

Patterns of COVID-19 Vaccination and Protective Equipment Usage in Endoscopy: A Survey of Endoscopy Providers

Kenneth W. Chow¹, Matthew T. Bell¹, Phoenix Nguyen², Mary L. Krinsky³ and Sofiya Reicher^{1,4*}

¹Department of Medicine, Harbor-UCLA Medical Center, Torrance, California.

²Division of Gastroenterology, Hoag Medical Center, Newport Beach, California.

³Division of Gastroenterology, University California, San Diego, San Diego, California.

⁴Division of Gastroenterology, Harbor-UCLA Medical Center, Torrance, California.

*Correspondence:

Sofiya Reicher MD, Clinical Professor of Medicine, David Geffen School of Medicine at UCLA; Director of Endoscopy, Harbor-UCLA Medical Center; 1000 W Carson St, Torrance, California, 90502, Tel: 424-306-4210.

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ABSTRACT

Background: Endoscopic procedures have an increased risk for COVID-19 transmission due to their production of respiratory droplets and aerosolized particles. Early case reports and surveys suggest that transmission risk during endoscopy is low given proper personal protective equipment (PPE) usage. However, the advent of new virus variants led to renewed concern regarding infection risk. We examined how these recent trends have affected patterns of COVID-19 positivity, endoscopy center pre-procedure screening protocols, PPE usage, and healthcare provider perceptions of safety in endoscopy.

Methods: We surveyed gastroenterologists, nurses, technicians, and other endoscopy unit personnel throughout the United States. The survey was sent on November 1, 2021 and November 15, 2021.

Results: Seventy-two individuals responded to the survey with a self-reported vaccination rate of 100%. Nine individuals (13%) reported testing positive for COVID-19, all of whom tested positive before vaccination. Fifty-one (71%) endoscopy workers received the booster dose, and 13 (18%) endoscopy workers planned to in the future. Seven (10%) had not received a booster dose and did not plan to, even if available. Forty-three (60%) individuals reported that their endoscopy center mandated routine COVID-19 testing for all patients undergoing endoscopy. Sixty-one respondents (85%) reported feeling safer performing endoscopic procedures after vaccination.

Conclusion: In our cohort, most endoscopy workers received the booster dose or planned to once available, and most reported feeling safer during endoscopy post-vaccination. Although the American Gastroenterological Association had recommended against routine COVID-19 screening prior to elective endoscopy, 60% of respondents reported that their endoscopy center mandated routine pre-procedural screening. Even with the advent of the highly transmissible Delta variant in early 2021, COVID-19 transmission during endoscopy remained low given vaccination and proper PPE utilization. Further data is needed to shape practice-changing guidelines regarding booster vaccine mandates and pre-procedural screening in high-risk fields such as endoscopy.

Keywords

COVID-19, Endoscopy, Survey.

Introduction

COVID-19 is believed to spread through respiratory droplets and aerosolized particles secreted by infected individuals [1]. Endoscopy is associated with the generation of respiratory droplets and aerosols [2], and endoscopic procedures are typically performed in relatively small and enclosed suites that contain multiple providers such as endoscopists, anesthesiologists, nurses, and technicians. Thus, without appropriate personal protective equipment (PPE), endoscopy poses a significant risk for COVID-19 transmission. In a cohort of 368 healthcare workers, it was found that the department of gastroenterology had the second-highest prevalence of COVID-19 viral exchange [3]. Although there have been case series and cross-sectional studies that examined the extent of COVID-19 transmission in endoscopy, these studies were performed early in the pandemic and results varied from 1% to 13.5% of endoscopy workers who reported testing positive and attributed this to endoscopy [4,5].

Subsequent society guidelines suggest that disease transmission is relatively low given proper PPE utilization [6]. Regardless, the COVID-19 pandemic has drastically affected gastrointestinal practice worldwide. During the initial surge of cases in early 2020,

many endoscopy centers cancelled elective endoscopic procedures, leading to delayed cancer diagnoses and patient follow-up. The advent of the COVID-19 vaccine in late 2020 has been shown to reduce both disease transmission and severity. However, the rise of novel virus variants such as the Delta variant in early 2021 has led to renewed concern regarding infection risk. On August 2021, the Food and Drug Administration (FDA) authorized the use of a third booster vaccination dose. Unfortunately, vaccine hesitancy has grown in certain subgroups of healthcare providers and patients alike, fueled by misinformation from anti-vaccination groups. We examined how these recent trends affected patterns of COVID-19 positivity, endoscopy center pre-procedure screening protocols, protective equipment usage, and healthcare provider perceptions of safety in endoscopy.

We surveyed gastroenterologists and endoscopy unit personnel throughout the United States and assessed patterns of COVID-19 positivity among providers, vaccination status, COVID-19 pre-procedural testing protocols, PPE usage, and healthcare provider perception of safety in endoscopy. An email database of 700 endoscopy workers was used. The survey was anonymous and was sent out twice: first on November 1, 2021, and again on November 15, 2021. It consisted of up to 25 questions using branched logic and required less than 5 minutes for completion (Appendix).

Table 1: Patterns of COVID-19 Positivity and Protective Equipment Use.

Demographics	Number of responses		72
	Age (mean ± SD)		47.4 (± 11.6)
	Gender	Male	23 (31.9%)
		Female	49 (68.1%)
COVID-19 Positivity	Tested positive for COVID-19	Yes	9 (12.5%)
		No	63 (87.5%)
	Timing of COVID-19 positivity	Before vaccination	9 (100.0%)
		After vaccination	0 (0.0%)
	Date	January 2020 to June 2020	2 (22.2%)
		July 2020 to December 2020	5 (55.6%)
		January 2021 to June 2021	1 (11.1%)
		July 2021 to November 2021	1 (11.1%)
	Symptom severity in COVID-19 positive individuals	Asymptomatic	0 (0.0%)
		Mild	5 (55.6%)
Moderate		4 (44.4%)	
Severe		0 (0.0%)	
Critical illness		0 (0.0%)	
Endoscopy Center Guidelines	My institution requires N95 masks:	Does not require N95 masks for any patient	14 (19.4%)
		Only for suspected COVID-19 patients	32 (44.4%)
		For all upper endoscopic procedures	5 (6.9%)
		For all endoscopic procedures	20 (27.8%)
		Other	1 (1.4%)
	Mandatory routine COVID-19 testing for all patients	Yes	43 (59.7%)
No		29 (40.3%)	
Endoscopy Provider Perceptions	Perception of safety performing endoscopic procedures after receiving vaccination compared to before	Much safer	41 (56.9%)
		Somewhat safer	20 (27.8%)
		Same	9 (12.5%)
		Somewhat less safe	1 (1.4%)
		Much less safe	0 (0.0%)
		No response	1 (1.4%)

Seventy-two individuals responded to the survey, with a self-reported vaccination rate of 100%. Fifty-two respondents (72.2%) received the Pfizer vaccine, 15 (20.8%) received the Moderna vaccine, and 5 (6.9%) received Johnson and Johnson vaccine. The average age of respondents was 47.4 years, and 49 (68.1%) identified as female. Nine individuals (13%) reported testing positive for COVID-19, all of whom tested positive before vaccination. Of those who tested positive, 7 (77.8%) cases occurred before 2021. Fifty-one (71%) endoscopy workers received the booster dose, and 13 (18%) endoscopy workers planned to in the future. Seven (10%) had not received a booster dose and did not plan to, even if available. Fourteen respondents (19.4%) reported that their institution did not require advanced masks (i.e. N95) for any patients, while the remainder reported some degree of advanced masking requirement. Forty-three (59.7%) individuals reported that their endoscopy center mandated routine COVID-19 testing for all patients undergoing endoscopy. Sixty-one respondents (85%) reported feeling safer performing endoscopic procedures after vaccination (Table 1).

In our cohort, no individuals tested positive for COVID-19 after receiving their first vaccination series, compared to 9 individuals (13%) who tested positive before vaccination. The majority (77.8%) of positive tests occurred before January 2021, which is approximately when vaccines began their roll-out in the United States. Most endoscopy workers (90.1%) received the booster dose or planned to once available. Most respondents (85%) report feeling safer during endoscopy post-vaccination. Although the American Gastroenterological Association (AGA) recommended against routine COVID-19 screening prior to elective endoscopy [6], 60% of respondents reported that their endoscopy center mandated routine pre-procedural screening. Although seemingly well intentioned, mandatory pre-procedural screening can exacerbate disparities in healthcare access, with one study demonstrating that minority patients were three times as likely to experience COVID-19-related pre-endoscopy cancellations [7]. Our findings suggest that even with the advent of the highly

transmissible Delta variant in early 2021, COVID-19 transmission during endoscopy remained low given vaccination and proper PPE utilization. Further data is needed to shape practice-changing guidelines regarding booster vaccine mandates and pre-procedural screening in high-risk fields such as endoscopy, especially with the continually emerging variants of COVID-19.

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Appendix

Demographics

1. What is your age (years)?
2. What is your biologic sex?
 - a. Male
 - b. Female
 - c. Prefer not to answer
3. How would you best describe yourself?
 - a. Asian Indian or Alaskan Native
 - b. Asian
 - c. Black or African American
 - d. Hispanic, Latino, or Spanish origin
 - e. Native Hawaiian or Pacific Islander
 - f. White
 - g. Prefer not to answer
 - h. Other
4. Are you a(n)...
 - a. Administrator
 - b. Anesthesiologist or Certified Registered Nurse Anesthetist (CRNA)
 - c. Custodial Staff
 - d. Endoscopy Nurse
 - e. Endoscopy Technician
 - f. Gastroenterologist
 - g. Other
5. How would you describe your endoscopy center? Select 1 or more.
 - a. Ambulatory Center
 - b. Private Hospital
 - c. Public Hospital
 - d. University Hospital
6. Region of the United States or Canada that your endoscopy center is located in?
 - a. Northeast (CT, ME, MA, NH, NJ, NY, PA, RI, VT)
 - b. Midwest (IA, IL, IN, KS, MI, MN, MO, NE, ND, OH, SD, WI)
 - c. South (AL, AR, DC, DE, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, WV)
 - d. West (AK, AZ, CA, CO, HI, ID, MT, NV, NM, OR, UT, WA, WY)
 - e. Canada

Vaccination Status

7. Have you received a vaccine against COVID-19?
 - a. Yes
 - b. No
8. If yes, which vaccine did you receive?
 - a. Johnson & Johnson
 - b. Moderna
 - c. Pfizer-BioNTech
 - d. Other
9. If yes, approximately when did you receive your first vaccine? (Month, Year)
10. Have you received an additional booster vaccination dose after your first vaccination series?
 - a. Yes
 - b. No
11. If no, do you plan on receiving an additional booster vaccination dose, once available?
 - a. Yes
 - b. No
 - c. Unsure

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12. If no or unsure, please briefly describe your reasoning.
 13. Which of the following statements best applies to you?
 - a. I feel *much safer* performing or helping perform endoscopic procedures after receiving the COVID-19 vaccine
 - b. I feel *somewhat safer* performing or helping perform endoscopic after receiving the COVID-19 vaccine
 - c. I feel *the same* performing or helping perform endoscopic procedures after receiving the COVID-19 vaccine
 - d. I feel *somewhat less safe* performing or helping perform endoscopic procedures after receiving the COVID-19 vaccine
 - e. I feel *much less safe* performing or helping perform endoscopic procedures after receiving the COVID-19 vaccine

COVID-19 Status

14. Have you ever performed or help perform endoscopy in a patient with known infection of COVID-19?
 - a. Yes
 - b. No
15. Have you ever tested positive for COVID-19 with a molecular (PCR) or antigen test?
 - a. Yes
 - b. No
16. If yes, do you attribute this to exposure during endoscopy?
 - a. Yes
 - b. No
 - c. Unsure
17. Did you test positive for COVID-19 before or after vaccination? Select 1 or more.
 - a. Before vaccination
 - b. After vaccination
18. Approximately when did you test positive for COVID-19? (Month, Year)
19. How would you describe your symptoms of COVID-19?
 - a. Asymptomatic
 - b. Mild (absence of shortness of breath or abnormal chest imaging)
 - c. Moderate (presence of shortness of breath or abnormal chest imaging, and did NOT require supplemental oxygen or inpatient hospitalization)
 - d. Severe (required supplemental oxygen or inpatient hospitalization)
 - e. Critical illness (respiratory failure, septic shock, and/or multiple organ dysfunction)

Endoscopy Center Guidelines

20. Does your endoscopy center currently require mandatory COVID-19 testing for all patients prior to endoscopy?
 - a. Yes
 - b. No
21. Has an employee of your endoscopy center ever been known to test positive for COVID-19 and attributed this to exposure during endoscopy?
 - a. Yes
 - b. No
 - c. Unsure
 - d. Prefer not to answer
22. If yes, approximately when did employee(s) test positive for COVID-19? Select 1 or more.
 - a. Before December 2020
 - b. Between December 2020 to February 2021
 - c. Between March 2021 to May 2021
 - d. Between June 2021 to August 2021
 - e. Between September 2021 to Present
 - f. Unsure

Personalized Protective Equipment

23. Does your institution require N95 masks (or other NIOSH-approved respirators) for endoscopy?
 - a. My institution does not require N95 masks for any endoscopic procedures
 - b. My institution requires N95 masks only for patients with known or suspected COVID-19
 - c. My institution requires N95 masks for all upper endoscopic procedures
 - d. My institution requires N95 masks for all endoscopic procedures
 - e. Other

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24. After vaccination,
- a. I did not routinely wear masks during endoscopy
 - b. I wore surgical or cloth masks for most/all endoscopic procedures
 - c. I wore surgical or cloth masks for routine endoscopic procedures, but wore advanced masks (N95, PAPR, etc.) when recommended by my institution (known or suspected COVID-19 infection, during upper endoscopic procedures, etc.)
 - d. I wore advanced masks (N95, PAPR, etc.) for most/all endoscopic procedures
 - e. Other
25. Before vaccination,
- a. I did not routinely wear masks during endoscopy
 - b. I wore surgical or cloth masks for most/all endoscopic procedures
 - c. I wore surgical or cloth masks for routine endoscopic procedures, but wore advanced masks (N95, PAPR, etc.) when recommended by my institution (known or suspected COVID-19 infection, during upper endoscopic procedures, etc.)
 - d. I wore advanced masks (N95, PAPR, etc.) for most/all endoscopic procedures
 - e. Other