

# Self-reported Treatment Goals in Chinese Patients with Inflammatory Bowel Disease During the Coronavirus Disease 2019 Pandemic

Wen-Ning Tian<sup>1</sup>, Yu-Hong Huang<sup>1</sup>, Min Jiang<sup>1</sup>, Cong Dai<sup>1</sup>

Department of Gastroenterology, China Medical University First Affiliated Hospital, Shenyang City, Liaoning Province, China

**Cite this article as:** Tian W, Huang Y, Jiang M, Dai C. Self-reported treatment goals in Chinese patients with inflammatory bowel disease during the coronavirus disease 2019 pandemic. *Turk J Gastroenterol.* 2022;33(7):554-564.

## ABSTRACT

**Background:** Inflammatory bowel disease is a chronic recurrent disease, and the treatment goals of inflammatory bowel disease are mainly based on doctors' perspective, but there are some differences between the doctor's perspective and the patient's perspective. The aim of this study is to understand the treatment goals and the related factors from the patients' perspective during the coronavirus disease 2019 pandemic.

**Methods:** A total of 212 participants were recruited to fill out the questionnaires including clinical characteristics and treatment goals. Eleven treatment goals were measured by a Short-Form 34 questionnaire. Univariate and multivariate regression analyses were used to explore the related factors about these treatment goals.

**Results:** A total of 212 inflammatory bowel disease patients were enrolled in this study. The most concerned treatment goal was the improvement of quality of life (mean score was 8.54), while mean score of ulcerative colitis patients and Crohn's disease patients was 9.10 and 8.45, respectively. We had also found some related factors such as the type of disease, the course of disease, the frequency of hematochezia, and defecation.

**Conclusion:** Our survey showed that inflammatory bowel disease patients pay more attention to the improvement of quality of life and few drugs during the coronavirus disease 2019 pandemic. There are some related factors such as the type of disease, the course of disease, the frequency of hematochezia, and defecation. Our results help clinicians understand the patients' treatment goals, which can contribute to better management of inflammatory bowel disease patients.

**Keywords:** COVID-19, Crohn's disease, inflammatory bowel disease, treatment goals, ulcerative colitis

## INTRODUCTION

Inflammatory bowel disease (IBD) including ulcerative colitis (UC) and Crohn's disease (CD) is a chronic non-specific gastrointestinal disease.<sup>1</sup> The etiology of IBD is multifactorial, which is closely associated with genetic susceptibility, immunity, environment, and microorganism.<sup>2</sup> Inflammatory bowel disease patients are often disturbed by embarrassing gastrointestinal symptoms and systemic symptoms, which give rise to increased rates of frequent hospitalization, surgery, and even death.<sup>3</sup> Frequent clinical symptoms such as abdominal pain, diarrhea, and fever can lead to a decline in the quality of life (QoL) of patients with IBD.<sup>4</sup>

Inflammatory bowel disease treatments were revolutionized with the introduction of anti-tumor necrosis factor (TNF)- $\alpha$  agents (infliximab and adalimumab) in the 1990s. Some new biological agents (vedolizumab and

ustekinumab), as well as a small molecule pharmaceutical (tofacitinib), have also been used clinically for IBD patients. This remarkable change has led to significant and long-standing remission in steroid-refractory and steroid-dependent IBD patients, a reduction in surgery rates, and a chance to alter the deleterious disease course of IBD patients.

With the significant increase in IBD treatments, choosing the appropriate therapy for IBD patients becomes more and more challenging. Although many IBD guidelines and consensus give many specific treatment options for the treatment of IBD patients, there are still some aspects that pose great challenges for clinicians to choose treatment options. At present, existing therapeutics differ in mode of application (enteral or parenteral), speed of onset of action, side effects (risk of infectious complications and cancer), and intensity of treatment (combination therapy

Corresponding author: Cong Dai, e-mail: [cong dai2006@sohu.com](mailto:cong dai2006@sohu.com)

Received: April 3, 2021 Accepted: August 18, 2021 Available Online Date: July 13, 2022

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DOI: 10.5152/tjg.2022.21180

or monotherapy, frequency of treatment application, and number of tablets).

Coronavirus disease 2019 (COVID-19), which was first reported in Wuhan in December 2019, has already spread all over the world causing a great deal of panic. The major clinical manifestations of patients with COVID-19 are fever, chills, cough, shortness of breath, generalized myalgia, malaise, diarrhea, confusion, dyspnea, and bilateral interstitial pneumonia. The virus that causes this disease was severe acute respiratory syndrome coronavirus 2. The virus enters the cells via the angiotensin-converting enzyme 2 receptor. This receptor is expressed in different tissues, mainly in the intestinal tract. Excessive binding of the virus to the receptor can lead to overactivation of immune cells, which can lead to severe systemic diseases. Some studies showed that gastrointestinal symptoms such as diarrhea and vomiting occurred more frequently in patients with COVID-19. Because patients with IBD are unable to determine whether diarrhea is due to the aggravation of the disease or the infection of COVID-19, it may cause panic to patients with IBD.

During the COVID-19 pandemic (from February 02, 2020 to April 30, 2020), some patients changed their treatment schedules according to our questionnaire.<sup>5</sup> These patients do not have access to obtain enough drugs such as infliximab because many hospitals were unable to open and treat non-COVID-19 patients during the COVID-19 pandemic. Some patients use immunosuppressants, steroids, and other drugs which may lead to an increased risk of the COVID-19 infection.<sup>6</sup> In fact, the use of immunosuppressants was not associated with an increased risk of COVID-19 in IBD patients.<sup>7,8</sup> In order to avoid the COVID-19 infection, some patients have changed their treatment schedules and treatment goals.

Furthermore, enhancing medical therapy and surgical treatment are both valid options in IBD therapy. In addition to IBD treatment selection, patients and physicians sometimes have different priorities regarding treatment goals. For example, physicians often stick to objective parameters, such as mucosal healing and normalization of biomarkers (C-reactive protein (CRP) and fecal calprotectin (FC)). However, IBD patients are more inclined to choose the relief of symptoms as the treatment goals.

While treatment options become more complex and individualized, little is known about IBD patients' treatment goals. Non-compliance with therapy is common in

IBD patients, with rates up to 50%. Non-compliance with therapy leads to an increase in disease activity and frequent relapses, poor QoL, higher disability, morbidity, and mortality. Some studies found that the most important influencing factor about IBD patients' adherence to medication was patients' beliefs about medications. However, due to the COVID-19 pandemic, the assessment of the condition of IBD patients has become particularly difficult. Most patients would rather take oral or subcutaneous medication (adalimumab) than go to the hospital for systematic evaluation. These patients are more likely to choose the improvement of symptoms as the treatment goal.

Physicians can improve their physician-patient relationship by understanding the patients' treatment goals, thereby effectively influencing IBD patients' adherence to treatment and improving disease prognosis. Therefore, understanding the patients' treatment goals can contribute to better management of IBD patients during the COVID-19 pandemic. The aims of study were to assess IBD patients-reported treatment goals and the related factors in China during the COVID-19 pandemic by conducting a questionnaire-based survey.

## **MATERIALS AND METHODS**

### **Participants and Procedures**

This was a cross-sectional observational study. All participants were recruited from patients with IBD who were diagnosed in our hospital from January 2017 to April 2020. The data collection period is from February 01, 2020 to April 30, 2020. The inclusion criteria were: (1) age 18-75 years; (2) a confirmed diagnosis of CD or UC or unclassified IBD, according to the current diagnostic criteria; (3) all participants volunteered to take part in this study; and (4) all participants have ability to understand and complete the questionnaire. Exclusion criteria were: (1) intellectual disability or dementia; (2) severe concomitant diseases; (3) gastrointestinal tumors, severe cardiovascular and cerebrovascular diseases, severe cardiopulmonary function, and liver and kidney dysfunction.

### **Demographic and Clinical Characteristics**

Demographic characteristics were gathered from a self-designed questionnaire, including age, gender, smoking history, place of residence, and type of labor. Clinical characteristics were also extracted, including disease type, year of diagnosis, disease location, history of perianal involvement, abdominal pain, defecation, frequency of hematochezia, disease behavior, disease activity, current medical therapy, and IBD-related surgical history.

All patients received written information. Informed consent was obtained, and ethical approval was granted by Research Ethics Committees.

### **Questionnaire**

All participants were invited to fill out a structured Short-Form 34 questionnaire (Supplementary Table 1). The questions focused on opinions and current practice regarding IBD patients' self-reported treatment goals. We identified 11 items that represent patients' self-reported treatment goals (improvement of QoL, few drugs, avoidance of surgery, radiologic healing, less psychological impact, all-oral therapy, few side effects, mucosal healing, normalization of biomarkers, the relief of abdominal pain, and normalization of defecation). Patients were asked to express the level of importance to them by allocating a total of 10 points to each item. Thus, each item can be scored from 0 to a maximum of 10 points, with more points indicating more importance.

### **Statistical Analysis**

Statistical analyses were performed by the Statistical Package for Social Sciences (SPSS) version 23.0 software (IBM Corp.; Armonk, NY, USA). All analyses were two-tailed. The value of  $P < .05$  was considered statistically significant. Qualitative variables were described using frequency and percentage. The chi-squared test and Wilcoxon rank-sum test were performed to assess the significance of qualitative comparisons. Quantitative variables were expressed as mean and standard deviation, which were compared with Student's  $t$ -test and analysis of variance. The factors related to the score of the questionnaire were analyzed by bivariate and multivariate logistic regression analysis. These factors with  $P < .05$  in bivariate analysis were introduced into the stepwise selected logistic multiple regression model. The magnitude of the effect is expressed as the odds ratio (OR) (95% CI).

## **RESULTS**

### **Demographic and Clinical Characteristics**

A total of 212 IBD patients (52.36% males, mean ages  $43 \pm 0.94$ ) were enrolled in this study. Of them, 49 (23.11%) patients had CD, 145 (68.4%) patients had UC, and 18 (8.49%) patients had unclassified IBD; 88 (41.5%) patients were mental workers, 38 (17.9%) patients were manual workers, and 86 (40.6%) patients were mixed workers; 18 (8.5%) patients were smokers, 147 (69.3%) patients did not smoke, and 47 (22.2%) patients had

quit smoking; 63.27% of CD patients are non-stenotic and non-penetrating, and most of them are in remission; 90 (42.5%) patients had mild abdominal pain and 4 (1.59%) patients had severe abdominal pain; 23 (10.85%) patients had suspicious abdominal masses and 13 (6.13%) patients had abdominal tenderness. In this survey, the most common extraintestinal manifestation in these patients with IBD was arthralgia (33.02%) (Table 1). In patients with perianal lesions, perianal abscess (48.15%) was the main symptom, followed by anal fistula (18.52%). Forty-five patients said they had undergone surgery for the disease, and 2 patients had an enterostomy. At the present stage, 72.6% of the patients thought they were in clinical remission, while 27.4% said they had fever, abdominal pain, diarrhea, hematochezia, and vomiting. From the point of view of drug selection, 78.3% of the patients chose 5-aminosalicylic acid (5-ASA) drugs.

### **The Scores of Treatment Goals in Inflammatory Bowel Disease Patients**

The most concerned treatment goal among these patients was the improvement of QoL (mean score is 8.54), while mean score of UC patients and CD patients was 9.10 and 8.45, respectively. The treatment goals in all IBD patients are ranked as follows (Figure 1): few drugs (8.46 score), avoidance of surgery (8.38 score), radiologic healing (8.24 score), less psychological impact (8.23 score), all-oral therapy (8.20 score), few side effects (8.19 score), mucosal healing (7.93 score), normalization of biomarkers (7.89 score), the relief of abdominal pain (7.62 score), and normalization of defecation (7.47 score).

Among the patients who had undergone surgery, the most concerned treatment goal was also the improvement of QoL (8.64 score). The treatment goals in IBD patients who had undergone surgery are ranked as follows (Figure 1): radiologic healing (8.56 score), all-oral therapy (8.47 score), few drugs (8.45 score), avoidance of surgery (8.45 score), few side effects (8.36 score), less psychological impact (8.29 score), the relief of abdominal pain (8.16 score), normalization of defecation (8.13 score), mucosal healing (8.12 score), and normalization of biomarkers (7.98 score).

### **Univariate and Multivariate Analysis**

We further analyzed the related factors of these treatment goals in IBD patients. In a univariate analysis, the

**Table 1.** The Demographic and Clinical Characteristics of IBD Patients

Characteristics	Total (n = 212)	CD (n = 49)	UC (n = 145)	Unclassified (n = 18)
Age, mean (IQR)	43 (32-54)	37 (25-49)	45 (34-55)	44 (31-51)
Gender, n (%)				
Male	111 (52.4)	33 (67.3)	67 (46.2)	11 (61.1)
Female	101 (47.6)	16 (32.7)	78 (53.8)	7 (38.9)
Lesion site CD, n (%)				
Upper digestive tract		5 (10.2)		
Terminal ileum		22 (44.9)		
Colon		24 (48.9)		
Ileocolon		7 (14.3)		
Rectum		6 (12.2)		
Unknown		7 (14.3)		
Disease behavior CD, n (%)				
Non-narrow and non-penetrating		31 (63.3)		
Stenosis		18 (36.7)		
Penetrating		0 (0)		
Lesion site UC, n (%)				
Rectum			77 (53.1)	
Left colon			36 (24.8)	
Extensive colon			53 (36.6)	
Unknown			22 (15.2)	
Living place, n (%)				
Rural	57 (26.9)	11 (22.4)	41 (28.3)	5 (27.8)
City	155 (73.1)	38 (77.6)	104 (71.7)	13 (72.2)
Occupation, n (%)				
Mental labor	88 (41.5)	23 (46.9)	60 (41.4)	5 (27.8)
Physical labor	38 (17.9)	6 (12.2)	27 (18.6)	5 (27.8)
Mixed labor	86 (40.6)	20 (40.8)	58 (40.0)	8 (44.4)
Smoking status, n (%)				
Never smoked	147 (69.3)	34 (69.4)	99 (68.3)	14 (77.8)
Smoking	18 (8.5)	4 (8.2)	11 (7.6)	3 (16.7)

(Continued)

**Table 1.** The Demographic and Clinical Characteristics of IBD Patients (Continued)

Characteristics	Total (n = 212)	CD (n = 49)	UC (n = 145)	Unclassified (n = 18)
Given up smoking	47 (22.2)	11 (22.4)	35 (24.1)	1 (5.6)
Course of disease, n (%)				
≤2 years	118 (55.7)	29 (59.2)	78 (53.8)	11 (61.1)
2-5 years (>2 years, ≤5 years)	37 (17.5)	7 (14.3)	27 (18.6)	3 (16.7)
5-10 years (>5 years, ≤10 years)	24 (11.3)	10 (20.4)	13 (9.0)	1 (5.6)
>10 years	33 (15.6)	3 (6.1)	27 (18.6)	3 (16.7)
Times of treatment, n (%)				
1-3 times	100 (47.2)	15 (30.6)	75 (51.9)	10 (55.6)
4-6 times	45 (21.2)	7 (14.3)	33 (22.8)	5 (27.8)
7-9 times	20 (9.4)	8 (16.3)	11 (7.6)	1 (5.6)
>10 times	47 (22.2)	19 (38.8)	26 (17.9)	2 (11.1)
Abdominal pain, n (%)				
No	102 (48.1)	23 (46.9)	74 (51.0)	5 (27.8)
Light	90 (42.5)	23 (46.9)	58 (40.0)	9 (50.0)
Medium	16 (7.5)	3 (6.1)	10 (6.9)	3 (16.7)
Serious	4 (1.9)	0 (0)	3 (2.1)	1 (5.6)
Abdominal mass, n (%)				
None	177 (79.7)	38 (76.0)	125 (81.7)	14 (73.7)
Suspicious	23 (10.4)	6 (12.0)	14 (9.2)	3 (15.8)
Confirm	9 (4.1)	4 (8.0)	5 (3.3)	0 (0)
Tenderness	13 (5.8)	2 (4.0)	9 (5.8)	2 (10.5)
Hematochezia, n (%)				
No hematochezia	124 (58.5)	36 (73.5)	72 (49.7)	16 (88.9)
Seldom hematochezia	61 (28.8)	11 (22.4)	49 (33.8)	1 (5.6)
Often hematochezia	19 (8.9)	0 (0)	18 (12.4)	1 (5.6)
Always hematochezia	8 (3.8)	2 (4.1)	6 (4.1)	0 (0)
Concomitant symptoms, n (%)				
Joint pain	70 (33.0)	22 (40)	43 (27.0)	5 (25.0)

(Continued)

**Table 1.** The Demographic and Clinical Characteristics of IBD Patients (Continued)

Characteristics	Total (n = 212)	CD (n = 49)	UC (n = 145)	Unclassified (n = 18)
Iritis	6 (2.8)	0 (0)	6 (3.8)	0 (0)
Nodular erythema	4 (1.9)	1 (1.8)	3 (1.9)	0 (0)
Pyoderma gangrenosum	4 (1.9)	2 (3.6)	2 (1.3)	0 (0)
Aphthous ulcer	0 (0)	0 (0)	0 (0)	0 (0)
Fistula	2 (0.9)	1 (1.8)	0 (0)	1 (5.0)
Abscess	8 (3.8)	2 (3.6)	4 (2.5)	2 (10.0)
Intestinal perforation	1 (0.5)	0 (0)	0 (0)	1 (5.0)
Gastrointestinal bleeding	9 (4.3)	2 (3.6)	7 (4.4)	0 (0)
Intestinal obstruction	7 (3.3)	7 (12.7)	0 (0)	0 (0)
Canceration	0 (0)	0 (0)	0 (0)	0 (0)
None	123 (58.0)	18 (32.7)	94 (59.1)	11 (55)
Drugs, n (%)				
5-ASA	166 (78.3)	15 (18.7)	136 (76.0)	15 (71.4)
Steroid	8 (3.8)	1 (1.3)	7 (3.9)	0 (0)
Immunosuppressant	25 (11.8)	20 (25.0)	5 (2.8)	0 (0)
Biological preparation	36 (16.9)	26 (32.5)	9 (5.0)	1 (4.8)
Enteral nutrition	45 (21.2)	18 (22.5)	22 (12.3)	5 (23.8)
Defecation times, n (%)				
1-2 times	162 (76.4)	41 (83.7)	106 (73.1)	15 (83.3)
3-4 times	36 (17.0)	6 (12.2)	28 (19.3)	2 (11.1)
>5 times	14 (6.6)	2 (4.1)	11 (7.6)	1 (5.6)

(Continued)

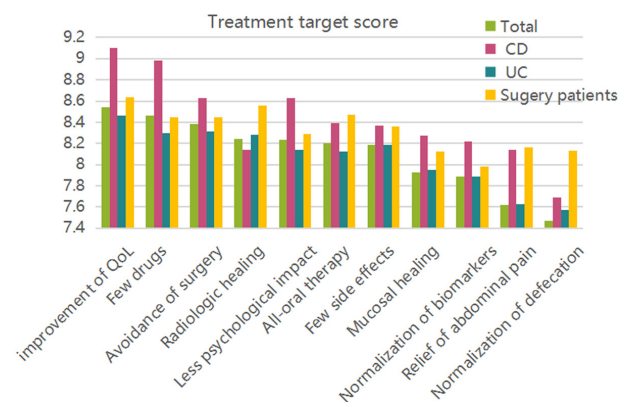
related factors of the treatment goal about few drugs were the course of the disease ( $P = .038$ ), the frequency of defecation ( $P = .004$ ), and hematochezia ( $P = .047$ ). In a multivariate analysis, the related factor of this treatment goal was the frequency of defecation ( $P = .01$ ) (Table 2).

In a univariate analysis, the related factor of the treatment goal about avoidance of surgery was the course of the disease ( $P = .015$ ) (Table 3). The related factor of the treatment goal about radiologic healing was the frequency of defecation ( $P = .008$ ) (Table 3). The related factor of

**Table 1.** The Demographic and Clinical Characteristics of IBD Patients (Continued)

Characteristics	Total (n = 212)	CD (n = 49)	UC (n = 145)	Unclassified (n = 18)
Disease activity, n (%)				
Active disease	25 (11.8)	6 (12.2)	19 (13.1)	0 (0)
Clinical remission	122 (57.5)	26 (53.1)	86 (59.3)	10 (55.6)
Unknown	65 (30.7)	17 (34.7)	40 (27.6)	8 (44.4)
Perianal lesions, n (%)				
Yes	27 (12.7)	13 (26.5)	8 (5.5)	6 (33.3)
No	185 (87.3)	36 (73.5)	137 (94.5)	12 (66.7)
Types of perianal lesions, n (%)				
Anal fistula	5 (18.5)	3 (23.1)	0 (0)	2 (33.3)
Anal fissure	4 (14.8)	0 (0)	3 (37.5)	1 (16.7)
Perianal abscess	13 (48.1)	7 (53.8)	3 (37.5)	3 (50)
Other	5 (18.5)	3 (23.1)	2 (25)	0 (0)
Intestinal surgery, n (%)				
Yes	45 (21.2)	25 (51.0)	17 (11.7)	3 (16.7)
No	167 (78.8)	24 (49.0)	128 (88.3)	15 (83.3)
Enterostomy, n (%)				
Yes	2 (0.9)	1 (2.0)	1 (0.7)	0 (0)
No	209 (98.6)	47 (95.9)	144 (99.3)	18 (100)
Unknown	1 (0.5)	1 (2.0)	0 (0)	0 (0)

CD, Crohn's disease; IQR, interquartile range; UC, ulcerative colitis; 5-ASA, 5-aminosalicylic acid.

**Figure 1.** Mean points in the 11 items of inflammatory bowel disease patients' self-reported treatment goals.

**Table 2.** The Treatment Goal of Few Drugs and the Related Factors

	Univariate Logistic Regression Analysis			Multivariate Logistic Regression Analysis		
	OR	95% CI	P	OR	95% CI	P
Gender						
Male	Ref					
Female	0.676	0.3-1.522	.344			
Disease type						
CD	Ref					
UC	1.406	0.235-8.428	.709			
Unclassified	0.699	0.150-3.255	.648			
Age						
≤16	Ref					
16-40 (>16, ≤40)	269.1	0	.999			
40-65 (>40, ≤65)	1.69	0.177-16.118	.648			
>65	0.833	0.095-7.304	.869			
Living place						
Rural	Ref					
City	0.618	0.266-1.432	.261			
Occupation						
Mental labor	Ref					
Physical labor	1.287	0.505-3.282	.597			
Mixed labor	0.55	0.201-1.502	.243			
Smoking status						
Never smoked	Ref					
Smoking	2.213	0.927-5.283	.074			
Given up smoking	2.162	0.425-11.008	.353			
Course of disease						
≤2 years	Ref					
2-5 years (>2 years, ≤5 years)	0.974	0.255-3.712	.968			
5-10 years (>5 years, ≤10 years)	0.429	0.101-1.816	.25			
>10 years	0.248	0.055-1.064	.06			
Times of treatment						
1-3 times	Ref					
4-6 times	0.899	0.322-2.508	.839			

(Continued)

**Table 2.** The Treatment Goal of Few Drugs and the Related Factors (Continued)

	Univariate Logistic Regression Analysis			Multivariate Logistic Regression Analysis		
	OR	95% CI	P	OR	95% CI	P
7-9 times	1.171	0.331-4.145	.807			
>10 times	0.829	0.186-3.705	.806			
Abdominal pain						
No	Ref					
Light	6.286	0.818-48.316	.077			
Medium	6.5	0.835-50.594	.074			
Serious	161547	0	.998			
Hematochezia						
No hematochezia	Ref			1.397	0.623-3.133	.418
Seldom hematochezia	4.717	1.015-21.894	.048			
Often hematochezia	5.5	1.045-28.955	.044			
Always hematochezia	1.68	0.29-9.748	.563			
Defecation times				3.905	1.394-10.938	.01
1-2 times	Ref					
3-4 times	5.444	1.615-18.358	.006			
>5 times	1.944	0.506-7.473	.333			
Disease activity						
Active disease	Ref					
Clinical remission	0.724	0.156-3.352	.68			
Unknown	1.812	0.233-14.119	.57			
Perianal lesions						
Yes	Ref					
No	2.044	0.457-9.149	.35			
Intestinal surgery						
Yes	Ref					
No	0.986	0.374-2.6	.978			

CD, Crohn's disease; OR, odds ratio; UC, ulcerative colitis.



**Table 3.** Pearson Coefficients of Correlation for IBD Patients' Self-reported Treatment Goals

	Gender	Type	Age	Living Place	Occupation	Smoking	Course of Disease	Times of Treatment	Abdominal Pain	Hematochezia	Defecation Times	Disease Activity	Perianal Lesions	Intestinal Surgery	Enterostomy
Normalization of defecation	0.504	0.016	0.299	0.102	0.644	0.66	0.079	0.725	0.798	0.048	0.199	0.569	0.558	0.053	0.634
Relief of abdominal pain	0.949	0.135	0.316	0.256	0.662	0.755	0.137	0.62	0.588	0.055	0.957	0.306	0.998	0.305	0.621
Normalization of biomarkers	0.146	0.185	0.895	0.104	0.251	0.816	0.034	0.759	0.974	0.024	0.375	0.841	0.615	0.693	0.553
Mucosal healing	0.645	0.487	0.824	0.104	0.317	0.437	0.053	0.387	0.547	0.703	0.153	0.404	0.994	0.693	0.553
Avoidance of surgery	0.632	0.935	0.491	0.546	0.437	0.372	0.015	0.503	0.685	0.339	0.295	0.312	0.595	0.3	0.352
Improvement of QoL	0.851	0.171	0.4	0.789	0.3	0.677	0.109	0.425	0.317	0.089	0.079	0.843	0.492	0.96	0.209
Few drugs	0.342	0.439	0.315	0.258	0.255	0.18	0.038	0.962	0.066	0.047	0.004	0.972	0.341	0.979	0.292
All-oral therapy	0.341	0.758	0.99	0.402	0.883	0.109	0.001	0.828	0.227	0.366	0.182	0.125	0.699	0.412	0.43
Few side effects	0.219	0.638	0.594	0.051	0.562	0.653	0.068	0.838	0.184	0.445	0.033	0.198	0.524	0.765	0.484
Less psychological impact	0.904	0.569	0.503	0.055	0.537	0.632	0.041	0.821	0.214	0.176	0.1	0.466	0.8	0.796	0.4
Radiologic healing	0.158	0.957	0.711	0.363	0.568	0.224	0.068	0.752	0.056	0.29	0.008	0.698	0.908	0.164	0.368

IBD, inflammatory bowel disease; QoL, quality of life.

**Table 4.** The Treatment Goal of Normalization of Biomarkers and the Related Factors

	Univariate Logistic Regression Analysis			Multivariate Logistic Regression Analysis		
	OR	95% CI	P	OR	95% CI	P
Gender						
Male	Ref					
Female	0.613	0.316-1.189	.148			
Disease type						
CD	Ref					
UC	2.828	0.869-9.315	.087			
Unclassified	2.34	0.838-6.538	.105			
Age						
≤16	Ref					
16-40 (>16, ≤40)	1	0.050-19.963	1			
40-65 (>40, ≤65)	0.598	0.067-5.313	.645			
>65	0.548	0.063-4.473	.585			
Living place						
Rural	Ref					
City	0.565	0.282-1.130	.106			
Occupation						
Mental labor	Ref					
Physical labor	1.276	0.607-2.684	.52			
Mixed labor	0.614	0.262-1.442	.263			
Smoking status						
Never smoked	Ref					
Smoking	1.283	0.596-2.760	.524			
Given up smoking	1.2	0.330-4.360	.782			
Course of disease						
≤2 years	Ref			1.47	1.031-2.096	.033
2-5 years (>2 years, ≤5 years)	1.778	0.694-4.556	.231			
5-10 years (>5 years, ≤10 years)	0.591	0.208-1.678	.323			
>10 years	0.64	0.200-2.049	.452			

(Continued)

**Table 4.** The Treatment Goal of Normalization of Biomarkers and the Related Factors (Continued)

	Univariate Logistic Regression Analysis			Multivariate Logistic Regression Analysis		
	OR	95% CI	P	OR	95% CI	P
Times of treatment						
1-3 times	Ref					
4-6 times	0.75		.512			
7-9 times	0.732		.539			
>10 times	1.342		.686			
Abdominal pain						
No	Ref					
Light	1.212	0.12-12.23	.87			
Medium	1.095	0.108-11.09	.939			
Serious	1.444	0.109-19.21	.781			
Hematochezia						
No hematochezia	Ref			2.262	1.402-4.895	.003
Seldom hematochezia	4.636	1.076-19.974	.04			
Often hematochezia	3.692	0.811-16.804	.091			
Always hematochezia	1.375	0.282-7.220	.707			
Defecation times						
1-2 times	Ref					
3-4 times	2.172	0.682-6.915	.189			
>5 times	1.667	0.442-6.291	.451			
Disease activity						
Active disease	Ref					
Clinical remission	1.306	0.422-4.047	.643			
Unknown	1.206	0.592-2.456	.606			
Perianal lesions						
Yes	Ref					
No	0.788	0.311-1.996	.616			
Intestinal surgery						
Yes	Ref					
No	1.178	0.522-2.662	.693			

CD, Crohn's disease; OR, odds ratio; UC, ulcerative colitis.

**Table 5.** The Treatment Goal of Normalization of Defecation and the Related Factors

	Univariate Logistic Regression Analysis			Multivariate Logistic Regression Analysis		
	OR	95% CI	P	OR	95% CI	P
Gender						
Male	Ref					
Female	0.812	0.441-1.496	.504			
Disease				59.241	9.45-371.362	<.001
CD	Ref					
UC	4.318	1.372-13.591	.012			
Unclassified	3.785	1.388-10.320	.009			
Age						
≤16	Ref					
16-40 (>16, ≤40)	2619	0	.999			
40-65 (>40, ≤65)	2.175	0.448-10.569	.335			
>65	1.897	0.403-8.928	.418			
Living place						
Rural	Ref					
City	1.724	0.893-8.327	.104			
Occupation						
Mental labor	Ref					
Physical labor	1.235	0.626-2.438	.543			
Mixed labor	0.839	0.366-1.925	.678			
Smoking status						
Never smoked	Ref					
Smoking	1.394	0.680-2.856	.365			
Given up smoking	1.219	0.367-4.046	.747			
Course of disease						
≤2 years	Ref					
2-5 years (>2 years, ≤5 years)	1.703	0.715-4.053	.229			
5-10 years (>5 years, ≤10 years)	0.638	0.237-1.718	.374			
>10 years	0.87	0.282-2.685	.808			

(Continued)



**Table 5.** The Treatment Goal of Normalization of Defecation and the Related Factors (Continued)

	Univariate Logistic Regression Analysis			Multivariate Logistic Regression Analysis		
	OR	95% CI	P	OR	95% CI	P
Times of treatment						
1-3 times	Ref					
4-6 times	0.87	0.387-1.954	.735			
7-9 times	0.611	0.244-1.528	.292			
>10 times	0.917	0.272-3.095	.889			
Abdominal pain						
No	Ref					
Light	0.926	0.092-9.287	.948			
Medium	0.971	0.096-9.804	.98			
Serious	0.556	0.047-6.629	.642			
Hematochezia						
No hematochezia	Ref					
Seldom hematochezia	4.238	0.961-18.689	.056	2.239	1.17-4.285	.015
Often hematochezia	7.576	1.571-36.529	.012			
Always hematochezia	3.611	0.642-20.320	.145			
Defecation times						
1-2 times	Ref					
3-4 times	2.365	0.773-7.236	.131			
>5 times	1.5	0.423-5.315	.53			
Disease activity						
Active disease	Ref					
Clinical remission	1.778	0.584-5.408	.311			
Unknown	1.25	0.644-2.427	.51			
Perianal lesions						
Yes	Ref					
No	1.332	0.509-3.489	.559			
Intestinal surgery						
Yes	Ref					
No	2.32	0.970-5.546	.058			

CD, Crohn's disease; UC, ulcerative colitis; OR, odds ratio.

the treatment goal about less psychological impact was the course of the disease ( $P = .041$ ). The related factor of the treatment goal about few side effects was the frequency of defecation. The related factor of the treatment goal about all-oral therapy was the course of the disease ( $P = .001$ ).

In a univariate analysis, the related factors of the treatment goal about normalization of biomarkers were the course of the disease ( $P = .033$ ) and the frequency of hematochezia ( $P = .003$ ). In a multivariate analysis, the related factors of this treatment goal were also the course of the disease ( $P = .033$ ) and the frequency of hematochezia ( $P = .003$ ) (Table 4).

In a univariate analysis, the related factors of the treatment goal about normalization of defecation were the course of the disease ( $P = .016$ ) and the frequency of hematochezia ( $P = .048$ ). In a multivariate analysis, the related factors of this treatment goal were the type of disease ( $P = .001$ ) and the frequency of hematochezia ( $P = .015$ ) (Table 5).

## DISCUSSION

Inflammatory bowel disease is a chronic disease that cannot be completely cured, so patients with IBD need to have better medication compliance. Otherwise, it will be recurrence or aggravation of the disease, and surgery may even be required. The medication compliance rate in adolescents was between 65% and 90% while the rate in adults was between 55% and 70%.<sup>9,10</sup> Main related factors were low medication knowledge, no good medication habits, busy lifestyle, and concurrent mental health concerns.<sup>11</sup> From our knowledge, this is the first study to explore these treatment goals and related factors among Chinese IBD patients during the COVID-19 pandemic. This study can provide a reference for clinicians in the management of patients with IBD during the COVID-19 pandemic.

From the perspective of patients, they would like to use the relief of symptoms as treatment goals. At the same time, some patients are more inclined to choose all-oral drugs such as mesalazine and subcutaneous drugs such as adalimumab at home because it can reduce the risk of the COVID-19 infection outdoors and in hospitals. But from the perspective of clinicians, we would like to use objective indicators as treatment goals. For example, some guidelines recommend endoscopic remission, mucosal healing, radiologic healing, and histologic healing as evaluation indicators for effective treatments. At

present, radiologic healing and histologic healing are considered to be the ultimate treatment goals for patients with IBD.<sup>12</sup> As CD involves intestinal transmural inflammation, cross-sectional radiological techniques such as computer tomography enterography and magnetic resonance imaging enterography are used to effectively evaluate this situation.<sup>13,14</sup> Our survey also showed that 179 (84.4%) patients would like to use radiological restoration and endoscopic remission as treatment goals. Mucosal healing has been recommended as an important treatment goal for IBD patients in clinical practice.<sup>15,16</sup> Our survey also showed that 165 (77.8%) patients would like to use mucosal healing as a treatment goal.

Clinical symptoms are also important concerns for patients with IBD. But the treatment goal of the relief of abdominal pain ranks second to last among these treatment goals by our questionnaire. Our survey showed that only 157 (74%) patients would like to use the relief of abdominal pain as a treatment goal. It is different from our understanding. The reason may be that many patients have already mastered a lot of IBD-related knowledge through patient education activities and media introduction. The disease activity of IBD patients was not only judged by clinical symptoms but also requires laboratory indicators, radiological and endoscopic evaluations. However, the symptom of hematochezia causes great attention from patients with IBD. The results of our survey also confirmed this view. Some studies found that between 7% and 10% of patients with chronic overt rectal bleeding have colorectal cancer.<sup>17</sup> Therefore, patients are particularly worried that the symptom of hematochezia is a sign of colon cancer. At the same time, the symptom of hematochezia is an important related factor in treatment goals of normalization of biomarkers and defecation.

Some patients pay more attention to the biomarkers such as CRP and FC.<sup>18</sup> Some studies showed that normalization of CRP was associated with therapeutic response in CD patients, and it also correlates modestly with disease activity.<sup>19</sup> Fecal calprotectin may also be a useful adjunctive biomarker for response to therapy and to predict relapse. However, FC has relatively high testing fees and testing difficulties. Therefore, it has not been widely used by some hospitals. Our survey showed that 156 (73.6%) patients would like to use the normalization of biomarkers as a treatment goal. The related factors of this treatment goal were the course of the disease and the frequency of hematochezia. This means that patients with a long course of the disease or with the symptom of

hematochezia are more inclined to choose the normalization of biomarkers as the evaluation of disease activity and treatment effect.

Therapeutic drugs for IBD patients include 5-ASA, steroids, immunomodulators, and biological agents such as infliximab and adalimumab. The choice of treatment drugs is mainly based on the severity of the patient and the location of the disease. It is also necessary to consider the adverse effects of the drug and the economic situation of patients with IBD. Oral 5-aminosalicylic acid has been shown to be effective in patients with mild or moderately active UC.<sup>20,21</sup> Corticosteroids were effective treatments for inducing remission in moderate-to-severe CD patients. Biological agents can be effectively used to induce and maintain remission therapy in patients with IBD. Our survey found that 59.3% of patients were treated with 5-ASA, and 184 (86.8%) patients would like to use few drugs as treatment goal. The related factors of this treatment goal were the course of the disease, times of defecation, and the frequency of hematochezia. Our survey showed that 88.7% of patients were most concerned about the improvement of QoL. However, analysis of the collected data showed that there were no related factors about the treatment goal of the improvement of QoL. Our survey showed that 80.7% of patients would like few side effects as treatment goal. The related factor of this treatment goal was the times of defecation.

However, our study has several limitations. First, this study was a cross-sectional observational study, while the disease is a dynamic process of relapse and remission. There may be some dynamic changes in patients' treatment goals, so it is difficult to evaluate the treatment goals of IBD patients accurately. Second, participants in our study were gathered from tertiary hospitals where patients were more likely to have higher disease activity, more complicated and invasive course of disease, so these patients' self-reported treatment goals may be higher than the general population.

In conclusion, our study showed that IBD patients pay more attention to the improvement of QoL and few drugs during the COVID-19 pandemic. There are some related factors about some treatment goals such as the type of disease, the course of the disease, the frequency of hematochezia, and defecation. The results of our study can better help clinicians understand the patients' treatment goals, which can contribute to better management

of IBD patients. But we need to further explore whether these treatment goals have changed throughout the course of the disease. More studies are needed to investigate the detailed mechanisms in the future.

**Ethics Committee Approval:** Ethical approval granted by First Affiliated hospital of China medical university Research Ethics Committees (2020-032-01).

**Informed Consent:** Written informed consent was obtained from the patients who agreed to take part in the study.

**Peer-review:** Externally peer-reviewed.

**Author Contributions:** Concept – W.N.T., C.D.; Design – W.N.T., C.D.; Data Collection and/or Processing – W.N.T., C.D.; Analysis and/or Interpretation – W.N.T., C.D.; Writing Manuscript – W.N.T., C.D., Y.H.H., M.J.; Critical Review – W.N.T., C.D., Y.H.H., M.J.

**Declaration of Interest:** The authors have no conflict of interest to declare.

**Funding:** This research was supported by Liaoning Science and Technology Foundation (No 20170541052).

**Data Availability Statement:** The data underlying this article are available in the article and in its online supplementary material.

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**Supplementary Table 1.** Questionnaire

Question	Answer	Question	Answer
Age	-	Hematochezia	None
Gender	Male		Seldom hematochezia
	Female		Often hematochezia
Living place	Rural		Always hematochezia
	City	Defecation times	1-3 times
Occupation	Mental labor		4-6 times
	Physical labor		>6 times
	Mixed labor	Extra-intestinal manifestations or comorbidity or complication	Arthritis
Smoking status	Not smoking		Iritis
	Smoking		Nodular erythema
	Smoking cessation		Pyoderma gangrenosum
Disease type	CD		Aphthous ulcer
	UC		Fistula
	Unclassified IBD		Abscess
Time of diagnosis of inflammatory bowel disease	-		Intestinal perforation
Times of visiting the hospital for treatment of IBD	-		Gastrointestinal bleeding
			Intestinal obstruction
Lesion site of CD	Upper digestive tract		Cancer
	Terminal ileum		None
	Colon	Drugs	5-ASA
	Ileocolon		Steroid
	Rectum		Immunosuppressant
Disease behavior of CD	Non-narrow and non-penetrating		Biological agents (infliximab, adalimumab, ustekinumab, and vedolizumab)
	Stenosis		Enteral nutrition
	Penetrating	Disease phase	Active stage
Lesion site of UC	Rectum		Remission stage
	Left colon	Whether have perianal lesions	Yes
	Extensive colon		No
Abdominal pain	None	Types of perianal lesions	Anal fistula
	Light		Anal fissure
	Medium		Perianal abscess
	Serious		None
Abdominal mass	None	Whether have intestinal surgery	Yes
	Suspicious		No
	Confirm	Whether have an enterostomy	Yes
	Tenderness		No

(Continued)

**Supplementary Table 1.** Questionnaire (Continued)

Question	Answer	Question	Answer
Self-assessment of disease status	Perfect	Avoidance of surgery	0-10
	Good	Radiologic healing	0-10
	Bad	Less psychological impact	0-10
	Serious	All-oral therapy	0-10
Self-reported treatment goals	Please quantify the score (0-10 points): 0 (unconcerned)-1-2-3-4-5-6-7-8-9-10 (very concerned)	Few side effects	0-10
Improvement of QoL	0-10	Mucosal healing	0-10
Few drugs	0-10	Normalization of biomarkers	0-10
		The relief of abdominal pain	0-10
		Normalization of defecation	0-10
CD, Crohn's disease; UC, ulcerative colitis; QoL, quality of life.			