*Original Article*
# Chronic illness trajectory-based nursing intervention improves the self-care abilities of patients with inflammatory bowel disease

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**Abstract:** Objective: To explore the effects of chronic illness trajectory model (CITM)-based nursing interventions on anxiety, depression, quality of life, medication adherence, and dietary compliance among patients with inflammatory bowel disease (IBD). Methods: A retrospective analysis was performed on 112 IBD patients admitted to Shandong Provincial Hospital Affiliated to Shandong First Medical University from January to December 2023. Patients were divided into two groups: a control group (n=62) receiving routine nursing care, and an observation group (n=50) receiving CITM-based nursing care. Assessments of anxiety, depression, self-care ability, daily living ability, and symptom severity were conducted before and after the intervention. Results: Post-intervention, the observation group demonstrated significantly higher quality of life scores at 1 and 3 months compared to the control group (both P<0.05). Additionally, the observation group showed improved medication adherence and lower symptom scores, with significant differences (both P<0.05). Anxiety and depression levels were also significantly reduced in the observation group compared to the control group (both P<0.05). Conclusion: CITM-based nursing intervention significantly enhances self-care abilities, quality of life, and compliance with medication and dietary regimens in IBD patients. Furthermore, it effectively alleviates anxiety and depression, supporting comprehensive management of this chronic disease.

**Keywords:** Chronic illness trajectory, nursing intervention, inflammatory bowel disease

## Introduction

Inflammatory bowel disease (IBD), encompassing ulcerative colitis and Crohn's disease (CD), represents chronic inflammatory conditions of the intestines predominantly diagnosed in young adults [1]. Over the past decade, the incidence of IBD in China has surged, increasing more than 24-fold [2]. Despite advances in treatment, IBD remains incurable, with internationally recognized goals focusing on inducing and maintaining clinical remission, preventing complications, and enhancing patient quality of life [3]. Effective nursing interventions are pivotal in facilitating patient recovery and improving quality of life [4]. Studies indicate that disease-related symptoms significantly degrade the quality of life and are primary factors affecting IBD patients [5-7]. Enhancing the quality of life and reducing mortality through effective healthcare and nursing interventions are current research priorities [8].

Research has demonstrated that pediatric IBD patients are more prone to anxiety and depression than their healthy counterparts [9], a trend that extends to adults. Additionally, although biologic agents can reduce disease severity, about 40% of CD patients experience anxiety due to insufficient information and challenges in managing symptoms, with 24% suffering from depression [10]. The severity of CD is positively correlated with psychological distress, with self-perceived stress being a predictive factor for early disease recurrence, significantly impacting mental well-being [11]. Increasing attention is being given to the mental health of IBD patients. Some studies have explored various interventions like continuity of care, mindfulness-based stress reduction, relaxation

training, and music therapy, which have yielded some positive outcomes but also exhibit limitations [12-16]. The varying needs of patients and their families at different treatment stages are not yet fully addressed, underscoring a significant gap in meeting individualized needs and understanding patient experiences throughout the disease progression. Thus, it is imperative to develop and integrate intervention programs tailored to the dynamic needs of patients into clinical nursing practices.

The Chronic Illness Trajectory Model (CITM), first proposed by Corbin and Strauss in the 1990s, advocates that nursing interventions should be adapted to the different stages of a chronic illness trajectory to prevent complications, control symptoms, stabilize psychological states, and improve quality of life [17, 18]. This model has been effectively utilized in managing diseases such as diabetes, breast cancer, stroke, and hypertension, significantly enhancing patient outcomes by guiding clinical nursing practices [19, 20]. Chen [21] implemented this model to support cancer survivors during transitional phases, underscoring its value in patient care. While existing research highlights the model's effectiveness in managing various diseases [22, 23], its application in IBD has not yet been reported, leaving its potential benefits in this area unexplored.

This study seeks to integrate the CITM into the nursing care of patients with inflammatory bowel disease, aiming to assess its overall impact on this patient group. The objectives are to alleviate negative emotions, improve self-care capabilities, and enhance quality of life.

## Methods and materials

### Study design

In our retrospective study, we selected 112 eligible IBD patients who met the enrollment criteria at Shandong Provincial Hospital Affiliated with Shandong First Medical University from January to December 2023. Of these, 62 patients who received routine nursing care were assigned to the control group, while 50 patients who underwent CITM-based nursing care were placed in the observation group. This study received approval from the Ethics Committee of Shandong Provincial Hospital

Affiliated with Shandong First Medical University.

### Inclusion and exclusion criteria

Inclusion criteria: 1) Diagnosed with inflammatory bowel disease (IBD) according to established criteria [24]. 2) Aged 18 years or older. 3) Complete clinical data available.

Exclusion criteria: 1) Critically ill patients unable to perform activities of daily living. 2) Individuals with cognitive impairments or language communication barriers. 3) Non-compliant patients or those unwilling to continue participation. 4) Patients with incomplete clinical data.

### Methods

Patients in the control group received routine care. Specific interventions included: During hospitalization, nurses provided postoperative health education and psychological counseling based on the IBD Treatment Center's standard practices. After discharge, follow-up nurses conducted monthly routine telephone follow-ups and health education for patients and their families. These sessions, lasting 45 minutes, covered medication guidance, dietary advice, life care, follow-up reminders, and addressed any questions regarding the disease.

The observation group received CITM-based nursing care in addition to the routine care provided to the control group. Specific intervention measures included: 1) Establishment of a nursing intervention team: A team was formed specifically for this study, consisting of one dedicated IBD physician and three nurses, all of whom had a comprehensive understanding of the required nursing care for this disease phase, specialized knowledge in IBD and psychology, and strong communication, expression, and coordination skills. 2) Disease-related knowledge education. After discharge, patients were moved to a recuperation area where, in the first week, they received disease knowledge manuals, attended lectures on IBD, and participated in visual presentations explaining disease progression. Comprehension was assessed through selective questioning. In weeks two to four, patients recapitulated the content to reinforce learning. 3) Medication and dietary guidance: Given the critical role of medication adherence and dietary management in IBD

treatment success, emphasis was placed in the second and third weeks on enhancing patient awareness of these aspects. Team members conveyed the importance of compliance using understandable explanations based on domestic and international research findings. Additionally, patients were instructed to set alarms and download apps to ensure timely medication intake. 4) Symptom monitoring and management: Patients were taught to recognize and manage common IBD symptoms such as abdominal pain, diarrhea, and rectal bleeding. Keeping a symptom record was emphasized as a continuous activity throughout the follow-up period. 5) Psychological counseling and daily life care guidance: In the fourth week, prior to patients returning home, a WeChat group was established for IBD patients. This platform facilitated the upload of psychological self-assessment questionnaires and corresponding psychological adjustment techniques. Patients were taught meditation and mindfulness techniques to promote mental tranquility. Individualized psychological cognitive interventions were conducted on Mondays, Wednesdays, and Fridays, focusing on the negative correlation between emotional distress and disease relapse. 6) Daily functional exercise and communication: Guidance on daily functional exercises was provided, and frequently asked questions were posted in the group announcements to ensure all patients had access to consistent information. After patients returned home, group members conducted bi-weekly telephone follow-ups to assist patients and their families with ongoing disease management issues.

*Outcome measures*

The primary outcomes measured in the study included quality of life and levels of anxiety and depression. The Simplified Chinese version of the Inflammatory Bowel Disease Quality of Life Questionnaire (IBDQ) was used, which is the most widely utilized disease-specific quality of life measure for IBD globally [25]. The IBDQ demonstrates high reliability and validity, with a Cronbach's alpha of 0.986. It comprises 32 items across four dimensions: intestinal symptoms, systemic symptoms, emotional function, and social function. Each item is rated on a 7-point scale, where 1 indicates the worst and 7 the best possible condition, yielding a total

score range from 32 to 224, with higher scores indicating better quality of life.

The Hospital Anxiety and Depression Scale (HADS) [26] is employed to assess the anxiety and depression status of patients. This widely used self-assessment scale features an Anxiety Subscale (HADS-A) and a Depression Subscale (HADS-D), each containing 7 items for a total of 14. Items are scored from 0 to 3, with total subscale scores ranging from 0 to 21. Scores from 0 to 7 are considered negative, 8 to 10 borderline, and 11 to 21 positive, indicating higher levels of anxiety or depression.

Secondary outcomes were measured using the Inflammatory Bowel Disease Symptom Severity Index (IBD-SSI), developed by Swaminathan et al. [27]. This scale assesses ten symptoms: bloody stool, abdominal pain, abdominal distension, diarrhea, fever, urgency, loss of appetite, anal burning, fatigue, and weight loss. The first five symptoms are rated on a Likert scale from 0 to 4, while the last five are assessed through closed-ended questions, with the total score ranging from 0 to 35. Higher scores indicate more severe symptoms and signs.

*Statistical analysis*

Statistical analysis was conducted using SPSS 24.0. The normality of metric data was assessed using the Kolmogorov-Smirnov test. Normally distributed data were presented as mean ± standard deviation. The independent sample t-test was employed for between-group comparisons. Non-normally distributed data were represented by the median (P25, P75), and the Mann-Whitney U test was used for between-group comparisons. Categorical data were presented as counts (%), with the chi-square test used for between-group comparisons. Pearson correlation analysis was conducted for normally distributed data, Spearman correlation analysis for non-normally distributed continuous variables, and Kendall's tau-b correlation analysis for non-normally distributed continuous variables with categorical data. Multiple comparisons among all experimental and control groups utilized Student's t-test, one-way ANOVA with Tukey's test, or two-way ANOVA, as appropriate. A *p*-value of <0.05 was considered statistically significant for all tests.

**Table 1.** Comparison of clinical characteristics

|  | Observation group (n=50) | Control group (n=62) | t | P |
|---|---|---|---|---|
| Gender |  |  | 0.186 | 0.684 |
| Male | 30 | 38 |  |  |
| Female | 20 | 24 |  |  |
| Age | 29.34±3.54 | 26.97±4.61 | 0.487 | 0.781 |
| Marriage |  |  | 2.197 | 0.164 |
| Married | 24 | 24 |  |  |
| Unmarried | 26 | 38 |  |  |
| Disease course | 3.14±1.01 | 3.54±0.97 | -0.342 | 0.674 |
| Type of disease |  |  | 2.098 | 0.169 |
| Crohn's disease | 20 | 22 |  |  |
| Ulcerative colitis | 30 | 30 |  |  |
| Body mass index (kg/m$^2$) | 21.5±4.3 | 21.2±3.1 | 1.986 | 0.881 |
| Hypertension | 14 | 19 | -0.876 | 0.067 |
| Diabetes | 15 | 21 | 1.996 | 0.880 |
| Smoking | 21 | 27 | 0.092 | 0.054 |
| Drinking | 13 | 16 | 3.764 | 0.211 |

## Results

*Comparison of clinical characteristics*

The two groups were comparable in terms of gender, age, BMI, marital status, disease duration, type of disease, and past medical history, with no statistically significant differences observed (all P>0.05). Demographics and clinical characteristics were similar between the groups (both P>0.05) (**Table 1**).

*Comparison of IBDQ scores*

Initially, there was no statistically significant difference in IBDQ scores between the two intervention groups (P>0.05). However, significant improvements were observed in the observation group at 1 and 3 months post-intervention (both P<0.05) (**Table 2**).

*Comparison of HADS-A between the two groups*

Before the intervention, HADS-A scores showed no significant differences between the groups (P>0.05). Post-intervention assessments at 1 and 3 months revealed significantly lower anxiety scores in the observation group compared to the control group, indicating statistically significant improvements (both P<0.05) (**Table 3**).

*Comparison of HADS-D between the two groups*

Similarly, no significant differences were noted in HADS-D scores between the groups before the intervention (P>0.05). However, at 1 and 3 months after the intervention, the observation group exhibited significantly lower depression scores than the control group, with these differences being statistically significant (both P<0.05) (**Table 4**).

*Comparison of quantitative scores of IBD symptom and sign grading*

There were no statistically significant differences in the scores for IBD symptom and sign grading between the groups prior to the intervention (P>0.05). Yet, at 1 month and 3 months post-intervention, the observation group showed significantly better scores than the control group, highlighting a statistically significant improvement (both P<0.05) (**Figure 1**).

*Comparison of self-care ability and scores in various dimensions between two groups*

Initial comparisons of total scores and the four dimensions of self-care ability showed no significant differences between the two groups before the intervention (P>0.05). However, significant improvements were noted in the observation group at 1 month and 3 months post-intervention, both in total scores and across all dimensions of self-care ability, with statistically significant differences (both P<0.05) (**Table 5**).

*Analysis of variance for repeated measures of self-care ability and scores in various dimensions*

The effects of the interventions on the total score of chronic disease self-management ability and on individual dimensions - self-care skills, self-responsibility, self-concept, and health knowledge level - varied significantly between the two groups (all P<0.05). There was also a significant interaction between time and intervention type on these scores (P<0.05) (**Table 6**).

**Table 2.** Comparison of IBDQ scores

| Project | | Intestinal symptoms | Systemic symptoms | Emotional ability | Social ability | Total score |
|---|---|---|---|---|---|---|
| Before intervention | Observation group (n=50) | 41.26±2.94 | 22.01±2.03 | 57.46±3.15 | 21.63±1.03 | 142.94±3.56 |
| | Control group (n=62) | 43.12±3.05 | 20.36±2.63 | 57.74±3.47 | 19.87±1.84 | 141.03±5.52 |
| | t | -1.47 | 1.745 | -0.043 | 1.789 | 0.578 |
| | p | 0.148 | 0.097 | 0.974 | 0.94 | 0.564 |
| 1 month intervention | Observation group (n=50) | 52.89±2.84 | 25.64±1.52 | 62.84±3.21 | 23.79±1.36 | 165.21±4.23 |
| | Control group (n=62) | 47.81±3.04 | 22.89±1.56 | 60.09±4.02 | 20.49±1.75 | 152.01±5.89 |
| | t | 4.969 | 4.723 | 2.364 | 6.264 | 7.852 |
| | p | 0.001 | 0.001 | 0.028 | 0.001 | 0.001 |
| 3 months intervention | Observation group (n=50) | 61.48±4.08 | 24.56±1.50 | 65.48±4.39 | 26.45±1.24 | 178.03±4.64 |
| | Control group (n=62) | 58.26±2.01 | 20.59±1.65 | 61.29±2.74 | 22.72±1.16 | 163.41±4.46 |
| | t | 2.386 | 7.368 | 3.336 | 9.187 | 9.326 |
| | p | 0.024 | 0.001 | 0.002 | 0.001 | 0.001 |

Inflammatory Bowel Disease Quality of Life Questionnaire (IBDQ).

**Table 3.** Comparison of HADS-A between the two groups

| Group | | Observation group (n=50) | Control group (n=62) | $\chi^2$ | P |
|---|---|---|---|---|---|
| Before intervention | Negative | 38 | 50 | | |
| | Suspected positive | 8 | 9 | 0.346 | 0.843 |
| | Positive | 4 | 3 | | |
| 1 month intervention | Negative | 37 | 40 | | |
| | Suspected positive | 10 | 16 | 6.154 | 0.049 |
| | Positive | 3 | 6 | | |
| 3 months intervention | Negative | 39 | 36 | | |
| | Suspected positive | 9 | 18 | 6.954 | 0.035 |
| | Positive | 2 | 8 | | |

Anxiety Subscale of the Hospital Anxiety and Depression Scale (HADS-A).

**Table 4.** Comparison of HADS-D between the two groups

| Group | | Observation group (n=50) | Control group (n=62) | $\chi^2$ | P |
|---|---|---|---|---|---|
| Before intervention | Negative | 39 | 36 | | |
| | Suspected positive | 9 | 11 | 0.784 | 0.684 |
| | Positive | 2 | 5 | | |
| 1 month intervention | Negative | 42 | 42 | | |
| | Suspected positive | 6 | 10 | 6.068 | 0.047 |
| | Positive | 2 | 9 | | |
| 3 months intervention | Negative | 40 | 43 | | |
| | Suspected positive | 8 | 9 | 8.23 | 0.019 |
| | Positive | 2 | 10 | | |

Depression Subscale of the Hospital Anxiety and Depression Scale (HADS-D).

## Discussion

Our study observed that CITM-based nursing interventions in IBD patients led to a more pronounced reduction in anxiety and depression scores compared to the control group, both 1 month and 3 months post-intervention. The levels of anxiety and depression in the intervention group significantly decreased post-intervention compared to pre-intervention values. These findings suggest that CITM-based nursing interventions can effectively alleviate anxi-
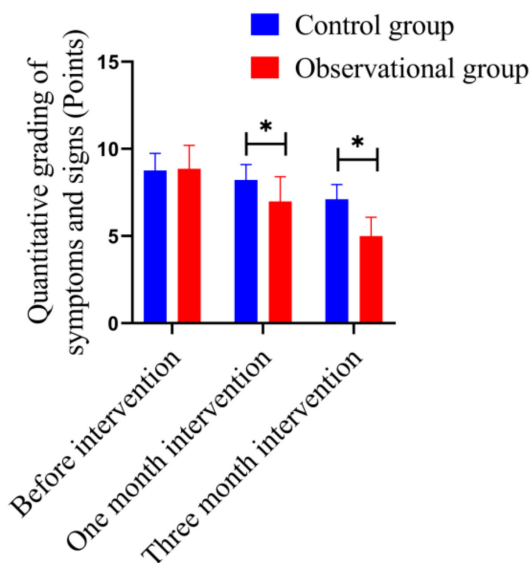
**Figure 1.** Comparison of quantitative scores of IBD symptom and sign grading between two groups. Inflammatory bowel disease (IBD).

ety and depression in IBD patients, enhance psychological recovery, and facilitate their reintegration into family and society while reducing other negative emotions.

The analysis indicates that IBD patients encounter various challenges throughout their disease course, with each stage of psychological distress linked to specific triggers that can fluctuate anxiety and depression levels. The intervention strategy in this study provided targeted disease knowledge, psychological support, and lifestyle interventions tailored to the phases from disease onset through to the unstable period, with varying emphases at each stage. This approach ensured that the intervention plan was not uniform but tailored to address specific issues as they arose. From identifying problems to formulating intervention plans, precise strategies were employed that considered patients' personal preferences, thereby enhancing their engagement, improving their emotional states, and mitigating potential psychological barriers [28, 29].

During the intervention, researchers employed strategies such as imparting health knowledge to understand and mitigate the triggers of patients' negative emotions, combined with engaging their interests and diverting their attention to correct misconceptions and foster inner passion and hope. This approach aligns with findings by Oh et al. [30], which demon-

strated that health education combined with effective psychological interventions can enhance long-term psychological resilience and alleviate negative emotions. Health education likely aids patients in understanding disease-related knowledge and treatment options at each stage, enhances communication between patients and healthcare providers, dispels myths about the disease, clarifies effective recovery strategies, and improves self-management and disease control abilities [31].

Additionally, by integrating patients' real experiences and identifying triggers of negative emotions, tailored psychological support was provided, which significantly improved symptoms of depression, anxiety, and other negative emotions. This support ultimately helped patients develop a positive and healthy outlook on life, restoring confidence and infusing them with positive energy [32]. After discharge, researchers enhanced family functioning and utilized various communication methods, such as daily WeChat updates, to monitor psychological trends and promptly address any risks of worsening negative emotions.

Our study revealed statistically significant improvements in the IBDQ scores for the dimensions of quality of life among patients who received CITM-based nursing interventions after 1 month and 3 months post-intervention (P<0.05). This indicates that CITM-based nursing interventions can effectively enhance the quality of life of IBD patients. The transitional period of 1 month in the recuperation area following surgery addresses the gap in healthcare information, continuity of nursing services, and difficulty in meeting health needs after discharge. Furthermore, this period enhances patients' awareness of disease management, educates them on how to appropriately confront their illness, and supports them in maintaining a better physical and mental state. This comprehensive approach enables patients to manage their condition more effectively and sustain a higher quality of life [33].

After implementing CITM-based nursing interventions, the daily living abilities of IBD patients improved significantly. The intervention group demonstrated higher levels of daily living ability compared to the control group, with the improvements becoming more pronounced over time. Although the control group

**Table 5.** Comparison of self-care ability and scores in various dimensions between the two groups

| Dimension | | Self care ability | | | F | P |
|---|---|---|---|---|---|---|
| | | Before intervention | 1 month intervention | 3 months intervention | | |
| Self skills | Experimental group (n=50) | 20.03±3.397 | 22.06±3.156 | 24.65±3.941 | 22.138 | <0.001 |
| | Control group (n=62) | 19.43±2.894 | 20.84±2.846 | 21.79±2.879 | 10.639 | <0.001 |
| | t | 1.046 | 2.231 | 4.226 | | |
| | p | 0.264 | 0.064 | <0.001 | | |
| Self responsibility | Experimental group (n=50) | 15.78±3.795 | 18.36±3.094 | 19.23±2.168 | 15.597 | <0.001 |
| | Control group (n=62) | 15.98±2.564 | 17.13±1.558 | 17.36±2.116 | 5.664 | 0.006 |
| | t | -0.184 | 2.794 | 4.235 | | |
| | p | 0.894 | 0.004 | <0.001 | | |
| Self-concept | Experimental group (n=50) | 15.03±3.087 | 17.56±2.738 | 20.06±3.647 | | |
| | Control group (n=62) | 15.65±3.398 | 16.38±2.687 | 17.29±2.846 | | |
| | t | -0.567 | 2.189 | 4.698 | | |
| | p | 0.568 | 0.024 | <0.001 | | |
| Health knowledge level | Experimental group (n=50) | 21.32±3.889 | 22.56±2.978 | 24.65±3.365 | 8.562 | <0.001 |
| | Control group (n=62) | 20.01±3.025 | 21.68±2.065 | 21.87±2.163 | 6.179 | 0.004 |
| | t | 1.736 | 2.364 | 5.146 | | |
| | p | 0.084 | 0.019 | <0.001 | | |
| Self care total score | Experimental group (n=50) | 71.98±7.965 | 80.36±5.964 | 88.65±6.754 | 79.987 | <0.001 |
| | Control group (n=62) | 71.64±5.794 | 75.86±4.598 | 78.23±4.687 | 36.541 | <0.001 |
| | t | 1.002 | 4.841 | 9.364 | | |
| | p | 0.287 | 0.002 | <0.001 | | |

**Table 6.** Analysis of variance (ANOVA) for repeated measures of self-care ability and scores in various dimensions before and after intervention

| Dimension | Intervention main effect | | Time main effect | | Intervention time interaction effect | |
|---|---|---|---|---|---|---|
| | F | P | F | P | F | P |
| Self skills | 9.364 | 0.004 | 53.746 | <0.001 | 5.678 | 0.006 |
| Self responsibility | 6.187 | 0.016 | 41.958 | <0.001 | 5.697 | 0.006 |
| Self-concept | 6.598 | 0.026 | 54.658 | <0.001 | 11.457 | <0.001 |
| Health knowledge level | 14.687 | <0.001 | 29.631 | <0.001 | 4.197 | 0.017 |
| Self care total score | 36.328 | <0.001 | 168.952 | <0.001 | 20.569 | <0.001 |

also experienced a slight improvement due to natural disease progression, the outcomes were consistently better in the intervention group. This suggests that CITM-based nursing interventions can effectively enhance the daily living abilities of IBD patients, and the longer the intervention, the greater the improvement.

The CITM adapts interventions to reflect the varying characteristics of different disease stages, with the focus of intervention shifting as the disease progresses [34]. In practice, the intervention incorporated bedside simulation training, personalized care, and health education tailored to the staging needs, allow-ing patients to engage based on their interests, and providing ongoing guidance and evaluation. This approach acknowledges the unique experiences and challenges posed by the disease at each stage, offering tailored psychological support and rehabilitation skills.

Research [35] has shown that CITM not only enhances patients' physical role function and cognitive abilities but also helps them understand and manage role changes, grasp the dynamics of daily living behaviors and self-concepts, and improve their adaptability and motivation. By aligning interventions with patient needs and preferences, the model more effectively meets their care requirements.

Furthermore, the study leveraged technology by requiring patients to report daily via WeChat, arranging remote video appointments on weekends, and conducting home visits to provide guidance. This approach helped increase patient motivation, facilitated their reintegration into family and society, and significantly promoted their daily living abilities.

This study, while providing valuable insights, is subject to several limitations. Firstly, the duration of the study was short, precluding the evaluation of long-term patient outcomes. Secondly, being a single-center, small-sample retrospective analysis, there is potential for selection bias. Additionally, the intervention methods were limited, and the study did not compare multiple intervention strategies. Lastly, the focus was exclusively on IBD patients, without assessing the efficacy of the interventions for other diseases. Future research should aim to expand the sample size, extend the duration of longitudinal studies, and develop nursing intervention plans that cover other stages of IBD CITM-based.

In summary, chronic illness trajectory-based nursing intervention can effectively improve the self-care abilities and daily life skills of IBD patients, significantly enhance their quality of life, medication and dietary compliance, and alleviate their anxiety and depression. It also ensures effective management of their chronic illness. Future studies should consider expanding the sample size, prolonging the duration of interventions, and exploring nursing intervention plans for additional stages of IBD, guided by the CITM.

### Disclosure of conflict of interest

None.

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