

# Infection Control Practices and Outcomes of Endoscopy Units in the Lombardy Region of Italy

## A Survey From the Italian Society of Digestive Endoscopy During COVID-19 Spread

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The authors declare that they have nothing to disclose.

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**Goals:** The present survey from the Italian Society of Digestive Endoscopy (SIED—Società Italiana di Endoscopia Digestiva) was aimed at reporting infection control practice and outcomes at Digestive Endoscopy Units in a high-incidence area.

**Background:** Lombardy was the Italian region with the highest coronavirus disease-2019 (COVID-19) prevalence, at the end of March 2020 accounting for 20% of all worldwide deaths. Joint Gastro-Intestinal societies released recommendations for Endoscopy Units to reduce the risk of the contagion. However, there are few data from high-prevalence areas on adherence to these recommendations and on their efficacy.

**Methods:** A survey was designed by the Lombardy section of SIED to analyze (a) changes in activity and organization, (b) adherence to recommendations, (c) rate of health care professionals' (HCP) infection during the COVID-19 outbreak.

**Results:** In total, 35/61 invited centers (57.4%) participated; most modified activities were according to recommendations and had filtering face piece 2/filtering face piece 3 and water-repellent gowns available, but few had negative-pressure rooms or provided telephonic follow-up; 15% of HCPs called in sick and 6% had confirmed COVID-19. There was a trend ( $P=0.07$ ) toward different confirmed COVID-19 rates among endoscopists (7.9%), nurses (6.6%), intermediate-care technicians (3.4%), and administrative personnel (2.2%). There was no correlation between the rate of sick HCPs and COVID-19 incidence in the provinces and personal protective equipment availability and use, whereas an inverse correlation with hospital volume was found.

**Conclusions:** Adherence to recommendations was rather good, though a minority were able to follow all recommendations. Confirmed COVID-19 seemed higher among endoscopists and nurses, suggesting that activities in the endoscopy rooms are at considerable viral spread risk.

**Key Words:** Covid-19, endoscopy, infection, risk

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The coronavirus disease-2019 (COVID-19) outbreak heavily affected Lombardy, the most populous Italian Region (10,060,574 inhabitants), with 34,889 infected and 4861 deaths by March 26 (<http://opendatadpc.maps.arcgis.com/apps/opsdashboard/index.html#/b0c68bce2cce478eaac82fe38d4138b1>, <http://dati.istat.it/Index.aspx?QueryId=18460>).

Most hospitals needed to reprogram and modify duties, while trying to avoid contagion among health care professionals (HCP). Gastrointestinal (GI) endoscopy is of particular concern as COVID-19 can affect the GI tract and persist in stools.<sup>1</sup>

The World Endoscopy Organization, USA joint GI societies, and European Society of Gastrointestinal Endoscopy (ESGE) have released recommendations to reduce contagion risk ([http://www.worldendo.org/wpcontent/uploads/2020/03/WEO\\_Advice\\_To\\_Endoscopists\\_COVID-19\\_032020.pdf](http://www.worldendo.org/wpcontent/uploads/2020/03/WEO_Advice_To_Endoscopists_COVID-19_032020.pdf), <https://www.gastro.org/press-release/joint-gi-society-message-covid-19-clinical-insights-for-our-community-of-gastroenterologists-and-gastroenterology-care-providers>, <https://www.esge.com/esge-and-esgena-position-statement-on-gastrointestinal-endoscopy-and-the-covid-19-pandemic/>) including postponing nonurgent/nonemergent examinations, screening patients preprocedurally, and suggesting a correct use of personal protective equipment (PPE). However, there are few available data from high disease prevalence areas on adherence to these recommendations, infection control practices, and outcomes.

The Lombardy Section of the Italian Society of Digestive Endoscopy (SIED—Società Italiana di Endoscopia

Digestiva) designed a survey of regional Endoscopy Units during the COVID-19 outbreak to collect data on (a) changes in activity and organization, (b) adherence to recommendations, and (c) rate of HCP infection.

## METHODS

### Design and Participants

Endoscopy Units were contacted through the members list of SIED Lombardy section,<sup>2</sup> covering virtually all facilities in the region. On March 20, 2020, email invitations were sent out detailing the aim of the study and asking to fill out a questionnaire regarding activity during the outbreak (Supplementary Statement 1, Supplemental Digital Content, <http://links.lww.com/JCG/A620>). After 7 days, nonresponding centers were individually solicited through a new email and a phone call. Last reply was received on March 28. Participating centers were classified into high volume if their number of hospital beds was  $\geq 75$  interquartile range, low volume if  $\leq 25$ , and intermediate volume if between 25 and 75.

A multiple choice and open-ended questionnaire was built including data on reorganization of activities, PPE availability, and use and illness or proved COVID-19 among HCPs, categorized as (a) physicians, (b) nurses, (c) intermediate-care technicians (ICT) (performing surface disinfection, patient transport, and scope reprocessing), and (d) administrative personnel. Confirmed COVID-19 cases were defined as cases with positive SARS-CoV-2 RNA test.

### Data Handling

Patients' personal data were not collected. Data about sickness or COVID-19 cases among personnel were collected anonymously, and therefore no ethics committee request was deemed necessary. Questions and answers were referred to the time frame during the outbreak (first case February 19, 2020; regional lockdown March 9, 2020). Data from questionnaires were extracted in spreadsheets. Incident cases in Lombardy provinces were ascertained from the Italian Civil Protection database (<http://opendatadpc.maps.arcgis.com/apps/opsdashboard/index.html#/b0c68bce2cce478eaac82fe38d4138b1>) and data on total population by January 1, 2019 ISTAT database (<http://dati.istat.it/Index.aspx?QueryId=18460>); a map was accordingly created on OpenStreetMap (<https://www.openstreetmap.org/copyright/en>).

### Statistics

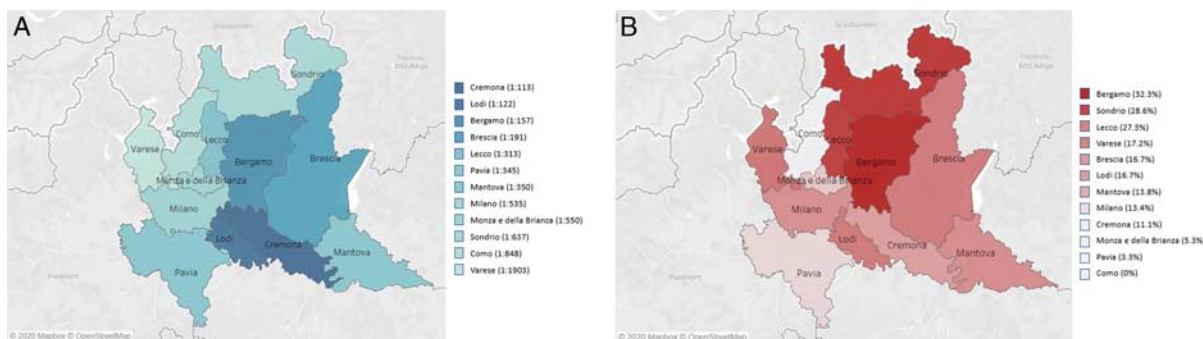
Results are reported as frequencies for categorical variables. Correlation between variables was investigated by Spearman's rank and differences between rates in the subgroup by  $\chi^2$ . A  $P < 0.05$  was considered statistically significant.

## RESULTS

Of 61 centers, 35 participated (response rate = 57.4%), covering 21,452 hospital beds. The participation rate was higher in high-volume (62.5%) and intermediate-volume (67.7%) centers than in low-volume centers (28.6%).

There were 13 centers from the Milano province, 5 from Bergamo, 4 from Brescia, 3 from Pavia, 3 from Monza Brianza, and 1 each from Lodi, Como, Cremona, Lecco, Mantova, Sondrio, and Varese.

The spread of confirmed COVID-19 cases in the 12 provinces by March 25 related to its total population by January 1, 2020 is reported in Figure 1A. Ten (28.6%) centers performed endoscopic procedures on at least 1 confirmed COVID-19 patient during the study period.



**FIGURE 1.** A, Rate of coronavirus disease-2019 (COVID-19) infection (positive cases on the total province population) throughout different Lombardy provinces. B, Rate of sick health care providers and administrative personnel throughout different Lombardy provinces.

As detailed in Table 1, 2 centers (5.7%) suspended endoscopy activities completely (1 after 1 week of activity, as both physicians developed COVID-19), whereas most maintained inpatients, emergencies, and outpatients with urgent or priority examinations; 30/35 (85.7%) centers were able to provide the detailed data on the number of performed endoscopic procedures, during March 2020 as compared with March 2019. In these centers, the global number of procedures decreased from 19,876 in March 2019 to 7701 (61.2% decrease rate) in March 2020. The number of esophagogastroduodenoscopy decreased from 8967 to 3143 (64.9%) and that of rectosigmoidocolonoscopy from 9563 to 3795 (60.3%); the reduction was slightly less pronounced for pancreaticobiliary endoscopy procedures, with endoscopic ultrasound decreasing from 732 to 407 (44.4%) and endoscopic retrograde colangiopancreatography from 614 to 356 (42%).

As for preprocedural screening and precautions for patient access to units, only 1 center did not perform any screening before procedures, but yet provided surgical masks and gloves to all patients, 35.3% registered body temperature and the vast majority asked about symptoms or contacts with COVID-19 cases in the previous 14 days. All centers implemented physical distancing measures for waiting rooms and 73.5% did not allow visitors (Table 1).

Regarding PPE use and precautions in endoscopy rooms, only 3 centers (8.8%) had negative-pressure room availability (2 in the Endoscopy Unit and 1 in an operating room). As for the availability of filtering face piece 2 (FFP2)/filtering face piece 3 (FFP3) respirators, this was absent in 2 (5.9%), intermittent in 5 (14.7%), and regular in 27 (79.4%) of the centers. In total, 22 centers (64.7%) adopted FFP2/FFP3 respirators for all patients, 10 (29.4%) only for patients with confirmed/suspected COVID-19, 2 (5.9%) only on confirmed cases. The availability and use of water-repellent gowns and protective glasses or shields are reported in Table 1.

Only 1 center performed sporadic postprocedural telephonic follow-up investigating the possible onset of COVID-19-related signs or symptoms in patients.

Among the 34 centers operating during the epidemic, 23 reported having at least 1 HCP calling in sick, with confirmation of COVID-19 status only on the minority of them. Sick HCPs were globally 98/635 (15.4%) with the distribution in provinces shown in Figure 1B. In more detail, the rate of sick HCPs was not different among endoscopy physicians (37/216, 17.1%), nurses (42/287, 14.6%), ICT (11/88, 12.5%), and administrative personnel (8/44, 18.1%)

( $\chi^2$  for trend  $P=0.62$ ). There were 40 COVID-19 confirmed cases (6.3% of all 635 HCPs): 17/216 (7.9%) among physicians, 19/287 (6.6%) among nurses, 3/88 (3.4%) among ICT, and 1/44 (2.2%) among administrative personnel, without a significant difference between categories, although a trend seemed apparent ( $\chi^2$  for trend  $P=0.07$ ; Fig. 2). There was no significant correlation between rates of sick HCPs and COVID-19 incidence rate in the provinces (Fig. 1A) (Spearman  $\rho=0.15$ ;  $P=0.63$ ) or with the availability and use of PPE (scored by adding 1 point to each item availability and reported use) among the centers (Spearman  $\rho=0.291$ ;  $P=0.1$ ). Interestingly, a significant inverse correlation was retrieved between the volume of the center and PPE availability and use (Spearman  $\rho=-0.343$ ;  $P=0.045$ ).

## DISCUSSION

Lombardy is an area with high COVID-19 disease prevalence, accounting for 20% of all deaths worldwide at the end of March 2020 (<http://opendatadpc.maps.arcgis.com/apps/opsdashboard/index.html#/b0c68bce2cce478eaac82fe38d4138b1>). In this scenario, all patients should be considered potentially infected and recommendations ([http://www.worldendo.org/wpcontent/uploads/2020/03/WEO\\_Advice\\_To\\_Endoscopists\\_COVID-19\\_032020.pdf](http://www.worldendo.org/wpcontent/uploads/2020/03/WEO_Advice_To_Endoscopists_COVID-19_032020.pdf), <https://www.gastro.org/press-release/joint-gi-society-message-covid-19-clinical-insights-for-our-community-of-gastroenterologists-and-gastroenterology-care-providers>, <https://www.esge.com/esge-and-esgena-position-statement-on-gastrointestinal-endoscopy-and-the-covid-19-pandemic/>)<sup>3</sup> should be strictly followed before/during/after endoscopic procedures. The results of this survey show that Endoscopy Units were heavily affected closing or reducing activities with a reduction of >60% of all procedures, and almost all tried to adhere to recommendations to minimize the risk of contagion among HCPs and patients. Notably, a minority had negative-pressure rooms available and some had limited availability of FFP2/FFP3 respirators. The rate of centers able to follow all recommendations was relatively low and 15% of HCPs called in sick during this period. There was no correlation between PPE availability and use and rates of sick personnel, whereas larger centers tended to have less PPE availability, probably due to the increased use in the wards and intensive care units. Notably, 6% of all involved HCPs had confirmed COVID-19. We observed a trend toward a difference in the rate of confirmed COVID-19 cases between physicians (7.9%), nurses (6.6%), ICT (3.4%), and administrative personnel (2.2%). The

**TABLE 1.** Reorganization of Activities, Patient Screening, and Precautions in the 35 Participating Centers

Centers Reply to the Survey	N (%)
Reorganization of activities	
Complete suspension of the service	2 (5.7)
Service only for inpatients and emergencies	5 (14.3)
Service for inpatients and outpatients with priority*	27 (77.1)
Normal service for inpatients and outpatients	1 (2.9)
Rescheduling of patients already done	9 (25.7)
Screening of patients	
Body temperature registration	12 (35.3)
Questions on contacts with COVID+ cases	31 (91.2)
Questions on symptoms in the previous 14 d	33 (97.1)
Centers with at least 1 screening performed	1 (2.9)
Centers with 2 screening performed	21 (61.8)
Centers with 3 screening performed	11 (32.4)
Precautions for patient access	
Patient social distancing in waiting rooms	34 (100)
Entrance in the waiting room not allowed to visitors	25 (73.5)
Handling of surgical mask and gloves to patients	26 (76.5)
Centers with at least 1 precaution undertaken	4 (11.8)
Centers with 2 precaution undertaken	9 (26.5)
Centers with 3 precaution undertaken	21 (61.7)
Use of surgical mask	32 (94.1)
Availability of negative-pressure room	3 (8.8)
In endoscopy/in operating room	2 (5.9)/1 (2.9)
Availability of FFP2/FFP3 respirators	
Yes	27 (79.4)
No	2 (5.9)
Sometimes	5 (14.7)
Use of FFP2/FFP3 respirators	
For all patients	22 (64.7)
For patients with confirmed or suspected COVID+	10 (29.4)
Only for confirmed COVID+ cases	2 (5.9)
Availability of WR gowns	
Yes	29 (85.3)
No	2 (5.9)
Sometimes	3 (8.8)
Use of WR gowns	
For all patients	25 (73.5)
For patients with confirmed or suspected COVID+	8 (23.5)
Only for confirmed COVID+ cases	1 (2.9)
Availability of protective glasses	
Yes	31 (91.2)
No	0
Sometimes	3 (8.8)
Use of protective glasses	
For all patients	28 (82.4)
For patients with confirmed or suspected COVID+	5 (14.7)
Only for confirmed COVID+ cases	1 (2.9)
Use of double gloves	
For all patients	18 (52.9)
For patients with confirmed or suspected COVID+	12 (35.3)
Only for confirmed COVID+ cases	4 (11.8)
Disinfection after procedure	
For all patients	11 (32.4)
For patients with confirmed or suspected COVID+	20 (58.8)
Only for confirmed COVID+ cases	3 (8.8)

**TABLE 1.** (continued)

Centers Reply to the Survey	N (%)
Higher precautions for upper GI compared with lower GI procedures	6 (17.6)
Telephonic follow-up	
Yes	0
No	33 (97.1)
Sometimes	1 (2.9)

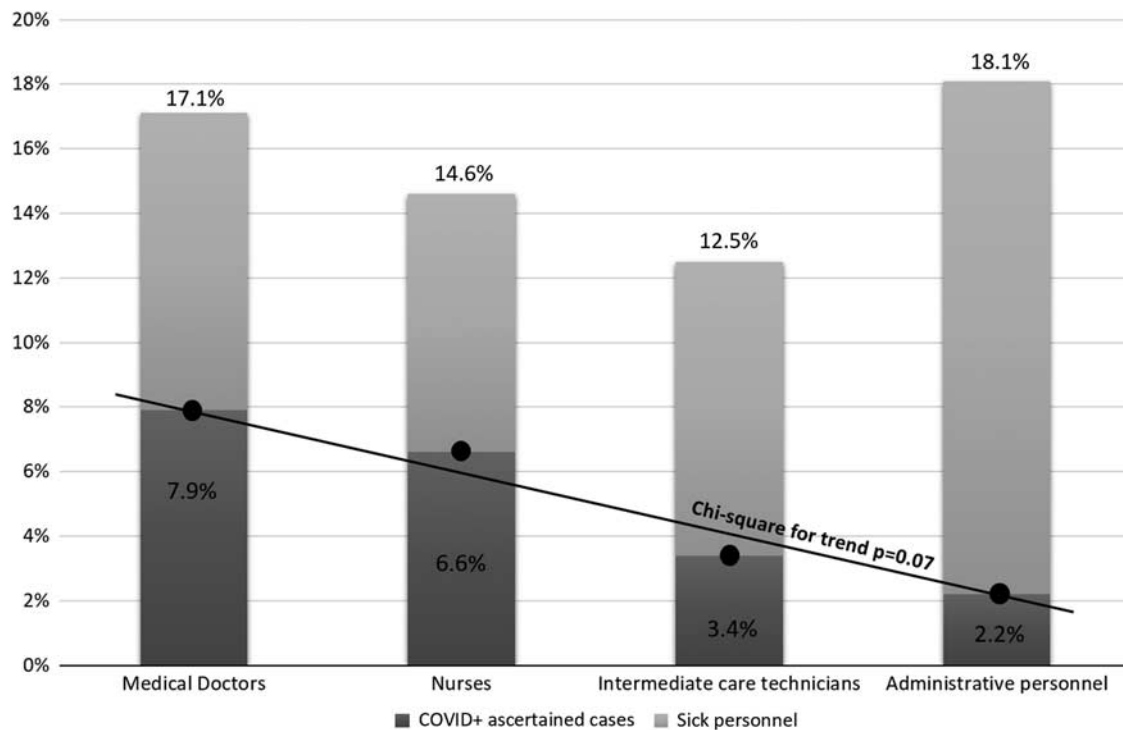
\*This refers to the urgent (within 72h) or fast (within 10d) priorities according to the Italian Legislation on prioritization of procedures (PNGLA 2019-2021), including examinations for (among the others) new-onset anemia, nonurgent lower gastrointestinal bleeding, bloody diarrhea, persistent dysphagia, persistent vomit, clinical, or instrumental suspicion of neoplasia.

COVID indicates coronavirus disease-2019; FFP2/FFP3, filtering face piece 2/filtering face piece 3; GI, gastrointestinal; WR, water-repellent.

finding of lower infection rates among personnel in contact with patients, but not involved in procedures inside the endoscopy room, might support the hypothesis that endoscopy is an aerosol-generating procedure that can cause viral spread and contagion.<sup>4</sup> Nevertheless, in our study, as the datum concerning the rate of tested personnel is missing, one might hypothesize that this is because of an easier accessibility to COVID-19 swab for physicians and nurses compared with other employees; however, it should be considered that in the first weeks of the epidemic, accessibility to swabs in Lombardy was extremely limited even for HCPs and considered only for serious illness or risk of contagion. Others have reported rates of up to 20% of contagion among HCPs taking direct care of COVID-19 patients,<sup>5</sup> but our findings are in keeping with the 9% reported in Italian HCPs working in mixed settings.<sup>6</sup> Furthermore, the increased risk of contagion for physicians and nurses compared with ICT was already observed in another study carried out in a Tertiary Hospital in Wuhan, China.<sup>7</sup> Interestingly, in that paper working in clinical departments other than fever clinics or wards was associated with an increased risk of infection, supporting the hypothesis that the risk of infection can be related to the medical specialty and not only to the direct and prolonged contact with COVID-19 positive cases.

It would, in general, be desirable that during this pandemic endoscopic procedures are performed in negative-pressure rooms, whereas it is mandatory that HCPs working inside endoscopy rooms are provided with all adequate PPEs and all recommendations are strictly followed (<https://www.gastro.org/news/aga-issues-formal-recommendations-for-ppe-during-gastrointestinal-procedures>). Moreover, it remains to be investigated whether undergoing endoscopic procedures also increases the risk of being infected for negative patients.

A survey<sup>8</sup> on organizational changes of Endoscopy Units in 5 Italian regions has been recently published, with some similarities with the present study. However, when compared with those published data, the present study brings additional and unique information as: (1) we homogeneously included only centers from the most severe outbreak area (Lombardy region), which might reduce undetectable differences because of different health care policies in different regions; (2) we focused on adherence to society recommendations, and shortage of PPE, which was a matter of concern in the initial phase of the outbreak; (3) we calculated correlations between the rate of HCPs illness and their specific duties, the availability and use of PPE, the



**FIGURE 2.** Rate of health care providers in Endoscopy Units calling in sick and coronavirus disease-2019 (COVID)+ ascertained cases. The rate of COVID-19 cases seems higher among medical doctors and nurses compared with intermediate-care technicians and administrative personnel, suggesting that the work inside the endoscopy room might increase the risk.

hospital volume, and the territorial incidence of cases in different parts of the region. The present results should be considered carefully when organizing activities of Endoscopy Units both in “Phase 1” in areas where the infection has not yet reached this high spread and in “Phase 2.”<sup>9</sup>

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