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# **Impact of Safety Measures in Endoscopic Procedures in Health Care Professionals during Corona Virus Pandemic**

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#### **Authors' contributions**

*This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.*

#### **Article Information**

DOI: 10.9734/JPRI/2021/v33i47A33074

Editor(s):

- (1) Dr. Giuseppe Murdaca, University of Genoa, Italy.  
(2) Dr. Takashi Ikeno, National Center of Neurology and Psychiatry, Japan.

Reviewers:

- (1) Dushantha Madagedara, National Hospital, Sri Lanka.  
(2) Muhammad Abdelhafez Mahmoud, Al-Azhar University, Egypt.

(3) Ulyatu Fitrotin, Gadjah Mada University, Indonesia.

Complete Peer review History: <https://www.sdiarticle4.com/review-history/75425>

**Received 20 September 2021**

**Accepted 25 October 2021**

**Published 29 October 2021**

**Original Research Article**

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## **ABSTRACT**

**Background and Aims:** During the Corona Virus Disease-19 outbreak, it is believed that ten percent of all health care professionals (HCPs) were affected. HCPs' safety measures have changed because of aerosol-generating techniques. As a result, we looked at the effectiveness of endoscopic safety measures and prevalence among HCPs who operate in an endoscopy unit.

**Methods:** Techniques such as polymerase chain reaction (PCR) and immunoglobulin G (IgG) serum-assay were used to assess the COVID-19 status of 117 healthcare workers (HCWs). It has been shown that the existence of the COVID-19 is related to demographic variables, work profile, location of employment, & medical history in research.

**Results:** 38 HCWs tested positive for COVID-19 using either a PCR assay (23.93%) or simply an IgG testing (32.48 percent) (8.55%). COVID-19 incidence was significantly greater ( $P = 0.003$ ) among endoscopy technicians when compared to doctors (68.75% (20.69%). Those who worked in critical care units were shown to be more susceptible to COVID-19 (42.86%). One hundred and

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sixty-six healthcare workers who received enough hydroxychloroquine prophylaxis were tested for COVID-19, and none were positive. Everyone who had been exposed to COVID-19 recovered. There was also a substantial decrease in the number of "man-days" worked.

**Conclusion:** We discovered a statistically significant COVID-19 risk among healthcare workers in the Gastroenterology department, with endoscopy technologists having the highest risk. More stringent triaging & pre-testing of patients and healthcare workers may help to decrease the risk of COVID-19 infection. Additional multicenter studies are needed to further understand the risk and its related variables.

**Keywords:** *Gastrointestinal endoscopies; coronavirus; procedures endoscope; pandemic; personal protection equipment.*

## 1. INTRODUCTION

Since December 2019, the world has been dealing with the Corona Virus Disease-19 outbreak, which was declared a pandemic by the World Health Organization on March 11, 2020 [1-13]. When there are over thirty million individuals infected with HIV and a high death rate among COVID-19 patients, it is clear that we are living in historic times [4]. India is currently the largest most affected country, behind the United States. About 10 percent of a total of health care professionals (HCPs) in Western countries have been diagnosed with COVID19, according to estimates [5]. As a consequence, while dealing with patients, HCPs must be vigilant and take all required measures. Many employees at gastrointestinal (GI) endoscopic facilities, including doctors and other healthcare professionals, work close to patients. Endoscopy operations pose a high risk of COVID-19 exposure because of the significant generation of aerosols during the process [6-8]. Many gastroenterology organizations published guidelines during the COVID-19 pandemic on the safety measures, prevention, & treatment that must be done when doing the endoscopy [9-11]. Early in the pandemic, it was advised that emergency operations be carried out with proper personal protective equipment (PPE), with non-urgent treatments being chosen on a case-by-case basis. The epidemic is still spreading throughout the world, but now that GI endoscopy units are restarting operations around the world, it's more important than ever to review data on safety measures and their efficacy in avoiding COVID-19 transmission to healthcare professionals [1,12]. This research looked at the prevalence and outcome of COVID-19 among HCPs during endoscopic operations at a single tertiary care facility to determine how effective safety measures were [13,14].

## 2. METHODS

To assess the effectiveness of the institute's HCP safety measures, we conducted a cross-sectional study of all endoscopic procedures. We kept track of indications and COVID-positive operations in our endoscopic unit, as well as a thorough screening of HCPs. The goal of the research was to determine how prevalent COVID-19 was among HCPs or how it impacted them [15,16].

The research comprised 117 HCWs who worked in the Gastroenterology department, with 62 (53 percent) of the participants being male. Those who took part in the study ranged in age from 20 to 61 years. Fifty-seven (48.71 percent) of the HCWs were between the ages of 20 and 30 years.

### 2.1 Study Population

In August of 2020, cross-sectional research was conducted. There are 117 HCWs in the Gastroenterology department. Consultants, residents, technicians, nurses, executives, cleaning workers, and dieticians are among these individuals. There are 75 specialized beds in the department, including 20 in critical care, 12 outpatient rooms, and six endoscopic suites, as well as 24-hour emergency services. The study's 117 HCWs were all asked to participate and gave their informed permission. The research was authorized by the institution's ethical committee.

### 2.2 A Policy of COVID Department

The department's stance on triaging, testing, and PPE has changed over time. The department's PPE policy is still unclear. RT-PCR was utilized to screen for COVID-19 in individuals who had symptoms of COVID 19 or had traveled to high-

prevalence regions during the first two months of testing (RT-PCR). We have just implemented a stricter policy requiring RT-PCR testing for all patients, excluding those requiring emergency endoscopy, regardless of condition. Our admission policy has been the same as our endoscopic policy. However, we questioned patients during this time in the outpatient clinic and sent all suspicious patients to the hospital triage area. When conducting endoscopy during COVID-19, it is essential to follow certain recommendations and seek professional assistance. During a pandemic, endoscopic units must be reorganized to ensure patient and healthcare worker safety. Others were allowed with precautions like masks and social isolation. In the outpatient area and non-COVID ward, HCWs wear N-95 masks and surgical gowns and often wash their hands. Almost all endoscopic operations were done using a protocol. Patients requested pharyngeal lignocaine injection for a modest percentage (20%) of diagnostic upper gastrointestinal endoscopies.

### 2.3 RT-PCR and COVID Antibody Testing

The RT-PCR testing was performed on a total of 109 healthcare professionals. We tested 34 healthcare workers because their symptoms were suggestive of COVID-19, and we tested 75 healthcare workers because they had been in close contact with a COVID-19 patient who had been diagnosed. It was decided that RT-PCR would be performed in the laboratory once symptoms in symptomatic HCWs began to manifest. In the case of HCWs who had only interacted with positive cases, the test was performed 5–7 days after the last close contact with a positive case was made. The test was carried out using nasopharyngeal and oropharyngeal swabs that had been collected in a viral transport medium and transferred to the lab under stringent temperature control guidelines. The enhanced chemiluminescence technique was used to identify COVID-19 IgG antibodies in all 117 healthcare workers. This study uses an in-house recombinant version of SARS-CoV-2 spike component 1. If the S/Co ratio of the sample is 1.0 or 1.00, the outcome will be negative. Category B patients may be tested at any point throughout the research period for IgG antibodies. Within 3 weeks of the start of symptoms or COVID-19 illness diagnosis (RT-PCR), serological testing was conducted on category A patients (reverse transcription-polymerase chain reaction).

### 2.4 Statistical Analysis

With the assistance of SPSS 20.0, we were able to complete all of our statistical analyses. Patients' numbers and percentages of patients were used to indicate counting variables, while categorical variables were assessed using either Pearson's Chi-Square Test for Independence of Attributes or Fisher's Exact Test, depending on the circumstances. When the p-value for each occurrence was less than 0.05, it was determined that the cases were statistically significant.

## 3. RESULTS

Thirty-eight (23.93 percent) of the individuals had their COVID-19 levels tested and were confirmed to be positive using PCR. There were 19 persons with COVID symptoms and nine people who had interacted with COVID-positive people but had no symptoms. Three weeks after the disease began, all 28 HCWs who tested positive for RT-PCR also tested positive for IgG antibodies. RT-PCR further showed that despite never being suspected or diagnosed with COVID-19, 10 (8.55%) HCWs tested positive for the COVID-19 IgG antibody. The total COVID-19 load in our department was 32.48 percent, as a result of this. COVID-19 positivity is shown in Fig. 1 to illustrate the distribution of HCWs.

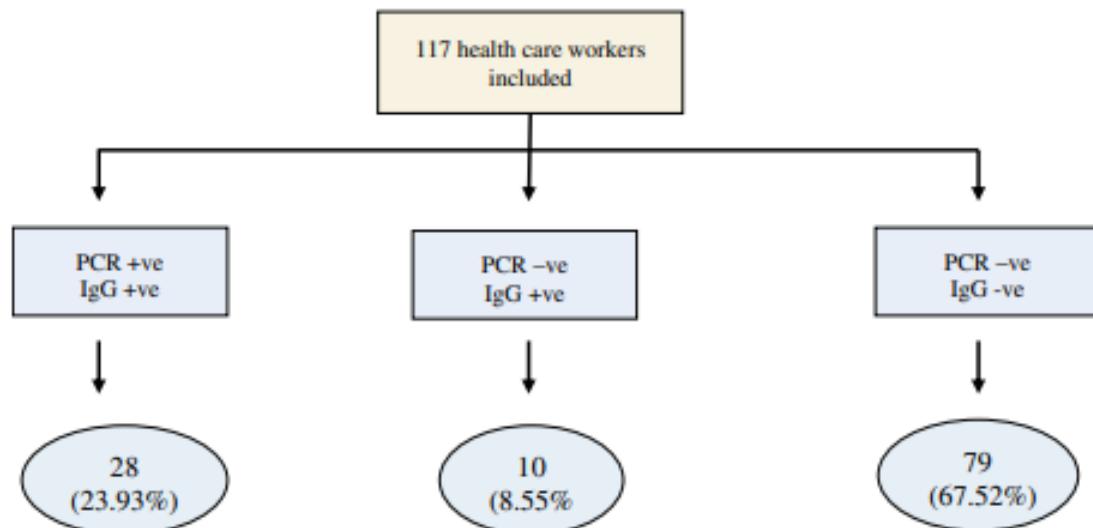
29 physicians, 43 nurses, 16 endoscopic technicians, 13 executives, 10 housekeeping workers, and 6 dieticians made up our group. The overall number of participants, as well as the COVID-19 positive rates in each of these groups, are shown in Fig. 2.

Endoscopy technicians had the greatest frequency of COVID-19 (RT-PCR or IgG positive) (68.75 percent,  $P = 0.003$ ), followed by executives (38.46%), nurses (34.88%), physicians (20.69%), and housekeeping staff (20.69%) (10%). None of the six dieticians tested positive for PCR or IgG. The COVID-19 positive rate by work area is shown in Fig. 3.

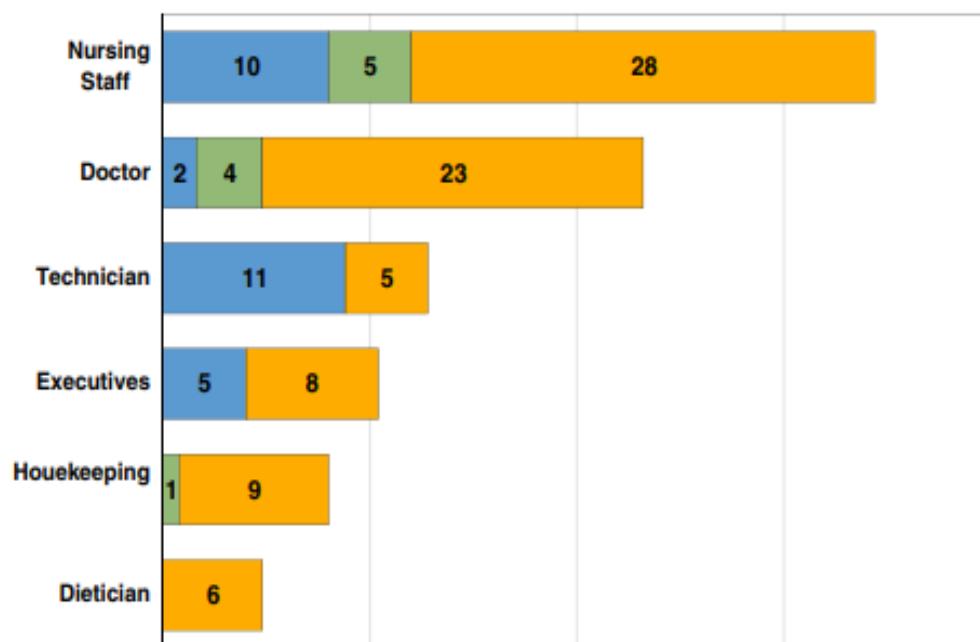
The COVID-19 positive rate among HCWs working in the critical care unit was 42.86 percent (15/35), followed by those working in the gastrointestinal ward (29.17 percent, 7/24), the endoscopy unit (28.26 percent, 13/46), and outpatient care (25 percent, 3/12). However, the change was not statistically significant. Nine (32.14%) of the 28 HCWs that tested positive through RT-PCR were asymptomatic, 15

(53.57%) had a mild illness, three (10.71%) had moderate disease, and one (3.57%) had severe disease. Only one of the COVID-19 PCR-positive individuals needed hospitalization and oxygenation, which they could do at home or in the hospital's quarantine facility. None of the HCWs required antiviral medications, high-flow nasal oxygen, or mechanical breathing. None of the participants died as a result of COVID-19.

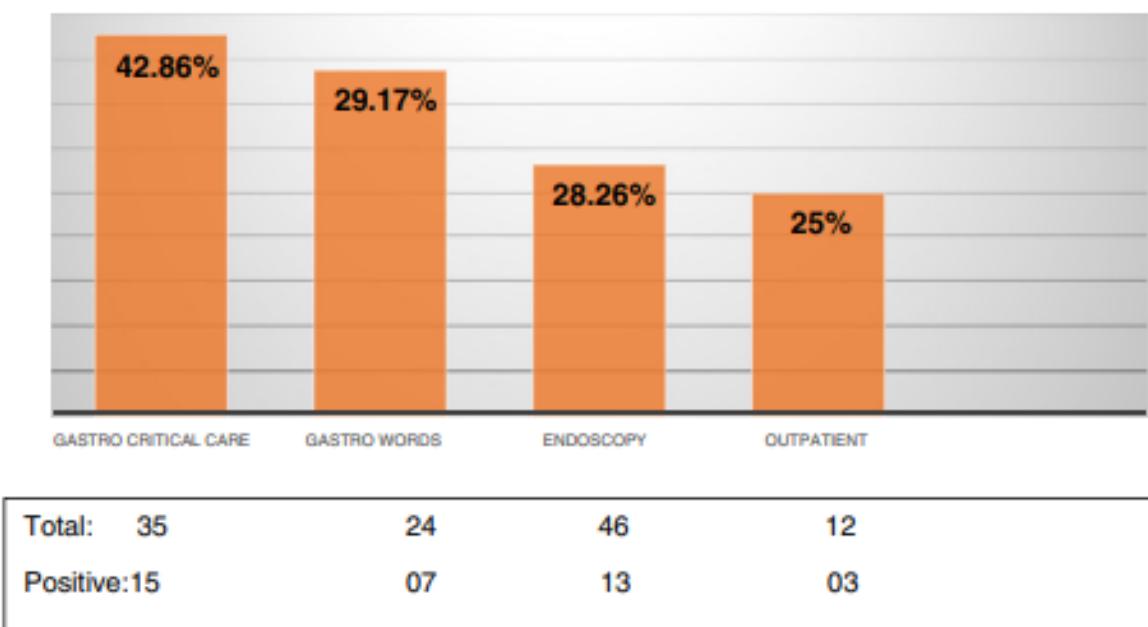
The quarantine/leave period for HCWs varied from 7 to 40 days. This amounted to a loss of 524 "man-days." We also inquired about the family history of all HCWs with positive PCR or IgG results, and eight of them had COVID-positive relatives. Only one member of the family was affected before the HCW, whereas the other seven had relatives diagnosed almost simultaneously or a few days afterward.



**Fig. 1.** Shows the research looked at polymerase chain reaction (PCR) or IgG positivity among healthcare professionals



**Fig. 2.** Shows the work profile and evidence of COVID-19, The work profile and evidence of COVID19 are depicted in a bar diagram (polymerase chain reaction (■), PCR and IgG positive; (□), only IgG positive; (▨), PCR and IgG non-reactive

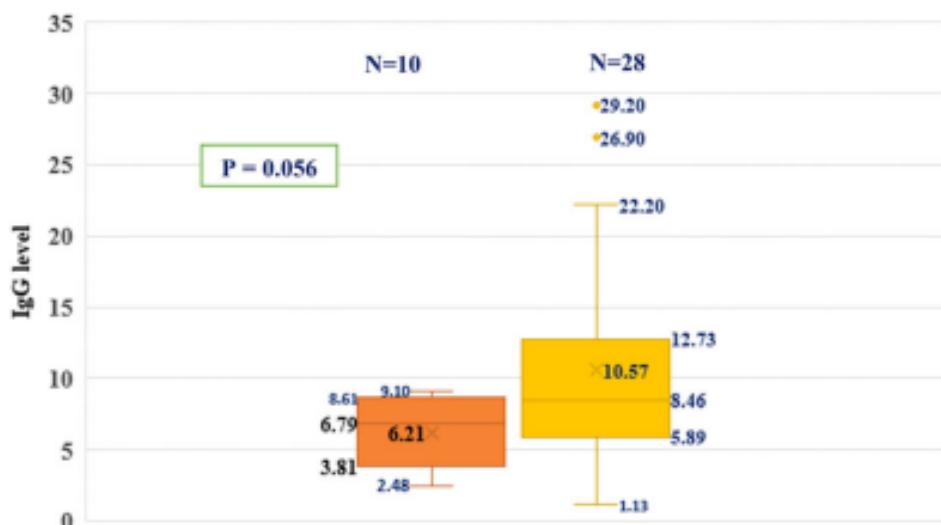


**Fig. 3.** Illustrates the relationship between the proportion of healthcare employees who have evidence of COVID-19 (positive polymerase chain reaction or IgG) and their working environment

All 28 HCWs tested positive for IgG and were proven to be COVID-19-positive by PCR, with a S/Co ratio ranging from 1.13 to 29.20, with a median of 8.46 and a mean (SD) of 10.57. (7.02). The S/Co ratio of the ten HCWs who only tested positive for IgG ranged from 2.48 to 9.1, with a median of 8.46 and a mean (standard deviation) of 6.21. (2.41). As a consequence, IgG S/Co ratios were greater in PCR-positive HCWs than in IgG-positive HCWs. This difference, however, was not statistically significant ( $P = 0.056$ ).

#### 4. DISCUSSION

In the Gastroenterology section, among the HCWs working and safety precautions. COVID 19 was found to be prevalent in 32.48 percent of the population in our research sample. Our previous research, which was focused on avid-19 seroprevalence in different therapeutic settings. We discovered a significant incidence of COVID-19 across the departments. In the Gastroenterology section, there are a lot of



**Fig. 4.** Relationship between IgG and COVID-19-positive by PCR

HCWs. 16 this may be the case. It is possible that frequent gastrointestinal endoscopies, which are regarded as aerosol-generating procedures, are to respond. The diagnosis of COVID was verified by PCR in 28 out of 38 healthcare workers who showed signs of the disease in the current research. Only serological analysis was used to confirm the diagnosis of the other ten healthcare workers, which showed that they had recently been exposed to an asymptomatic illness. These healthcare workers, before seroconversion, may have been responsible for the spread of the illness not only to patients but also to their coworkers in the department. This raises the issue of whether healthcare workers in medical departments, such as gastroenterology, should be subjected to periodic monitoring employing RT-PCR to detect current asymptomatic infections.

The findings seem to be in line with those of Dolinger et al. [17], who similarly found a low prevalence of COVID-19 patients having endoscopic procedures during the pandemic. It was interesting to observe how many patients in the semi-urgent/non-urgent category had neoplastic conditions/indeterminate strictures, as well as other causes such as dyspepsia and recurrent diarrhea, even though the data is still being gathered. Since endoscopy units have resumed operations during the ongoing pandemic, additional elective reasons for endoscopic treatments are now being considered, since they cannot be postponed indefinitely. Endoscopy is an aerosolizing method that may identify a virus in the air within three hours of it being released. [18,19]. Workman et al. [20] showed that both an intact surgical mask and a modified mask with a glove window were effective in preventing particle distribution. Because the upper respiratory tract has a high viral load and asymptomatic people may shed and spread the virus, protection during GI endoscopic procedures becomes critical. In later investigations, there was some direct proof of the mask's safety. However, there is still a lack of evidence on its safety for HCPs in an endoscopic context. HCPs had a positive rate of 6.8% in our research, which was much lower than the prior results reported by Gines et al. [21]. The infectivity rate was somewhat greater than in Repici et al'seminal's research [22] However, the number of surgeries performed in our cohort was much larger than that of the previous study, owing to a higher proportion of confirmed COVID-19 patients as well as urgent and semi-urgent cases. We have been able to effectively

perform these high-risk procedures and ensure the safety of our HCPs for an extended period even though instances are on the increase in India. This is promising. The usage of appropriate personal protective equipment (PPE) as recommended by clinical settings will minimize the risk of infection transmission among healthcare professionals. Even though fresh data on safety measures continues to emerge, we have developed an effective technique for avoiding transmission among HCPs that has shown positive outcomes in our study. One possible explanation is the kind of personal protective equipment (PPE) used, the frequency with which it is sterilized, or the adoption of fundamental techniques such as placing a plastic sheet over the work area to reduce aerosol generation, in conjunction with stringent screening processes. The thorough evaluation of all HCPs played a key role in ensuring that this was the case. A result of the testing revealed that the overwhelming majority of healthcare professionals did not carry COVID-19 and were thus not asymptomatic carriers. The vast majority of HCPs who tested positive for IgG (6/76, or 7.89 percent) were symptomatic ( $n = 5$ , or 6.57 percent) when the test was performed. According to our findings, the risk of transmission to healthcare professionals is extremely low, even in operations involving endotracheal intubation with general anaesthesia ( $n = 22$ , 0.63 percent), which included procedures such as motorised spiral enteroscopy, GERDx TM, and other similar operations ( $n = 22$ ). In this case, the technique is used to treat gastroesophageal reflux disease. Future research should examine the relationship between exposure time and the risk of transmission to HCPs in order to address these specific concerns. In addition to the fact that our study was conducted, there is no data to support the mechanistic relevance of various safety measures in decreasing COVID-19 transmission. An investigation on the efficacy of different safety nets, such as masks and face shields, in preventing COVID-19 would be interesting.

## 5. CONCLUSION

Health-care professionals (HCPs) who perform endoscopy and are exposed to COVID-19 are more susceptible due to a lack of preventive measures, according to our findings. To reduce the risk to HCPs associated with elective procedures, a comprehensive patient screening program will be needed, as will triaging patients based on etiology, COVID seropositivity (and/or CT findings), and evaluating protective measures

during endoscopy during which HCPs will be exposed. As the pandemic develops, such measures will enable us to conduct diagnostic and therapeutic endoscopic operations on patients while posing the smallest potential risk of transmission. It will be necessary to conduct a greater number of prospective studies at a range of endoscopic facilities to determine the efficacy of these preventative strategies.

## CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

## ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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**Peer-review history:**  
The peer review history for this paper can be accessed here:  
<https://www.sdiarticle4.com/review-history/75425>