



# Patient-Evaluated Quality of Care is Related to Better Inflammatory Bowel Disease Outcomes: The IQCARO II Project

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## Abstract

**Background** Measuring quality of care (QoC) from a patient’s perspective is becoming increasingly important in inflammatory bowel disease.

**Objective** The objective of this study was to determine whether patients’ evaluations of QoC correlate with better inflammatory bowel disease outcomes.

**Methods** A survey including patients’ characteristics, a decalogue of QoC indicators, and self-reported disease outcomes was completed by Spanish patients with inflammatory bowel disease. A QoC index (QoCI) was constructed with the sum of the “yes” answers in the decalogue. We evaluated the correlation of QoCI with outcomes. A sub-analysis comparing patients with high QoCI vs those with low QoCI was performed (QoCI = 10 or ≤ 7).

**Results** Seven hundred and eighty-eight questionnaires were analyzed. Mean age of participants was 43.4 years (63% women). Mean QoCI was 8.1 (± 2.4). The QoCI correlated significantly with activity of the disease, number of flares, emergency/unscheduled visits, and disease control. Patients scoring in the first QoCI quartile reported a decreased rate of moderate/severe disease (34.8% vs 55.3%,  $p < 0.001$ ), fewer numbers of flares ( $p < 0.001$ ), and fewer emergency/unscheduled visits ( $p < 0.001$ ) compared with those in the lower QoCI quartile. The high QoC group also reported better disease control.

**Conclusions** Patient-evaluated QoC correlates with better outcomes. Evaluation of QoC by patients may be useful to detect inadequate care and improve inflammatory bowel disease outcomes.

## Key Points

The IQCARO-QoC Decalogue is a simple instrument aimed to evaluate the quality of care received by patients with inflammatory bowel disease and can be easily implemented in clinical practice.

It may represent a further step to empower patients with inflammatory bowel disease, as it has been developed by the patients themselves.

Our study suggests that better patient-evaluated quality of care might be associated with better outcomes in patients with inflammatory bowel disease and may be a useful tool for quality of care evaluation and improvement.

## 1 Introduction

Inflammatory bowel diseases (IBDs) are chronic inflammatory disorders, including both Crohn’s disease (CD) and ulcerative colitis. These conditions occur early in life, are characterized by a chronically relapsing course, and frequently require both long-term and intensive medical care (outpatient, hospital admissions and, eventually, surgery) [1]. Inflammatory bowel disease is often associated with a range of debilitating symptoms and reduced quality of life, mainly in those patients with extra-intestinal manifestations such as perianal lesions [2]. Since, at present, there is no cure for IBD, the main medical goals are the induction and maintenance of clinical remission, avoiding hospitalization, surgery and treatment of adverse events, as well as mucosal healing as a goal related to better clinical outcomes [3]. For patients, however, quality-of-life normalization and complete control of symptoms are the outcomes with the highest priority [4].

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Quality of care (QoC) has received increased attention in IBD in recent years [5]. Recent surveys suggest that IBD QoC in Europe is heterogeneous and often suboptimal [6] and considerable effort must be spent to improve it. This is important because some studies of patients with IBD found an association between the degree of patients' satisfaction with the healthcare received and some positive outcomes, such as a better rating of their physical and mental health [7], while others found associations between lower satisfaction with QoC and certain adverse outcomes [8, 9]. Acknowledging the patients' points of view and fostering the physician–patient collaboration are increasingly recognized as basic tools for QoC improvement. In line with these goals, the IQCARO project is a Spanish multicenter study aimed to measure QoC exclusively from the patients' perspectives, with the final aim to improve the QoC received by patients with IBD. Phase I of the project consisted of the development of QoC indicators (named the IQCARO-QoC Decalogue) [10] by patients with IBD. Although higher QoC has been previously associated with better treatment outcomes [11–13], this correlation remains controversial, as patient experience is not always related to the delivered QoC and, sometimes, it has also been associated with poorer patient outcomes [12, 14]. The present study was exploratory in nature and aimed to determine if patients' evaluations of the QoC were correlated with disease outcomes using the IQCARO-QoC Decalogue [10].

## 2 Methods

The present project follows the STROBE 2007 Statement (version 4), a checklist of items that should be included in reports of cross-sectional studies [15].

### 2.1 Study Design

The IQCARO II project consisted of a multicenter observational study based on a cross-sectional survey, where patients self-reported both demographical and clinical characteristics and completed a decalogue of QoC indicators directly developed by patients with IBD [10].

### 2.2 Setting

The survey was distributed on paper to 60 IBD Units across Spain selected by the Spanish Working Group on Crohn's Disease and Ulcerative Colitis (GETECCU). The participant IBD specialists distributed the survey to nine consecutive patients, who attended the clinic routinely, irrespective of disease severity or any other criterion. Patients were requested to read the survey, complete it voluntarily in their homes, and return it by prepaid post mail. Posters with a QR

code were also distributed across all the included IBD Units inviting patients to complete the survey online. Additionally, the Confederation of Spanish Associations of Patients with Crohn's Disease and Ulcerative Colitis (ACCU) posted a link to the survey on their website. Additionally, the ACCU invited all their members to participate on the online survey by e-mail. Both on-paper and online surveys contained an initial explanation of the purpose of the study and an invitation to anonymously participate if agreed.

### 2.3 Subjects

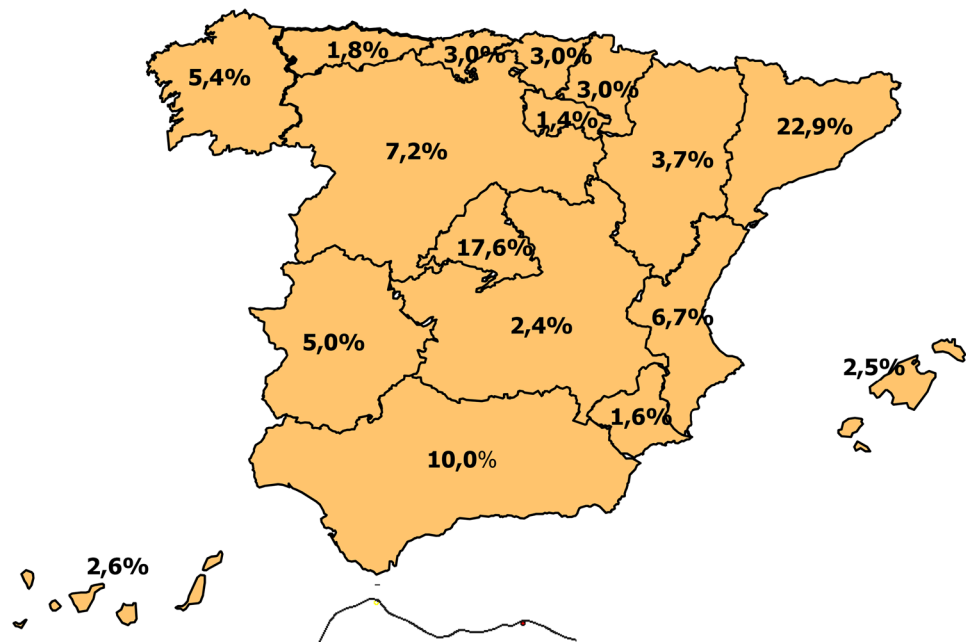
The sample consisted of patients with IBD distributed throughout Spain (Fig. 1). Surveys were completed by patients diagnosed with CD or ulcerative colitis, regardless of the severity of the disease or the type of treatment from October to December 2017. Patients aged less than 18 years or with an inability to understand or complete the survey were excluded. All patients gave their consent to participate in the study.

### 2.4 Survey Instrument

The IQCARO II project survey comprised two questionnaires with a total of 27 questions. The first part of the questionnaire included 17 questions about demographic and clinical characteristics and outcomes reported by patients (surgical procedures, ostomies, unscheduled visits, hospitalizations, disease activity in the preceding year, disease control in the preceding 2 weeks, number of flares in the last year, among others). The second part included the indicators from the IQCARO-QoC Decalogue already developed by our group, which fulfills two major conditions: (1) it is significant from the patient's point of view and (2) it is easily understandable and evaluable by any patient, independently of their educational background [10]. This questionnaire consists of ten critical questions related to the management of the IBD from the patients' perspectives and uses a dichotomous (yes/no) formulation, to facilitate its completion and generalize its use [10].

The Spanish version of the IQCARO-QoC Decalogue is provided as Fig. 1 in the Electronic Supplementary Material [ESM]. Based on the answers to the decalogue, a simple QoC index (QoCI) was developed that may explain the degree of QoC that the patients receive in their IBD Units. The QoCI ranges from 0 to 10 points, resulting from the sum of the "yes" answers to each item of the decalogue. A higher score means better QoC.

**Fig. 1** Proportion of participation of the different Spanish autonomous regions in the survey's results



## 2.5 Statistical Methods

We performed a descriptive analysis of the collected variables from the first questionnaire and the QoCI obtained from the IQCARO-QoC Decalogue assessment. The categorical variables were summarized by absolute frequencies and percentages, while the quantitative variables were described through the mean, standard deviation, median, minimum, maximum, and interquartile range. Additionally, we performed a sub-analysis comparing the disease outcomes in patients who received high QoC (defined as those patients being in the first QoCI quartile) vs patients with poor QoC (those patients in the fourth QoCI quartile). For the analysis, the Chi-squared test was used if the variables were categorical and the Student's *t* test or the analysis of variance test if the variables were quantitative (Mann–Whitney test or Kruskal–Wallis test, respectively, if they did not meet the parametric criteria). The association between quantitative variables was made using Spearman's correlation coefficient. The level of significance was set at 5%. We used the SPSS 19.0 statistical package (IBM Corporation, Chicago, IL, USA) for the statistical analyses.

## 3 Results

Nine hundred and thirty-eight surveys were received, 790 of them were answered online (ACCU website, with 8000 affiliates) and 148 were received on paper from IBD Units (27% completion rate for on-paper surveys). One hundred and fifty surveys (16%) were excluded because of the following reasons: 139 (14.8%) were not correctly filled in; 138 were left in blank

and one only filled in the gender), and 11 were answered by patients under 18 years of age (1.2%). Therefore, 788 surveys (640 online, 148 on paper) were valid for subsequent analysis. Each question from the first part of the questionnaire that included questions about demographic, clinical characteristics, and outcomes was answered by most of the patients. The less answered question was about the number of flares in the previous year, which was answered by 709 (90%) patients, followed by the question related to the number of emergency visits in the last year, answered by 742 (94%) patients, and having or not having an ostomy by 745 (94%) patients. The remaining 14 questions were answered by at least 95% of the patients. In the second part of the questionnaire, the decalogue, the less answered question was n6: “My opinion, my personal and work situation have been taken into account when making decisions about the management of my illness”, answered by 729 (92%) patients, with the most answered being n1 and 8: “My IBD care team has provided me with enough information about my illness” ( $n = 744$ , 94%) and “Within my IBD care, I know who the physician in charge of my case is” ( $n = 744$ , 94%) (Table 2). The population included patients from the 17 Spanish autonomous regions, and 183 sites (Fig. 1).

## 3.1 Demographic and Clinical Characteristics

The mean age of patients was 43.4 years (standard deviation [SD] 12.2 years), and the mean time from disease diagnosis was 13 years (1–44 years). Sixty-three percent were women and 58.1% were diagnosed with CD. Patients referred to an average of 1.3 flares (minimum 0, maximum 21), 1.1 unplanned visits to the doctor (minimum 0, maximum 25), and 0.4 hospitalizations in the preceding year (minimum 0,

maximum 15). In 24.5% of the cases, patients classified their disease as inactive during the preceding year, with 68% mild or moderate and 7.9% severe (Table 1).

### 3.2 Measurement of QoCI

Regarding the assessment of healthcare received, the average QoCI was 8.1 (SD 2.4) points out of a maximum of 10. When looking at each indicator individually, the least accomplished indicator was the one related to providing recommendations for daily life management and the most accomplished was the knowledge of the physician being in charge of the patient. Specific assessment of each indicator is shown in Table 2.

### 3.3 Relationship Between Patients' Clinical Outcomes with QoC Assessment

We found that the QoCI was statistically higher in patients with no or mild disease activity vs patients with moderate-to-severe disease activity ( $U = 52,822.5$ ;  $|z| = 5.05$ ;  $p < 0.001$ ). The QoCI was also higher in patients reporting their disease as better controlled ( $K = 115.89$ ,  $p < 0.001$ ).

Similarly, we found a negative relationship between the QoCI and the number of flares ( $\rho = -0.188$ ;  $p < 0.001$ ), hospitalizations ( $\rho = -0.082$ ;  $p = 0.027$ ), and unscheduled visits ( $\rho = -0.244$ ;  $p < 0.001$ ). On the contrary, we found no relationship between the QoCI and the need for surgery ( $U = 59,554.0$ ;  $|z| = 1.01$ ;  $p = 0.314$ ), number of surgical procedures ( $\rho = -0.027$ ;  $p = 0.675$ ), and ostomies ( $U = 16,046.0$ ;  $|z| = 1.10$ ;  $p = 0.272$ ).

### 3.4 Sub-analysis of Clinical Outcomes in Patients Receiving High Quality of Care vs Low Quality of Care

For this analysis, we split the population into two groups: high QoC group and low QoC group. The high QoC group included those whose QoCI score was in the first quartile (those who scored 10 out of 10 indicators). The low QoC group included those whose QoCI score was in the lowest quartile (those who scored  $\leq 7$  out of 10). Participants scoring 8 or 9 were not included in this analysis. From the 788 surveys (640 online, 148 on paper), 555 were eligible for the present analysis.

Regarding clinical outcomes in the preceding year, in the high QoC group, a lower proportion of patients reported the activity of their disease as moderate or severe compared to the low QoC group (34.8% vs 55.3%), hence a higher disease activity was associated with lower QoC ( $\chi^2 = 37.68$ ;  $p < 0.001$ ). The high QoC group also reported a lower mean number of flares (mean 1.0 vs 1.8, median 0 vs 1,  $U = 24,002.5$ ;  $|z| = 4.89$ ;  $p < 0.001$ ), and a lower average number of emergency or unscheduled visits (mean 0.6 vs

1.7, median 0 vs 1,  $U = 26,028.5$ ;  $|z| = 6.24$ ;  $p < 0.001$ ). Accordingly, in this group, we found that the better disease control in the preceding 2 weeks reported the highest QoC ( $\chi^2 = 111.27$ ;  $p < 0.001$ ). By contrast, the mean number of scheduled consultations in the preceding year was higher in the group with high QoC (mean 4.0 vs 3.7, median 3 vs 3  $U = 26,689.0$ ;  $|z| = 2.41$ ;  $p = 0.016$ ) (Table 3).

### 3.5 Comparison of Online vs On-Paper Completed Questionnaires

A sub-analysis limited to the online questionnaires only showed similar trends to those observed in the whole group in relation to which items scored higher or lower, thus suggesting that the results were not influenced by the method of the questionnaire delivery. Interestingly, surveys collected on paper showed significantly greater scores in comparison with surveys submitted online, both in the general sample and in the selected sample of high vs low quality. In the general sample, the mean QoCI was 7.8 (SD 2.6) in the online surveys and 9.4 (SD 1.1) in the on-paper surveys ( $U = 27,159.5$ ;  $|z| = 7.36$ ;  $p < 0.001$ ). Similarly, in the subgroup of high and low quality, the QoCI in the online survey was 7.5 (SD 2.9) vs 9.6 (SD 1.2) in the on-paper surveys ( $U = 14,178.0$ ;  $|z| = 7.29$ ;  $p < 0.001$ ) (Table 4). The items that scored lower were the same between the online and the on-paper surveys.

## 4 Discussion

This study strongly suggests that patient-reported higher QoC, as measured by the recently described IQCARO-QoC Decalogue, correlates with better outcomes such as disease activity, number of flares, number of emergency or unscheduled visits, or control of the disease. The high overall QoCI score in the study also suggests that the decalogue includes a set of very basic QoC indicators that were met by an important proportion of patients with IBD. Therefore, failing to fulfill a few of these basic indicators seems to be related to poor outcomes.

There is evidence that poor QoC contributes to adverse outcomes and increases overall costs [7, 11, 12]. Accordingly, QoC has shown to directly influence the health-related quality of life [16]. There have been many initiatives with the aim to develop tools to assess the delivery of services to people with IBD, such as the UK National Institute for Health and Clinical Excellence IBD quality statements [17], the Australian IBD Standards for IBD care [18], or the American Gastroenterology Association quality measures, which are currently incorporated into the physician quality reporting system [19]. Similarly, in Spain, a set of QoC indicators to facilitate the delivery of quality care to patients

**Table 1** Sociodemographic and clinical characteristics of the participants

	All participants ( <i>n</i> = 788)
Sex, <i>n</i> (%)	
Male	289 (36.8)
Female	494 (62.8)
Age (years)	
Mean (SD)	43.4 (12.2)
Median (IQR)	43 (18-84)
Educational background, <i>n</i> (%)	
Primary education	122 (15.6)
Secondary education	53 (6.8)
High school or vocational training	271 (34.6)
Bachelor's or equivalent level	338 (43.1)
Current employment status, <i>n</i> (%)	
Employed	443 (55.3)
Work disabled	106 (13.5)
Unemployed	88 (11.2)
Retired	65 (8.3)
Student	59 (7.5)
Housekeeper	29 (3.7)
Other	3 (0.4)
Diagnosis, <i>n</i> (%)	
Crohn's disease	456 (58.1)
Ulcerative colitis	321 (40.9)
Other	8 (1)
Time since diagnosis (years)	
Mean (SD)	13 (9.8)
Median (IQR)	11 (4-20)
Follow-up routinely performed by a digestive specialist, <i>n</i> (%)	751 (95.5)
Number of scheduled visits in the last year	
Mean (SD)	3.9 (3.2)
Median (IQR)	3.0 (2-5)
Patients reporting a surgical intervention due to IBD complications, <i>n</i> (%)	272 (34.8)
Number of surgical interventions	
Mean (SD)	2.5 (2.1)
Median (IQR)	2.0 (1-3)
Patients with an ostomy, <i>n</i> (%)	56 (7.5)
Self-reported disease activity in the preceding year, <i>n</i> (%)	
Inactive	186 (24.5)
Mild	258 (34)
Moderate	255 (33.6)
Severe	60 (7.9)
Self-reported disease control in the last 2 weeks, <i>n</i> (%)	
Well controlled	524 (69.2)
Partially controlled	175 (23.1)
Poorly controlled	58 (7.7)
Self-reported number of flares in the past year	
Mean (SD)	1.3 (2.1)
Median (IQR)	1 (0-2)
Number of admissions due to IBD in the last year	
Mean (SD)	0.4 (1.1)

**Table 1** (continued)

	All participants ( <i>n</i> = 788)
Median (IQR)	0 (0-0)
Number of emergency/unscheduled visits due to IBD in the preceding year	
Mean (SD)	1.1 (2.2)
Median (IQR)	0 (0-1)
Type of doctor that routinely monitors the patient, <i>n</i> (%)	
General gastroenterologist	577 (76.6)
Gastroenterologist specialised in IBD	160 (21.1)
Other	16 (2.2)

Percentages do not always add up to 100% because some patient data may be missing

*IBD* inflammatory bowel disease, *IQR* interquartile range, *QoC* quality of care, *SD* standard deviation

**Table 2** Proportion of participants that meet the IQCARO-QoC indicators

IQCARO-QoC indicator	Participants who meet the indicator, <i>n</i> (%)
1. My IBD care team has provided me with enough information about my illness ( <i>n</i> = 744)	613 (82.4)
2. The medical team that manage my illness participate in all phases of care [emergencies, outpatient consultation, hospitalization, endoscopy] ( <i>n</i> = 736)	546 (74.2)
3. My doctor pays me proper attention during my medical appointment ( <i>n</i> = 743)	660 (88.8)
4. In case of an emergency, I can reach urgently my IBD care team when I have symptoms of an outbreak or complications ( <i>n</i> = 740)	593 (80.1)
5. I am convinced that my IBD care team is capable of handling my illness correctly ( <i>n</i> = 737)	662 (89.8)
6. My opinion, my personal and work situation have been taken into account when making decisions about the management of my illness ( <i>n</i> = 729)	584 (80.1)
7. When I go to the outpatient clinic or hospital I have toilet facilities nearby ( <i>n</i> = 736)	661 (89.8)
8. Within my IBD care, I know who the physician in charge of my case is ( <i>n</i> = 744)	671 (90.2)
9. I have been offered recommendations to help me manage my illness in my daily life ( <i>n</i> = 739)	475 (64.3)
10. I have received information about the benefits and risks before starting any treatment for my illness ( <i>n</i> = 738)	552 (74.8)

*IBD* inflammatory bowel disease, *QoC* quality of care

with CD and ulcerative colitis has been identified [5]. However, none of these initiatives took into consideration the patient perspective. In this sense, both the health authorities and the scientific societies acknowledge the crucial role of the patients in their own self-care, and the need to change to a model where the patient is the center of the healthcare system [1, 20]. In line with these recommendations, several studies have developed tools with the intention to measure critical features of the disease from the patients' perspectives, such as the worries and concerns of persons with IBD [21], subjective health status [22], and the impact of IBD on everyday life [23, 24], relationships, and psychological well-being [24].

In this regard, the work of van der Eijk et al. [25] was remarkable in developing the QUOTE questionnaire for patients with IBD (QUOTE IBD) to measure their opinions on QoC. This questionnaire includes 23 items and each one of them is assessed for importance and performance

to produce a final "Quality Impact" that accounts for "satisfaction".

Despite the indisputable value of this questionnaire, that has been translated and validated into several languages [26–28], it has rarely been applied in clinical practice or research [7, 8, 29]. Possibly, this is because it is rather long and complex for the patient to complete, or because researchers do not always perceive the importance of patient-measured QoC [10]. Findings from the present work using the previous IQCARO Decalogue developed by our group suggest that patients, who consider that QoC received is high by scoring 10 out of 10 on the IQCARO QoC Decalogue, may have better outcomes and better disease control.

Patients' and doctors' definitions of good QoC can differ [7], thus we propose that the IQCARO QoC Decalogue adequately reflects the QoC, defined as the delivery of good services, and is associated with better outcomes [16]. However, some authors believe that patients could base their

**Table 3** Relationship between QoC and clinical outcomes in patients receiving high QoC vs low QoC

	Participants in the high vs poor QoC sub-analysis ( <i>n</i> = 555)		
	High QoC [QoC index = 10] ( <i>n</i> = 329)	Poor QoC [QoC index ≤7] ( <i>n</i> = 226)	<i>P</i> value [high vs poor QoC]
Number of scheduled visits in the last year			
Mean (SD)	4 (3)	3.7 (3.3)	0.016
Patients reporting a surgical intervention due to IBD complications, <i>n</i> (%)	118 (35.9)	70 (31.1)	0.25
Number of surgical interventions			
Mean (SD)	2.4 (1.7)	2.5 (1.8)	0.818
Patients with an ostomy, <i>n</i> (%)	21 (6.5)	17 (7.6)	0.63
Self-reported disease activity in the preceding year, <i>n</i> (%)			
Inactive	106 (32.3)	32 (14.2)	< 0.001
Mild	108 (32.9)	69 (30.5)	
Moderate	101 (30.8)	95 (42)	
Severe	13 (4)	30 (13.3)	
Self-reported disease control in the last 2 weeks, <i>n</i> (%)			
Well controlled	276 (84.7)	94 (42)	< 0.001
Partially controlled	39 (12)	89 (39.7)	
Poorly controlled	11 (3.4)	41 (18.3)	
Self-reported number of flares in the past year			
Mean (SD)	1 (1.8)	1.8 (2.5)	< 0.001
Number of admissions due to IBD in the last year			
Mean (SD)	0.3 (0.7)	0.4 (1.3)	0.068
Number of emergency/unscheduled visits due to IBD in the preceding year			
Mean (SD)	0.6 (1.2)	1.7 (3)	< 0.001

IBD inflammatory bowel disease, QoC quality of care, SD standard deviation

**Table 4** Comparison of mean and median quality index according to online or on paper IQCARO-QoC questionnaire completion

	Online ques- tionnaires	Paper questionnaires	<i>P</i> value	Total (online + paper question- naires)
All participants ( <i>n</i> = 744) All participants ( <i>n</i> = 744)				
<i>n</i>	599	145		744
Mean (SD)	7.8 (2.6)	9.4 (1.1)	< 0.001	8.1 (2.4)
Participants in the high vs poor QoC sub-analysis ( <i>n</i> = 555)				
<i>n</i>	449	106		555
Mean (SD)	7.5 (2.9)	9.6 (1.2)	< 0.001	7.9 (2.8)

QoC quality of care, SD standard deviation

assessment on their health status regardless of the care they are receiving [14]. This is a potential limitation of the present study. We could not rule out that patients in better health gave higher scores for the QoC. However, the IQCARO-QoC Decalogue includes many rather objective parameters that are less susceptible to influences by patient status. To definitively rule out this possibility, it would be necessary to perform longitudinal studies to evaluate whether the QoC

assessment changes as time progresses, depending on the clinical situation of the patients. In this regard, it is important to outline that the QoCI was significantly higher in the sample of patients who completed the survey on paper vs patients who completed the survey online. This could be reasonably expected because all patients who completed the survey on paper came from structured IBD units, in contrast to patients completing the survey online who are followed

up in different settings, including general gastroenterologists and primary care. This may explain the different QoC scores and stress the importance of IBD units in the delivery of high-quality care for this complex disease. Another explanation for this difference could be that patients completing the survey on paper were asked to do so by their own physician, and that could have produced a social desirability bias, as patients may not have wanted to rate their doctors poorly, even though the survey was completely anonymous. In any case, both in the general sample as well as the online- and on-paper-completed surveys, a similar association with disease outcomes was found, which suggests that the relationship between QoC and outcomes is reliable.

The limitations of this study include its cross-sectional design that prevents us from determining any causality in the associations we found. In addition, the IQCARO-QoC Decalogue is a newly developed questionnaire that has not been pilot tested and requires validation with other instruments or objective measures of QoC, as well as in different settings and countries. Nonetheless, our results suggest that this tool may be useful to monitor and improve QoC in patients with IBD and support the need for new studies to evaluate its role as a component of quality assurance in IBD care.

## 5 Conclusions

The IQCARO-QoC Decalogue is a simple instrument aimed at evaluating the QoC received by patients with IBD and can be easily implemented in clinical practice. Even though further studies are necessary, our study suggests that better patient-evaluated QoC might be associated with better outcomes in patients with IBD and may be a useful tool for QoC evaluation and improvement. It may represent a further step to empower patients with IBD to take control of their own care.

**Supplementary Information** The online version contains supplementary material available at <https://doi.org/10.1007/s40271-021-00500-8>.

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## Declarations

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**Conflict of interest** Xavier Calvet has served as a speaker, a consultant, and an advisory member for or has received research funding from MSD, Abbvie, Pfizer, Kern Pharma, Takeda, Janssen, Ferring, Faes Farma, Shire Pharmaceuticals, Tillotts Pharma, Otsuka Pharmaceutical, and Vifor Pharma. Francesc Casellas has served as a speaker, a consultant, and an advisory member for or has received research funding from Merck Sharp & Dohme, Abbvie, Pfizer, Takeda, Janssen, Ferring, Faes Farma, Shire Pharmaceuticals, Tillotts Pharma, and Ferrer. Daniel Carpio has served as a speaker, a consultant, and an advisory member for or has received research funding from Merck Sharp & Dohme, Abbvie, Kern Pharma, Takeda, Janssen, Ferring, Shire Pharmaceuticals, Tillotts Pharma, Dr Falk Pharma, and Gebro Pharma. Berta Juliá is an employee of Merck Sharp & Dohme, Spain. Roberto Saldaña, Miguel Mínguez, Isabel Vera, and Laura Marín have no conflicts of interest that are directly relevant to the content of this article.

**Ethics approval** The study complied with the Good Clinical Practice standards and the principles of the latest version of the Helsinki Declaration (Brazil, 2013) and was approved by the Parc Taulí Ethics Committee on 27 July, 2017 (approval number: 2017615).

**Consent to participate** Confidentiality and anonymity were guaranteed in accordance with the Spanish Law 15/1999 on personal data protection and all participants in the study gave their informed consent.

**Consent for publication** Not applicable.

**Availability of data and material** The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

**Code availability** Not applicable.

**Authors' contributions** XC, study concept and protocol development, manuscript writing, manuscript review; FC, study concept and protocol development, manuscript review; RS study concept and protocol development, manuscript review; DC, study concept and protocol development, manuscript review; MM, study concept and protocol development, manuscript review; IV, study concept and protocol development, manuscript review; LM, study concept and protocol development, manuscript review; BJ, study concept and protocol development, manuscript writing, manuscript review.

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