

# Improvement in appropriateness and diagnostic yield of fast-track endoscopy during the COVID-19 pandemic in Northern Italy

## Authors

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## ABSTRACT

**Background** During the COVID-19 outbreak in Italy, only fast-track endoscopic procedures have been performed; nevertheless, a significant drop in their number has been reported. We evaluated whether the pandemic has impacted the appropriateness and diagnostic yield of fast-track endoscopic procedures compared with those performed in 2019.

**Methods** This retrospective study involved endoscopy services in Northern Italy. We compared data regarding endoscopic procedures performed in March and April 2020 with those performed during the same period in 2019.

**Results** In 2020, there was a 53.6% reduction in the number of fast-track endoscopic procedures compared with 2019. Patients undergoing endoscopy in 2020 were younger than in 2019. Both appropriate referral and diagnostic yield increased in 2020 for both upper and lower endoscopy. A higher rate of cancer was diagnosed in 2020 by upper endoscopy (3.6% vs. 6.6%;  $P=0.04$ ).

**Conclusions** The high level of inappropriate endoscopy referrals registered in 2019 significantly improved during the COVID-19 outbreak of 2020, with an increase in the diagnostic yield.

## Introduction

Gastrointestinal (GI) endoscopy is used in clinical practice for diagnosis, surveillance, treatment, or exclusion of relevant diseases. In Northern Italy, general practitioners or other specialists can refer patients for GI endoscopy. The Italian National Health System classifies medical procedures into four categories: class U, due in 72 hours, for life-threatening situations; class B, due in

10 days, for patients with a suspected condition, the diagnosis of which should not be delayed; class D, due in 60 days; and class P, to be performed within 6 months (see **Fig. 1 s** in the online-only supplementary material). Endoscopy services will reserve places for U and B priority classes, but inappropriate patient allocation is common and results in the misuse of resources [1, 2]. Inappropriate GI endoscopies achieve low diagnostic yield and result in considerable increases in both costs and waiting lists [3]. Pos-

sible explanations for the high number of inappropriate endoscopies are overinterpretation of symptoms by general practitioners and the pressure exerted by patients on referring physicians [4, 5]. In Italy, during the COVID-19 outbreak in 2020, only U- and B-class procedures have been performed [6]; nevertheless, as the infection spread, a significant drop in the number of these procedures has been reported [7].

We conducted this study to evaluate the impact of the COVID-19 pandemic on the appropriateness and diagnostic yield of U- and B-class endoscopic procedures in Northern Italy.

## Methods

This was a retrospective study involving eight endoscopy services in Northern Italy, performing more than 5000 procedures per year. In each center, the following data were collected from medical charts: age, sex, type of endoscopic procedure, indication for endoscopy, and endoscopic findings. Appropriateness of each referral was evaluated by a single endoscopist at each center who, in accordance with the American Society for Gastrointestinal Endoscopy (ASGE) guidelines [8] (**Table 1s**), assessed the indications by comparing the history obtained from patients with that reported on the referral cards.

Demographic details, indications, appropriateness, and endoscopic findings of the U- and B-class endoscopic procedures performed in March and April 2020 were compared with those performed during the same period in 2019. Approval from institutional review boards was obtained for the study. The requirement for informed consent was waived because this was a retrospective, observational study and patients' privacy was guaranteed.

Data were analyzed using SPSS 26.0 (IBM Corp., Armonk, New York, USA). Continuous variables are presented as mean and standard deviation (SD), and categorical variables as absolute frequency and percentage. We used Student's *t* test to compare quantitative variables and  $\chi^2$  test for qualitative ones. Odds ratio (OR) and 95% confidence interval (CI) were reported for data analysis. All differences were considered significant at two-sided *P* value.

## Results

We observed a reduction of 53.6% in the number of fast-track endoscopic procedures performed in 2020 compared with 2019 (688 vs. 1481), which was more evident in upper GI endoscopy (UGIE) procedures (287 vs. 666, 56.9% reduction) than in lower GI endoscopy (LGIE) procedures (401 vs. 815, 50.8% reduction). Patients undergoing endoscopy in 2020 were younger than those in 2019, with a slight, but not significant, prevalence of males (**Table 2s**).

The main indications for endoscopy in the two groups are reported in **Table 3s**. Dyspeptic symptoms and a positive fecal occult blood test were the most frequent symptoms for IGIE and LGIE, respectively, both in 2019 and 2020. Alarm symptoms represented about 39.5% (263/666) of all indications for UGIE in 2019 and increased to 44.3% (127/287) in 2020 ( $P=0.03$ ). For LGIE procedures, 65.9% (537/815) of indications were repre-

sented by alarm symptoms in 2019, with no significant increase in 2020 (70.3%; 282/401).

The rate of appropriate referral significantly increased from 57.1% in 2019 to 66.6% in 2020 (OR 0.67, 95%CI 0.55–0.81;  $P<0.001$ ) and was evident for both UGIE (306/666 [45.9%] vs. 161/287 [56.1%]; OR 0.68, 95%CI 0.51–0.89;  $P<0.001$ ) and LGIE (540/815 [66.3%] vs. 297/401 [74.1%]; OR 0.69, 95%CI 0.53–0.90;  $P=0.006$ ) (**Table 3s**).

The main endoscopic findings are shown in **Table 1** and **Fig. 1**. The diagnostic yield (the rate of relevant diagnoses achieved by endoscopy) was 29.4% (435/1481) in 2019 vs. 38.7% (266/688) in 2020 (OR 0.66, 95%CI 0.55–0.80;  $P<0.001$ ), with similar results for UGIE (23.9% vs. 35.5%; OR 0.57, 95%CI 0.42–0.77;  $P<0.001$ ) and LGIE (33.9% vs. 40.9%; OR 0.74, 95%CI 0.58–0.95;  $P=0.01$ ). Overall, cancer diagnosis was achieved in 7.3% of procedures in 2020 vs. 6.0% in 2019 (OR 0.83, 95%CI 0.58–1.18;  $P=0.2$ ). However, a significantly higher rate of cancer was diagnosed in 2020 by UGIE (3.6% vs. 6.6%; OR 0.53, 95%CI 0.28–0.98;  $P=0.04$ ).

## Discussion

Our study shows that during the pandemic in 2020 the number of endoscopic procedures significantly decreased while the rate of appropriate referral and of relevant findings improved compared with the same period in 2019. As availability and ease of access to U- and B-class procedures during the pandemic have not changed from previous years, we can hypothesize that patients' and physicians' perceptions toward the risk of COVID-19 exposure could have limited the number of inappropriate procedures. Of note, the rate of inappropriate fast-track procedures registered in the 2019 study period was about 40%, and this rate was higher at 54% for UGIE procedures. This situation could overload endoscopy services with a high number of unnecessary procedures and potentially delay diagnosis for high-risk patients.

Concern about potential medicolegal consequences related to a possible delayed diagnosis is a common cause of overinterpretation of patient symptoms and over-referral for endoscopic procedures by general practitioners [1, 2, 4]. During the outbreak, new concerns about patients acquiring the infection while undergoing a potentially inappropriate procedure has likely prevailed and has resulted in fewer patient referrals; a concern also shared by patients themselves, who were less likely to attend endoscopy services or even general practitioners' offices [7]. Patients, particularly those affected by functional pathology, frequently exert considerable pressure on general practitioners and specialist services to undergo endoscopy for their symptoms [5]. It is conceivable that, during the pandemic, such pressure might have decreased because patients' attention was diverted from their GI symptoms to the risk of infection; this is probably more evident in patients with functional disease who often suffer from generalized anxiety disorders [9]. Of note, patients with no alarm signs, who ask to shorten their endoscopy waiting time due to anxiety, do not represent a high-risk category for major organic pathology and anticipating their endoscopy determines a very low diagnostic gain [10].

**► Table 1** Major endoscopic findings in patients undergoing endoscopy in 2019 and 2020. Only one finding is reported for each patient. Significant data are depicted in bold.

Endoscopic findings	2019, n (%)	2020, n (%)	P value (OR, 95%CI)
Upper GI Endoscopy	n = 666	n = 287	
Not relevant diagnoses-			
▪ Normal <sup>1</sup>	487 (73.1)	169 (58.9)	<0.001 (1.90, 1.42 – 2.54)
▪ Other <sup>2</sup>	20 (3)	16 (5.6)	0.06 (0.52, 0.27 – 1.02)
Relevant diagnoses			
▪ Erosive esophagitis/ Barrett's	66 (9.9)	35 (12.2)	0.3 (0.79, 0.51 – 1.22)
▪ Peptic ulcer	44 (6.6)	15 (5.2)	0.4 (1.28, 0.70 – 2.34)
▪ Esophageal/gastric cancer	24 (3.6)	19 (6.6)	0.04 (0.53, 0.28 – 0.98)
▪ Benign stenosis	9 (1.8)	22 (7.7)	<0.001 (0.16, 0.07 – 0.36)
▪ Other <sup>3</sup>	16 (2.4)	11 (3.8)	0.2 (0.62, 0.28 – 1.34)
Lower GI Endoscopy	n = 815	n = 401	
Not relevant diagnoses			
▪ Normal <sup>4</sup>	478 (58.6)	216 (53.9)	0.1 (1.21, 0.95 – 1.54)
▪ Low risk adenoma	38 (4.7)	11 (2.7)	0.1 (1.73, 0.88 – 3.43)
▪ Other <sup>5</sup>	23 (2.8)	10 (2.5)	0.7 (1.13, 0.53 – 2.40)
Relevant diagnoses			
▪ Advanced adenoma	150 (18.4)	90 (22.4)	0.09 (0.78, 0.58 – 1.05)
▪ IBD	49 (6)	38 (9.5)	0.02 (0.61, 0.39 – 0.95)
▪ Colon cancer	65 (8)	31 (7.7)	0.9 (1.03, 0.66 – 1.61)
▪ Other <sup>6</sup>	12 (1.5)	5 (1.2)	0.7 (1.8, 0.41 – 3.38)

OR, odds ratio; CI, confidence interval; GI, gastrointestinal; IBD, inflammatory bowel disease.

<sup>1</sup> Normal finding includes nonerosive gastritis/duodenitis, hiatal hernia.

<sup>2</sup> Other includes fundic gland polyps, gastric resected stomach.

<sup>3</sup> Other includes varices, portal hypertensive gastropathy, celiac disease, fistula.

<sup>4</sup> Normal includes diverticulosis.

<sup>5</sup> Other includes hyperplastic polyps, not specific inflammation.

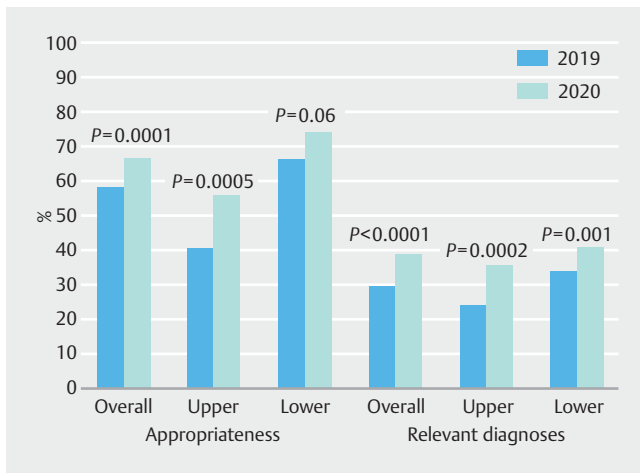
<sup>6</sup> Other includes fistula, benign stenosis, solitary rectal ulcer, angiodysplasia, diverticulitis, other specific colitis.

Rex et al. have reported that during the pandemic, 44% of patients scheduled for endoscopy were very or somewhat concerned about acquiring the infection, while 25% were quite unsure or not willing at all to undergo endoscopy [11]. In an emerging epidemic, human behavioral changes are driven by risk perceptions [7, 12, 13], which are also related to the psychological status of the patient, self-perception of vulnerability, and perceived severity of symptoms. Our finding that patients attending endoscopy during the pandemic were younger than in 2019 might be explained by elderly patients having a perceived higher risk of developing a more severe infection. Moreover, the improvement in appropriateness recorded in 2020 was highly evident for patients undergoing endoscopy for symptoms usually related to functional disease: about 51% of patients undergoing UGIE in 2019 presented dyspeptic symptoms with a level of appropriateness of only 17%; in 2020 dyspeptic symptoms still represented about 44% of the indications, but the level of appropriateness had increased to 30%. Similarly, ab-

dominal pain, diarrhea, and constipation together represented the indications for LGIE in 23% and 16% of patients in 2019 and 2020, respectively, but the level of appropriateness increased from 27% in 2019 to 41% in 2020.

We reported a decrease of about 50% in fast-track procedures performed in 2020 compared with 2019, while appropriateness increased by only about 10%. This finding suggests that several potentially appropriate procedures may not have been performed. Indeed, the overall number of cancer diagnoses decreased in 2020 compared with 2019, from 24 to 19 in the upper GI tract and from 65 to 31 in the lower GI tract. A delayed diagnosis of malignancy will likely occur in several patients due to the pandemic [14], but we will only be able to verify this in the coming months.

This study has some limitations in addition to its retrospective design. First, fast-track procedures are usually indicated only when alarm symptoms are present. Furthermore, patients with mild symptoms may not have sought medical attention during



► **Fig. 1** Appropriateness and relevant diagnoses of fast-track endoscopic procedures performed during the COVID-19 pandemic in 2020 and in the same period in 2019.

the COVID pandemic. This would result in referral bias for moderate to severe cases, and therefore the data are not easily generalizable. Second, in the absence of clear-cut criteria to define appropriateness of fast-track endoscopies [8, 15], we used the ASGE criteria [8], which were not designed for urgent procedures. The strengths of the study include its multicenter design and the sample size, which make the results very reproducible.

In conclusion, our study suggests that the high rate of inappropriate use of endoscopy has improved during the pandemic. The psychological impact of COVID-19 may have affected patient attitudes toward diagnostic endoscopy, especially those with functional disease. These data could help the Italian National Health System to redesign priority classes and ensure that they are assigned correctly to improve appropriate use of endoscopy services.

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## Competing interests

The authors declare that they have no conflicts of interest.

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