopy units (97.6%), single pair of gloves in 5 endoscopy units (12.2%), double pair of gloves in 36 endoscopy units (87.8%), hairnet in 39 endoscopy units (95.1%), goggles/face-shield in 40 endoscopy units (97.6%), and long-sleeved water-resistant gown in 36 endoscopy units (87.8%). Finally, 7 endoscopy units (17.1%) have availability of a negative-pressure room, while 16 endoscopy units (39.0%) dedicated specific areas for endoscopy in COVID-19 patients.

3.5 Modifications in Endoscopy Department organization due to COVID-19 outbreak

In 27 (65.9%) endoscopy units, endoscopists were relocated to other hospital departments, for example, to assist with COVID-positive patients with pneumonia or in the emergency department. In 31 endoscopy units (75.6%) nurses were relocated to other hospital departments. Twenty-five endoscopy units (61.0%) received specific Infection Prevention and Control (IPC) instructions from the Hospital Health Direction (HHD). A protocol for PPE use was written in agreement with HHD by 26 endoscopy units (63.4%) while a protocol on how to manage positive or highly suspicious COVID-19 cases was written by 23 endoscopy units (56.1%).

3.6 Potential SARS-CoV-2 infection within the Endoscopy Department

We asked if there were cases of infection within endoscopic departments; 12 endoscopy units confirmed infections among nurses and physicians with 6 endoscopy personnel (3 nurses and 3 physicians) requiring hospitalization : none of the infections were through the endoscopic equipment, one was presumed from the environment outside the endoscopy unit, 3 presumed from contact with unrecognized infected patients early-middle February when stringent protective measure were not yet adopted by endoscopy personnel, and the remaining with a combination of presumed exposures from the external environment and/or infected colleagues/endoscopy personnel.

Discussion

Our survey showed dramatic burden for endoscopy units related to COVID-19 outbreak in a high-risk area. Most routine procedures have been cancelled or postponed, limiting endoscopy to urgent cases; we outline here the variability of approaches taken in different centers. In addition, all endoscopy units are in hospitals with at least one case of COVID-19, and in more than half of the Departments, procedures were performed in infected/high-risk patients. This was offset by a reassuring availability of adequate protectors, especially N95/FFP2-3 respirators.

Most endoscopy units limited their activity to urgent cases, including also patients at high-risk of cancer, such as FIT+. This underlines a multi-center approach to how the triage of cases can be done case-by-case matching the risk of GI-cancer against that of infection [3].

The second relevant result of our survey is the fact that at least one in every 2 endoscopy units is directly involved in emergent or urgent procedures in COVID-19 cases. Such contact is to be deemed as potentially dangerous, as upper-GI endoscopy is an aerosol-generating procedure [2]. Thus, most of the staff of endoscopy units in a red-area of COVID-19 must be ready to face the highest risk of infection. Third, despite the shortage of medical resources, most endoscopy units have availability of N95 respirators for high-risk procedures.

The third relevant result is the very limited risk of known patient to healthcare personnel transmission within the endoscopy unit setting, but the presence of possible transmission from healthcare provider to other healthcare providers, emphasizing the importance of maintaining vigilance in all contacts and settings.

Burden of COVID-19 on endoscopy units is substantial, disrupting daily routine and exposing HCP to risk of infection.

Figure captions

Figure 1. Reduction of endoscopic activities

REFERENCES

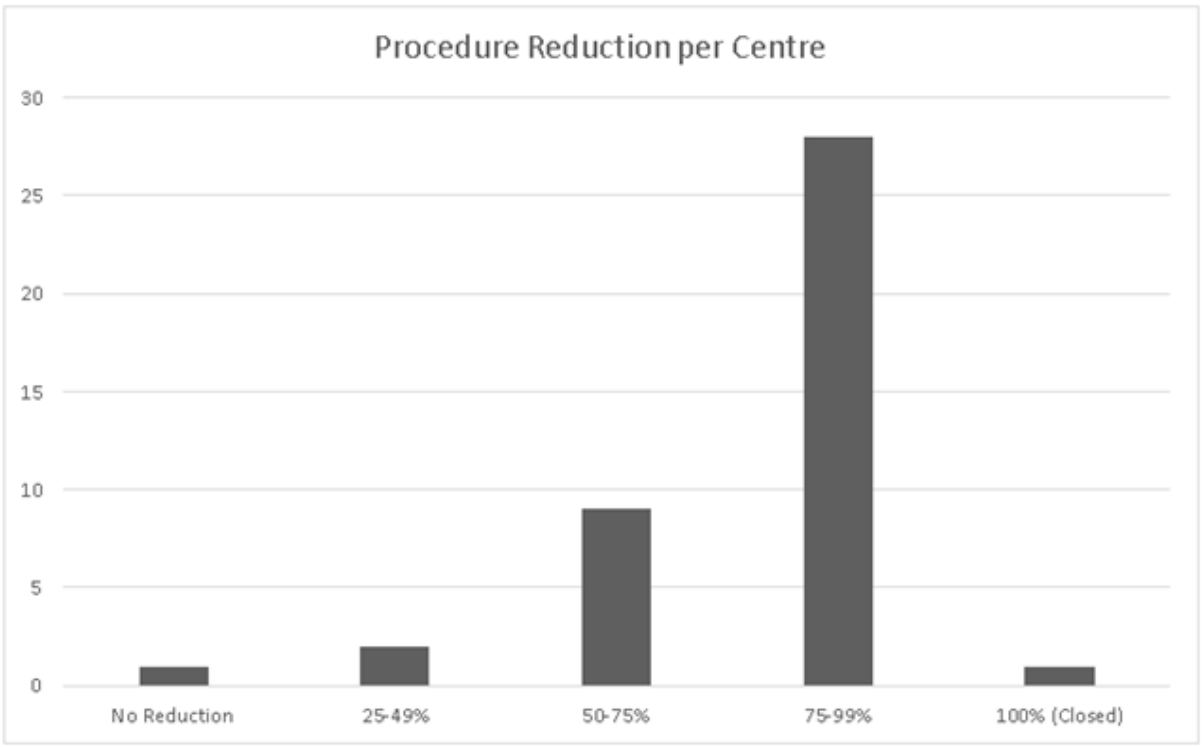
1 COVID-19: protecting health-care workers. The Lancet 2020; 395: 922

2 Comunicati stampa Protezione Civile - 22/3/2020. Dipartimento della Protezione Civile Im Internet: http://www.protezionecivile.gov.it/media-comunicazione/comunicati-stampa

3 ESGE and ESGENA Position Statement on gastrointestinal endoscopy and the COVID-19 pandemic – European Society of Gastrointestinal Endoscopy (ESGE). Im Internet: https://www.esge.com/esge-and-esgena-position-statement-on-gastrointestinal-endoscopy-and-the-covid-19-pandemic/

4 Repici A, Maselli R, Colombo M, Gabbiadini R, Spadaccini M, Anderloni A, Carrara S, Fugazza A, Leo MD, Galtieri PA, Pellegatta G, Ferrara EC, Azzolini E, Lagioia M. Coronavirus (COVID-19) outbreak: what the department of endoscopy should know. Gastrointestinal Endoscopy 2020; 0 Im Internet: https://www.giejournal.org/article/S0016-5107(20)30245-5/abstract

5 ASGE Quality Assurance in Endoscopy Committee, Calderwood AH, Day LW, Muthusamy VR, Collins J, Hambrick RD, Brock AS, Guda NM, Buscaglia JM, Petersen BT, Buttar NS, Khanna LG, Kushnir VM, Repaka A, Villa NA, Eisen GM. ASGE guideline for infection control during GI endoscopy. Gastrointest Endosc 2018; 87: 1167–1179



SUPPLEMENTARY METHODS

The study was conducted as a survey between March 16, and March 21, 2020. The directors of EDs of specific area of northern Italy, defined as red zone, were invited by e-mail to complete a structured questionnaire on the COVID-19 related changes in endoscopic activities, prevention measures, and overall burden of the outbreak in their Units (**Supplementary Table 1 - Questionnaire**). We arbitrarily defined as *red-zone* the area of northern Italy with highest incidence of infected people, as well as isolated clusters in the adjacent area, with at least 500 confirmed cases of COVID-19 as of March 15, 2020. No incentive was offered for participation.

Statistics

Data were collected, analyzed and extracted with graphs and analysis performed using SPSS (IBM SPSS Inc, Chicago, Illinois). Percentages were calculated based on the total number of survey participants and the number of responses to each individual question. Data were collected and analyzed by means of descriptive statistics as a mean and standard deviation. Categorical variables were compared using the χ^2 test. The Student's t test was used to compare the distribution of continuous variables by outcome. All differences were considered significant at two-sided P-value <0.05.

SUPPLEMENTARY TABLE 1 – LIST OF QUESTIONS PRESENTED IN THE SURVEY

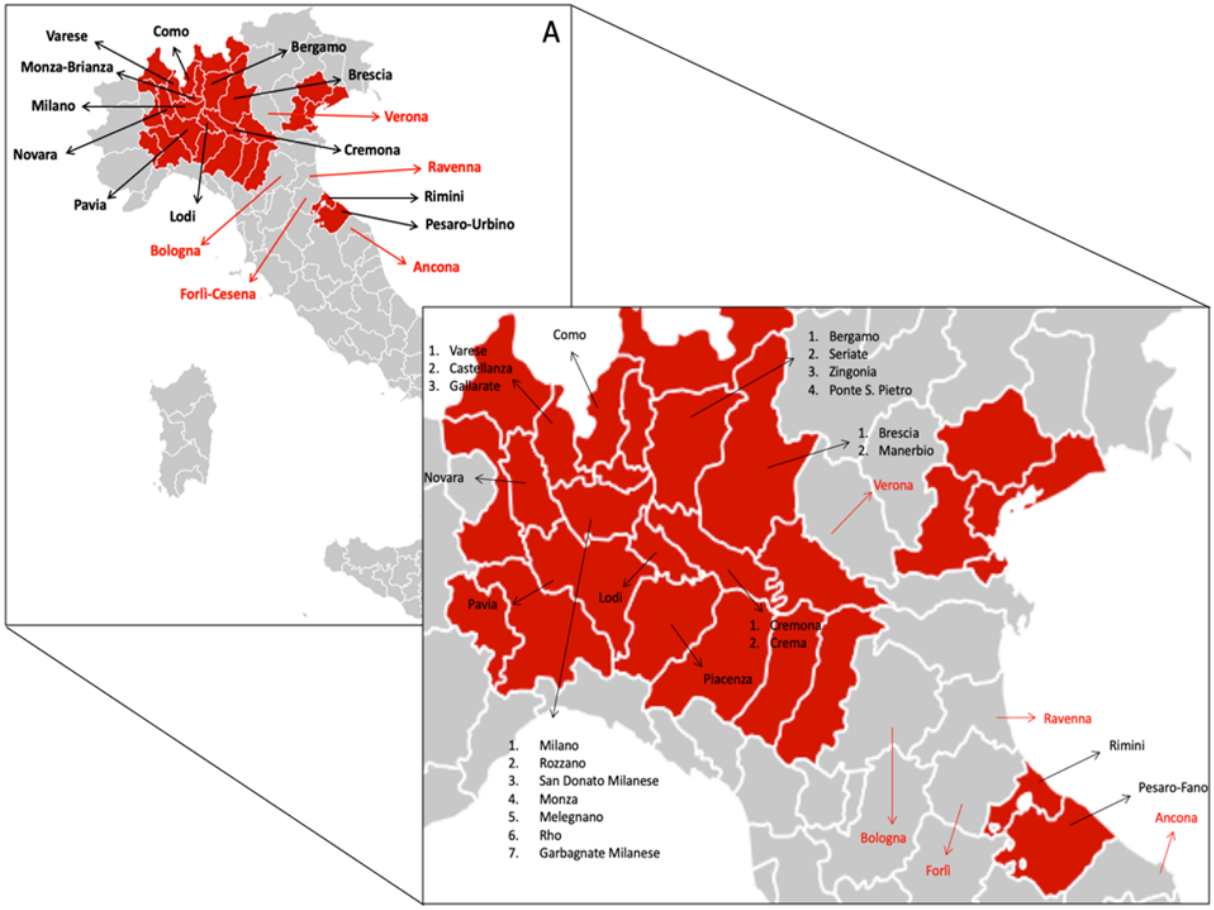
Characteristics of Endoscopy Units	
1	**How many procedures do you perform in your Endoscopy Unit every year?** a. < 5000 b. ≥ 5000
2	**How many physicians do you have in your Endoscopy Unit?**
3	**How many nurses do you have in your Endoscopy Unit?**
4	**How many healthcare assistant do you have in your Endoscopy Unit?**
Changes in Endoscopy activity related with COVID-19	
5	**When was the first case of infection found in your hospital?** a. 1-2 weeks ago b. 2-3 weeks ago c. 3-4 weeks ago d. > 4 weeks ago
6	**When did you start reducing the daily endoscopic activity?**
7	**How much has it reduced?** a. 100% (stopped) b. 75 – 99%

	c. 50 – 74% d. 25 – 49% e. 0 – 24% (no reduction)
8	**What kind of procedure are you still doing?** a. Urgencies from Emergency Department b. Inpatients c. Non-deferrable urgencies d. Colo-rectal cancer screening program e. Day-Hospital procedures f. All of them
Procedures in COVID-19 positive or high-risk patients	
9	**How many endoscopic procedures have you performed in SARS-CoV-2[2] infected patients?**
10	**What were the main indications for the examination?**
11	**How many endoscopic procedures have you performed in patients with suspected SARS-CoV-2 infection?**
12	**What were the main indications for the examination?**
13	**Did you do follow-up in this type of patients?** a. Yes, specify when: b. No
14	**How many of them were found to be positive for COVID-19?**
15	**Are you performing follow-up in asymptomatic patients who undergo endoscopic procedures to assess whether they develop respiratory symptoms in the next 14 days?** a. Yes b. No
16	**Have you ever been informed of a patient who became positive in the 14 days following an endoscopic procedure?** a. Yes, specify the number: b. No
Infection Prevention and Control measures for COVID-19	
17	**What kind of preventive measures have you taken since the news of the first case of COVID-19[1] reported in Italy (February 18th, 2020)?** a. Triage for risk stratification before entering endoscopy b. Staff reduction c. Other, please specify:
18	**Have you recently (after March 9th, 2020) changed any of the previously cited measures?** a. Yes, please specify: b. No
19	**Have you changed something in emergency endoscopic procedures?** a. Yes, please specify: b. No
20	**What kind of personal protective equipment was provided to your endoscopy unit?** a. Surgical mask b. N95/FFP2-3 respirator[3]

	c. Gloves d. Hairnet e. Goggles or face-shield f. Long-sleeved water-resistant gown
21	**What kind of personal protective equipment do you use while performing procedures in positive or highly suspicious patients for SARS-CoV-2 infection?** a. Surgical mask b. N95/FFP2-3 respirator c. Gloves, single pair d. Gloves double pair e. Hairnet f. Goggles or face-shield g. Long-sleeved water-resistant gown
22	**Do you provide any personal protective equipment to patients who have to undergo endoscopic procedures?** a. Yes, please specify: b. No
23	**Is your endoscopy unit provided with negative-pressure rooms?** a. Yes b. No
24	**Have you dedicated specific areas to performing endoscopic procedures in COVID-19 patients?** a. Yes b. No
Modifications in Endoscopy Department organization due to COVID-19 outbreak	
25	**How many physicians have been relocated to other departments?** a. None b. 1 – 2 c. 3 d. > 3
26	**How many nurses have been relocated to other departments?** a. None b. 1 – 2 c. 3 d. > 3
27	**Was the endoscopy unit converted to another use?** a. Yes b. No
28	**Have you had any specific instructions from the Hospital Health Direction on how to work during this period?** a. Yes b. No
29	**Have you developed infectious risk management protocols in agreement with the Hospital Health Direction?** a. Yes b. No
30	**Have you written protocols in agreement with the Hospital Health Direction on the proper use of personal protective equipment?** a. Yes b. No
31	**Have you received training on how to wear personal protective equipment properly?**

	a. Yes b. No
32	**Have you developed protocols in agreement with the Hospital Health Direction on how to manage positive or highly suspicious cases for SARS-CoV-2 infection?** a. Yes b. No
33	**In your opinion, is it possible to transmit the infection within the endoscopy unit?** a. Yes, through the endoscopic equipment b. Yes, through the environment c. Yes, through the endoscopy personnel d. No

Supplementary Figure 1. A. Italian provinces included in our survey; in black (black arrows) indicate the first ones quarantined, in red (red arrows) the ones quarantined later. **B.** Cities are one where the endoscopic units that answered the survey are present; in black (black arrows) those belonging to areas immediately quarantined, in red (red arrows) those quarantined later.


A
Varese
Como
Bergamo
Monza-Brianza
Brescia
Milano
Verona
Novara
Cremona
Ravenna
Rimini
Pavia
Lodi
Pesaro-Urbino
Bologna
Ancona
Forlì-Cesena
1. Varese
2. Castellanza
3. Gallarate
Como
1. Bergamo
2. Seriate
3. Zingonia
4. Ponte S. Pietro
1. Brescia
2. Manerbio
Novara
Verona
Pavia
Lodi
1. Cremona
2. Crema
Piacenza
Ravenna
Rimini
1. Milano
2. Rozzano
3. San Donato Milanese
4. Monza
5. Melegnano
6. Rho
7. Garbagnate Milanese
Pesaro-Fano
Ancona
Bologna
Forlì

ITALIAN GI-COVID19 Working Group

Roberta Maselli, MD, PhD[1], Marco Spadaccini, MD[1,2], Massimiliano Mutignani, MD[3], Armando Gabbrielli, MD[4], Clementina Signorelli, MD[5], Cristiano Spada, MD[6], Piera Leoni, MD[7], Carlo Fabbri, MD[8], Sergio Segato, MD[9], Nicola Gaffuri, MD[10], Benedetto Mangiavillano, MD[11], Franco Radaelli, MD[12], Raffaele Salerno, MD[13], Stefano Bargiggia, MD[14], Luca Maroni, MD, PhD[15], Antonio Benedetti, MD[15], Pietro Occhipinti, MD[16], Federico De Grazia, MD[17], Luca Ferraris, MD[18], Gianpaolo Cengia, MD[19], Salvatore Greco, MD[20], Costanza Alvisi, MD[21], Antonella Scarcelli, MD[22], Luca De Luca, MD[22], Fabrizio Cereatti, MD[23], Pier Alberto Testoni, MD[24], Roberto Mingotto, MD[25], Giovanni Aragona, MD[26], Gianpiero Manes, MD[27], Paolo Beretta, MD[28], Georgios Amvrosiadis, MD[29], Vincenzo Cennamo, MD[30], Fausto Lella, MD[31], Guido Missale, MD[32], Pavlos Lagoussis, MD[33], Omero Triossi, MD[34], Mauro Giovanardi, MD[35], Giuseppe De Roberto, MD[36], Paolo Cantù, MD[37], Elisabetta Buscarini, MD[38], Andrea Anderloni, MD, PhD[1], Silvia Carrara, MD[1], Alessandro Fugazza, MD[1], Piera Alessia Galtieri, MD[1], Gaia Pellegatta, MD[1], Giulio Antonelli, MD[39], Thomas Rösch, MD[40], Prateek Sharma, MD[41].

Affiliations:

[1] Humanitas Clinical and Research Center, Digestive Endoscopy Unit, Rozzano (Milan). Italy.
[2] Humanitas University, Department of Biomedical Sciences, Rozzano (Milan). Italy .
[3] Niguarda-Ca' Granda Hospital, Digestive and Operative Endoscopy Unit, Milan. Italy.
[4] The Pancreas Institute, University Hospital of Verona, Gastroenterology and Digestive Endoscopy Unit, Verona. Italy.
[5] ASST Bergamo Ovest, Gastroenterology and Digestive Endoscopy, Bergamo. Italy.
[6] Fondazione Poliambulanza, Digestive Endoscopy Unit, Brescia. Italy.
[7] AO Lodi, Gastroenterology & Digestive Endoscopy Unit, Lodi. Italy.
[8] AUSL Bologna Bellaria-Maggiore Hospital, Gastroenterology and Digestive Endoscopy Unit, Bologna. Italy.
[9] ASST Dei Sette Laghi, Gastroenterology and Gastrointestinal Endoscopic Unit, Varese. Italy.
[10] Humanitas Gavazzeni, Gastrointestinal Endoscopy Unit, Bergamo. Italy.
[11] Humanitas Mater Domini, Gastrointestinal Endoscopy Unit, Castellanza (Milan). Italy.
[12] Valduce Hospital, Gastroenterology Unit, Como. Italy.
[13] Fatebenefratelli Sacco, Gastroenterology and Digestive Endoscopy Unit, ASST Milan. Italy.
[14] Clinica San Carlo, Gastroenterology and Digestive Endoscopy Unit, Paderno Dugnano (Milan). Italy .
[15] Università Politecnica delle Marche, Department of Gastroenterology and Hepatology, Ancona. Italy.
[16] Department of Gastroenterology, "Maggiore Della Carità" Hospital, Novara. Italy.
[17] Fondazione IRCCS Policlinico San Matteo, University of Pavia, First Department of Internal Medicine, Pavia. Italy.
[18] ASST Valleolona PO, Gastroenterology and Digestive Endoscopy, Gallarate (Varese). Italy.
[19] Ospedale di Manerbio, Endoscopy Unit, Brescia. Italy.
[20] Papa Giovanni XXIII Hospital, Gastroenterology and Digestive Endoscopy Units, Bergamo. Italy.
[21] ASST Pavia, Digestive Endoscopy Unit, Pavia. Italy.
[22]Azienda Ospedaliera Ospedali Riuniti Marche Nord, Gastroenterology and Digestive Endoscopy Units, Pesaro (Pesaro-Urbino). Italy.
[23] Cremona Hospital, Digestive Endoscopy and Gastroenterology Unit, Cremona. Italy.
[24] Vita Salute San Raffaele University, IRCCS San Raffaele Scientific Institute, Division of Gastroenterology and Gastrointestinal Endoscopy, Milan. Italy.
[25] ASST Melegnano-Martesana, Gastroenterology and Digestive Endoscopy, Melegnano (Milan). Italy.
[26] "Guglielmo da Saliceto" Hospital, Department of Internal Medicine, Gastroenterology and Hepatology Unit Piacenza. Italy.
[27] ASST Rhodense, Department of Gastroenterology and Digestive Endoscopy, Garbagnate Milanese (Milan). Italy.
[28] Città Studi, Gastroenterology and Digestive Endoscopy Unit, Milan. Italy.
[29] Policlinico San Marco, Department of Gastroenterology, Zingonia (Bergamo). Italy.
[30] Bellaria-Maggiore Hospital, Division of Gastroenterology, Bologna. Italy.
[31] Policlinico San Pietro, Gastroenterology and Digestive Endoscopy Unit, Bergamo. Italy.
[32] ASST Spedali Civili, Brescia University, Digestive Endoscopy Unit, Brescia. Italy.
[33] IRCCS Policlinico San Donato, Digestive Endoscopy, San Donato Milanese (Milan). Italy.
[34] AUSL Romagna, Gastroenterology Unit, Ravenna. Italy.
[35] Ospedale di Rimini, Gastroenterology and Digestive Endoscopy, Rimini. Italy.
[36] Institute of Oncology IRCCS, Division of Endoscopy, European Milan. Italy.
[37] Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico, Gastroenterology and Endoscopy Unit, Milan. Italy.
[38] Maggiore Hospital, Gastroenterology and Digestive Endoscopy Unit, Crema (Cremona). Italy.
[39] Nuovo Regina Margherita Hospital, Digestive Endoscopy, Rome. Italy.
[40] University Hospital Hamburg-Eppendorf, Department of Interdisciplinary Endoscopy, Hamburg, Germany.
[41] University of Kansas Medical Center, Division of Gastroenterology & Hepatology, Department of Internal Medicine, Kansas, Missouri, USA.