



International Journal of Innovative Technologies in Social Science

e-ISSN: 2544-9435

Operating Publisher
SciFormat Publishing Inc.
ISNI: 0000 0005 1449 8214

2734 17 Avenue SW,
Calgary, Alberta, T3E0A7,
Canada
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ARTICLE TITLE	BIOPSYCHOSOCIAL BURDEN OF IRRITABLE BOWEL SYNDROME: A NARRATIVE REVIEW OF QUALITY OF LIFE, MENTAL HEALTH AND DIGITAL HEALTH PERSPECTIVES
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DOI	https://doi.org/10.31435/ijitss.2(50).2026.5688
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RECEIVED	28 April 2026
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ACCEPTED	18 June 2026
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PUBLISHED	30 June 2026
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BIOPSYCHOSOCIAL BURDEN OF IRRITABLE BOWEL SYNDROME: A NARRATIVE REVIEW OF QUALITY OF LIFE, MENTAL HEALTH AND DIGITAL HEALTH PERSPECTIVES

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ABSTRACT

Irritable bowel syndrome (IBS) is a common disorder of gut-brain interaction characterized by recurrent abdominal pain associated with altered bowel habits in the absence of structural abnormalities that could fully explain the reported symptoms. Despite the lack of organic lesions typical of structural gastrointestinal diseases, IBS remains a significant diagnostic and therapeutic challenge because of its heterogeneous clinical presentation, multifactorial pathogenesis, and substantial impact on patients' quality of life. The aim of this review was to summarize current evidence regarding epidemiology, pathogenesis, clinical presentation, diagnosis, treatment, and quality-of-life burden associated with IBS. Particular attention was paid to the variability in prevalence estimates depending on diagnostic criteria and study methodology, as well as to the role of the gut-brain axis, gut microbiota, visceral hypersensitivity, immune activation, and psychosocial factors in the development and persistence of symptoms. The review also highlights the importance of a positive diagnostic strategy based on Rome IV criteria, identification of alarm features, and selective use of additional tests. Current therapeutic approaches require individualized and integrated management that combines patient education, dietary interventions, psychological therapies, and symptom-directed pharmacological treatment. IBS does not increase mortality; however, it markedly impairs social, occupational, and emotional functioning. A multidimensional, biopsychosocial approach therefore appears essential for improving both symptom control and overall patient well-being.

KEYWORDS

Irritable Bowel Syndrome, Gut-Brain Axis, Diagnosis, Treatment, Quality Of Life

CITATION

Szczepan Półchłopek, Kacper Szpanelewski, Radosław Kołodziej, Anna Kołodziej, Szymon Lulek, Jakub Klecha, Emilia Kucab, Katarzyna Dziki, Izabella Kula, Joanna Ciemięga, Wiktor Adamiec, Damian Danilczuk. (2026) Biopsychosocial Burden of Irritable Bowel Syndrome: a Narrative Review of Quality of Life, Mental Health and Digital Health Perspectives. *International Journal of Innovative Technologies in Social Science*. 2(50). doi: 10.31435/ijitss.2(50).2026.5688

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1. Introduction

Irritable bowel syndrome (IBS) is a chronic disorder of gut-brain interaction and one of the most commonly diagnosed disorders in this category. The condition is characterized by recurrent abdominal pain associated with changes in stool frequency and/or stool consistency, in the absence of identifiable structural or biochemical abnormalities that could fully explain the reported symptoms (Huang et al., 2023; Hung et al., 2023). The diagnosis of IBS is based primarily on the Rome IV criteria, which remain the cornerstone of contemporary clinical practice and a reference standard for research on this condition (Huang et al., 2023; Hung et al., 2023).

IBS is common worldwide; however, its estimated prevalence varies considerably depending on the diagnostic criteria applied, study methodology, and the characteristics of the population analyzed. Its heterogeneous clinical presentation and multifactorial pathogenesis make IBS a persistent diagnostic and therapeutic challenge (Huang et al., 2023; Hung et al., 2023).

The clinical significance of IBS extends beyond the presence of intestinal symptoms. The disorder markedly reduces patients' quality of life, frequently coexists with anxiety and depression, and is associated with a substantial social and economic burden (Huang et al., 2023; Hung et al., 2023; Staudacher et al., 2023). The contemporary understanding of IBS emphasizes its biopsychosocial nature; therefore, both diagnosis and treatment should take into account not only somatic symptoms, but also psychological factors and the impact of the disorder on the patient's daily functioning. Increasing attention is also being paid to the need for a multidisciplinary approach that includes gastroenterological assessment, dietary interventions, and psychological support (Huang et al., 2023; Hung et al., 2023; Staudacher et al., 2023).

The aim of this review article is to present current data on the epidemiology, pathogenesis, clinical presentation, diagnosis, and treatment of IBS, as well as the impact of the disorder on patients' quality of life.

2. Materials and Methods

This article is a narrative review. The literature search was conducted using the PubMed database. Only English-language full-text open-access articles published within the last 6 years were included. The search used keywords related to irritable bowel syndrome, including its epidemiology, pathogenesis, clinical presentation, diagnosis, treatment, and impact on quality of life. Original studies, review articles, meta-analyses, and clinical guidelines relevant to IBS were considered. Articles older than 6 years, papers not available in open access, and studies not directly related to IBS were excluded.

3. IBS Epidemiology

The prevalence of IBS remains dependent on the diagnostic criteria applied, the sampling method, and the characteristics of the study population. Therefore, data on the prevalence of IBS should be interpreted with careful consideration of study methodology (Ballena-Caicedo et al., 2025; Huang et al., 2023).

Prevalence and the significance of diagnostic criteria

In the review by Huang et al. (2023), it was emphasized that the Rome Foundation Global Study reported an IBS prevalence of 3.8% according to the Rome IV criteria and 10.1% according to the Rome III criteria. These data illustrate that even when the same disease entity is being analyzed, prevalence estimates may differ substantially depending on the case definition adopted (Huang et al., 2023).

A different picture was presented in the more recent meta-analysis by Ballena-Caicedo et al. (2025), which included 43 studies and 188,885 participants. The authors estimated the global prevalence of IBS at 13.21% according to Rome III and 17.14% according to Rome IV; however, when the analysis was restricted to studies using random sampling, these values were 11.19% and 13.28%, respectively. This discrepancy demonstrates that comparisons between studies based on Rome III and Rome IV are not straightforward and also depend on study selection, population characteristics, and methodology. The high heterogeneity across studies indicates that epidemiological data should be interpreted with caution, even when only more recent studies are taken into account (Ballena-Caicedo et al., 2025).

Epidemiological data on IBS are best presented as a range of values, taking into account the Rome criteria applied, the type of study, and the method used to recruit respondents (Ballena-Caicedo et al., 2025; Huang et al., 2023).

Regional variation

Available studies consistently indicate substantial regional variability in the prevalence of IBS. Huang et al. (2023) noted that, in analyses based on the Rome IV criteria, the values reported in Europe and the United States were similar, whereas greater discrepancies were observed in some Asian countries and in internet-based studies.

A good example is the international cross-sectional study by Takeoka et al. (2023), conducted in urban populations in Japan, China, and South Korea (specifically Tokyo and Fukuoka, Beijing, and Seoul, respectively). The overall prevalence of IBS in this study was 12.6%; however, significant differences were found between the populations examined: 14.9% in Japan, 5.5% in China, and 15.6% in South Korea. These findings demonstrate that even within a single broad geographic region, a uniform distribution of IBS should not be assumed (Takeoka et al., 2023).

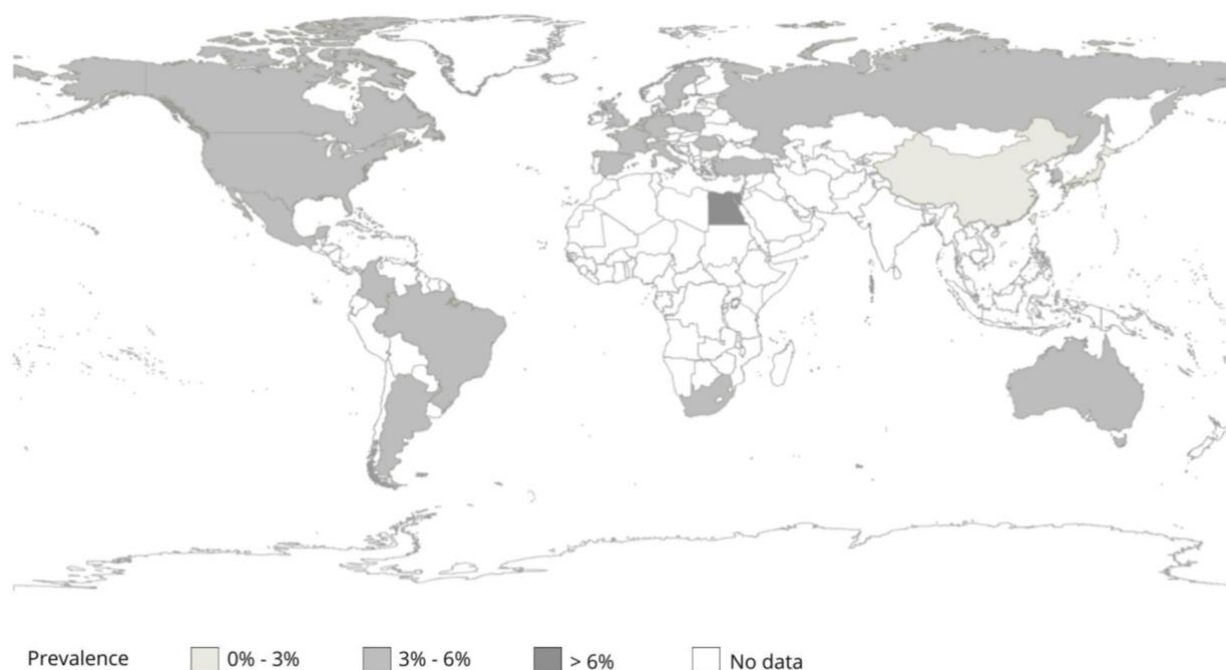


Fig. 1. Variation in the prevalence of IBS according to the Rome IV criteria across selected regions of the world.

Note: The map presents data from the Rome Foundation Global Study internet surveys; the highest values were recorded, among others, in Egypt, whereas lower values were observed in some Asian countries, according to Huang et al. (2023).

Additional data are also provided by population-based studies conducted in individual countries and regions. In a study of the adult population of Gibraltar, the prevalence of IBS according to the Rome IV criteria was 5.2%, demonstrating that estimates obtained in individual European population-based studies may be markedly lower than those reported in some more recent global analyses (Ballena-Caicedo et al., 2025; Kovács et al., 2022). In turn, the systematic review by Almansour (2024), which included 52 studies from Arab countries, revealed substantial variability in the prevalence of IBS across the Arab world, as well as a predominance of women in most analyses.

Regional studies should not, therefore, serve as the basis for global generalizations; however, they are highly useful in illustrating the epidemiological heterogeneity of IBS (Almansour, 2024; Huang et al., 2023; Kovács et al., 2022; Takeoka et al., 2023).

Sex and age

Sex-related differences are among the most consistently reported epidemiological findings in IBS (Almansour, 2024; Ballena-Caicedo et al., 2025; Huang et al., 2023). In the meta-analysis by Ballena-Caicedo et al. (2025), the prevalence of IBS according to the Rome IV criteria was 20.17% in women and 11.45% in men, while according to the Rome III criteria it was 15.69% and 11.10%, respectively. A similar pattern was observed in the population-based study from Gibraltar and in the systematic review concerning the Arab world (Almansour, 2024; Kovács et al., 2022).

At the same time, regional data suggest that the magnitude of female predominance is not identical across all populations. Huang et al. (2023) noted that although most earlier studies indicated a higher prevalence of IBS in women, in some Asian studies the differences between the sexes were small, and in selected analyses or IBS subtypes a male predominance was also observed. This observation supports a cautious approach when extrapolating data from one region to the global population (Huang et al., 2023; Takeoka et al., 2023).

With regard to age, more recent reviews do not provide a single uniformly reported quantitative measure, but the overall pattern remains relatively consistent. Huang et al. (2023) indicated that the highest prevalence was observed in younger individuals, particularly among students and young adults, and that prevalence decreased with age. Owing to the methodological heterogeneity of the studies, age-related data should be

interpreted with caution, and quantitative comparisons across individual analyses are of limited value (Huang et al., 2023).

In summary, the epidemiology of IBS should be interpreted with consideration of differences in diagnostic criteria, substantial regional variability, and the influence of sex and the likely influence of age on the estimates obtained (Ballena-Caicedo et al., 2025; Huang et al., 2023).

4. IBS Pathogenesis

The pathogenesis of irritable bowel syndrome (IBS) is currently understood as a multifactorial process involving disturbances in gut–brain axis communication, intestinal microbiota dysbiosis, epithelial barrier dysfunction, immune activation, visceral hypersensitivity, and psychosocial factors (Cheung & Kenway, 2026; Huang et al., 2023; Soufan et al., 2025). Contemporary reviews emphasize that the contribution of individual mechanisms may vary among patients; therefore, IBS should be viewed as a syndrome of heterogeneous, partially overlapping biological mechanisms rather than as a single uniform pathophysiological model (Cheung & Kenway, 2026; Huang et al., 2023). In addition, an umbrella review published in 2025 showed that the major categories of risk factors for IBS include both psychological and microbiome-related factors, which indirectly supports the biopsychosocial conceptualization of this disorder (Sulaimi et al., 2025).

Gut–brain axis

The gut–brain axis constitutes a bidirectional communication network linking the central nervous system, the enteric nervous system, the autonomic nervous system, the hypothalamic–pituitary–adrenal (HPA) axis, the immune system, and the intestinal microbiota (Cheung & Kenway, 2026; Huang et al., 2023; Soufan et al., 2025). Disruption of homeostasis within this axis is considered one of the central elements in the pathogenesis of IBS, as it may simultaneously affect gastrointestinal motility, secretion, intestinal barrier permeability, pain perception, and mood regulation (Cheung & Kenway, 2026; Huang et al., 2023; Soufan et al., 2025).

The importance of the gut–brain axis arises from the interplay of at least three major signaling pathways: neuronal, neuroendocrine, and immunological (Cheung & Kenway, 2026; Soufan et al., 2025). In the neuronal pathway, afferent fibers of the vagus nerve and enteric sensory pathways play an important role by transmitting information to the central nervous system regarding the composition of intestinal contents, the state of the epithelial barrier, and inflammatory activity (Cheung & Kenway, 2026; Soufan et al., 2025). In the neuroendocrine pathway, enteroendocrine cells respond to bacterial metabolites and release mediators such as serotonin, GLP-1, and PYY, thereby modulating both local intestinal function and more distant circuits involved in stress responses and the perception of visceral stimuli. In turn, the immunological pathway is associated with the transmission of inflammatory signals and cytokines, which may alter pain processing and contribute to the persistence of symptoms (Cheung & Kenway, 2026; Soufan et al., 2025).

Neuroimaging studies cited in more recent reviews have shown that patients with IBS exhibit functional and structural alterations in brain regions involved in pain perception and emotional regulation, including the cingulate cortex, insula, prefrontal cortex, thalamus, and amygdala (Cheung & Kenway, 2026; Huang et al., 2023; Soufan et al., 2025). In practice, this means that even physiological stimuli originating from the gastrointestinal tract may be perceived as excessively intense or unpleasant, especially when stress, low-grade inflammation, or dysbiosis coexist (Cheung & Kenway, 2026; Huang et al., 2023; Soufan et al., 2025).

Intestinal microbiota

The intestinal microbiota is not merely a passive “background” in IBS, but rather an active regulator of metabolism, epithelial integrity, immune responses, and signaling within the gut–brain axis (Cheung & Kenway, 2026; Huang et al., 2023; Soufan et al., 2025). Reviews published between 2023 and 2026 most commonly indicated that patients with IBS exhibit features of dysbiosis, including reduced microbial diversity and disturbances in the relative abundance of selected microbial groups (Cheung & Kenway, 2026; Soufan et al., 2025). At the same time, the authors emphasize that the exact taxonomic “signature” is not consistent across studies, which may reflect geographic differences, variation in patient populations, the type of material analyzed, and heterogeneity in sequencing methods (Soufan et al., 2025).

The significance of microbial metabolic functions is much better documented than the specific list of microorganisms itself (Cheung & Kenway, 2026). Short-chain fatty acids, particularly butyrate, support the expression of tight junction proteins, promote immune tolerance, and reduce intestinal barrier permeability. Other microbiota-derived metabolites, such as bile acids, bacterial gases, or tryptophan derivatives, may in turn affect motility, secretion, enteroendocrine cell activity, and the severity of pain symptoms (Huang et al., 2023). Intestinal microorganisms also participate in the modulation of serotonin, GABA, and other neuroactive molecules, thereby influencing not only intestinal function but also mood and the stress response (Soufan et al., 2025).

Dysbiosis may promote activation of pattern-recognition receptors, increase LPS concentrations, and shift the immune response toward chronic low-grade inflammatory activation (Cheung & Kenway, 2026; Huang et al., 2023; Soufan et al., 2025). As a result, barrier integrity deteriorates, the excitability of sensory nerve endings increases, and the pathological loop linking the microbiota, inflammation, and visceral pain becomes reinforced (Cheung & Kenway, 2026;). From the perspective of IBS pathogenesis, it therefore seems more justified to view the microbiota as a dynamic modulator of intestinal and brain function rather than as a single diagnostic biomarker.

Visceral hypersensitivity

Visceral hypersensitivity is one of the best-established mechanisms responsible for abdominal pain in IBS and, according to some studies, may be present in up to approximately 60% of patients (Cheung & Kenway, 2026). This phenomenon consists of an abnormally enhanced pain response to physiological stimuli, such as stretching of the intestinal wall. It results from the interplay of peripheral and central sensitization mechanisms (Cheung & Kenway, 2026; Huang et al., 2023).

At the peripheral level, mast cells, histamine, serotonin, proteases, and pain receptors, including TRPV1, TRPV4, TRPA1, and PAR2, play an important role, as their excessive activation increases the excitability of sensory fibers in the gastrointestinal tract (Cheung & Kenway, 2026; Huang et al., 2023). Low-grade inflammation, impairment of the intestinal barrier, and exposure of nerve endings to mediators released from immune cells further lower the pain threshold and promote the persistence of symptoms (Cheung & Kenway, 2026).

Visceral hypersensitivity also has a distinct central component. Reviews have cited studies showing that, during rectal distension in patients with IBS, altered patterns of activation were observed in structures responsible for pain processing, together with impaired mechanisms of descending pain modulation (Cheung & Kenway, 2026; Huang et al., 2023; Soufan et al., 2025). Importantly, the relationship between the microbiota and visceral hypersensitivity is not limited to clinical correlations: animal models and experiments involving microbiota transplantation from patients with IBS support the hypothesis that an altered microbiome composition may itself enhance abnormal perception of visceral stimuli.

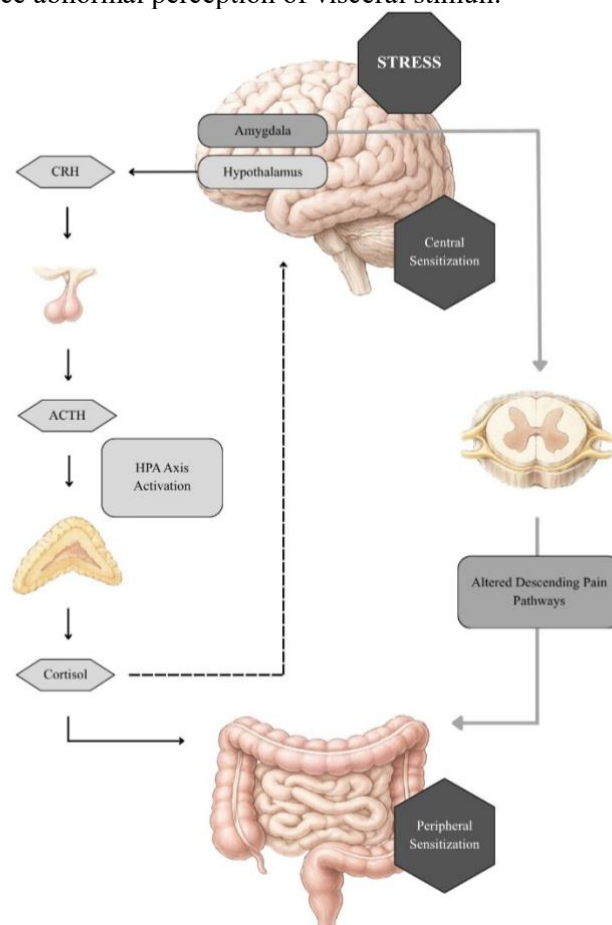


Fig. 2. Mechanisms of peripheral and central sensitization in visceral hypersensitivity in patients with IBS.

Note: The diagram illustrates the influence of stress and activation of the hypothalamic–pituitary–adrenal axis on visceral pain processing, as well as the role of peripheral sensitization, central sensitization, and impaired descending pain modulation in the exacerbation of IBS symptoms. Adapted from Cheung and Kenway (2026).

This perspective highlights that pain in IBS is related not only to the stimulus originating in the gut, but also to its amplified processing at both the peripheral and central levels, further intensified by stress and activation of the HPA axis (Cheung & Kenway, 2026; Huang et al., 2023).

Psychosocial factors

Psychosocial factors should not be regarded merely as a secondary consequence of chronic symptoms, as they may contribute both to the initiation and to the maintenance of IBS (Cheung & Kenway, 2026; Huang et al., 2023; Soufan et al., 2025; Sulaimi et al., 2025). Reviews addressing the pathogenesis of IBS have emphasized the close bidirectional relationship between stress, anxiety, depression, dysregulation of the HPA axis, and the severity of intestinal symptoms (Cheung & Kenway, 2026; Huang et al., 2023; Soufan et al., 2025).

The umbrella review by Sulaimi et al. (2025) showed that psychological factors are among the eight major categories of risk factors for the development of IBS, with anxiety disorders and depression being among the most frequently reported. These findings are consistent with mechanistic reviews in which chronic stress has been linked to increased secretion of CRH, ACTH, and cortisol, sympathetic activation, reduced vagal tone, and secondary changes in intestinal permeability, microbiota composition, and immune responses (Cheung & Kenway, 2026; Soufan et al., 2025).

As a result, psychosocial factors may act as amplifiers of already existing biological abnormalities by increasing vigilance toward visceral stimuli, enhancing autonomic nervous system excitability, impairing the resolution of pain responses, and promoting symptom chronicity (Cheung & Kenway, 2026; Huang et al., 2023; Soufan et al., 2025; Sulaimi et al., 2025). From this perspective, IBS may be regarded as an example of a disorder in which biological and psychosocial components remain in a reciprocal feedback relationship (Cheung & Kenway, 2026; Huang et al., 2023; Soufan et al., 2025; Sulaimi et al., 2025).

Taken together, the available evidence indicates that the pathogenesis of IBS is based on the interaction of several interrelated regulatory loops rather than on a single dominant mechanism. Disturbances in the gut–brain axis, dysbiosis, immune activation, visceral hypersensitivity, and psychosocial factors may mutually reinforce one another, creating the heterogeneous clinical and biological picture of the disorder (Cheung & Kenway, 2026; Huang et al., 2023; Soufan et al., 2025; Sulaimi et al., 2025). This pathogenic model helps explain why different symptom phenotypes may predominate in different patients and why a mechanistic and individualized approach currently appears to be the most justified (Cheung & Kenway, 2026; Huang et al., 2023; Soufan et al., 2025; Sulaimi et al., 2025).

5. Clinical Presentation of IBS

According to the current understanding, IBS is classified as a disorder of gut–brain interaction, and its diagnosis is based on positive symptom-based criteria rather than on a single biomarker (Cheung & Kenway, 2026; Hidayat et al., 2024). The clinical picture of the disorder centers on recurrent abdominal pain associated with defecation and a change in stool frequency and/or form; in many patients, bloating and a sensation of abdominal distension are also present (Cheung & Kenway, 2026; Huang et al., 2023).

Main symptoms

The most characteristic clinical feature of IBS is recurrent abdominal pain, which remains the central symptom in the Rome IV criteria and should be associated with defecation, a change in stool frequency, or a change in stool form (Cheung & Kenway, 2026; Hidayat et al., 2024). In clinical practice, patients may also describe their symptoms as discomfort or bloating; however, the term “discomfort” is ambiguous and is no longer included in the Rome IV criteria (Hidayat et al., 2024).

In addition to pain, common symptoms include bloating, visible abdominal distension, a sensation of incomplete evacuation, urgency, and, in some cases, the presence of mucus in the stool (Hidayat et al., 2024; Lindberg & Mohammadian, 2023). Symptom severity may fluctuate over time, and their pattern may overlap with other functional gastrointestinal disorders, particularly functional dyspepsia (Huang et al., 2023; Lindberg & Mohammadian, 2023).

The symptom profile of IBS is not uniform: in some patients, diarrhea and urgency predominate; in others, constipation with straining during defecation is the dominant feature; while in still others, alternating periods of loose and hard stools are observed. From a clinical perspective, this variability justifies the

classification of IBS into subtypes based on the predominant stool pattern (Cheung & Kenway, 2026; Wang et al., 2022).

Clinical subtypes

The symptom-based classification of IBS distinguishes IBS-C, IBS-D, IBS-M, and IBS-U. This classification is based on the predominant stool pattern and has important practical implications, as it helps organize the clinical picture, facilitates description of the patient's phenotype, and supports the selection of further management strategies (Cheung & Kenway, 2026; Wang et al., 2022).

In IBS-C, hard stools, straining during defecation, and a sensation of incomplete evacuation predominate, whereas IBS-D is typically characterized by loose stools, more frequent bowel movements, and urgency. IBS-M is defined by the alternating occurrence of diarrheal and constipating symptoms, while IBS-U is diagnosed when a patient meets the criteria for IBS but the stool pattern does not allow classification into the other subtypes (Cheung & Kenway, 2026; Wang et al., 2022).

In the large UK Biobank study based on the Rome III criteria, IBS-M was the most common subtype, further demonstrating that the clinical presentation of IBS is often mixed rather than exclusively diarrheal or constipating (Wang et al., 2022). The authors of that study also highlighted the post-infectious form of IBS, in which the onset of symptoms may be abrupt and associated with a preceding episode of gastrointestinal infection (Wang et al., 2022).

Table 1. Clinical subtypes of IBS according to the predominant stool pattern.

Subtype	Predominant stool pattern	Typical clinical profile
IBS-C	>25% stools type 1–2; <25% stools type 6–7	Constipation, straining, incomplete evacuation, bloating
IBS-D	>25% stools type 6–7; <25% stools type 1–2	Loose stools, urgency, frequent bowel movements, diarrhea-predominant phenotype
IBS-M	>25% stools type 1–2 and >25% stools type 6–7	Alternating constipation and diarrhea, fluctuating symptom burden
IBS-U	Criteria for IBS fulfilled, but stool pattern not classifiable	Symptom-based diagnosis without stable stool-profile dominance

Note: Developed based on the definitions of symptom subtypes and clinical descriptions presented in Cheung and Kenway (2026) and Wang et al. (2022).

Alarm symptoms

Although IBS is diagnosed on the basis of positive criteria, the presence of alarm symptoms warrants further diagnostic evaluation and reassessment of whether the reported complaints are truly consistent with a functional disorder (Hidayat et al., 2024; Lindberg & Mohammadian, 2023). The most important alarm features include rectal bleeding or a positive fecal occult blood test, anemia, unintentional weight loss, fever, nocturnal symptoms, new onset of symptoms after the age of 50 years, and a positive family history of colorectal cancer, inflammatory bowel disease, or celiac disease (Hidayat et al., 2024; Yang et al., 2022).

Importantly, alarm symptoms should not be treated as a simple criterion that automatically excludes IBS; rather, their presence increases the likelihood of organic disease and justifies further investigation (Hidayat et al., 2024; Yang et al., 2022). In the multicenter study by Yang et al. (2022), anemia, a positive fecal occult blood test, and unintentional weight loss had the highest predictive value for the diagnosis of organic disease.

From a clinical perspective, it should also be remembered that IBS-like symptoms may accompany other potentially treatable conditions. The most important differential diagnoses include celiac disease, microscopic colitis, inflammatory bowel disease, bile acid diarrhea, carbohydrate malabsorption, and SIBO (Hidayat et al., 2024; Lindberg & Mohammadian, 2023).

In clinical practice, the presentation of IBS is heterogeneous but recognizable: chronic or recurrent abdominal pain, bloating, and disturbances in bowel habits predominate, whereas the presence of alarm features should direct the diagnostic process toward organic disease rather than lead to an uncritical diagnosis of IBS (Cheung & Kenway, 2026; Hidayat et al., 2024; Huang et al., 2023; Lindberg & Mohammadian, 2023).

6. Diagnosis of IBS

Rome IV diagnostic criteria

The diagnosis of irritable bowel syndrome is currently based on the Rome IV criteria, which define IBS as recurrent abdominal pain occurring, on average, at least 1 day per week during the previous 3 months, associated with at least two of the following: related to defecation, associated with a change in stool frequency, or associated with a change in stool form; symptom onset must have occurred at least 6 months before the diagnosis is established (Black & Ford, 2025; Hung et al., 2023; Vasant et al., 2021).

Based on the predominant stool pattern, four clinical subtypes are distinguished: IBS with predominant constipation (IBS-C), IBS with predominant diarrhea (IBS-D), mixed IBS (IBS-M), and unclassified IBS (IBS-U) (Black & Ford, 2025; Hung et al., 2023; Vasant et al., 2021). Compared with the Rome III criteria, the Rome IV criteria are more restrictive and more specific, but less sensitive, and therefore more accurately identify patients with a more typical clinical presentation of IBS (Black & Ford, 2025; Hung et al., 2023).

In clinical practice, symptom-based criteria do not replace a carefully obtained medical history and physical examination, but rather help structure the diagnostic process. Of particular importance is confirmation of the chronic nature of the symptoms, the relationship between pain and defecation, and variability in stool consistency and frequency, as well as establishing whether the symptoms were consistent with the IBS pattern from the outset or appeared suddenly and show atypical features (Black & Ford, 2025; Hidayat et al., 2024; Vasant et al., 2021).

A positive diagnosis rather than a diagnosis of exclusion

Contemporary guidelines emphasize that IBS should be diagnosed positively rather than solely through the extensive exclusion of successive organic diseases (Black & Ford, 2025; Hidayat et al., 2024; Vasant et al., 2021). This means that in a patient with a typical history, no alarm features, and no abnormalities on basic screening tests, the diagnosis may be established without extensive endoscopic or imaging investigations (Black & Ford, 2025; Vasant et al., 2021).

This approach has important practical implications, as an excessive number of tests rarely changes the final diagnosis, may increase patient anxiety, and may reinforce the belief that IBS is merely a “diagnosis of exclusion” (Black & Ford, 2025; Hidayat et al., 2024; Vasant et al., 2021). At the same time, a positive diagnosis does not imply dismissal of the patient’s complaints, but rather is based on a typical symptom pattern, physical examination, digital rectal examination, and a reasonably selected panel of additional tests (Black & Ford, 2025; Vasant et al., 2021).

The diagnostic process should also take into account that the clinical picture of IBS may overlap with other disorders of gut–brain interaction and that the predominant stool pattern may change over time. For this reason, the diagnosis should be periodically reassessed, particularly if alarm features, atypical manifestations, or persistent diagnostic uncertainty arise (Black & Ford, 2025; Vasant et al., 2021).

Alarm features and differential diagnosis

Alarm features include, among others, unintentional weight loss, overt gastrointestinal bleeding or a positive fecal occult blood test, anemia, new onset of symptoms after the age of 50 years, a palpable mass, lymphadenopathy, severe nocturnal symptoms, and a positive family history of colorectal cancer or inflammatory bowel disease (Black & Ford, 2025; Hung et al., 2023; Vasant et al., 2021). Their presence does not automatically exclude IBS, but it should prompt more extensive evaluation for organic disease (Black & Ford, 2025; Lindberg & Mohammadian, 2023; Vasant et al., 2021; Yang et al., 2022).

Not all alarm features have the same predictive value. In a multicenter study based on the Rome IV criteria, anemia, a positive fecal occult blood test, and unintentional weight loss had the highest predictive value for organic disease (Yang et al., 2022).

The key elements of the differential diagnosis depend on the predominant clinical phenotype. In patients with diarrhea-predominant symptoms, the differential diagnosis should primarily include celiac disease, inflammatory bowel disease, microscopic colitis, and bile acid diarrhea. Carbohydrate malabsorption or SIBO should be considered only in selected atypical cases rather than routinely in patients with a typical IBS presentation (Black & Ford, 2025; Lindberg & Mohammadian, 2023; Vasant et al., 2021). In contrast, in patients with constipation-predominant symptoms or features suggestive of defecatory dysfunction, differentiation from pelvic floor dyssynergia and other functional anorectal disorders may be necessary (Black & Ford, 2025; Vasant et al., 2021).

The role of additional investigations in the diagnosis of IBS

In all patients with suspected IBS, celiac serology should be performed, and the basic laboratory workup usually also includes a complete blood count and inflammatory markers. In patients with diarrhea, particularly

those younger than 45 years, fecal calprotectin is of particular importance as a noninvasive marker that helps exclude inflammatory bowel disease (Black & Ford, 2025; Vasant et al., 2021).

Colonoscopy should not be performed routinely in every patient with a typical presentation of IBS. It should be considered in the presence of alarm features or in patients with diarrhea accompanied by atypical features or risk factors for microscopic colitis, such as age ≥ 50 years, female sex, autoimmune disease, nocturnal watery diarrhea, a shorter duration of diarrhea, or weight loss, as well as the use of medications associated with an increased risk of this condition, such as NSAIDs or proton pump inhibitors (Black & Ford, 2025; Vasant et al., 2021).

Selected additional investigations that may be relevant in the diagnostic evaluation of suspected IBS are presented in Table 2 (Black & Ford, 2025; Hidayat et al., 2024; Lindberg & Mohammadian, 2023; Vasant et al., 2021).

Table 2. Selected additional investigations and their role in suspected IBS.

Test	When to consider	Main purpose / comment
Coeliac serology	All patients with suspected IBS	Most consistently recommended test to exclude celiac disease.
Fecal calprotectin	Diarrhea-predominant symptoms, especially in younger patients	Help exclude inflammatory bowel disease.
Colonoscopy with biopsies	Alarm symptoms, or IBS-D with atypical features and/or risk factors for microscopic colitis	Not routine; targeted use in selected patients.
SeHCAT / serum C4	Selected IBS-D, especially nocturnal or severe diarrhea or after cholecystectomy	Assessment for bile acid diarrhea.
Anorectal physiology tests	Symptoms suggesting dyssynergic defecation or fecal incontinence	Useful in selected constipation phenotypes.
Hydrogen breath tests / EPI tests	Not recommended routinely in typical IBS; consider only in selected atypical cases	Hydrogen breath tests are not recommended routinely; evaluation for exocrine pancreatic insufficiency should be reserved for patients with features suggesting malabsorption.

Note: Developed based on selected guidelines and review articles by Black and Ford (2025), Hidayat et al. (2024), Lindberg and Mohammadian (2023), and Vasant et al. (2021).

In cases of suspected bile acid diarrhea, targeted tests such as the SeHCAT test or measurement of 7 α -hydroxy-4-cholesten-3-one concentration are preferred, depending on local availability (Black & Ford, 2025; Vasant et al., 2021). This diagnosis should be considered particularly in patients with IBS-D who report severe or nocturnal diarrhea or who have undergone cholecystectomy (Black & Ford, 2025; Lindberg & Mohammadian, 2023; Vasant et al., 2021).

However, not all investigations used in everyday practice are justified. Current guidelines do not recommend the routine use of tests for exocrine pancreatic insufficiency or hydrogen breath tests to exclude SIBO or carbohydrate intolerance in patients with typical IBS symptoms, as their diagnostic value in this group is limited (Black & Ford, 2025; Vasant et al., 2021). In contrast, anorectal investigations may be useful in patients with suspected defecatory disorders or fecal incontinence (Vasant et al., 2021).

In clinical practice, the diagnosis of IBS should be based on a combination of the Rome IV criteria, a positive clinical diagnosis, and selectively chosen additional investigations. Such an approach reduces the risk of both overlooking significant organic disease and overdiagnosis through costly and low-yield investigations

performed without clear indications (Black & Ford, 2025; Hidayat et al., 2024; Lindberg & Mohammadian, 2023; Vasant et al., 2021).

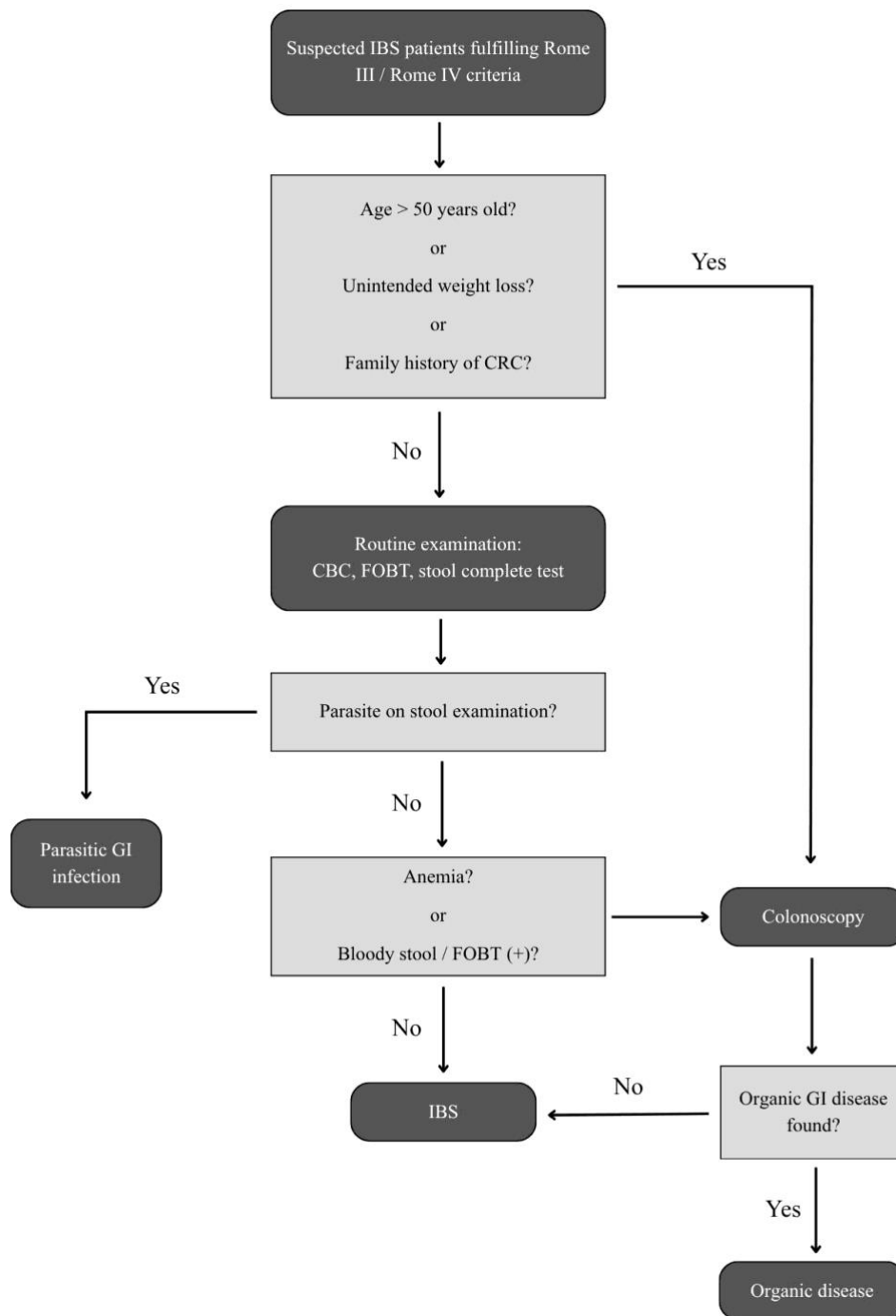


Fig. 3. Proposed diagnostic algorithm for a patient with suspected irritable bowel syndrome (IBS).

Note: The diagram presents the proposed diagnostic approach for a patient with suspected irritable bowel syndrome. Adapted from Hidayat et al. (2024).

7. Treatment of IBS

Treatment of irritable bowel syndrome (IBS) should be individualized and should take into account the predominant stool pattern, the severity of abdominal pain, the presence of bloating, coexisting extraintestinal symptoms, and the psychological component. Contemporary guidelines have moved away from a one-size-fits-all approach for all patients and recommend combining non-pharmacological interventions with symptom-directed therapy tailored to the IBS subtype and the predominant complaints (Black & Ford, 2025; Huang et al., 2023; Hung et al., 2023; Vasant et al., 2021).

In clinical practice, treatment should begin with explaining the nature of the disorder to the patient, discussing the chronic and relapsing course of symptoms, and establishing realistic therapeutic goals. Such an approach improves therapeutic cooperation and provides the foundation for further dietary recommendations, lifestyle modifications, psychotherapy, and pharmacological treatment (Black & Ford, 2025; Hung et al., 2023; Vasant et al., 2021).

Non-pharmacological treatment

Patient education and a strong physician–patient relationship remain the cornerstone of non-pharmacological management. Guidelines emphasize the importance of empathy, shared decision-making, and explaining that IBS is a disorder of gut–brain interaction, with symptoms that may be modulated by diet, stress, health behaviors, and individual cognitive–emotional responses (Black & Ford, 2025; Vasant et al., 2021).

As a first step, simple traditional dietary advice is recommended, including regular meal consumption, avoidance of large portion sizes, reduction of excessive fat and caffeine intake, and identification of individual foods that exacerbate symptoms. This approach should precede more restrictive elimination strategies (Black & Ford, 2025; Hung et al., 2023; Vasant et al., 2021).

The low-FODMAP diet currently holds an important place in the treatment of IBS, particularly in patients with prominent bloating, abdominal pain, and a feeling of fullness. Available guidelines and reviews indicate that a diet low in fermentable oligo-, di-, and monosaccharides and polyols may reduce global IBS symptoms and pain severity, but it should be implemented as a second-line therapy and under the supervision of a dietitian (Black & Ford, 2025; Hung et al., 2023; Vasant et al., 2021). The need for gradual reintroduction of foods according to individual tolerance is also emphasized, as prolonged, unsupervised elimination may promote nutritional deficiencies and unnecessarily restrict the diet (Black & Ford, 2025; Hung et al., 2023; Vasant et al., 2021).

Lifestyle factors are also of considerable importance. Regular physical activity is recommended for all patients with IBS, as it may alleviate both intestinal symptoms and some extraintestinal complaints, while also improving overall well-being (Hung et al., 2023; Vasant et al., 2021). Guidelines also emphasize the role of reducing chronic stress and introducing dietary interventions cautiously and stepwise, preferably under specialist supervision, especially in the case of the low-FODMAP diet (Black & Ford, 2025; Vasant et al., 2021).

Psychotherapy is not reserved exclusively for patients with diagnosed depression or anxiety disorders. Therapies referred to as brain–gut behavioral therapies, particularly cognitive behavioral therapy (CBT) and gut-directed hypnotherapy, have demonstrated efficacy in reducing global IBS symptoms, and their effects are associated, among other factors, with reductions in visceral anxiety, symptom catastrophizing, and excessive focus on gastrointestinal signals (Black & Ford, 2025; Cheung & Kenway, 2026; Vasant et al., 2021).

The importance of psychotherapy is particularly pronounced in patients with persistent symptoms, a high burden of stress, and in those whose pain symptoms predominate despite treatment targeted to the stool pattern. In clinical practice, psychotherapy should be regarded as part of an integrated treatment approach rather than as an alternative to pharmacotherapy (Black & Ford, 2025; Cheung & Kenway, 2026; Vasant et al., 2021).

Table 3. Main therapeutic areas in the treatment of irritable bowel syndrome (IBS).

Treatment domain	Examples	Main clinical use
Foundational / nonpharmacological	Traditional dietary advice; physical activity	First-line supportive management; useful for overall symptom burden
Dietary and psychological adjuncts	Low FODMAP diet; CBT / gut-directed hypnotherapy	Second-line or selected-patient interventions for global symptoms, bloating, abdominal pain and stress-related symptom amplification
IBS-D	Loperamide; bile acid sequestrants in selected patients; 5-HT ₃ antagonists; rifaximin; eluxadoline	Reduction of diarrhea, urgency and stool frequency; some second-line agents may improve global symptoms
IBS-C	Polyethylene glycol; secretagogues / other prosecretory agents	Improvement of constipation; some agents also reduce global symptoms and abdominal pain
Pain / neuromodulation	Antispasmodics; peppermint oil; tricyclic antidepressants; selected SSRIs	Treatment of abdominal pain and gut-brain neuromodulation; strongest evidence for tricyclic antidepressants

Note: Own elaboration based on current review articles and recommendations by Black and Ford (2025), Cheung and Kenway (2026), Hung et al. (2023), and Vasant et al. (2021).

Pharmacological treatment targeted to the predominant stool pattern

The selection of pharmacotherapy should be based primarily on the predominant bowel habit disturbance, while recognizing that improvement in diarrhea or constipation alone does not always lead to complete resolution of abdominal pain. For this reason, in many cases it is necessary to treat both the stool pattern and pain in parallel (Black & Ford, 2025; Hung et al., 2023; Vasant et al., 2021).

In patients with IBS-D, first-line treatment consists of antidiarrheal agents, primarily loperamide, which may reduce stool frequency and urgency but has limited effects on abdominal pain and global symptoms. In selected cases, particularly when concomitant bile acid diarrhea is suspected, bile acid sequestrants may also be considered (Black & Ford, 2025; Hung et al., 2023; Vasant et al., 2021).

If the response to first-line treatment is insufficient, guidelines recommend 5-HT₃ receptor antagonists, rifaximin, or eluxadoline as second-line options. These agents have greater potential to improve global IBS-D symptoms; however, their availability varies by country, and their use must take into account contraindications and the adverse-effect profile (Black & Ford, 2025; Vasant et al., 2021).

In IBS-C, laxatives are used initially, particularly polyethylene glycol, although their effect on abdominal pain is limited (Black & Ford, 2025; Hung et al., 2023; Vasant et al., 2021). If symptoms persist, secretagogues or prosecretory agents such as linaclotide, lubiprostone, plecanatide, tenapanor, or tegaserod are recommended, provided they are available and approved for use within a given healthcare system (Black & Ford, 2025; Vasant et al., 2021).

Within this group, linaclotide is of particular value and is identified in guidelines as one of the best-supported second-line agents, as it improves both constipation and global symptoms, including abdominal pain. At the same time, the choice of a specific agent should depend on patient tolerance, the risk of diarrhea, and the cost of therapy (Black & Ford, 2025; Vasant et al., 2021).

Treatment of abdominal pain and neuromodulators

Abdominal pain remains the core symptom of IBS and requires separate therapeutic assessment regardless of subtype. Antispasmodic agents are considered first-line treatment for pain, and some recommendations also support the use of peppermint oil, particularly in patients with predominantly cramping symptoms (Black & Ford, 2025; Hung et al., 2023; Vasant et al., 2021).

If pain persists despite basic treatment, neuromodulators acting on the gut–brain axis should be considered. The best-documented group remains tricyclic antidepressants, used at lower doses than those prescribed for depression, usually with slow titration from a low starting dose. These agents may reduce global IBS symptoms and improve pain control (Black & Ford, 2025; Vasant et al., 2021).

Selective serotonin reuptake inhibitors have weaker evidence support than TCAs, but they may be considered as second-line treatment in selected patients; their use requires an individualized approach (Black & Ford, 2025; Vasant et al., 2021).

In clinical practice, the need for combination therapy is being increasingly emphasized. The combination of dietary interventions, medications tailored to the IBS subtype, and neuromodulators or psychotherapy may be particularly useful in patients with chronic symptoms, severe pain, and a high psychological burden (Black & Ford, 2025; Cheung & Kenway, 2026; Vasant et al., 2021).

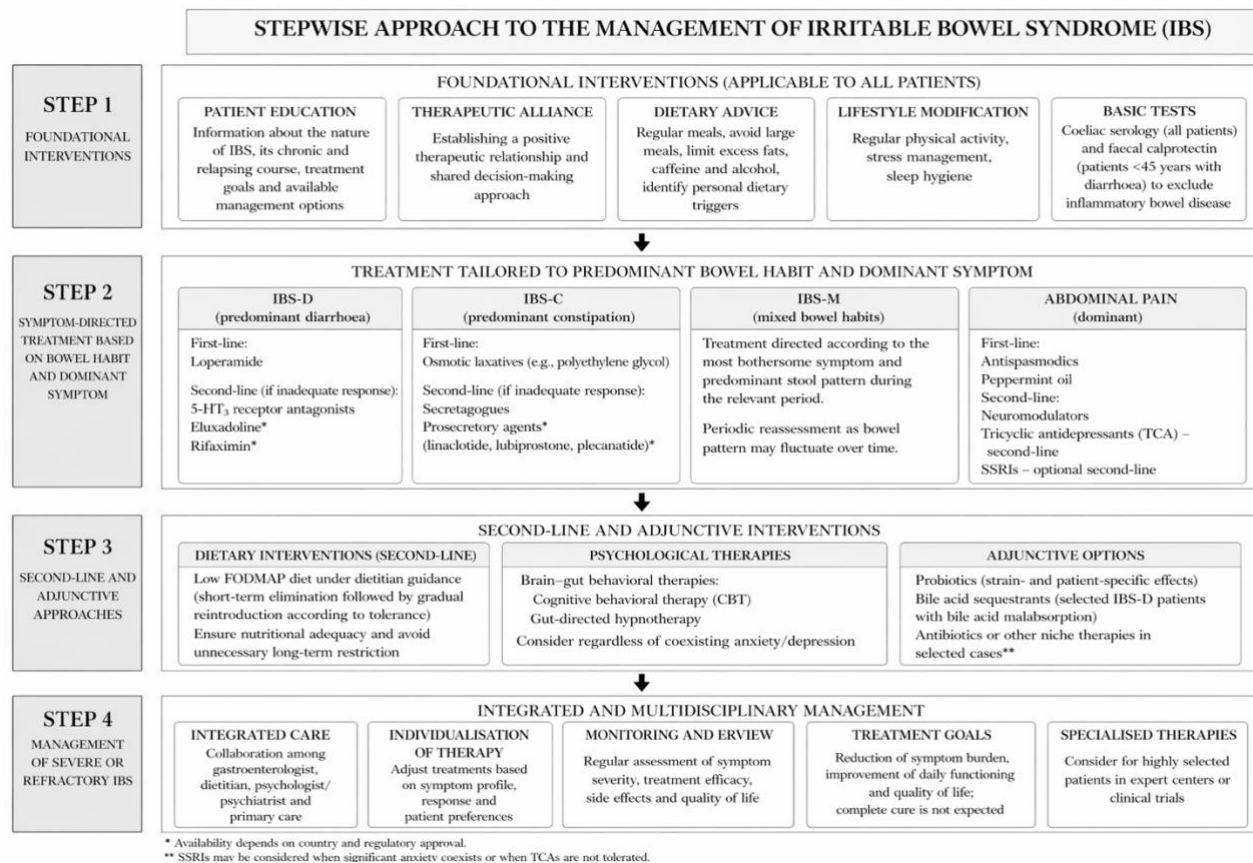


Fig. 4. Stepwise management of irritable bowel syndrome (IBS): a conceptual framework for graduated, symptom-directed, and integrated care.

Note: Developed based on Black and Ford (2025) and Vasant et al. (2021).

8. IBS and quality of life

Irritable bowel syndrome (IBS) is a chronic disorder that does not increase mortality, but it may substantially impair quality of life and generate significant indirect costs related to limitations in daily functioning (Black & Ford, 2025; Huang et al., 2023). Contemporary studies emphasize that the burden experienced by patients arises not only from abdominal pain and disturbances in bowel habits, but also from the unpredictability of symptoms, fatigue, the need to adjust daily activities to intestinal complaints, and the loss of a sense of control over one's own functioning (Black & Ford, 2025; Staudacher et al., 2023).

Impact on daily functioning

The impact of IBS on daily life is well illustrated by the Norwegian survey study conducted by El-Salhy et al., in which 97% of patients reported impaired quality of life, 90% reported an impact of the disorder on social life, 69% on sexual life, and 94% on functioning at work or in education. In addition, 98% of respondents

reported fatigue, and 91% considered IBS to be an economic burden (El-Salhy et al., 2025). These data indicate that the disorder affects not only intestinal comfort, but also social relationships, productivity, and the subjective sense of personal agency.

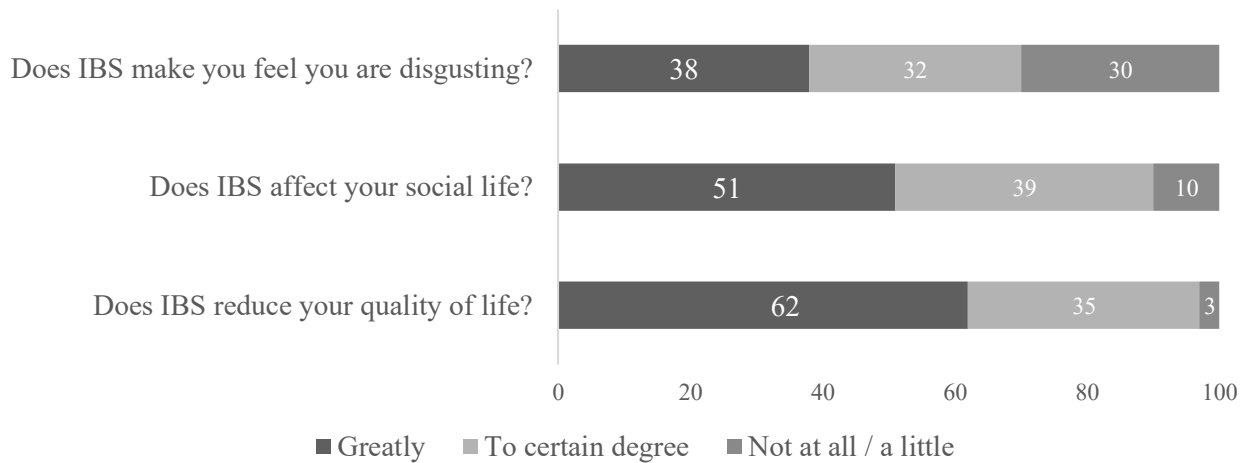
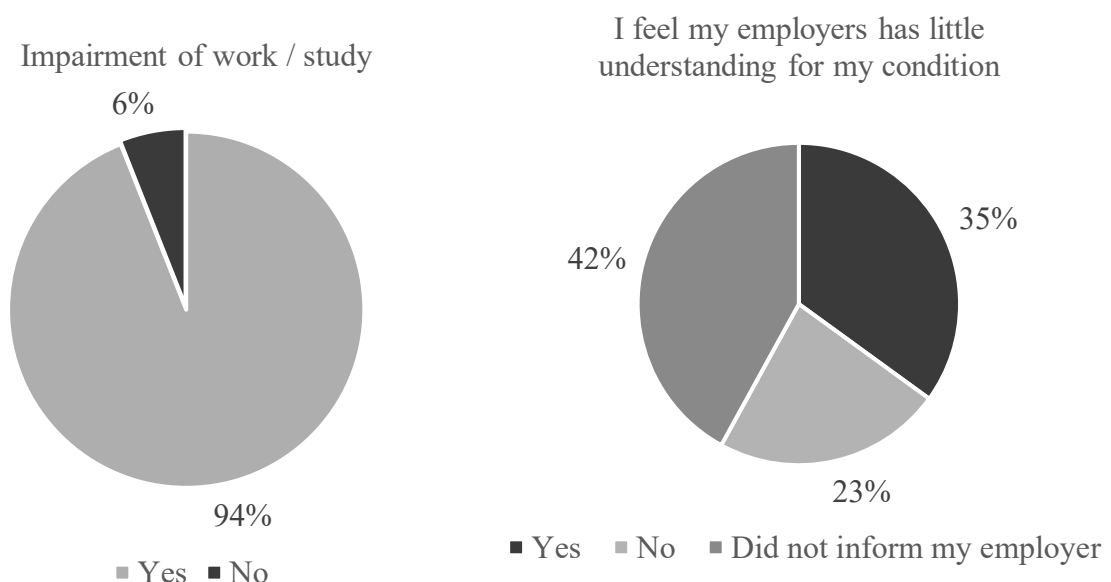


Fig. 5. Impact of IBS on overall quality of life, social life, and feelings of disgust toward one's own body.
Note: Developed based on data from El-Salhy et al. (2025, Fig. 2, panels A, C, E).

Similar conclusions were drawn from the study by Goodoory et al., which included patients meeting the Rome IV criteria. The authors demonstrated that 91.0% of participants reported some degree of limitation in activities of daily living, and among those who were employed, both absenteeism and presenteeism—defined as reduced productivity despite being present at work—were frequently observed (Goodoory et al., 2022). In a recent review, Sugaya (2024) further emphasized that working individuals with IBS more often report occupational stressors, lower productivity, and greater difficulty maintaining full work capacity than individuals without IBS (Sugaya, 2024).



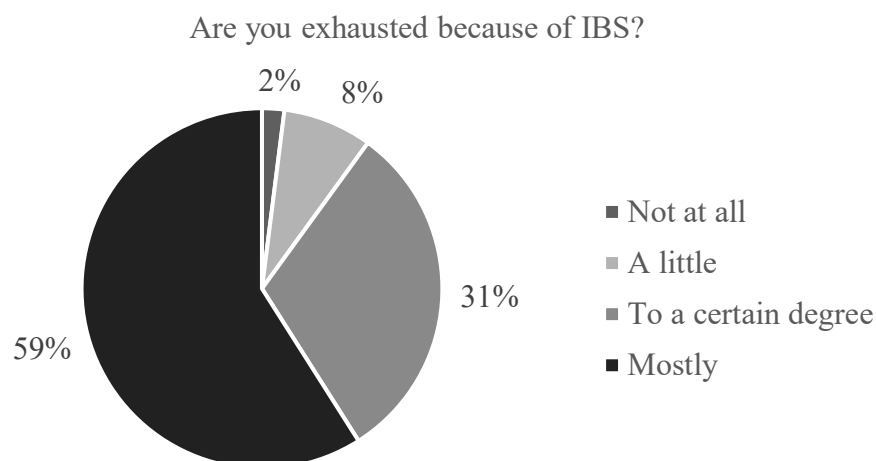


Fig. 6. Impact of IBS on occupational and daily functioning.

Note: Adapted based on data from El-Salhy et al. (2025, Fig. 1, panels C, D, E).

Psychological aspects

The coexistence of IBS with anxiety and depression is common, and psychological disorders not only accompany the condition but also amplify its impact on quality of life. Staudacher et al. point out that coexisting psychopathology may be a more important determinant of long-term quality of life than intestinal symptoms themselves (Staudacher et al., 2023). Findings in a similar direction were reported by Goodoory et al., according to whom greater impairment in work and daily activities was associated with higher levels of anxiety, depression, somatization, and gastrointestinal symptom-specific anxiety (Goodoory et al., 2022).

The importance of psychological factors is further emphasized by the study by Xie et al., which showed that psychological symptoms, particularly anxiety, may have a more detrimental effect on quality of life than some somatic symptoms (Xie et al., 2024). From a clinical perspective, this means that the assessment of quality of life in a patient with IBS should not be limited to questions about bowel movement frequency, pain, or bloating, but should also include emotional distress, sense of security, ability to work, and interpersonal relationships (Staudacher et al., 2023; Xie et al., 2024).

Shame, stigma, and reduced spontaneity

In the qualitative and social dimensions of IBS, shame, feelings of disgust toward one's own body, and fear of symptoms occurring in public places also play an important role. In the study by El-Salhy et al., 70% of patients reported that IBS made them feel "disgusting," and a substantial proportion of respondents did not inform their employer about their condition (El-Salhy et al., 2025). Hearn et al., in turn, described that stigma related to IBS exists not only in the general public, but also among coworkers and some healthcare professionals, which may intensify psychological distress, increase healthcare utilization, and further worsen quality of life (Hearn et al., 2020).

In clinical practice, the section on quality of life should present IBS in a multidimensional way. The disorder affects social, occupational, sexual, and emotional functioning, and its burden may be intensified by anxiety, depression, and stigma (Black & Ford, 2025; El-Salhy et al., 2025; Goodoory et al., 2022; Hearn et al., 2020; Staudacher et al., 2023; Sugaya, 2024). This way of describing IBS better reflects patients' real-life experiences than limiting the problem exclusively to intestinal symptoms.

9. Discussion

The accumulated evidence confirms that irritable bowel syndrome remains a disorder of substantial clinical significance, while at the same time representing a clearly heterogeneous entity in terms of epidemiology, pathogenic mechanisms, and symptom presentation. One of the most important conclusions emerging from the literature review is that the prevalence of IBS cannot be interpreted independently of the diagnostic criteria applied, study methodology, and the characteristics of the populations examined. The discrepancies between results obtained using the Rome III and Rome IV criteria demonstrate that epidemiological data require cautious interpretation and that simple comparisons between studies may lead to excessive oversimplification (Ballena-Caicedo et al., 2025; Huang et al., 2023).

Current evidence also indicates that the contemporary understanding of IBS extends beyond the traditional view of this condition as a nonspecific functional disorder. Increasing evidence suggests that IBS symptoms result from the interplay of disturbances in the gut–brain axis, intestinal microbiota dysbiosis, visceral hypersensitivity, immune activation, and the influence of psychosocial factors. This model better explains both the diversity of clinical phenotypes and the differing treatment responses observed among patients, thereby supporting the need for an individualized approach to both diagnosis and therapy (Cheung & Kenway, 2026; Huang et al., 2023; Soufan et al., 2025).

An important component of the contemporary approach to IBS remains a positive diagnostic strategy based on the Rome IV criteria, careful history-taking, assessment of alarm features, and selectively chosen additional investigations. At the same time, analysis of treatment-related data indicates that the most valuable practical approach is integrated management combining patient education, dietary interventions, psychological therapy, and pharmacotherapy tailored to the predominant symptoms and stool pattern. Such an approach appears particularly justified because, for many patients, the main problems include not only disturbances in bowel habits, but also abdominal pain, bloating, and chronic limitations in daily functioning (Black & Ford, 2025; Hung et al., 2023; Staudacher et al., 2023; Vasant et al., 2021).

The impact of IBS on quality of life also deserves emphasis. Although the disorder does not increase mortality, it may substantially impair social, occupational, and emotional functioning, while coexisting anxiety, depression, and stigma further intensify its burden. At the same time, it should be recognized that the current state of knowledge is limited by substantial heterogeneity across studies, which makes direct comparison of results and the formulation of universal conclusions difficult. It therefore seems that future research should focus on better identification of the clinical and mechanistic phenotypes of IBS, which could enable more precise and personalized therapeutic strategies (Ballena-Caicedo et al., 2025; Black & Ford, 2025; El-Salhy et al., 2025; Goodoory et al., 2022; Xie et al., 2024).

10. Conclusions

Irritable bowel syndrome remains a heterogeneous disorder of gut–brain interaction with a complex, multifactorial pathogenesis and substantial clinical significance. Contemporary evidence indicates that the clinical picture of the disorder results from the interplay of disturbances in the gut–brain axis, intestinal microbiota dysbiosis, visceral hypersensitivity, immune activation, and psychosocial factors, thereby supporting the need for an individualized diagnostic and therapeutic approach (Black & Ford, 2025; Cheung & Kenway, 2026; Huang et al., 2023).

The diagnosis of IBS should be based on a positive diagnostic strategy incorporating the Rome IV criteria, assessment of alarm features, and targeted additional investigations, whereas treatment should combine patient education, dietary interventions, psychological therapy, and pharmacotherapy tailored to the predominant symptoms. It is also of major practical importance to take into account the impact of IBS on quality of life, as the disorder may markedly impair social, occupational, and emotional functioning. A biopsychosocial approach therefore appears to be the most appropriate model for contemporary care of patients with IBS (Black & Ford, 2025; Staudacher et al., 2023; Vasant et al., 2021).

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