



Original Article

# The IBD-disk Is a Reliable Tool to Assess the Daily-life Burden of Patients with Inflammatory Bowel Disease

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## Abstract

**Background and Aim:** The inflammatory bowel disease [IBD]-disk is a 10-item self-questionnaire that is used to assess IBD-related disability. The aim of the present study was to evaluate this tool in the assessment of IBD daily-life burden.

**Methods:** A 1-week cross-sectional study was conducted in 42 centres affiliated in France and Belgium. Patients were asked to complete the IBD-disk [best score: 0, worst score: 100] and a visual analogue scale [VAS] of IBD daily-life burden [best score: 0, worst score: 10]. Analyses included internal consistency, correlation analysis, and diagnostic performance assessment.

**Results:** Among the 2011 IBD outpatients who responded to the survey [67.8% of the patients had Crohn's disease], 49.9% were in clinical remission. The IBD-disk completion rate was 73.8%. The final analysis was conducted in this population [ $n = 1455$  patients]. The mean IBD-disk score and IBD daily-life burden VAS were  $39.0 \pm 23.2$  and  $5.2 \pm 2.9$ , respectively. The IBD-disk score was well correlated with the IBD daily-life burden VAS [ $r = 0.67$ ;  $p < 0.001$ ]. At an optimal IBD-disk cut-off of 40, the area under the receiver operating characteristic curve [AUROC] for high IBD daily-life burden [VAS  $> 5$ ] was 0.81 (95% confidence interval [CI]: 0.79–0.83;  $p < 0.001$ ).

**Conclusions:** In a large cohort of patients, the IBD-disk score was well correlated with IBD daily-life burden, and it could be used in clinical practice.

**Key Words:** Crohn's disease; ulcerative colitis; inflammatory bowel disease; disability; patient-reported outcome

## 1. Introduction

Inflammatory bowel diseases [IBDs] are chronic inflammatory conditions that negatively affect various dimensions of daily life.<sup>1</sup> Therefore new standards of care, taking into account IBD-related disability and daily-life burden, are increasingly being incorporated into clinical practice. According to the World Health Organization [WHO], disability is an umbrella term that includes impairments, activity limitations, and participation restrictions. An impairment is a problem with a bodily function or structure; an activity limitation is a difficulty encountered by an individual in executing a task or action; and a participation restriction is a problem experienced by an individual in achieving full involvement in life situations.<sup>2</sup> According to WHO, the burden of a disease is somewhat different from disability because it also covers death. As IBD is not considered to be a disease that reduces lifespan, the burden of IBD should directly correlate with IBD-related disability.

IBD can cause physical, psychological, familial, and social impairment, and self-administered questionnaires that assess patients' quality of life are often too restrictive for the assessment of disability.<sup>3–7</sup> To date, there is only one validated tool used to assess IBD-related disability: the IBD Disability Index [IBD-DI].<sup>8,9</sup> Although the IBD-DI is a very informative questionnaire, it has to be completed with the assistance of a trained nurse and it is time consuming.

Based on the principles of the PSO-disk, a validated self-administered tool for assessing the burden of psoriasis,<sup>10–12</sup> the IBD Connect group has developed the IBD-disk, a visual self-administered tool based on a Delphi consensus process to measure disability in patients with IBD.<sup>13</sup> Ten items were chosen to assess 10 dimensions

defaecation, interpersonal interactions, education and work, sleep, energy, emotions, body image, and sexual functions.<sup>1,8,9</sup> The IBD-disk has been recently validated in the VALIDate Study, a multicentre French study including 447 patients in the baseline analysis.<sup>14</sup> In this study the IBD-disk has shown good correlation between IBD-disk and IBD-DI [ $r = 0.75$ ,  $p < 0.001$ ]. Reproducibility and internal consistency [Cronbach's  $\alpha = 0.89$ ] were both excellent.

Therefore, we aimed to assess in real life the correlation between the overall IBD-disk score and the IBD-disk subscores with the IBD daily-life burden, taking into account disability during the past week in a larger cross-sectional study

## 2. Methods

### 2.1. Study population

A cross-sectional survey was conducted in 42 tertiary centres in France and Belgium, affiliated with the Groupe d'Etude Therapeutique des Affections Inflammatoires du tube Digestif [GETAID] in France and Belgium. The survey was conducted from November 26 to November 30, 2018. Investigators asked consecutive adult outpatients with a confirmed diagnosis of IBD, regardless of any other criteria, to complete a standardised self-questionnaire that was provided by their treating physician or IBD nurse.

The study was conducted in accordance with the ethical principles expressed in the Declaration of Helsinki and the requirements of applicable French regulations. The patients' experience study was conducted through the French reference methodology, MR-004, and it was supervised by and registered with GETAID [registration

of disability including joint pain, abdominal pain, regulation of

number 2210131]. All the authors had access to the study data and reviewed and approved the final manuscript.

## 2.2. Survey instrument

A four-page, self-administered questionnaire was designed to examine the demographics of the patients, type of IBD, history of surgical treatment of IBD, working status, duration of IBD, and current IBD-related treatment [Supplementary Figure S1, available as Supplementary data at ECCO-JCC online]. An IBD-disk was included in the survey and included a 0–10 visual analogue scale [0 = absolutely disagree; 5 = neither agree nor disagree; 10 = absolutely agree or maximal disability] assessing each component of the IBD-related disability during the past week: joint pain, abdominal pain, body image, education and work, emotions, energy, interpersonal interactions, regulation of defaecation, sexual function, and sleep [Figure S1]. The overall IBD-disk score was calculated as the sum of its 10 components, ranging from 0 to 100. The questionnaire also included two VASs to assess the IBD daily-life burden and overall health [0 = worst; 10 = perfect]. Burden scales have been used to study the burden of many chronic diseases, such as Crohn's disease, coeliac disease, irritable bowel syndrome, diabetes, and congestive heart failure.<sup>14–20</sup> IBD activity was determined by patient self-assessment [yes or no].

## 2.3. Correlation of the overall IBD-disk score with IBD daily-life burden

A simple linear correlation analysis using Pearson's correlation coefficient was applied to test the correlation between the overall IBD-disk score and IBD-disk subscores with the IBD daily-life burden scale. Outliers were detected using a graphical method by excluding values 1.5-fold over the standard deviation. A correlation was considered significant if the Pearson correlation coefficient  $r$  was strictly superior to 0.5. Discrimination of models was assessed by the C statistic [area under the receiver operating characteristic curve: AUROC]. The C statistics of the models were applied to assess the accuracy of detecting a high IBD daily-life burden [score >5].

## 2.4. Reliability

Cronbach's  $\alpha$  coefficient [ $>0.7$ ] and corrected item-total correlations [ $>0.4$ ] were used to assess the internal consistency of the overall IBD-disk score. Cronbach's  $\alpha$  coefficient with a one-at-a-time deletion procedure was used to assess the impact of the items on the internal consistency of the overall IBD-disk score.

## 2.5. Factors associated with IBD-related disability using the overall IBD-disk score

The overall IBD-disk score was calculated for the overall study population and compared according to the patients' characteristics using a Mann-Whitney test or an analysis of variance [ANOVA] test followed by a Tukey test for post hoc analysis.

## 2.6. Statistical analysis

The data are expressed as numbers [%] for qualitative data and as the means  $\pm$  standard deviations [SDs] or medians [interquartile ranges: IQRs] for quantitative data. Qualitative variables were compared using the chi square test or Fisher's exact test, and quantitative variables were compared using the Mann-Whitney test or an ANOVA test followed by a Tukey test for post hoc analysis. The normality of the distribution was verified using the Kolmogorov-Smirnov test, Shapiro-Wilk test, and visual inspection. A result was considered significant if the  $p$ -value was less than 0.05. All the statistics were calculated using SPSS Statistics v23® software.

**Table 1.** Demographic, disease and medication characteristics of 2011 patients with inflammatory bowel disease.

| Characteristic                           | Overall population [ $n = 2011$ ]                |
|------------------------------------------|--------------------------------------------------|
| Age at diagnosis, years                  | 40.0 [29.0–52.0]                                 |
| Male gender, no. [%]                     | 47.3%                                            |
| BMI, kg/m <sup>2</sup>                   | 24.4 $\pm$ 6.5                                   |
| Duration of IBD, years                   | 10.5 [4.5–18.5]                                  |
| Age at diagnosis, no. [%]                |                                                  |
| A1: $\leq 16$ years                      | 14.1%                                            |
| A2: 17–40 years                          | 67.6%                                            |
| A3: $>40$ years                          | 18.3%                                            |
| Type of inflammatory bowel disease, [%]  |                                                  |
| Crohn's disease                          | 67.8%                                            |
| Ulcerative colitis                       | 32.2%                                            |
| History of intestinal resection, no. [%] | 45.6%                                            |
| Occupational status, %                   |                                                  |
| Employed                                 | 62.1%                                            |
| Unemployed                               | 8.5%                                             |
| Homemaker                                | 8.6%                                             |
| Student                                  | 8.5%                                             |
| Retired                                  | 12.3%                                            |
| Distance from home, km                   | 46.8 $\pm$ 99.6                                  |
| Current treatment                        |                                                  |
| None                                     | 8.3%                                             |
| 5-ASA                                    | 9.2%                                             |
| Immunomodulator alone                    | 8.6%                                             |
| Anti-TNF                                 | 56.0% [including 14.7% with combination therapy] |
| Vedolizumab                              | 11.1% [including 0.9% with combination therapy]  |
| Ustekinumab                              | 6.6% [including 1% with combination therapy]     |

Variables are presented as  $n$  [%], mean  $\pm$  standard deviation or median [interquartile range].

5-ASA, 5-aminosalicylic acid; TNF, tumour necrosis factor; BMI, body mass index; IBD, inflammatory bowel disease.

## 3. Results

### 3.1. Study population

During the 1-week study period, 2011 outpatients with IBD (47% male; median age of 40.0 [29.0–52.0] years) were included in the 42 centres. The median number of patients recruited at each centre was 46.5 [24.0–63.0]. The characteristics of the study population are listed in Table 1. Briefly, 67.8% of the patients had Crohn's disease [CD] and 32.2% had ulcerative colitis [UC]. The median duration of IBD was 10.5 [4.5–18.5] years. The majority of the patients were treated with biologic agents, including anti-tumour necrosis factor [TNF] in 56.0%, vedolizumab in 11.1%, and ustekinumab in 6.6%; 78.6% of the patients were treated with biologic agents alone, and 21.4% of the patients were treated with biologic agents in combination with an immunomodulator. According to the patient global assessment, 49.1% of the patients considered themselves to be in clinical remission.

### 3.2. Overall IBD-disk score and IBD-disk subscores correlation and reliability

Among the 2011 participants, 1484 [73.8%] patients fully completed the 10 items of the IBD-disk score, 220 [10.9%] completed  $\geq 6$  items and 307 [15.3%] completed  $<6$  items. Considering every

**Table 2.** IBD-disk overall score and subscores in a subset of 1455 patients who completed the 10-item questionnaire according to the patient global assessment of clinical remission.

|                             | Overall study population<br>[ <i>n</i> = 1455] | Presence of clinical remission<br>[ <i>n</i> = 648] <sup>a</sup> | Absence of clinical remission<br>[ <i>n</i> = 638] <sup>a</sup> | Missing values <sup>b</sup><br>[%] | <i>p</i> |
|-----------------------------|------------------------------------------------|------------------------------------------------------------------|-----------------------------------------------------------------|------------------------------------|----------|
| Joint pain                  | 3.9 ± 3.3                                      | 3.5 ± 3.2                                                        | 4.2 ± 3.2                                                       | 16.3%                              | <0.001   |
| Abdominal pain              | 4.2 ± 3.1                                      | 3.5 ± 2.9                                                        | 5.1 ± 3.0                                                       | 15.6%                              | <0.001   |
| Regulation of defaecation   | 3.9 ± 3.4                                      | 2.9 ± 3.1                                                        | 4.8 ± 3.5                                                       | 15.9%                              | <0.001   |
| Interpersonal interactions  | 2.4 ± 2.9                                      | 1.9 ± 2.7                                                        | 2.9 ± 3.0                                                       | 18.2%                              | <0.001   |
| Education and work          | 4.0 ± 3.4                                      | 3.1 ± 3.2                                                        | 4.9 ± 3.3                                                       | 16.1%                              | <0.001   |
| Sleep                       | 5.0 ± 3.4                                      | 4.4 ± 3.3                                                        | 4.7 ± 3.4                                                       | 15.1%                              | <0.001   |
| Energy                      | 5.7 ± 3.2                                      | 5.1 ± 3.2                                                        | 6.5 ± 2.9                                                       | 14.2%                              | <0.001   |
| Emotions                    | 4.5 ± 3.2                                      | 3.8 ± 3.2                                                        | 5.3 ± 3.2                                                       | 15.5%                              | <0.001   |
| Body image                  | 4.0 ± 3.4                                      | 3.5 ± 3.3                                                        | 4.5 ± 3.4                                                       | 17.0%                              | <0.001   |
| Sexual functions            | 2.8 ± 3.2                                      | 2.3 ± 3.0                                                        | 3.4 ± 3.3                                                       | 19.4%                              | <0.001   |
| Overall IBD-disk score      | 39.3 ± 23.0                                    | 32.9 ± 21.5                                                      | 46.7 ± 22.2                                                     | 26.2%                              | <0.001   |
| IBD daily-life burden scale | 5.2 ± 2.9                                      | 4.1 ± 2.8                                                        | 6.2 ± 2.6                                                       | 4.2%                               | <0.001   |
| Overall health scale        | 6.6 ± 2.2                                      | 7.5 ± 1.8                                                        | 5.7 ± 2.1                                                       | 2.9%                               | <0.001   |

Variables are presented as mean ± standard deviation. Quantitative variables between groups was compared using the Mann-Whitney test.

IBD, inflammatory bowel disease.

<sup>a</sup>The patient global assessment of global remission was missing in 169 out of 1455 patients.

<sup>b</sup>Missing values are given with respect with the overall study population of 2011 patients.

**Table 3.** Cronbach's alpha coefficients assessing the consistency of the IBD-disk subscores with one-at-a-time deletion of subscores contributing to the overall IBD-disk score.

|                            | Cronbach's alpha coefficient | Corrected item-total correlation | Cronbach's alpha coefficient if item deleted |
|----------------------------|------------------------------|----------------------------------|----------------------------------------------|
| Joint pain                 | 0.888                        | 0.492                            | 0.888                                        |
| Abdominal pain             | 0.877                        | 0.652                            | 0.877                                        |
| Regulation of defaecation  | 0.880                        | 0.605                            | 0.880                                        |
| Interpersonal interactions | 0.879                        | 0.627                            | 0.879                                        |
| Education and work         | 0.870                        | 0.740                            | 0.870                                        |
| Sleep                      | 0.877                        | 0.647                            | 0.877                                        |
| Energy                     | 0.873                        | 0.709                            | 0.873                                        |
| Emotions                   | 0.872                        | 0.719                            | 0.872                                        |
| Body image                 | 0.886                        | 0.525                            | 0.886                                        |
| Sexual functions           | 0.883                        | 0.566                            | 0.883                                        |

IBD, inflammatory bowel disease.

item of the IBD-disk questionnaire separately, the completion rate of any item was >80% [Table 2]. The IBD-disk questionnaire was considered easy to complete by 1571 [88.4%] patients.

After removing 29 outliers, complete IBD-disk scores with all subscores were assessable in 1455 patients. The overall IBD-disk score and subscores are presented in Table 2. The mean complete IBD-disk score was 39.3 ± 23.0, and the subscores from its components ranged from 2.4 [interpersonal interactions] to 5.7 [energy]. The proportions of patients with significant disability [subscore >5] in each dimension of IBD-related disability are presented in Table S2, available as Supplementary data at ECCO-JCC online.

Cronbach's alpha coefficient calculated with the overall IBD-disk score was 0.89, and this value calculated with the subscores was between 0.87 and 0.89. One-at-a-time deletion of subscores confirmed the contribution and the unidimensionality of the 10 subscores [Cronbach's alpha coefficient between 0.87 and 0.89] [Table 3]. All the corrected item-total correlations were >0.4.

Assessments of IBD daily-life burden and overall health with the VAS were available for 1927 [95.8%] and 1952 [97.1%] patients,

**Table 4.** Pearson's correlation coefficient *r*<sup>2</sup> assessing the convergent validity of the overall IBD-disk score with IBD daily-life burden and overall health.

|                            | IBD daily-life burden | Overall health |
|----------------------------|-----------------------|----------------|
| Joint pain                 | 0.348                 | -0.319         |
| Abdominal pain             | 0.499                 | -0.490         |
| Regulation of defaecation  | 0.535                 | -0.500         |
| Interpersonal interactions | 0.438                 | -0.389         |
| Education and work         | 0.590                 | -0.532         |
| Sleep                      | 0.463                 | -0.419         |
| Energy                     | 0.515                 | -0.505         |
| Emotions                   | 0.491                 | -0.454         |
| Body image                 | 0.299                 | -0.246         |
| Sexual functions           | 0.371                 | -0.329         |
| Overall IBD-disk score     | 0.650                 | -0.614         |
| New IBD-disk score         | 0.670                 | -0.640         |

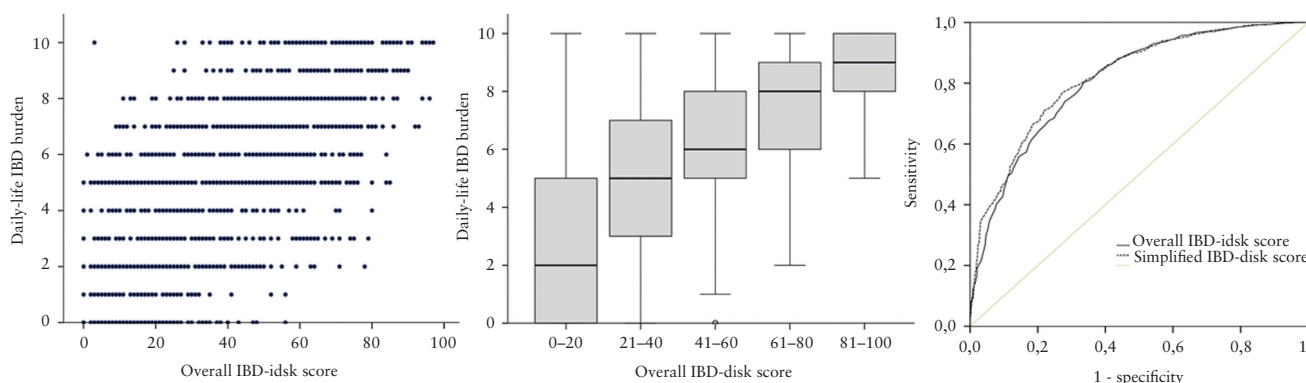
*p*-values for each Pearson's correlation coefficient was <0.001.

IBD, inflammatory bowel disease.

respectively. The mean IBD daily-life burden and overall health scores were 5.2 ± 2.9 and 6.6 ± 2.2, respectively.

The correlation between the complete IBD-disk score and IBD daily-life burden VAS was *r* = 0.67 [*p* < 0.001] and was inversely correlated with the overall health score [*r* = -0.64, *p* < 0.001]. Analysis of the IBD-disk subscores revealed inconsistent correlations; four subscores [regulation of defaecation, abdominal pain, work and study, and energy] had correlations with IBD daily-life burden that were over 0.5, and six other subscores had correlations that were lower than 0.5, ranging between 0.299 and 0.491 [Table 4].

The diagnostic performance of the overall IBD-disk score in predicting a high IBD daily-life burden [>5] was evaluated using a receiver operating characteristic curve showing a C statistic of 0.81 [0.79–0.83] [*p* < 0.001] with an optimal threshold for the overall IBD-disk score >40 [Figure 1].



**Figure 1.** Scatter plot [A] and box plot [B] of the distribution of the IBD daily-life burden according to the overall IBD-disk score and predictive accuracy of the overall IBD-score and the simplified shortened IBD-disk score in discriminating patients with high IBD daily-life burden (>5), summarised using ROC curves analysis [C]. IBD, inflammatory bowel disease; ROC, receiver operating characteristic.

#### 4. Discussion

Taking into account IBD-related disability requires validated tools. In the present study, we assessed the performance and internal consistency of the IBD-disk questionnaire in a large population of outpatients with IBD, to predict high IBD-related daily-life burden. Our study population encompassed a wide range of patients with long-lasting disease, requirements of immunomodulators and biologic agents, and a history of intestinal resection, namely a population highly relevant to the field of patient-reported outcomes [PRO]. We demonstrated there was a good correlation of the overall IBD-disk score with IBD daily-life burden. The overall IBD-disk score disclosed a diagnostic performance of 0.81 [0.79–0.83] to predict high IBD daily-life burden >5, with an optimal threshold for the overall IBD-disk score >40.

IBD is a severe, chronic, progressive disease that causes disability and affects patients' daily lives.<sup>21</sup> The development of biologic agents has changed the paradigm of management of IBD from focusing on physician-reported clinical outcomes to implementing mucosal and/or transperietal healing and patient-reported outcomes.<sup>22,23</sup> PROs are divided into two categories: those that measure disease activity from the patients' perspective, and those that assess IBD-related disability. Although most of the current studies are focusing on PRO measurement of clinical activity, we chose to focus on those that assess IBD-related disability, by using the IBD-disk questionnaire. Indeed, disability remains poorly studied in IBD compared with other inflammatory diseases such as rheumatoid arthritis, multiple sclerosis, or psoriasis.<sup>11,24–27</sup>

It should be emphasised that quality of life and disability are two distinct concepts that should be studied independently.<sup>3</sup> Disability is an objective description, unlike quality of life which is the patient's subjective perception regarding a loss of function. For those reasons, we chose to use an auto-administered questionnaire to assess different components of disability, and the IBD daily-life burden scale as a reference of IBD-related disability, instead of quality-of-life scores such as the Short-IBD questionnaire or other tools built by physicians, and not patients, to assess IBD-related disability.<sup>1,8,28</sup>

Assessing a tool for IBD-related disability requires clarity, readability, and comprehensiveness of the questionnaire as well as a high completion rate of the whole questionnaire.<sup>29,30</sup> Indeed, it is not conceivable to focus on the small subset of patients who are willing to complete a complex questionnaire or only those who understand the whole questionnaire or specific items. In the present study, the IBD-disk questionnaire was considered easy to complete by 88.4%

of patients. Furthermore, the full completion rate for the 10 items of the IBD-disk was 73.8%.

It is important to mention that the IBD-disk we used in this study shows some deviations from the original IBD-disk, which is a VAS-scale ranging from 0 [absolutely disagree] to 10 [absolutely agree]. Le Berre *et al.* chose to adapt the scale from 0 [absolutely no complaint] to 10 [maximal complaint]. We also use this modified version of the IBD-disk, since it has been validated in a large cohort with a 80% completion rate [447 patients out of 559].<sup>14</sup> It should be noted that such deviations have been previously demonstrated as non-inferior to the original model in other similar studies.<sup>31,32</sup> We also did not find any difference in the overall IBD-disk score and IBD-disk subscores between patients with CD and ulcerative colitis [UC] patients with mild but significant differences for abdominal pain, emotions, and body image subscores, confirming that the two diseases induce a similar level of disability.<sup>9,33</sup>

IBD-related disability is a multidimensional concept that includes six main domains: body functions and structures, activities and participation, and personal and environmental factors.<sup>1</sup> The IBD-DI and the IBD-disk questionnaire were developed focusing mostly on three domains: bodily functions [abdominal pain, sleep, energy, emotions, joint pain, body image, and sexual functions], activities, and participation [regulation of defaecation, interpersonal interactions, and work and study].<sup>8,13</sup> The IBD-DI is an exhaustive questionnaire that evaluates different aspects of IBD-related disability. The IBD-DI is not self-administered, and could lead to discrepancies between the patients' experience and the perception of a physician.<sup>34,35</sup> As such, it is mostly used in clinical trials settings.<sup>13</sup> It should be emphasised that the IBD-DI is based on a 0 to 4 Likert scale and does not include sexual function, which is an important component of disability. Moreover, the IBD-DI includes the number of daily liquid stools which is more related to the clinical activity of IBD.<sup>36,37</sup> In the present study, we confirmed that a self-administered questionnaire, such as IBD-disk, that assess all of the components of disability on a wider scale of severity, was also reliable and was easy to complete. However, we have to highlight the lack of a direct comparison between the IBD-disk and IBD-DI in our study.

We also need to highlight some limitations of the present study. The recruitment was mainly conducted in tertiary IBD centres with an obvious recruitment bias, and more than two-thirds of the included patients were treated with biologic agents. However, this limitation is counterbalanced by the size of our study population, which included a large panel of patients with varied IBD history, demographics, and

treatment. We did not assess the reliability of the overall IBD-disk score, due to the absence of repeated IBD-disk questionnaire administration. However, we thought that anonymity was an important prerequisite for this study, which is not compatible with repeated testing. Another limitation is the lack of assessment of clinical activity using validated and dedicated clinical scores and of objective inflammation using laboratory, morphological, and/or endoscopic tools. However, Le Berre *et al.* recently showed a good correlation between the overall IBD-disk score and validated clinical scores and C-reactive protein level.<sup>14</sup> It is possible that the daily-life burden VAS does not perfectly account for IBD-related disability. However, this limitation is counterbalanced by the use of the VAS in many chronic diseases, including IBD, thus proving its reliability,<sup>15-20</sup> and by the fact that none of the alternative scores available to measure IBD-related disability would have been satisfying in this setting.

It should be stressed that the IBD-disk is a communication tool between patients and their health care professionals. Our questionnaire was not designed to know if patients found the IBD-disk useful to discuss subjects that would have been otherwise overlooked during appointment time. This would be an interesting approach in future studies regarding patients' experience. Incremental use of the IBD-disk in randomised clinical trials may provide good opportunities in this setting.

The IBD-disk is a visual representation of IBD-related burden. It gives more information than a simple one-dimensional score and it easy to use from the patient's and the healthcare professional's point of view. The benefit of such tool may be useful for remote monitoring, especially during the COVID-19 era.

In conclusion, the IBD-disk questionnaire is a self-administered questionnaire used to evaluate IBD-related disability with a good accuracy and reliability in both UC and CD. We validated this questionnaire and provided evidence of internal consistency in a large multicentre cohort study of 2011 outpatients with IBD. Further studies are needed to highlight the determinants of IBD-related disability and to assess the reliability of the IBD-disk questionnaire in longitudinal follow-up.

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## Conflicts of Interest

MN has received consulting and travel accommodation fees from Abbvie, Adacety, Amgen, Biogen, Boehringer-Ingelheim, Ferring, Janssen, Mayoli Spindler, MSD, Takeda. YB has received lecture and consulting fees from Abbvie, Biogaran, Boehringer-Ingelheim, CTMA, Ferring, Gilead, Hospira, ICON, Inception IBD, Janssen, Lilly, Mayoli Spindler, Merck, MSD, Norgine, Pfizer, Roberts Clinical Trials, Roche, Sanofi, Shire, Takeda, UCB, and Vifor Pharma. This author has also stock ownership of Inception IBD, San Diego, CA, USA. MS has received lecture or consulting fees from Abbvie, Ferring, Amgen, Celltrion, Janssen, Ferring, Takeda, and Tillotts. XH has received fees and research support from Abbvie, Abivax, Alfasigma, Arena, Astellas, Baxter, Bristol Myers Squibb, Cellgen, Gilead, Eli Lilly, Enterome, Ferring, Fresenius-Kabi, InDex Pharmaceuticals, Janssen, MSD, Nutricia, Pfizer, Roche, Sanofi-Aventis, Salix, Sangamo, Servier, Takeda, Theravance, Tillotts. XR reported a relationship with MSD, Abbvie, Amgen, Sandoz, Pfizer, Takeda, and Janssen. GB received lecture fees from Abbvie, Ferring, MSD, Takeda, and Pfizer, and consultant fees from Takeda, Janssen. DF is research director of FNRS; he has received educational grants from Abbvie, Takeda, MSD; and has received honoraria fees for lectures or consultancy from Ferring, Falk, Chiesi, Abbvie, MSD, Centocor, Pfizer, Amgen, Janssen,

Mundipharma, Takeda, and Hospira. GS has received lecture fees from Vifor Pharma, Takeda, Pfizer, HAC Pharma, Abbvie, MSD, and Ferring France. This author has also received travel accommodations from Ferring, Abbvie, and MSD France as well as a research grant from Ferring. AB has received research funding from Pfizer, lecture fees from Abbvie, Ferring, Hospira, MSD, Janssen, Sanofi-Aventis, Takeda, and Vifor Pharma, and consulting fees from Abbvie, Biogen, Janssen, Pfizer, and Takeda. EL has received fees for: research grant: Takeda, Pfizer; educational grant: Abbvie, Takeda, Janssen; speaker fees: Abbvie, Ferring, MSD, Falk, Takeda, Hospira, Janssen, Pfizer, Celgene; advisory board: Abbvie, Ferring, MSD, Takeda, Celgene, Hospira, Janssen; consultant: Abbvie. SN has received consulting fees from Merck, Abbvie, Takeda, Ferring, Norgine, Vifor Pharma, Novartis, Janssen Cilag, Hospira, Takeda, and HAC Pharma. VA has received lecture fees from Ferring, MSD, Vifor Pharma, and Abbvie. J-MR has received consulting fees from Hospira and Pfizer. This author has also received lectures fees from Abbvie, Ferring, Janssen Cilag, Pfizer, and Takeda. This author has also received travel accommodations from Ferring, Abbvie, MSD, Janssen Cilag, Pfizer, Hospira, and Takeda. OD has received lecture and/or consultant fees from Abbvie, Ferring, Fresenius-Kabi, Janssen, Mylan, MSD, Pfizer, Takeda. LV has received lecture fees from Abbvie, MSD, Takeda, Ferring, Janssen, and Pfizer, and research grants from MSD, Takeda, and Pfizer. NM has received lecture fees from Abbvie, Amgen, Biogen, Janssen, MSD, Takeda, Pfizer, Ferring France, and Vifor Pharma. This author has also received travel accommodations from Abbvie, Takeda, and Pfizer as well as consulting fees from Amgen, Janssen, MSD, Sandoz, and Takeda. LP-B has received consulting fees from Merck, Abbvie, Janssen, Genentech, Ferring, Norgine, Tillots, Vifor, Shire, Therakos, Pharmacosmos, Pilège, BMS, UCB-Pharma, Hospira, Celltrion, Takeda, Biogaran, Boehringer-Ingelheim, Lilly, Pfizer, and HAC-Pharma. This author has also received lecture fees from Merck, Abbvie, Takeda, Janssen Cilag, Ferring, Norgine, Tillots, Vifor, Therakos, HAC-Pharma, and Mitsubishi. CG received lecture fees from Abbvie, Takeda, Pfizer, and Janssen and consulting fees from Abbvie, Janssen, and Celltrion. MA has received honoraria from Novo Nordisk, MSD, Abbvie, Ferring, Genentech, Janssen, Pfizer, GSK, Hospira, UCB, Novartis, Takeda, Mayolo-Spindler. SV has received consulting fees from Abbvie, MSD, Takeda, Vifor Pharma, and Ferring. MF has received lecture and consulting fees from Abbvie, MSD, Boehringer, Pfizer, Takeda, Janssen, and Ferring. CT-P has received lecture fees from MSD, Takeda, Janssen, Abbvie, Vifor Pharma, and Norgine. MB has received travel accommodation from Abbvie, Janssen, Takeda, and Pfizer. LB has received consulting fees from Abbvie and Tillotts. LC received board and lecture fees from Abbvie, Janssen, Pfizer, Takeda, Amgen. DL has received counseling, board, transport, and/or fees from Abbvie, Biogaran, Biogen, Ferring, HAC-Pharma, Janssen, MSD, Novartis, Pfizer, Prometheus, Roche, Takeda, Theradiag, Tillotts. AA has received consulting fees from Abbvie, Hospira, Takeda, Tillotts, Gilead, and Biocodex, as well as lecture fees and travel accommodations from Abbvie, Janssen, Biocodex, Hospira, Ferring, Takeda, Tillotts, and MSD. This author has also received advisory board fees from Gilead, Takeda, and Abbvie.

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Concept and design of the study: AM, MN, DL, LPB. Generation, collection, assembly, analysis and/or interpretation of data: ST, MN, YB, MS, XH, XR, JK, GB, DF, GS, AB, EL, SN, VA, JMR, OdW, LV, NM, LPB, CG, MA, SV, CTP, ND, HB, MB, LP, RA, MF, LC, DL, AA. Drafting or revision of the manuscript: ST, MN, YB, MS, XH, XR, JK, GB, DF, GS, AB, EL, SN, VA, JMR, OdW, LV, NM, LPB, CG, MA, SV, CTP, ND, HB, MB, LP, RA, MF, LC, DL, AA. Approval of the final version of the manuscript: ST, MN, YB, MS, XH, XR, JK, GB, DF, GS, AB, EL, SN, VA, JMR, OdW, LV, NM, LPB, CG, MA, SV, CTP, ND, HB, MB, LP, RA, MF, LC, DL, AA. The GETAID-IBD-disk study group: Aurelien Amiot, Sara Tadbiri, Charlotte Gagniere, Jenny Tannoury: Department of Gastroenterology, Henri Mondor Hospital, APHP, Paris Est-Créteil Val de Marne University, Creteil, France. Maria Nachury, Benjamin Pariente, Pauline Wils: Department of Gastroenterology, Huriez Hospital, Université de Lille, Lille, France. Yoram Bouhnik, Carmen Stefanescu, Xavier Treton: Department of Gastroenterology, IBD and Nutrition Support, Beaujon Hospital, University Paris 7 Denis Diderot, Clichy, France. Melanie Serrero:

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## Supplementary Data

Supplementary data are available at *ECCO-JCC* online.

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