

# Low risk of COVID-19 transmission in GI endoscopy

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## MESSAGE

Reported experience from the recent worldwide COVID-19 outbreak suggests that GI endoscopy is a potential source of infection for healthcare workers (HCW); less is known about patient risk through performance of GI endoscopy as a high-risk medical procedure. Two case series from Northern Italy were recorded, one on 851 patients from one large tertiary referral centre and the other on 968 HCWs from 41 hospitals in the area. All 851 patients endoscoped in Humanitas University Hospital between 27 January and 13 March received a 2-week follow-up call; the response rate was 94.2%. Of these 802 patients, only 1 became COVID-19 positive; 7 further cases developed fever and cough (3 tested negative). None of these eight cases (1.0%) required hospitalisation. In the other study, 42 hospitals in Northern Italy were invited to join a survey with regard to COVID-19 positivity among HCWs, and 41 responded; centres with positive cases were interviewed in detail. Of 968 HCWs in these centres, 42 (4.3%) were tested positive for COVID-19, and 6 (0.6%) had to be temporarily hospitalised (for a mean of 8 days, none on intensive care unit (ICU)). Of these 42 cases, 85.7% occurred before the introduction of safety measures, including personal protective equipment (PPE) and case selection/reduction in GI endoscopy. Clustering of HCW infection (54.7% of all cases) was observed in three centres. This data suggest that GI endoscopy appears to be relatively safe for both patients and medical personnel when using adequate protective measures.

## IN MORE DETAIL

As of 31 March 2020, Italy and especially its Northern regions became the epicentre of the novel coronavirus (severe acute respiratory syndrome-CoV-2) outbreak, with more than 100 000 documented infections and a higher mortality rate than that reported in other countries. According to recent data issued by the Italian Health Authority, more than 10% of all infections in Italy have been reported among HCWs and some of them have died.<sup>1</sup> However, there are very few scientific data on the real incidence and risk of infection both among different categories/specialties of HCWs, as well as for patients.

Since endoscopy procedures are performed at a short physical distance to patients and also coworkers, it seems logical that both patients and HCWs in endoscopy may be exposed to significant

risk for diffusion of diseases transmitted by airborne spread. In high-prevalence areas, this could be even more relevant since virus transmission can occur through asymptomatic patients. International guidelines have been proposed<sup>2–5</sup> to implement preventive measures. However, the effect of such protocols and the real burden of COVID-19 outbreak on endoscopy patients and personnel still have to be analysed in detail.

The aim of this study was to describe incidence and outcome of infection among patients undergoing endoscopy in one tertiary referral centre in Lombardia, as well as among endoscopy personnel in the majority of hospitals located in the most affected area of Northern Italy (online supplementary figure S1).

## Patients

All consecutive patients undergoing endoscopy procedures between 27 January and 13 March at the endoscopy department of the Humanitas Research Hospital Rozzano (Milan), Italy, were contacted by phone by research nurses and coordinators. A dedicated protocol with a specific list of questions (online supplementary table S1) was used to identify patients who had developed fever or respiratory symptoms or were diagnosed as COVID-19 positive within 2 weeks after endoscopic procedures.

During the study period, 851 procedures were performed (online supplementary table S2). Starting with the third week of February, most of the elective procedures have been cancelled and a triage protocol has been adopted to select patients before endoscopy (time course of case numbers; see online supplementary figure S2). At the same time, protective measures for the endoscopy personnel<sup>4</sup> were implemented, such as reduction of cases by 80% or more to focus on emergency and immediately relevant therapies, as well as use of PPE, with gowns, goggles and different masks.

Of 802 patients completing the survey, the mean age of the respondents was 57.2 years (range 22–84, 503 M). Overall, eight patients developed mild respiratory symptoms with fever (1.0%), and one of them with cough on day 15 after lower GI endoscopy was tested positive by swab test (proven infection rate of 0.12%). None of the eight patients had to be hospitalised; details are shown in table 1. Of note, no cases of respiratory symptoms have been recorded among the 26 HCWs of the endoscopy

**Table 1** Details of eight patients with respiratory symptoms

Case	Procedure	Patient	Date of endoscopy	Test for COVID-19	Symptoms	Follow-up call
1	Screening colonoscopy	55 years, female No comorbidities	14 February	Tested positive 2 March	Cough since 1 March	20 March Asymptomatic
2	RFA ablation Barrett LGIN	49 years, male No comorbidities (physician)	21 February	Tested negative, 23 March	Fever since 19 March	24 March Still intermittent fever (<38°C)
3	EUS for cholecystitis after prior stenting for cholangiocarcinoma	73 years, male Cholangiocarcinoma	19 February	Hospital admission 3 March, tested negative	Fever since 3 March	24 March Asymptomatic
4	EUS for biliary stones followed by ERCP with stone extraction	68 years, female Hypertension	13 February	No test	Fever and cough since 14 February for 3 days	20 March Asymptomatic
5	Screening colonoscopy	63 years, male No comorbidities	14 February	No test	Cough since 3 March	19 March Very mild cough
6	Diagnostic colonoscopy Family history CRC	54 years, male No comorbidities	7 February	Tested negative, 16 February	Fever since 11 February	24 March Asymptomatic
7	Diagnostic colonoscopy suspected diverticulosis	82 years, female Hypertension Cardiopathy	5 February	No test	Fever since 9 February	18 March Asymptomatic
8	Surveillance colonoscopy after adenoma removal	64 years, male No comorbidities	10 February	No test	Fever since 15 February	24 March Asymptomatic

CRC, colorectal cancer; ERCP, endoscopic retrograde cholangiopancreatography; EUS, endoscopic ultra sonography; LGIN, low grade intraepithelial neoplasia; RFA, radiofrequency ablation.

unit (EU) of Humanitas Research Hospital (no routine testing of asymptomatic HCWs in our centre).

### Healthcare workers

Between 16 and 21 March 2020, we conducted a web-based survey among the directors of EUs of Northern Italy (see online supplementary figure S1) in order to assess the impact of COVID-19 infection in the endoscopy setting. Forty-one out of 42 centres replied (97.6%) and contributed data to the final analysis (see questionnaire in online supplementary table S3), accounting for an overall number of 968 of healthcare providers (323 physicians, 496 nurses and 149 healthcare assistants). All centres with positive cases were interviewed to confirm and further assess details by the first author.

Forty-two cases (26 male (M)/16 female (F), mean age 53.2 years) of HCWs positive for COVID-19 were reported (4.3%), namely, 23 physicians, 16 nurses and 3 healthcare assistants. Six of them (three physicians and three nurses, 3 M/3 F, mean age 55 years) were hospitalised because of interstitial pneumonia. Thirty-six HCWs reported mild symptoms, including fever, cough and sore throat, and 2 HCWs (4.8%) reported GI symptoms, namely, diarrhoea. All hospitalised HCWs could be discharged after a mean of 8 days (range 4–17). None required ICU or any form of assisted ventilation.

On a centre basis, 29 EU (70.7%) did not report any case of infection in their endoscopy teams (covering n=671 HCWs). Details of all centres which reported infections are shown in table 2. There were three centres with a high rate of HCW infection (19.4% and more) who accounted for 54.7% of all 42 HCW infections, with majority of them (85.7%) recorded before 8 March, when stringent preventive measures were installed by the regional authority.<sup>5</sup>

### COMMENTS

Our retrospective study shows a very low risk of COVID-19 infection for patients undergoing GI endoscopy, based on data from one tertiary referral centre; also, there appears to be an only slightly higher risk for the HCWs involved in such activity. The infection risk of GI endoscopy for patients has been a matter of discussion following bacterial infections related to

pancreatobiliary endoscopy in recent years.<sup>6,7</sup> Transmission of viruses has been reported very infrequently, partially due to the long latency period and/or the low resistance of viruses to endoscope disinfection.<sup>8</sup> However, patients may acquire COVID-19 in a hospital setting. Although it can be debated whether evidence from one centre can be generalised, our data suggest that in an endoscopy centre with high-level PPE, patients are at very low risk.

The infection rate among endoscopy personnel was significantly lower (4.3%) than the average infection rate reported among HCWs (about 10%) by the Italian ministry of health.<sup>1</sup> These results are somewhat unexpected since hospital-based transmission is considered a major route of COVID-19 spread in the community. Furthermore, upper GI endoscopy is known to be an aerosol-generating procedure, and thus HCWs are at potential high risk of infection. In addition, only surgical masks were available for most of the procedures in Northern Italy in the study period—N95 or equivalent being reserved for COVID-19 infected or high-risk cases—further reassuring the low-risk of COVID-19 transmission for HCWs in GI units with adequate preventive measures. The protective role of appropriate preventive measures is also confirmed by anecdotal evidence from the literature: in Wuhan Hospital, China, a superpreeder patient with abdominal symptoms admitted to the surgical department infected >10 HCWs in the department; preventive measures are not reported in this paper.<sup>9</sup> On the other hand, a recent case report on a severely ill respiratory patient with contact to 41 HCWs having exposure to aerosol-generating procedures for at least 10 min at a distance of less than 2 m from the patient showed that none of the HCWs was infected; the authors concluded that ‘surgical masks, hand hygiene, and other standard procedures protected them from being infected’.<sup>10</sup>

Thus, the most plausible explanation for our low rate of HCW infection is that COVID-19 transmission could have been prevented by relatively simple measures, such as the use of double-surgical masks (patient/HCW), as airborne droplets rather than aerosol remains the dominant route of infection. Orofaecal transmission during colonoscopy has been postulated due to the GI replication of the virus but has never been really demonstrated and is currently considered unlikely. Almost

**Table 2** Overview of the 12 centres with number and rates of COVID-19-infected HCWs (n=42)

Centre	% of HCW with COVID-19 infection	Infected (n)/HCW (total n)	Physicians/nurses/assistants	HCWs hospitalised (n)	HCWs discharged (n)
1	3.0	1/33	1/0/0	0	–
2	4.8	1/21	1/0/0	0	–
3	6.3	1/16	0/1/0	0	–
4	7.1	1/14	1/0/0	0	–
5	8.1	3/37	1/1/1	0	–
6	8.8	3/34	1/2/0	0	–
7	11.1	2/18	1/1/0	0	–
8	12.0	3/25	1/2/0	0	–
9	16.0	4/25	3/1/0	0	–
10	19.4	7/36	3/3/1	1	1
11	36.4	4/11	4/0/0	0	–
12	44.4	12/27	6/5/1	5	5
Total	14.1	42/297	23/16/3	6	6

HCW, healthcare worker.

90% of infections occurred before introduction of protective measures at the beginning of March in our analysis. In addition, cancellation of significant numbers of elective procedures, reducing the exposure of both HCW and patients to the mutual risk of infection, may have been another factor to keep HCW risk relatively low. This low rate could even be maintained during a time period (ie, the last 2 weeks of the study) that has been associated with an exponential rise of infections and deaths in Italy. On the other hand, there was a remarkable clustering of infections among HCWs in a few centres. A possible reason could have been that these centres—before 8 March—scoped infected patients not recognised as positive at the time of endoscopy, thus leading to uncontrolled spread of the virus among the HCWs. Even though some protection was used at that time, it can be speculated whether protective measures were incomplete or suspended when HCWs met between examinations, during breaks or hospital meetings, or on other occasions unrelated to direct patient care. So, social distancing is currently regarded as an important measure also for HCWs.

Our study has several limitations due to retrospective data acquisition, the lack of systematic testing among asymptomatic patients and HCWs (as is general policy in Italy and most other countries), and the absence of traceability of the COVID-19 infection routes (especially of HCWs). Thus, it could be that the actual rate of COVID-19-positive individuals is higher. Nevertheless, in conclusion, our analysis suggests that the risk for both patients and HCWs to acquire clinically relevant COVID-19 infection by means of endoscopy appears to be low. Although we cannot fully prove a causal relationship by our data, we strongly recommend protective measures, as well as contact and workload reduction, which most likely contributed to this effect. Further data from other parts of the world are necessary to confirm these preliminary findings.

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