COVID-19 Vaccination Intent and Perceptions Among Patients With Inflammatory Bowel Diseases

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Patients with inflammatory bowel disease (IBD) develop coronavirus disease 2019 (COVID-19) at similar rates as the general population, and there was initial concern regarding potential for severe illness.[1-4] Vaccinations were authorized for emergency use in the United States in December 2020 and aim to halt the spread of COVID-19. However, there are concerns that people will be hesitant to receive the vaccine for a variety of reasons including insufficient data in certain populations including those with IBD. We surveyed patients with IBD to identify potential concerns regarding COVID-19 vaccination.

Methods

Two adult IBD populations were recruited December 22, 2020–January 26, 2021. The first included a local population of 2914 eligible patients seen at the Crohn's and Colitis Center of Brigham and Women's Hospital (Boston, MA). The second included a broad population identified via gastroenterology and IBD-specific social media (SM) (Supplementary Methods).

We developed an anonymous survey using the secure platform Research Electronic Data Capture (REDCap).[5,6] It assessed demographics, IBD history, influenza vaccination status, and concerns and intentions regarding COVID-19 vaccination. Participants were asked if they: (1) will receive the vaccine when available; (2) will likely receive it, but at a later time; (3) are undecided; or (4) will not receive it. Those who selected options 2–4 were asked about potential reasons for vaccination hesitancy. Several methods were used to discourage multiple submissions from the same respondent and submissions from non-IBD patients (Supplementary Methods).

The primary outcome was intention to receive a COVID-19 vaccine as soon as it is available (ie, "vaccination intent"). We used multivariable logistic regression to calculate adjusted odds ratios (aORs) of factors associated with vaccination intent (Supplementary Methods). This study was approved by the institutional review board of Brigham and Women's Hospital.

Results

A total of 906 participants (236 local, 670 SM) completed the survey. The survey response rate among local participants was 8.1%. Median age was 45 years (interquartile range, 35–62 years) for local and 40 years (interquartile range, 32–48 years) for SM participants. Self-reported influenza vaccination rates seemed to differ by population (92.0% local, 76.3% SM). Demographic and IBD characteristics are presented in Table 1.

Rates of COVID-19 vaccination intent were 80.9% for local and 60.0% for SM participants. The hesitant participants most commonly selected "concern that long-term safety of vaccines is unknown" (64.4% local, 70.1% SM) and "prefer to see how others tolerate vaccine first" (62.2% local, 55.6% SM). Approximately 70% desire data regarding vaccine safety/efficacy among patients with IBD (Supplementary Table 1).

After multivariable analysis, age $\geq$50 years (aOR, 2.2; 95% confidence interval [CI], 1.1–4.5) and having a bachelor's degree (aOR, 3.3; 95% CI, 1.4–8.1) were significantly associated with vaccination intent for local participants. White race (aOR, 2.1; 95% CI, 1.2–3.9), having a bachelor's degree (aOR, 1.7; 95% CI, 1.2–2.4), self-reported prior COVID-19 infection (aOR, 2.0; 95% CI, 1.1–3.7), and current biologic therapy (aOR, 1.5; 95% CI, 1.1–2.2) were significantly associated with vaccination intent for SM participants (Supplementary Table 2).

Discussion

A recent poll by the Kaiser Family Foundation estimates that 41% of Americans would "definitely get" the COVID-19 vaccine, although the rate among IBD patients is unknown.[7] Our survey suggests higher vaccination intent among an IBD population, which may be caused by frequent interactions with health care providers or concerns of severe COVID-19 illness. These hypotheses

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Table 1. Survey Responses Pertaining to Demographics, IBD History, and COVID-19 Vaccination

Survey items	Local (n = 236) % (fraction)	Social media (n = 670) % (fraction)
1. IBD diagnosis		
Crohn's disease	59.8 (141/236)	48.4 (324/670)
Ulcerative colitis	33.9 (80/236)	50.2 (336/670)
Indeterminate colitis	6.4 (12/236)	1.5 (10/670)
2. Race		
White	96.2 (227/236)	92.4 (619/670)
Black or African American	0.9 (2/236)	1.6 (11/670)
Asian, Pacific Islander, or Native Hawaiian	3.0 (7/236)	5.7 (38/670)
Native American or Alaska Native	0.0 (0/236)	0.3 (2/670)
3. Hispanic ethnicity	0.4 (1/236)	3.8 (26/670)
4. Female sex	75.4 (178/236)	86.7 (581/670)
5. Age ≥50 y	43.2 (102/236)	21.2 (142/670)
6. IBD duration ≥10 y	73.7 (174/236)	52.8 (354/670)
7. Level of education		
No high school degree to associate's degree	11.9 (28/236)	45.6 (212/670)
Bachelor's degree or master's degree	71.2 (168/236)	59.6 (399/670)
Professional or doctorate degree	16.9 (40/236)	8.8 (59/670)
8. Tested positive for COVID-19 at any point	3.4 (8/236)	6.9 (46/670)
9. Current IBD medications[a]		
Anti-TNF	34.8 (82/236)	45.9 (214/670)
Vedolizumab or natalizumab	16.5 (39/236)	23.3 (156/670)
Tofacitinib or ustekinumab	14.8 (35/236)	15.2 (102/670)
Azathioprine, 6-mercaptopurine, or methotrexate	11.4 (27/236)	17.8 (119/670)
Mesalamine	23.3 (55/236)	28.8 (193/670)
Prednisone or oral budesonide	3.8 (9/236)	12.5 (84/670)
10. Prior exposure to 2 or more biologic therapies	19.1 (45/236)	24.5 (164/670)
11. Prior bowel resection surgery	34.3 (81/236)	23.7 (159/670)
12. Received or intend to receive influenza vaccine	92.0 (217/236)	76.3 (511/670)
13. Intention to receive COVID-19 vaccine		
1. Yes, as soon as it is available	80.9 (191/236)	60.0 (402/670)
2. Not right away, but likely later in the year	7.2 (17/236)	14.0 (94/670)
3. Undecided	11.0 (26/236)	17.3 (116/670)
4. No	0.9 (2/236)	8.7 (58/670)
14. Reasons for COVID-19 vaccination hesitancy (responses 2–4 to item #13)[a]		
Concerned about adverse reaction to vaccine	37.8 (17/45)	45.5 (122/268)
Concerned vaccine will interfere with IBD medication efficacy	26.7 (12/45)	26.9 (72/268)
Concerned that IBD medication may render vaccine ineffective	8.9 (4/45)	19.8 (53/268)
Already had COVID-19 infection	2.2 (1/45)	5.6 (15/268)
Negative experience with last vaccine	4.4 (2/45)	7.8 (21/268)
Do not take vaccines in general	6.7 (3/45)	15.3 (41/268)
Concerned that long-term safety of vaccines is unknown	64.4 (29/45)	70.1 (188/268)
Concerned that vaccine did not undergo typical scrutiny and safety checks	33.3 (15/45)	41.0 (110/268)
Personal history of allergic reactions	22.2 (10/45)	18.7 (50/268)
Prefer to see how others tolerate vaccine first	62.2 (28/45)	55.6 (149/268)

IBD, inflammatory bowel disease; TNF, tumor necrosis factor.
[a]Respondents could choose multiple options for survey items #9 and #14.

are supported by the higher rates of influenza vaccination (92%) and COVID-19 vaccination intent (81%) among our local population, comprised entirely of referral patients. We observed that participants who are White, those age ≥50 years, those with bachelor's degrees, those reporting prior COVID-19 infection, and those taking biologics were more likely to have vaccination intent. Those with vaccination hesitancy were largely concerned about long-term safety.

This study's strengths include recruitment of 2 populations with distinct vaccination behaviors, a large sample, and timely distribution of surveys within 2

weeks of vaccine authorizations. Limitations include response bias inherent to online surveys. Low response rates, which are partly caused by an abbreviated study period, may overestimate vaccination intent. Therefore, our survey results do not represent the national IBD population or the full range of vaccination concerns. However, the similarity of reasons for vaccination hesitancy in 2 distinct IBD populations suggests that such concerns are commonly shared.

In summary, our study identifies a relatively high rate of COVID-19 vaccination intent among the IBD populations assessed, but concerns about long-term safety are common. Vaccination intent is associated with White race, older age, education level, prior COVID-19 infection, and current biologic therapy. Targeting outreach and educational interventions toward subpopulations less likely to have vaccination intent may facilitate COVID-19 vaccination efforts.

Supplementary Material

Note: To access the supplementary material accompanying this article, visit the online version of *Clinical Gastroenterology and Hepatology* at www.cghjournal.org, and at https://doi.org/10.1016/j.cgh.2021.02.004.

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Supplementary Methods

Recruitment

The local population was sent survey links directly via email. This included 2914 patients receiving care at the Crohn's and Colitis Center of Brigham and Women's Hospital (Boston, MA) with a documented email address and diagnosis code for Crohn's disease (ICD-10-CM K50), ulcerative colitis (ICD-10-CM K51), or indeterminate colitis (ICD-10-CM K52.3) obtained from the electronic medical record. The social media population (among the general public) was recruited via postings of a separate survey link on our gastroenterology division's Twitter page and on IBD-focused Facebook groups. Facebook groups were identified using the search terms "inflammatory bowel disease," "IBD," "Crohn," and "ulcerative colitis." Facebook groups specific to countries outside of the United States and groups with fewer than 1000 members were not included. A total of 17 Facebook groups met this search criteria. Although the total number of Facebook group members exceeds 20,000, the precise number of eligible patients with IBD from both Twitter and Facebook groups cannot be determined.

All respondents were assigned a unique identification number; however, Internet Protocol addresses could not be tracked to prevent respondents from completing the survey more than once. Therefore, the text "Please only complete this survey once" was included in bold immediately before the first survey question to discourage multiple submissions from the same respondent. Additionally, all survey submissions were manually reviewed and no 2 submissions had identical responses to all survey items. To discourage responses from non-IBD patients, all survey invitations and instructions in the survey header indicate that the survey is intended for patients with IBD. Additionally, all survey items, 7 of which include specific questions about IBD history, require a response for successful submission. Therefore responses from non-IBD patients would require intentional fabrication. Respondents were not provided reimbursement or other incentivization for completing the survey. The survey instrument was tested for proper functionality before publishing online.

Statistical Analysis: Regression

We used univariable logistic regression to calculate unadjusted odds ratios of factors associated with vaccination intent for each study population. Factors with $P < .10$ on univariable analysis were included in multivariable analyses. Factors with $P < .05$ on multivariable analysis were considered significant. Statistical analyses were performed using Stata/IC version 15.1 (StataCorp, College Station, TX).

Supplementary Table 1. Additional Survey Responses Specific to COVID-19 Vaccination

Survey items	Local (n = 236) % (fraction)	Social media (n = 670) % (fraction)
15. COVID-19 vaccine will be important for health of others	96.2 (227/236)	90.9 (609/670)
16. COVID-19 vaccine will be important for my health	95.8 (226/236)	83.6 (560/670)
17. Someone close to me was negatively affected by COVID-19	48.7 (115/236)	46.3 (310/670)
18. My IBD provider's recommendation is an important factor in my decision to take the COVID-19 vaccine	92.0 (217/236)	80.6 (540/670)
19. What can IBD providers do to better inform you about the COVID-19 vaccines?[a]		
Have a conversation with me about risks/benefits	58.9 (139/236)	67.5 (452/670)
Provide me an informational handout	31.4 (74/236)	32.8 (220/670)
Provide me data about vaccine safety/efficacy among patients with IBD or other autoimmune disorders	66.5 (157/236)	71.3 (478/670)
Provide me data about vaccine safety/efficacy among patients with IBD who take my medication(s)	67.4 (159/236)	71.5 (479/670)
Nothing	9.3 (22/236)	10.0 (67/670)

IBD, inflammatory bowel disease.
[a]Respondents could choose multiple options for survey item #19.

Supplementary Table 2. Logistic Regression of Factors Associated With Intention to Receive COVID-19 Vaccine

Predictor	Local survey (n = 236)		Social media survey (n = 670)	
	Univariable OR (95% CI)	Multivariable OR (95% CI)	Univariable OR (95% CI)	Multivariable OR (95% CI)
Crohn's disease	0.78 (0.40–1.54)		1.52 (1.11–2.07)[a]	1.38 (1.00–1.92)
White race	1.22 (0.25–6.09)		2.10 (1.18–3.73)[a]	2.13 (1.17–3.85)[b]
Hispanic ethnicity	—		0.56 (0.25–1.23)	
Female sex	0.85 (0.39–1.84)		0.87 (0.55–1.38)	
Age ≥50 y	1.89 (0.95–3.78)[a]	2.21 (1.07–4.54)[b]	1.27 (0.93–1.73)	
IBD duration ≥10 y	1.03 (0.49–2.14)		1.30 (0.93–1.83)	
Bachelor's or more advanced degree	2.75 (1.17–6.45)[a]	3.31 (1.36–8.06)[b]	1.63 (1.17–2.27)[a]	1.72 (1.22–2.41)[b]
Had COVID-19 infection	1.43 (0.28–7.35)		1.87 (1.02–3.41)[a]	2.02 (1.09–3.73)[b]
Prior IBD bowel resection	1.06 (0.53–2.10)		1.35 (0.93–1.96)	
Current biologic	0.93 (0.47–1.84)		1.67 (1.19–2.33)[a]	1.52 (1.07–2.16)[b]
Current thiopurine or methotrexate	1.40 (0.46–4.28)		1.27 (0.84–1.93)	
Current corticosteroids	1.92 (0.23–15.78)		1.03 (0.65–1.65)	
≥2 prior biologic exposures	1.11 (0.47–2.58)		1.39 (0.96–2.01)[a]	1.16 (0.79–1.71)

NOTE. Missing univariable values for Hispanic ethnicity are caused by an insufficient number of observations in the local survey.

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

[a]$P < .10$ on univariable analysis. Only these variables were candidates for multivariable analysis.

[b]$P < .05$ on multivariable analysis.