


Health Confidence Is Associated With Disease Outcomes and Health Care Utilization in Inflammatory Bowel Disease: A Nationwide Cross-sectional Study

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Background: We aimed to examine the associations between health confidence (one's belief on the degree of control on their health and disease), inflammatory bowel disease (IBD) outcomes, and health care utilization among adults with IBD.

Methods: In total, 17,205 surveys were analyzed from a cross-sectional sample of IBD patients at 23 gastroenterology (GI) practices participating in the Crohn's and Colitis Foundations' IBD Qorus Learning Health System. We used bivariate analyses and multivariable logistic regression to examine associations between health confidence and disease activity, opioid use, glucocorticoid use, well-being, and health care utilization. We used receiver operating curve analysis to determine a clinically relevant cutoff for health confidence (0-10 Likert scale).

Results: Health confidence was highly correlated with patients' well-being, symptomatic disease activity, opioid use, and glucocorticoid use (all $P < .0001$). Health confidence scores <8 had 69% sensitivity for emergency department (ED) visits and 66% for hospitalizations. In patients with inactive disease, patients with low health confidence (<8) were 10 times more likely to call/message the GI office >4 times/month (adjusted odds ratio [aOR], 10.3; 95% CI, 6.1-17.3; $P < .0001$), 3-4 times more likely to have an IBD-related ED visit (aOR, 4.0; 95% CI, 2.9, 5.4. $P < .0001$), or hospitalization (aOR, 3.0, 95% CI, 2.1, 4.1, $P < .0001$) compared with patients with high health confidence (≥ 8).

Conclusions: In a large, national sample of adults with IBD, there were strong associations between patients' health confidence and multiple disease outcome measures. Health confidence scores <8 on a 0-10 Likert scale may be clinically useful to screen for patients who are at risk for ED visits and hospitalizations.

Key Words: health confidence, health care utilization, disease outcomes, patient engagement, patient-reported outcome measures

Introduction

Inflammatory bowel disease (IBD), including ulcerative colitis (UC) and Crohn's disease (CD), is an incurable, chronic, relapsing-remitting, immune-mediated disorder of the gastrointestinal tract that is managed with medical therapies and surgical interventions.¹ Inflammatory bowel disease is known to have profound effects on an individual's quality of life and function in multifaceted domains including physical, psychological, and social contexts.

Nearly a decade ago, the National Academy of Medicine (formerly known as the Institute of Medicine) advocated for a paradigm shift in health care to integrate social and behavioral measures into routine clinical care, given their impact on treatment choices, disease outcomes, and health care costs.²

Rooted in the theory that the body and mind are inseparable entities, the biopsychosocial model of disease posits that illness and health outcomes result from a complex milieu of biochemical alterations, psychological influences, and social-environmental factors.³ An individual's perception of their capabilities may be just as predictive of their function and behavior than the objective level of physical ability/impairment.⁴

Health confidence is a broad concept that encompasses components of self-efficacy,⁵⁻⁷ competence,⁸ health literacy,⁹ and patient activation.¹⁰⁻¹² Health confidence and self-efficacy are closely related but distinct concepts: health confidence is an individual's *belief* in their degree of control on disease outcomes; self-efficacy describes both perception and capability.^{4,7,13} Patient activation describes competence, which

is defined as having the knowledge, skills, and confidence to effectively manage one's care.^{4,11,12} Health confidence focuses on patients' *perception* of their capabilities and control (what they feel they can do and achieve, not what they know (health literacy), what they actually do (patient activation and engagement), or how they interact with medical providers (patient-provider relationship, shared-decision making).

Disease outcomes in IBD have been shown to be highly correlated with several patient-level behavioral factors including adherence to medications,¹⁴ engagement in lifestyle modifications (dietary changes, smoking cessation),¹⁵ and interactions with health care providers and the health care system (routine clinic visits, blood tests, endoscopies, radiographic imaging, and other testing/procedures).^{16,17} Overall, people with IBD who are more engaged in disease management have been found to have improved disease activity,^{6,12,18} quality of life,¹⁹ and overall perceived health⁶ compared with less engaged patients. However, the association between health confidence and clinical outcomes in IBD has not been evaluated. We aimed to measure and correlate health confidence with clinical outcomes and health care utilization in a large cohort of adults with IBD receiving care at gastroenterology (GI) practices participating in IBD Qorus, a nationwide learning health system.

Methods

Study Setting

A total of 20,046 surveys were collected from patients with IBD from March 2018 to April 2019 at 28 GI clinic sites participating in The Crohn's and Colitis Foundation's IBD Qorus Learning Health System's breakthrough series aimed at reducing unnecessary ED utilization.²⁰ The IBD Qorus Learning Health System was founded in 2016 and spans approximately 30 academic and community GI practices caring for an estimated 20,000 adults with IBD across the United States.^{21,22} Participating GI clinics are located in diverse settings and include academic hospitals, community health centers, and

private practices that are geographically distributed across the United States in urban and rural areas. Patient data are collected and amalgamated across multiple sites to generate data that reveal predictive patient-level and subpopulation-level associations with various patient outcomes (eg, disease activity, quality of life, and health care utilization).

Data Collection

A 19-item anonymous paper survey was distributed to adult IBD patients at ambulatory GI visits to capture patient demographics (gender, age group), remission status, IBD disease subtype and activity, well-being, health confidence, and health care utilization (Supplemental Figure 1). Disease activity was assessed using the Manitoba IBD disease activity index.²³ General well-being was assessed using the general well-being item abstracted from the Harvey-Bradshaw Index, Crohn's Disease Activity Index, and the Simple Clinical Colitis Activity Index.^{24,25} Health confidence was assessed using the Wasson Health Confidence scale, a validated 11-item Likert scale ranging from 0 (not confident at all) to 10 (very confident) to assess the degree to which patients felt that they could control and manage their health problems related to IBD.²⁶ Patient-reported health care utilization over the past 6 months included emergency department visits, computerized tomography (CT) scans, and hospitalizations. A prior study of IBD Qorus participants validated self-report of health care utilization with electronic medical records ($\geq 76\%$ sensitivity and $\geq 89\%$ specificity).²⁷ Due to the anonymous nature of the surveys, patients may submit >1 survey during the study period if they had >1 clinic visit.

Surveys were excluded from data analysis if the IBD diagnosis was unknown or unclear (including blank/ineligible responses, "other" free-text diagnoses that were not UC or CD), a diagnosis of indeterminate colitis, >3 questions with missing responses, or missing health confidence scores. One IBD Qorus site opted not to participate in the dissemination of survey responses (Figure 1).

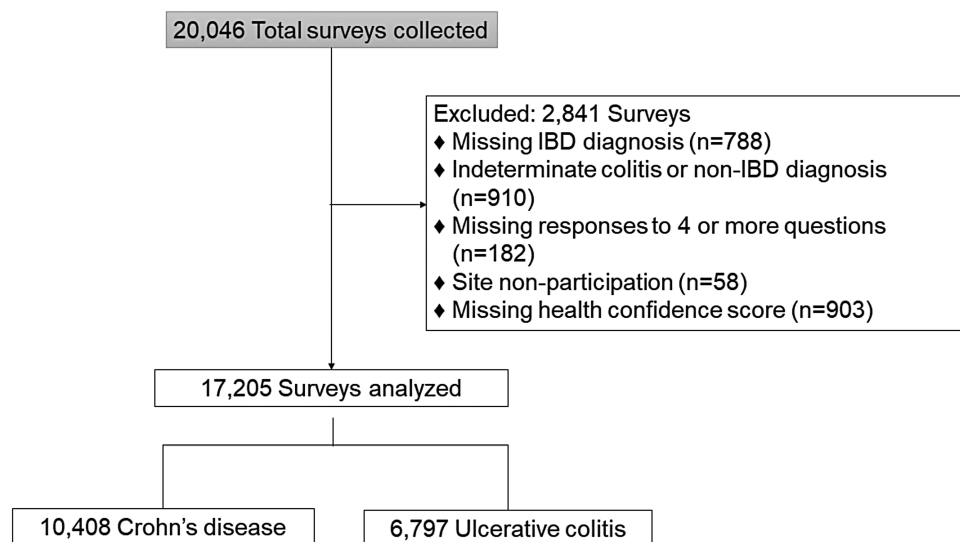


Figure 1. Study design flow diagram of patients with inflammatory bowel disease surveyed at 28 gastroenterology clinics in the United States. A total of 20,046 surveys was collected from patients with IBD at 28 GI clinics across the United States participating in The Crohn's and Colitis Foundation's IBD Qorus Learning Health System. After the exclusion of 2841 surveys, 17,205 were analyzed; of which 39.5% ($n = 6797$) comprised patients with UC and 60.5% ($n = 10,408$) patients with Crohn's disease.

Statistical Analysis

To examine the effects of demographics, disease characteristics, and health care utilization on health confidence scores over time, we performed linear mixed model regression analysis with random intercept to adjust for nested observations over time per site, using time as a continuous variable. Analyses were adjusted for the number of observations per site. Residuals were inspected to confirm the fit of the model. The change in health confidence over time was evaluated by mixed effects regression models, with time modeled as a continuous predictor.

To examine the effects of potentially interrelated factors and to reduce type 1 error, we constructed a full mixed multivariate regression model, adjusting for time and site differences, with health confidence as the dependent variable and the following independent variables: IBD subtype, gender, age, general well-being, patient-reported remission, Manitoba IBD disease severity index, opioid use, glucocorticoid use, urgent IBD need, ED visits, hospitalizations, CT scans over the past 6 months, and >4 calls to GI provider over the past 4 weeks. We then performed a second multivariate regression model that retained only the significant factors from the first (full) model.

To measure the strength and direction of association between health confidence and symptomatic disease activity and general well-being, we measured the nonparametric Spearman correlation coefficient (r_s) on the ranked variables. Associations were interpreted as very strong (0.80-1.0), strong (0.60-0.79), moderate (0.40-0.59), weak (0.20-0.39), or very weak (<0.2).²⁸

To investigate the degree to which health confidence impacts patients' perception of disease remission and health care utilization, while accounting for the disease activity, mixed logistic regression models with Tukey-Kramer adjustment for multiple comparisons were performed, and adjusted odds ratios (aORs) were reported. Health confidence (low or high) and disease activity (inactive, moderately active, or severely active) were independent variables. Emergency department visits, hospitalizations, >4 GI office calls/messages, and perceived remission status were dependent variables. Disease activity was assessed using the Manitoba IBD Index²³ and was classified as inactive (inactive/rare symptoms), moderately active (sometimes/occasional symptoms), or severely active (often/constantly active symptoms). Health confidence was measured by the Wasson Health Confidence Scale.²⁹ A score <8 was classified as low health confidence, with ≥8 classified as high health confidence.³⁰

To explore the predictive properties of health confidence, we constructed receiver operating characteristics (ROC) curves to model the performance measure of health confidence (as a continuous scale from 0-10) for IBD-related ED visits and hospitalizations in the last 6 months. An area under the curve (AUC) of 0.7-0.8 was considered acceptable, 0.8-0.9 excellent, and >0.9 outstanding.³¹ The Youden Index (J) was used to summarize the index of accuracy for each health confidence score and to determine the optimal cutoff to use in the clinical setting.

All data analysis was performed using SAS software (Version 9.3, Copyright 2011, SAS Institute Inc., Cary, NC, USA). A P value of <0.05 was considered statistically significant.

Ethical Considerations

Due to the anonymous nature of the paper surveys, the research was determined exempt by the Dartmouth College Institutional Review Board (IRB), the central IRB overseeing the IBD Qorus Learning Health System (Study #00029226).

Results

Patient Demographics and Health Confidence

A total of 20,046 surveys from 27 sites were collected, of which 17,205 met eligibility criteria for inclusion in the data analysis; 2841 surveys were excluded (Figure 1). There were 45.3% ($n = 7802$) male respondents, 39.5% ($n = 6797$) with UC, 60.5% ($n = 10,408$) with CD, and 46.3% ($n = 7973$) were 21-40 years old (Table 1). The mean health confidence score of the study sample was 7.1 (SD, 2.4). Nearly half of the patients overall (47.2%, $n = 8121$) had health confidence scores <8 (Supplement Table 1).

There were small but statistically significant effects of gender and age on health confidence (univariate analysis in Table 1 and multivariable analysis in Supplemental Table 2). The health confidence scores of males were higher than females (males, median 8, interquartile range [IQR] 6-9; females, median 8, IQR 5-9; $P < .0001$). Age was weakly but significantly correlated with health confidence ($r = 0.05$, $P < .0001$). Patients 60 years and older had slightly higher health confidence than patients younger than 60 years old (Table 1). The IBD subtype (CD vs UC) was not associated with differences in health confidence on multivariable analysis ($P = .06$; Supplement Table 2).

Over the study duration of 14 months, there was a small increase over time in health confidence from 7.1 ± 2.4 to 7.3 ± 2.4 (multivariable mixed model regression, $P = .04$; Supplemental Table 2).

Lower Health Confidence Associated With Worse Disease Activity and Well-being

Patients reported their symptomatic IBD activity as "well/in remission" or "rarely active" in nearly one-third (32.4%, $n = 5584$) of clinic visits and as "often active" or "constantly active" in 31.8% ($n = 5481$) of clinic visits (Table 1). Health confidence was moderately correlated with general well-being ($r = 0.54$, $P < .0001$) and weakly but inversely correlated with disease activity ($r = -0.32$, $P < .0001$). Patients with lower symptomatic burden who felt "generally well" had significantly higher health confidence: the widest gap in health confidence scores occurred in patients who felt "generally well" compared with those who felt "terrible" (median 9, IQR 7-10; median 3, IQR 1-6; $P < .0001$) and patients with "constantly active" symptoms compared with those "in remission" (median 9, IQR 7-10; median 3, IQR 3-8; $P < .0001$; Table 1, Figure 2).

Health confidence scores were significantly lower in patients with glucocorticoid and opioid use on univariate analysis (Table 1), and the relationship remained statistically significant in multivariable analysis after accounting for potential confounders, including disease activity (Supplemental Table 2). The median (IQR) health confidence scores of patients who used glucocorticoid or opioids were 6 (4-8) and 5 (3-7), respectively, compared with 8 (6-9) and 8 (6-9) in those who did not (both $P < .0001$; Table 1).

Table 1. Descriptive and comparative analysis of health confidence scores from a national sample of patients with inflammation bowel disease.

Characteristics	Patients, N = 17,205 (n %)	Health Confidence Median (IQR)	P
Patient Demographics			
Gender			
Male	7802 (45.3)	8 (6-9)	<0.0001
Female	9270 (53.9)	8 (5-9)	Ref.
Missing	133 (0.8)	NA	
Age, in years			
<21	745 (4.3)	8 (5-9)	0.0046
21-30	3957 (23.0)	8 (6-9)	<0.0001
31-40	4016 (23.3)	7 (5-9)	<0.0001
41-50	2679 (15.6)	8 (5-9)	<0.0001
51-60	2313 (13.4)	8 (5-9)	<0.0001
61-70	2042 (11.9)	8 (6-9)	Ref.
71-80	986 (5.7)	8 (6-9)	0.5525
>80	277 (1.6)	8 (5-10)	0.2950
Missing	240 (1.4)	NA	NA
General Well-being			
Generally well	9277 (53.9)	8 (7-10)	<0.0001
Slightly under par	4557 (26.5)	7 (5-8)	<0.0001
Poor	2210 (12.8)	5 (3-7)	<0.0001
Very poor	652 (3.8)	4 (2-6)	<0.0001
Terrible	276 (1.6)	3 (1-6)	^a Ref.
Missing	233 (1.3)	NA	NA
Inflammatory Bowel Disease Characteristics and Medications			
IBD			
Ulcerative colitis	6797 (39.5)	8 (6-9)	0.0110
Crohn's disease	10,408 (60.5)	8 (5-9)	Ref.
Symptomatic Remission			
Yes	7005 (40.7)	8.5 (1.6)	<0.0001
No	9363 (54.4)	6.1 (2.5)	Ref.
Missing	837 (4.8)	NA	
Manitoba IBD Disease Index			
WellNA In remission	3098 (18.0)	9 (7-10)	<0.0001
Rarely active	2476 (14.4)	8 (7-9)	<0.0001
Occasionally active	2214 (12.9)	8 (7-9)	<0.0001
Sometimes active	3475 (20.2)	7 (6-8)	<0.0001
Often active	2743 (15.9)	7 (5-8)	<0.0001
Constantly active	2738 (15.9)	6 (3-8)	Ref. ^a
Missing	461 (2.7)	NA	NA
Glucocorticoids			
Yes	2052 (11.9)	6 (4-8)	<0.0001
No	14,996 (87.2)	8 (6-9)	Ref.
Missing	157 (0.9)	NA	
Opioids			
Yes	1073 (6.2)	5 (3-7)	<0.0001
No	15,984 (92.9)	8 (6-9)	Ref.
Missing	148 (0.9)	NA	
Health Care Utilization for IBD			
Urgent IBD Need (past 6 months)			
Yes	3746 (21.8)	6 (4-8)	<0.0001
No	13,167 (76.5)	8 (6-9)	Ref.
Missing	292 (1.7)	NA	
>4 IBD Office Contact (past month)			

Table 1. Continued

Characteristics	Patients, N = 17,205 (n %)	Health Confidence Median (IQR)	P
Yes	1631 (9.5)	5 (3-7)	<0.0001
No	15,397 (89.5)	8 (6-9)	Ref.
Missing	177 (1.0)	NA	
CT scan (past 6 months)			
Yes	3335 (19.4)	7 (5-8)	<0.0001
No	13,571 (78.9)	8 (6-9)	Ref.
Missing	299 (1.7)	NA	
ED visit (past 6 months)			
Yes	2572 (14.0)	6 (4-8)	<0.0001
No	14,519 (84.4)	8 (6-9)	Ref.
Missing	114 (0.7)	NA	
Hospitalization (past 6 months)			
Yes	2060 (12.0)	6 (4-8)	<0.0001
No	15,010 (87.2)	8 (6-9)	Ref.
Missing	135 (0.8)	NA	

The effects of patient, disease, and health care utilization characteristics on health confidence scores were analyzed. Regression results represent coefficients computed by mixed model regression to account for nested observations within sites over time. Abbreviations: CT, computed tomography; ED, emergency department; IBD, inflammatory bowel disease; IQR, interquartile range; LSM, least square means; NA, data missing due to patients' non-response to the survey question

^aAll strata have $P < .0001$ (ie, any stratum has $P < .0001$ when compared with any other stratum)

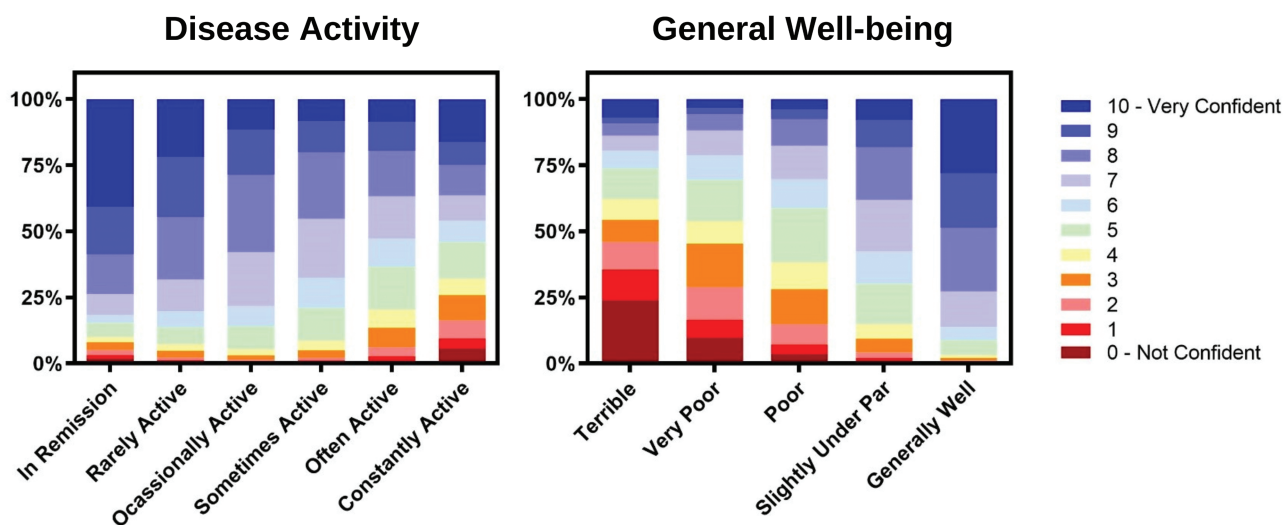


Figure 2. Health confidence and disease activity and well-being. Distribution of IBD patients' health confidence by disease activity ($n = 16,744$) and general well-being ($n = 16,972$).

Lower Health Confidence Associated With More Health Care Utilization

At more than one-fifth of clinic visits (21.8%, $n = 3746$), patients reported experiencing significant IBD symptoms that needed to be addressed within hours ("urgent IBD need") over the previous 6 months (Table 1). Nearly 1 in 10 patients contacted the IBD office more than 4 times in the preceding month (via telephone or electronic messaging; 9.5%, $n = 1631$; Table 1). One in 7 patients visited the ED (14.0%, $n = 2572$), and 1 in 8 (12.0%, $n = 2060$) were hospitalized for IBD-related reasons in the preceding 6 months (Table 1). Health confidence was modestly lower in patients who had urgent IBD needs (median 6, IQR 4-8; median 8, IQR 6-9; $P < .0001$) or had frequent monthly calls to the GI office (median

5, IQR 3-7; median 8, IQR 6-9, $P < .0001$) compared with those who did not (univariate analysis in Table 1; multivariate analysis in Supplemental Table 2).

Health confidence scores <8 had a sensitivity of 66% to 69% and specificity of 55% to 57% for ED visits (ROC AUC, 0.66; Youden index, 0.25) and hospitalizations (ROC AUC, 0.64, Youden index, 0.21; Table 2; Figure 3).

When examining health care utilization in the context of disease activity, patients with inactive IBD symptoms who had low health confidence (score <8) compared with those who had high health confidence (score ≥ 8) were less likely to perceive IBD to be in remission (aOR, 0.10; 95% confidence interval [CI], 0.07-0.14; $P < .0001$) and 10 times more likely to call/message the GI office >4 times/month (aOR, 10.3; 95%

Table 2. receiver operating characteristic of the health confidence of adults with inflammatory bowel disease and the likelihood of emergency department visit and hospitalization.

Health Confidence Cutoff	Emergency Department Visit			Hospitalization		
	Sensitivity	Specificity	Youden Index	Sensitivity	Specificity	Youden Index
<6	0.427	0.786	0.214	0.408	0.777	0.185
<7	0.533	0.712	0.246	0.517	0.702	0.220 ^a
<8	0.687	0.567	0.253 ^a	0.657	0.555	0.212
<9	0.841	0.357	0.198	0.829	0.349	0.178
AUC	0.665			0.643		

Receiver operating characteristics (ROC) of health confidence score to predict ED visits and hospitalizations in the previous 6 months, as well as remission. The overall predictive power is expressed as the area under the curve (AUC). The Youden Index summarizes the predictive accuracy for each health confidence score. Abbreviations: AUC, area under the curve

^aOptimal cut point when equal weight is given to sensitivity and specificity

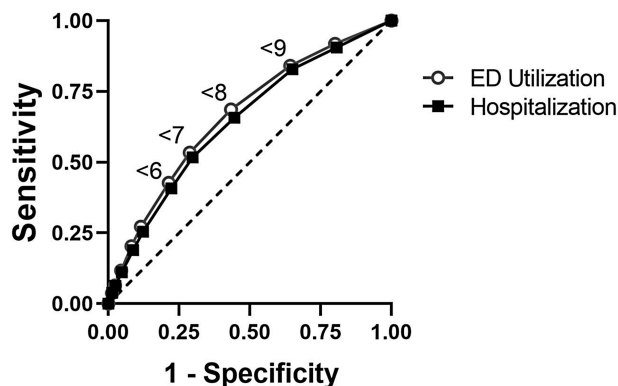


Figure 3. Receiver operating curve of health confidence to predict recent emergency department (ED) visits and hospitalizations in adults with inflammatory bowel disease. Receiver operating characteristics (ROC) of health confidence score to predict ED visits and hospitalizations in the previous 6 months. The area under the curve (AUC) is 0.665 for ED visits and 0.643 for hospitalization. Optimal health confidence score cutoffs on the ROC were <8 for ED visit and <7 for hospitalization.

CI, 6.1-17.3; $P < .0001$), 4 times more likely to have an IBD-related ED visit (aOR, 4.0; 95% CI, 2.9-5.4; $P < .0001$), and 3 times more likely to have an IBD-related hospitalization (aOR, 3.0, 95% CI, 2.1-4.1; $P < .0001$) in the previous 6 months (Table 3). A similar pattern was observed among patients with moderate and severe disease activity, though to a lesser degree than among patients with inactive symptoms (Table 3).

Discussion

We found that IBD patients' general well-being and perception of remission were strongly associated with their confidence to manage their IBD, suggesting that health confidence measurement impacts patients' perception of disease activity status and well-being. Moreover, we discovered strong associations between health confidence and health care utilization (both ambulatory and hospital-based) even after adjusting for multiple covariates such as disease activity, suggesting that health confidence may be independently associated with health care utilization in adults with IBD. Finally, we found that a cutoff of health confidence scores <8 on a 0-10 Likert scale were modestly associated with ED visits and hospitalizations in the last 6 months. This may be an informative cutoff to use in the clinical setting to risk-stratify patients.

Several large studies on health confidence in the primary care setting among patients with chronic medical conditions (hypertension, diabetes, cardiovascular diseases, dyslipidemia, or respiratory disease) have found strong associations between health confidence and disease outcomes and health care utilization.^{26,32-37} In a study of 1047 patients with chronic diseases receiving care at 15 rural primary care practices in the New England area, patients with low health confidence had higher rates of ED visits and hospitalizations, even after adjusting for age, gender, financial status, and burden of illness.²⁶ In the same study, patients were more likely to report these ED visits/hospitalization as unnecessary if they were not confident in managing their disease.²⁶ Studies in other chronic disease conditions found that higher health confidence was associated with better disease outcomes, including glucose control (for diabetes),^{32,33} blood pressure control (for hypertension),³² and normalization of cholesterol levels (for dyslipidemia).^{33,34} The present study supports the existence of correlations between health confidence and disease outcomes in patients with IBD.

Health confidence has also been associated with patient engagement in their health. Patients with higher health confidence are more likely to adhere to prescription medications and preventive cancer screenings (colon, cervical, and breast cancer),³³ engage in self-care behaviors, and lifestyle modifications such as low-salt diets, physical activity, smoking cessation, and weight management.³⁵ Interventional studies of patients with chronic diseases in the primary care setting suggest that motivational interviewing and coaching can increase health confidence and decrease ED visits and hospitalizations.^{34,36,37}

Our study has several limitations. First, its cross-sectional design precludes the observation of patient-level changes over time; therefore, conclusions cannot be drawn on the causality (directionality of associations) between health confidence and disease outcomes. Nevertheless, this study's large sample size provides strong statistical power for novel observed associations between health confidence and disease activity, health care utilization, opioid and glucocorticoid use, and other clinically important factors. Second, granular patient-level data (eg, patients' socioeconomic status, psychiatric comorbidities) were not collected on the surveys as part of the IBD Qorus Learning Health System's breakthrough series aimed at reducing unnecessary ED utilization,²⁰ which was designed to be implemented into routine clinical practice without undue burden on the patients, providers, and medical office staff—and without the requirement of additional dedicated research

Table 3. the impact of low vs high health confidence on perceptions of remission and health care utilization in adults with inflammatory bowel disease.

IBD Disease Activity	>4 GI Office Calls/Messages	ED Visit	Hospitalization	Perceived Remission
Inactive	10.3 (6.1-17.3)	4.0 (2.9-5.4)	3.0 (2.1-4.1)	0.10 (0.07-0.14)
Moderate	2.6 (1.- 4.0)	1.8 (1.4-2.4)	1.6 (1.1-2.3)	0.43 (0.34-0.56)
Severe	3.4 (2.1-5.4)	2.4 (1.8-3.3)	2.1 (1.5-3.0)	0.09 (0.07-0.13)

Adjusted odds ratio (aOR, 95% confidence interval [CI]) were obtained from mixed model logistic regression with Tukey-Kramer adjustment for multiple comparisons with health confidence (low or high) and disease activity (inactive, moderately active, or severely active) as independent variables; ED visits, hospitalizations, and perceived remission status were dependent variables. IBD Disease Activity was classified as inactive (inactive/rare symptoms), moderately active (sometimes/occasional symptoms), or severely active (often/constantly active symptoms) based on the Manitoba IBD Index. Health confidence was measured by the Wasson Health Confidence Scale; scores <8 were classified as low health confidence, ≥8 high health confidence. IBD-related ED visits and hospitalizations over the previous 6 months were reported by patients. Perceived remission was assessed by the yes/no question: “Do you feel your disease is currently in remission (by remission we mean a complete absence of IBD related symptoms)?” Abbreviations: ED, emergency department; GI, gastroenterology; IBD, inflammatory bowel disease

*All comparisons had $P < .0001$, except for $P = .0035$ for hospitalizations in patients with moderate IBD Disease activity

personnel. Notwithstanding, this multiparameter data set collected from a large sample of population-based participants allowed us to capture patients from diverse geographical regions at heterogeneous GI practice settings, including academic centers, private practices, and community hospitals in urban and rural areas across the U.S. Third, the Wasson health confidence scale has not been specifically validated in the IBD population, although it was developed and validated in large populations of primary care patients.²⁹ It has been studied in large populations of patients with chronic diseases in 11 countries.^{26,29,32,36} This study has helped discover numerically small but statistically significant differences in health confidences with age and gender—but its implications on clinical practice require further exploration.

The present study demonstrates strong associations between IBD patients' confidence in managing their disease and several important patient-reported outcome measures including general well-being, symptomatic disease activity, health care utilization (including frequent calls to the GI clinic, ED visits, and hospitalizations for IBD), and opioid and glucocorticoid use. Acute hospital-based health care utilization in the ED and inpatient admission may be mediated by both disease-related factors and patients' confidence in their ability to manage the disease. For example, the patients in this study who have few IBD symptoms but have low health confidence (score <8 on a 0-10 scale) can still have high utilization of medical resources, comparable to those utilized by patients with moderate and severe symptomatic disease activity. The concept of patient confidence is a promising psychosocial measure that could be integrated into routine clinical practice to assess disease activity and facilitate risk stratification of those with imminent and urgent care needs. Further studies that longitudinally assess patient-level health confidence and outcomes are warranted.

Supplementary Data

Supplementary data is available at *Inflammatory Bowel Diseases* online.

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Author Contributions

G.Y.M. and C.A.S. conceived the study. G.Y.M. designed the study and provided critical revision for the manuscript for important intellectual content. B.J.O. contributed to the oversight of the IBD Qorus data management system. C.S.T. interpreted the data and drafted the manuscript. S.A.W., B.J.O., W.v.D., G.Y.M., and C.A.S. designed the survey. All authors critically reviewed and revised the manuscript and approved the final version. The data were acquired through the IBD Qorus Learning Health System.

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Conflicts of Interest

C.A.S.: consultant/advisory board for Abbvie, Amgen, BMS, Lilly, Janssen, Pfizer, Prometheus, and Takeda; speaker for continuing medical education (CME) activities for Abbvie, Celgene, Janssen, Pfizer, and Takeda; grant support from the Abbvie, Janssen, Pfizer, and Takeda. R.O.: IBD Qorus Clinical Operations Manager (employee) for the Crohn's and Colitis Foundation. G.Y.M.: Consultant for Abbvie, Arena, Bristol Meyers Squibb, Boehringer Ingelheim, Celgene, Entasis, Medtronic, Pfizer, Samsung Bioepis, Takeda, and Techlab. S.A.W. is an employee of Crohn's and Colitis Foundation. B.J.O.: educational and research consultant for @Point of Care and has received investigator-initiated research grants from Biogen and EMD Serono. W.K.M.: research grant funding from the Crohn's and Colitis Foundation. C.S.T. does not have any disclosures.

Data Access

Data, analytical methods, and study materials can be available to other researchers is available upon reasonable request to the corresponding author.

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