

Dietetic Management of Irritable Bowel Syndrome: A National Survey of Dietary Approaches and Decision-making Factors

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ABSTRACT

Background & Aims: There has been a growing emphasis on dietary therapies for irritable bowel syndrome (IBS). Furthermore, there has been an evolving evidence base for the low fermentable oligosaccharides, disaccharides, monosaccharides and polyols (FODMAP) diet, gluten-free diet (GFD), and lactose-free diet. This study examines the dietary approaches employed and the factors influencing dietetic decision-making for IBS interventions.

Methods: Participants, including registered dietitians and nutritionists, were recruited from diverse healthcare settings at the point of registration for the 4th Sheffield National Dietetic Gastroenterology Symposium, 2023. A 15-question online survey investigated the practices of dietitians and nutritionists in managing IBS patients, covering dietary approaches, decision-making factors, and patient education. The evidence base for different dietary interventions was provided and a follow-up survey assessed symposium attendees' views on current IBS dietary practices.

Results: Out of 731 respondents, primarily registered dietitians (93%) and females (93%), 54% spent 10-50% of clinic time on IBS. Respondents noted that a GFD (34%), low lactose (32%), and traditional dietary advice (TDA) (18%) were the most frequently used dietary interventions that patients try before seeking professional advice. Delegates were asked to rank their dietary intervention preferences pre- and post-meeting (after the evidence base had been presented): TDA pre-meeting 75% versus post-meeting 87% ($p=0.04$), fibre modification 59% versus 6% ($p<0.0001$), low FODMAP 25% versus 10% ($p=0.0001$), low lactose 12% versus 62% ($p<0.0001$) and GFD 6% to 23% ($p<0.0001$).

Conclusions: TDA remains the choice of diet for dietitians. After our educational event, the use of low-lactose and gluten-free diet significantly increased. Factors influencing the decision-making process were based on patient acceptability, counselling time, supporting evidence base and dietary triggers.

Key words: diet – irritable bowel syndrome – gluten-free – FODMAP.

Abbreviations: FODMAP: fermentable oligosaccharides, disaccharides, monosaccharides and polyols; GFD: gluten free diet; IBS: irritable bowel syndrome; TDA: traditional dietary advice.

INTRODUCTION

Irritable bowel syndrome (IBS) is a prevalent functional bowel disorder condition, affecting approximately 4% of the population, which is characterized by frequent abdominal pain associated with altered bowel habit and bloating [1]. Numerous pharmacological treatments are available for managing IBS; however, dietary management remains a concern

for the majority of patients [2]. More than 80% of individuals with IBS encounter symptoms related to food, specifically in relation to fermentable carbohydrates and fats [2, 3]. Additionally, over 60% express a desire to identify foods to avoid, and as many as 70% have made modifications to their diet [4]. Those with more severe IBS tend to identify a higher number of food triggers [2, 3]. Over the past decade, there has been an increasing focus in clinical practice on three diets for managing IBS: traditional dietary advice (TDA), a low fermentable oligosaccharides, disaccharides, monosaccharides and polyols (FODMAP) diet (LFD), and a gluten-free diet (GFD). Among these, TDA is prioritized as the initial approach, following guidance from the National Institute for Health and Care Excellence and the British Dietetic Association [5].

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Traditionally dietary advice for IBS involves a holistic approach to diet and lifestyle modification, based on current guidelines [5]. It recommends reducing alcohol, caffeine, spicy foods, and fat intake while increasing fluids and adjusting fiber consumption. Although TDA broadly addresses IBS dietary triggers, including those beyond FODMAPs, its evidence base largely stems from case-control studies and clinical expertise, with limited support from RCTs except for the beneficial role of soluble fiber such as ispaghula in mitigating IBS symptoms [6].

The past decade has seen an increased uptake of GFDs for managing IBS. There have been six RCTs in total including 349 number of patients [7-12]. The current summary of this data, demonstrates GFD's short-term effectiveness in alleviating IBS symptoms, though the durability of its benefits remains underexplored [8, 13].

Low FODMAP diet is a structured intervention for IBS management, commencing with a strict reduction of all FODMAPs and, if effective, proceeding to a personalized, less restrictive phase [14]. Research predominantly examines short-term benefits, with meta-analyses indicating significant symptom severity score reductions [15]. The low FODMAP diet has the strongest evidence base with 10 RCTs and 817 patients [8, 16-24]. Long-term follow-up suggests enduring symptom relief and substantial adherence. There has been only one study with a head-to-head comparison of a TDA versus GFD versus LFD [8]. The primary end point of a 50-point reduction in IBS-SSS was met by 42% (n=14/33) undertaking TDA, 55% (18/33) for LFD, and 58% (19/33) for GFD (p=0.43). This study suggests that all current dietary therapies may have a role in the management of IBS and selection may be dependent on patient factors [8].

Given the new evidence base that has been summarised the current study focuses on investigating the dietary strategies utilized, the factors impacting decision-making in dietetic interventions for IBS, and the methods of patient education among registered dietitians, nutritionists, and student dietitians working across various healthcare settings in the United Kingdom.

METHODS

Study Design & Participants

A 15-item online questionnaire was developed to explore the practices of dietitians and nutritionists in managing patients with IBS. Participants were offered the opportunity to take part in the study during the online registration of the 4th Sheffield Dietetic Gastroenterology Symposium in May 2023. All participants were required to provide electronic consent for the publication of their responses at the start of the survey. The Symposium included a 1-hour round table panel discussion on the dietary management of IBS (Supplementary file) and a follow-up 2-item questionnaire was sent to those who attended the symposium to evaluate their view of the current dietary practices for IBS. Both surveys are provided in the supplementary material.

Survey Questions

The online survey consisted of categorical and Likert-scale questions, and included the following:

- Demographic information: age, sex, current role, years of experience, and work setting;
- Percentage of time managing patients with IBS;
- Dietary approaches: the self-reported influence of food intake on patients' bowel symptoms, the types of diets patients frequently try prior to seeing a dietitian, the types of diets recommend, and the effectiveness of different types for patients with IBS such as first-line TDA, fibre modification, low lactose, GFD, and LFD;
- Decision-making: factors influencing the choice of specific dietary therapy for IBS, such as supporting evidence, patient-reported dietary triggers, time needed to provide counselling, and patient acceptability;
- Barriers to delivery of dietary interventions in patients with IBS: complexity of diet, patient interest, cost, and meal-preparation time;
- Patient education and optimising the delivery of dietary therapy to patients with IBS;
- Post-symposium questionnaire: Two questions were repeated in a follow-up survey to explore if participants changed their views regarding the recommended diets for IBS and the factors influencing their decisions after attending the symposium.

Data Collection and Coding

Data collection from the online survey was conducted using a secure online platform (Sheffieldgastro.nhs.uk), anonymised, and collated onto a password-protected Excel spreadsheet (Microsoft, Redmond, Wash, USA). Duplicate responses (multiple participation) were removed. The spreadsheet included columns for demographic information and responses to Likert-scale questions, with each row representing a single response. Numerical values were assigned to each Likert-scale response (e.g., 1=Almost never, 2=Rarely, 3=Sometimes, 4=Usually, 5=Almost always).

Statistical Analysis

Descriptive statistics were used to summarise demographic data and responses to survey questions. Categorical data were expressed as frequencies and percentages. Comparisons between pre- and post-symposium responses were performed using the Fisher's exact test. A p-value of <0.005 was considered statistically significant. Statistical analysis and data visualisation were performed using GraphPad Prism (GraphPad Software Inc, San Diego, CA, USA) and RStudio (RStudio, Boston, Massachusetts, USA).

RESULTS

Respondents Characteristics

A total of 731 respondents completed the survey. The majority of respondents were registered dietitians (93%) and females (93%). Respondents had various levels of experience and worked in secondary care, primary care, and the private sector. The characteristics of survey respondents are summarised in Table I.

Experience in Managing IBS

Approximately half of the respondents (54%) spent 10–50% of their clinic time managing IBS, and 57% felt comfortable

Table I. Characteristics of survey respondents

	N (%)
Gender	
Female	683 (93.4)
Male	48 (6.6)
Age group (years)	
<25	37 (5)
25 – 34	299 (41)
35 – 44	219 (30)
45 – 55	133 (18.1)
>55	43 (5.9)
Job role	
Registered dietitian	680 (93)
Registered nutritionist	16 (2.2)
Student dietitian	35 (4.8)
Experience (years)	
< 1	35 (5.1)
1 – 5	182 (26.8)
6 – 10	163 (24)
11 – 15	126 (18.5)
16 – 20	56 (8.2)
> 20	117 (17.2)
Work setting	
Secondary care	385 (52.4)
Primary care	181 (24.6)
Private	95 (13)
Other	74 (10)
Percentage of time treating IBS	
< 10%	237 (32.4)
10 – 25%	240 (32.8)
26 – 50%	152 (20.8)
51 – 75%	70 (9.5)
> 75%	32 (4.3)

providing dietary therapy counselling to patients with IBS. Most respondents reported that patients with IBS link food intake to their symptoms (76%), and 44% self-manage their IBS before seeing a dietitian or a nutritionist.

Dietary Approaches

Respondents felt that dietary interventions were more effective than other treatments available for IBS (60%). As shown in Fig. 1, GFD (34%), low lactose (32%), and TDA (18%) were the most frequently used dietary interventions that patients tried before seeking professional advice. Conversely, TDA (75%), fiber modification (59%), and low FODMAP diet (31%) were the most frequent interventions recommended by dietitians and nutritionists. The low FODMAP diet was ranked as the most effective dietary intervention (50%), followed by TDA (39%) and fiber modification (37%). In contrast, low lactose (14%) and GFD (8%) were ranked as the least likely to be effective. The most common follow-up period was 4–12 weeks (68%), and only 2.7% did not arrange follow-up appointments for their patients.

Decision-making Factors and Barriers to Dietary Interventions

The two main factors influencing the decision to recommend a specific dietary intervention for IBS were patients' acceptability (95%) and supporting evidence (95%). Patient-reported dietary triggers (88%) and time needed to provide counselling (82%) were also considered important factors by respondents. The complexity of diet (39%) and meal preparation time (33%) were deemed the main barriers to dietary interventions for IBS (Fig. 2).

Nutritional Advice Delivery and Patient Education

One-to-one clinic appointments (93%) and educational handouts (74.4%) were the most used methods to deliver nutritional advice to patients with IBS, while websites (38%), smartphone apps (21.6%), group clinic appointments (11.6%), and books (8.6%) were used less frequently. Respondents felt that educational websites (68%), greater availability of dietitians with a specialist interest in IBS (64.5%), live or recorded webinars (61%), and smartphone apps (59.2%) would enhance the delivery of dietary therapy to patients with IBS.

Follow-up Survey

A total of 186 respondents completed both the pre-symposium and post-symposium questionnaires. After attending the symposium, respondents still ranked TDA as their first-line dietary intervention for IBS (87%). However, the use of low lactose and GFD significantly increased from 11% to 62% ($p<0.0001$) and from 6% to 23% ($p<0.0001$), respectively. Conversely, the use of fibre modifications has significantly reduced from 59% to 6% ($p<0.0001$) (Fig. 3). Following participation in the symposium, a notable shift in the determinants influencing the choice to advocate a particular dietary intervention is evident. Notably, respondents pre-symposium regarded the existence of supportive evidence for dietary therapy (96%) as the foremost consideration. However, increased significance is now attributed to factors such as patient acceptability (98%) and the time needed to provide counselling (97%), as illustrated in Fig. 4.

DISCUSSION

This is the first study to explore dietitians' views on the dietary management of IBS in relation to current treatment options and delivery modalities and also to evaluate the impact of participation of dietitians in scientific events and its effect on their clinical practice. Delegates were asked to rank their dietary intervention preferences pre and post-meeting (after the evidence base had been presented): TDA pre-meeting 75% versus post-meeting 87% ($p=0.04$), fibre 59% versus 6% ($p<0.0001$), low FODMAP diet 25% versus 10% ($p=0.0001$), lactose free diet 12% versus 62% ($p<0.0001$) and GFD 6% to 23% ($p<0.0001$). The evidence-based findings presented directly changed dietitian's views and we would expect this to translate into clinical practice.

Irritable bowel syndrome is a significant workload for dietitians and there has been a notable resurgence of interest exploring dietary interventions as a means of managing IBS. This reflects the growing recognition of the role of nutrition in

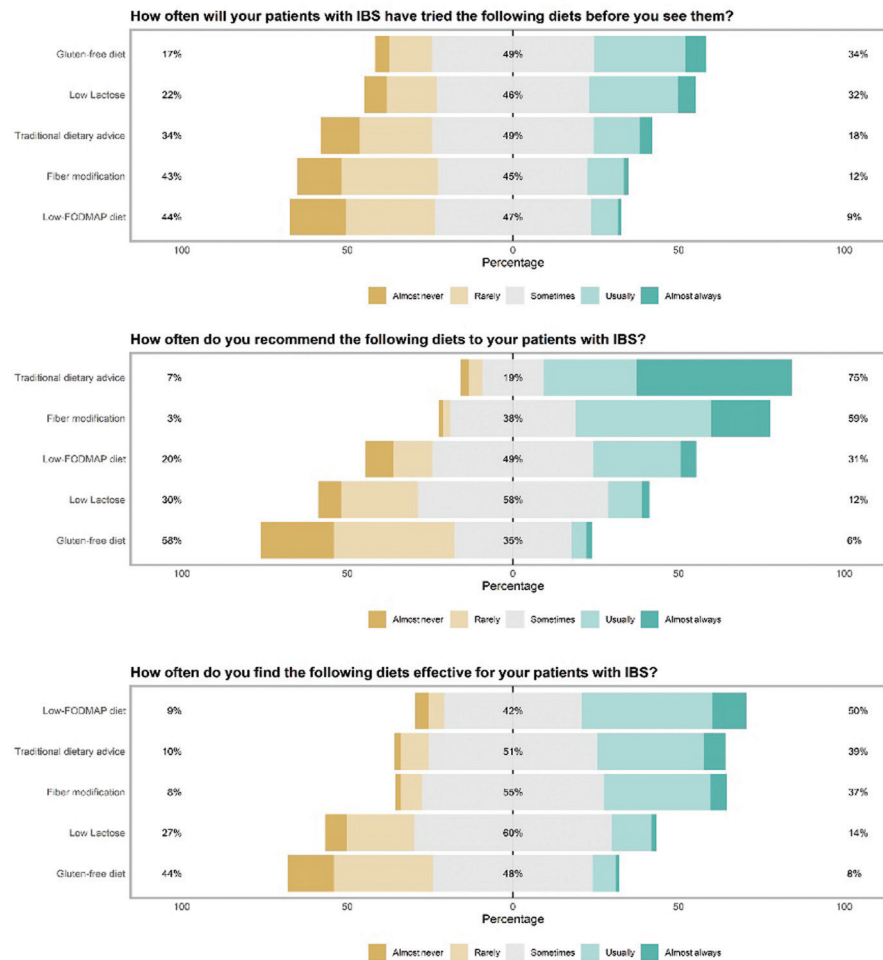


Fig. 1. Respondents' views on different dietary practices and the effectiveness of different diets for the management of IBS.

gastrointestinal health. Among the various dietary approaches, TDA, a GFD, and LFD have garnered particular attention. These dietary strategies have become focal points in clinical discussions, with patients expressing a heightened interest in their potential benefits. A recent study has also explored the Mediterranean diet as a feasible option in improving gastrointestinal and psychological symptoms of IBS [25]. The spotlight on dietary management underscores the shift towards holistic approaches in addressing IBS, acknowledging the dynamic interrelationship between dietary factors and gastrointestinal well-being. As research in this field progresses,

these dietary interventions offer promising avenues for personalized and effective management strategies in the evolving landscape of IBS therapeutics.

Presently, equivalent effectiveness has been substantiated in short-term follow-up assessments for TDA, GFD, and low FODMAP diet [8]. Nevertheless, TDA exhibits greater acceptability relative to GFD and LFD [8]. Consequently, considering these findings, initiating a trial of TDA represents a judicious first-line dietary approach for individuals with IBS, aligning with prevailing UK guidelines [5, 6]. Notably, a subset of individuals identify wheat as an IBS trigger [26]. For those

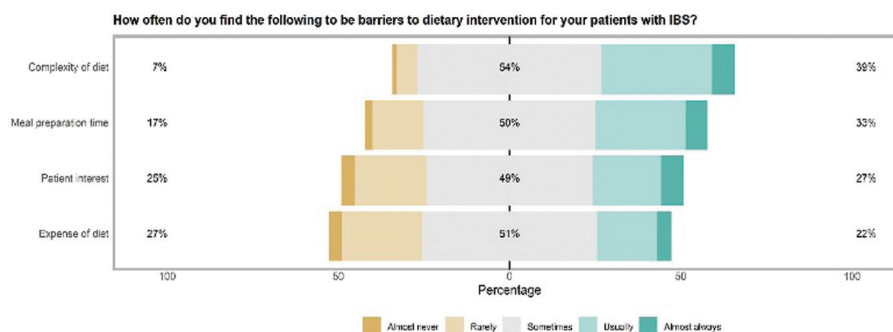


Fig. 2. Respondents' views on the barriers to dietary intervention for patients with IBS.

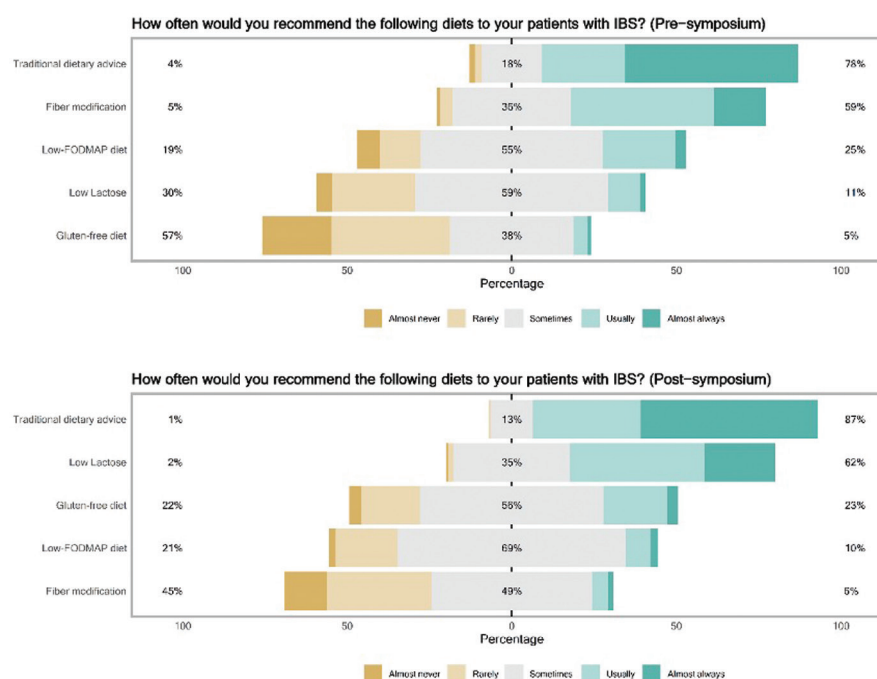


Fig. 3. Differences in dietary recommendations before and after attending the Sheffield Dietary Gastroenterology Symposium.

attributing wheat/gluten as a primary trigger, a GFD may be more suitable as an initial strategy for symptom management, adopting a 'bottom-up' approach before considering the complete low FODMAP approach [27]. This possibility is further supported by the recognition that patient acceptability is a key issue in terms of dietary IBS management. A GFD or gluten reduced diet is a far easier undertaking than the more complex low FODMAP diet [28,29]. However, a recent meta-analysis suggests that the efficacy of GFD in IBS is much lower than low FODMAP diet [30].

There are challenges with delivering dietetic therapies for IBS. Dietetic-led low FODMAP diet advice significantly enhances adherence during the personalization phase, with only 29% adherence observed in non-dietetic-led scenarios [31]. Less stringent 'bottom-up' strategies, initiating with a reduction in specific FODMAPs based on dietary history and patient-identified triggers, often result in a GFD and diminished fructan intake [32]. Recent RCTs report varying FODMAP consumption across diets, with GFD and TDA serving as less restrictive, 'bottom-up' methods [8]. Although

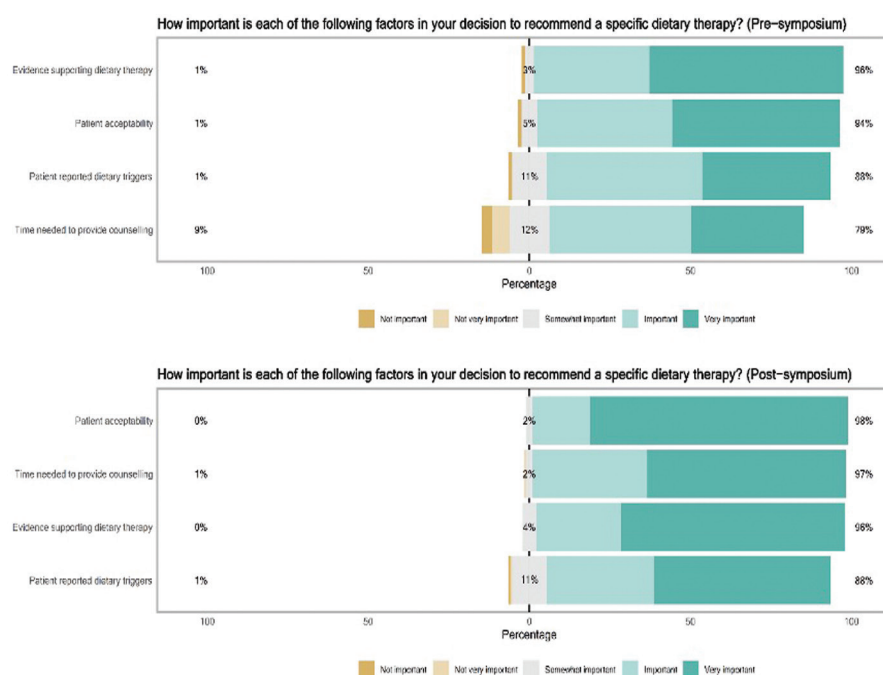


Fig. 4. Differences in factors influencing the decision to recommend a specific dietary therapy before and after attending the Sheffield Dietary Gastroenterology Symposium.

a 12g daily reduction in FODMAPs is proposed for symptom relief, individual visceral sensitivity may alter symptomatic thresholds. Long-term follow-up and broader demographic studies, including pediatric populations and primary care settings, are needed to evaluate the low FODMAP diet's efficacy and applicability.

Overall TDA presents as a cost-effective and less complex nutritional strategy, offering convenience during grocery shopping and adherence in social dining scenarios compared to GFD and low FODMAP diet [8]. The economic and social implications of long-term adherence to a low FODMAP diet have been documented, revealing higher expenses and constraints on social eating compared to standard diets [28, 29]. Notably, there is an absence of studies evaluating the long-term acceptability of TDA and GFD. Moreover, dietary preference trends favor simpler diets, as evidenced by a substantial majority of an Italian cohort indicating a desire to continue with a Mediterranean diet over GFD or low FODMAP diet [33].

Critical to the successful implementation of dietary therapies in IBS is the provision of patient choice, coupled with dietetic assessment and guidance. Sturkenboom et al. [34] in their recent discrete choice experiment indicated a pronounced predilection for dietary interventions among IBS. Ideally, complex and restrictive dietetic therapies should be administered by a qualified dietitian to mitigate the risk of nutritional inadequacy [31], given that the evidence base for these therapies primarily stems from dietitian-led implementations. Despite the dietetic-led evidence base, a survey in the United States revealed only 21% of gastroenterologists commonly referring patients to registered dietitians [35]. Furthermore gastrointestinal-specific symptom anxiety and the associated fear of symptoms contribute to food avoidance behaviours in IBS, potentially leading to an avoidant restrictive food intake disorder. This underscores the indispensable role of dietetic involvement [36].

Moreover, there exists a shortage of available dietitians to deliver dietetic therapies, as evidenced by a recent study indicating an inequity of dietetic services across England [37]. Consequently, additional research is warranted to evaluate the effectiveness of a physician-led approach in managing IBS. Although innovative modes of dietetic delivery, such as group sessions and webinars, necessitate further evaluation, they may present more resource-efficient means of delivering dietary therapies [37–39]. Further work is required in this field. The current extent of evidence predominantly indicates the efficacy of dietetic therapies (TDA, low FODMAP diet, and GFD) in managing IBS patients in the short term, necessitating further investigation into their long-term efficacy.

CONCLUSIONS

Traditional dietary advice persists as the preferred nutritional strategy among dietetics professionals. This is the first study to evaluate the impact of the participation of dietitians in scientific events and its effect on their clinical practice. Subsequent to an educational symposium, there was a notable rise in the implementation of diets with reduced lactose and exclusion of gluten. The determinants shaping this clinical decision-making include patient receptivity, duration

of dietary consultation, the foundation of empirical support, and identified dietary precipitants.

Conflicts of interest: None to declare.

Author' contribution: D.S.S., N.T. and I.A. conceived and designed the study. N.T., C.C.S., R.L.B. collected the data. M.G.S. performed the statistical analysis. A.D. drafted the manuscript. All authors critically revised the manuscript, approved the final version to be published, and agree to be accountable for all aspects of the work.

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REFERENCES

1. Sperber AD, Bangdiwala SI, Drossman DA, et al. Worldwide Prevalence and Burden of Functional Gastrointestinal Disorders, Results of Rome Foundation Global Study. *Gastroenterology* 2021;160:99–114.e3. doi:[10.1053/j.gastro.2020.04.014](https://doi.org/10.1053/j.gastro.2020.04.014)
2. Böhn L, Störsrud S, Törnblom H, Bengtsson U, Simrén M. Self-reported food-related gastrointestinal symptoms in IBS are common and associated with more severe symptoms and reduced quality of life. *Am J Gastroenterol* 2013;108:634–641. doi:[10.1038/ajg.2013.105](https://doi.org/10.1038/ajg.2013.105)
3. Simrén M, Månsson A, Langkilde AM, al. Food-related gastrointestinal symptoms in the irritable bowel syndrome. *Digestion* 2001;63:108–115. doi:[10.1159/000051878](https://doi.org/10.1159/000051878)
4. Halpert A, Dalton CB, Palsson O, et al. What patients know about irritable bowel syndrome (IBS) and what they would like to know. National Survey on Patient Educational Needs in IBS and development and validation of the Patient Educational Needs Questionnaire (PEQ). *Am J Gastroenterol* 2007;102:1972–1982. doi:[10.1111/j.1572-0241.2007.01254.x](https://doi.org/10.1111/j.1572-0241.2007.01254.x)
5. McKenzie YA, Bowyer RK, Leach H, et al. British Dietetic Association systematic review and evidence-based practice guidelines for the dietary management of irritable bowel syndrome in adults (2016 update). *J Hum Nutr Diet* 2016;29:549–575. doi:[10.1111/jhn.12385](https://doi.org/10.1111/jhn.12385)
6. Vasant DH, Paine PA, Black CJ, et al. British Society of Gastroenterology guidelines on the management of irritable bowel syndrome. *Gut* 2021;70:1214–1240. doi:[10.1136/gutjnl-2021-324598](https://doi.org/10.1136/gutjnl-2021-324598)
7. Biesiekierski JR, Peters SL, Newnham ED, Rosella O, Muir JG, Gibson PR. No effects of gluten in patients with self-reported non-celiac gluten sensitivity after dietary reduction of fermentable, poorly absorbed, short-chain carbohydrates. *Gastroenterology* 2013;145:320–328.e1–e3. doi:[10.1053/j.gastro.2013.04.051](https://doi.org/10.1053/j.gastro.2013.04.051)
8. Rej A, Sanders DS, Shaw CC, et al. Efficacy and Acceptability of Dietary Therapies in Non-Constipated Irritable Bowel Syndrome: A Randomized Trial of Traditional Dietary Advice, the Low FODMAP Diet, and the Gluten-Free Diet. *Clin Gastroenterol Hepatol* 2022;20:2876–2887.e15. doi:[10.1016/j.cgh.2022.02.045](https://doi.org/10.1016/j.cgh.2022.02.045)
9. Biesiekierski JR, Newnham ED, Irving PM, et al. Gluten causes gastrointestinal symptoms in subjects without celiac disease: a double-blind randomized placebo-controlled trial. *Am J Gastroenterol* 2011;106:508–514. doi:[10.1038/ajg.2010.487](https://doi.org/10.1038/ajg.2010.487)
10. Vazquez-Roque MI, Camilleri M, Smyrk T, et al. A controlled trial of gluten-free diet in patients with irritable bowel syndrome-diarrhea: effects on bowel frequency and intestinal function. *Gastroenterology* 2013;144:903–911.e3. doi:[10.1053/j.gastro.2013.01.049](https://doi.org/10.1053/j.gastro.2013.01.049)

11. Shahbakhani B, Sadeghi A, Malekzadeh R, et al. Non-Celiac Gluten Sensitivity Has Narrowed the Spectrum of Irritable Bowel Syndrome: A Double-Blind Randomized Placebo-Controlled Trial. *Nutrients* 2015;7:4542–4554. doi:[10.3390/nu7064542](https://doi.org/10.3390/nu7064542)
12. Zanwar VG, Pawar SV, Gambhire PA, et al. Symptomatic improvement with gluten restriction in irritable bowel syndrome: a prospective, randomized, double blinded placebo controlled trial. *Intest Res* 2016;14:343–350. doi:[10.5217/ir.2016.14.4.343](https://doi.org/10.5217/ir.2016.14.4.343)
13. Aziz I, Trott N, Briggs R, North JR, Hadjivassiliou M, Sanders DS. Efficacy of a Gluten-Free Diet in Subjects With Irritable Bowel Syndrome-Diarrhea Unaware of Their HLA-DQ2/8 Genotype. *Clin Gastroenterol Hepatol* 2016;14:696–703.e1. doi:[10.1016/j.cgh.2015.12.031](https://doi.org/10.1016/j.cgh.2015.12.031)
14. Whelan K, Martin LD, Staudacher HM, Lomer MCE. The low FODMAP diet in the management of irritable bowel syndrome: an evidence-based review of FODMAP restriction, reintroduction and personalisation in clinical practice. *J Hum Nutr Diet* 2018;31:239–255. doi:[10.1111/jhn.12530](https://doi.org/10.1111/jhn.12530)
15. van Lanen AS, de Bree A, Greyling A. Efficacy of a low-FODMAP diet in adult irritable bowel syndrome: a systematic review and meta-analysis. *Eur J Nutr* 2021;60:3505–3522. doi:[10.1007/s00394-020-02473-0](https://doi.org/10.1007/s00394-020-02473-0)
16. Peters SL, Yao CK, Philpott H, Yelland GW, Muir JG, Gibson PR. Randomised clinical trial: the efficacy of gut-directed hypnotherapy is similar to that of the low FODMAP diet for the treatment of irritable bowel syndrome. *Aliment Pharmacol Ther* 2016;44:447–459. doi:[10.1111/apt.13706](https://doi.org/10.1111/apt.13706)
17. Goyal O, Batta S, Nohria S, et al. Low fermentable oligosaccharide, disaccharide, monosaccharide, and polyol diet in patients with diarrhea-predominant irritable bowel syndrome: A prospective, randomized trial. *J Gastroenterol Hepatol* 2021;36:2107–2115. doi:[10.1111/jgh.15410](https://doi.org/10.1111/jgh.15410)
18. Patcharatkul T, Juntrapirat A, Lakananurak N, Gonlachanvit S. Effect of Structural Individual Low-FODMAP Dietary Advice vs. Brief Advice on a Commonly Recommended Diet on IBS Symptoms and Intestinal Gas Production. *Nutrients* 2019;11:2856. doi:[10.3390/nu11122856](https://doi.org/10.3390/nu11122856)
19. Zahedi MJ, Behrouz V, Azimi M. Low fermentable oligo-di-mono-saccharides and polyols diet versus general dietary advice in patients with diarrhea-predominant irritable bowel syndrome: A randomized controlled trial. *J Gastroenterol Hepatol* 2018;33:1192–1199. doi:[10.1111/jgh.14051](https://doi.org/10.1111/jgh.14051)
20. Eswaran SL, Chey WD, Han-Markey T, Ball S, Jackson K. A Randomized Controlled Trial Comparing the Low FODMAP Diet vs. Modified NICE Guidelines in US Adults with IBS-D. *Am J Gastroenterol* 2016;111:1824–32. doi:[10.1038/ajg.2016.434](https://doi.org/10.1038/ajg.2016.434)
21. Böhn L, Störsrud S, Liljebo T, et al. Diet low in FODMAPs reduces symptoms of irritable bowel syndrome as well as traditional dietary advice: a randomized controlled trial. *Gastroenterology* 2015;149:1399–1407.e2. doi:[10.1053/j.gastro.2015.07.054](https://doi.org/10.1053/j.gastro.2015.07.054)
22. Halmos EP, Power VA, Shepherd SJ, Gibson PR, Muir JG. A diet low in FODMAPs reduces symptoms of irritable bowel syndrome. *Gastroenterology* 2014;146:67–75.e5. doi:[10.1053/j.gastro.2013.09.046](https://doi.org/10.1053/j.gastro.2013.09.046)
23. Pedersen N, Andersen NN, Végh Z, et al. Ehealth: low FODMAP diet vs *Lactobacillus rhamnosus* GG in irritable bowel syndrome. *World J Gastroenterol* 2014;20:16215–16226. doi:[10.3748/wjg.v20.i43.16215](https://doi.org/10.3748/wjg.v20.i43.16215)
24. Staudacher HM, Lomer MCE, Anderson JL, Barrett JS, Muir JG, Irving PM, et al. Fermentable carbohydrate restriction reduces luminal bifidobacteria and gastrointestinal symptoms in patients with irritable bowel syndrome. *J Nutr* 2012;142:1510–1518. doi:[10.3945/jn.112.159285](https://doi.org/10.3945/jn.112.159285)
25. Staudacher HM, Mahoney S, Canale K, et al. Clinical trial: A Mediterranean diet is feasible and improves gastrointestinal and psychological symptoms in irritable bowel syndrome. *Aliment Pharmacol Ther* 2023. doi:[10.1111/apt.17791](https://doi.org/10.1111/apt.17791)
26. Carroccio A, Mansueto P, Iacono G, et al. Non-celiac wheat sensitivity diagnosed by double-blind placebo-controlled challenge: exploring a new clinical entity. *Am J Gastroenterol* 2012;107:1898–1906. doi:[10.1038/ajg.2012.236](https://doi.org/10.1038/ajg.2012.236)
27. Shaw CC, Buckle RL, Rej A, Trott N, Aziz I, Sanders DS. A Gluten Reduction Is the Patients' Choice for a Dietary "Bottom Up" Approach in IBS-A Comment on 'A 5Ad Dietary Protocol for Functional Bowel Disorders' *Nutrients* 2019, 11, 1938. *Nutrients* 2020;12:137. doi:[10.3390/nu12010137](https://doi.org/10.3390/nu12010137)
28. Rej A, Shaw CC, Buckle RL, et al. The low FODMAP diet for IBS; A multicentre UK study assessing long term follow up. *Dig Liver Dis* 2021;53:1404–1411. doi:[10.1016/j.dld.2021.05.004](https://doi.org/10.1016/j.dld.2021.05.004)
29. O'Keeffe M, Jansen C, Martin L, et al. Long-term impact of the low-FODMAP diet on gastrointestinal symptoms, dietary intake, patient acceptability, and healthcare utilization in irritable bowel syndrome. *Neurogastroenterol Motil* 2018;30:e13154. doi:[10.1111/nmo.13154](https://doi.org/10.1111/nmo.13154)
30. Arabpour E, Alijanzadeh D, Sadeghi A, et al. Gluten restriction in irritable bowel syndrome, yes or no?: a GRADE-assessed systematic review and meta-analysis. *Front Nutr* 2023;10:1273629. doi:[10.3389/fnut.2023.1273629](https://doi.org/10.3389/fnut.2023.1273629)
31. Tuck CJ, Reed DE, Muir JG, Vanner SJ. Implementation of the low FODMAP diet in functional gastrointestinal symptoms: A real-world experience. *Neurogastroenterol Motil* 2020;32:e13730. doi:[10.1111/nmo.13730](https://doi.org/10.1111/nmo.13730)
32. Wang XJ, Camilleri M, Vanner S, Tuck C. Review article: biological mechanisms for symptom causation by individual FODMAP subgroups - the case for a more personalised approach to dietary restriction. *Aliment Pharmacol Ther* 2019;50:517–529. doi:[10.1111/apt.15419](https://doi.org/10.1111/apt.15419)
33. Paduano D, Cingolani A, Tanda E, Usai P. Effect of Three Diets (Low-FODMAP, Gluten-free and Balanced) on Irritable Bowel Syndrome Symptoms and Health-Related Quality of Life. *Nutrients* 2019;11. doi:[10.3390/nu11071566](https://doi.org/10.3390/nu11071566)
34. Sturkenboom R, Keszthelyi D, Masclee AAM, Essers BAB. Discrete Choice Experiment Reveals Strong Preference for Dietary Treatment Among Patients With Irritable Bowel Syndrome. *Clin Gastroenterol Hepatol* 2022;20:2628–2637. doi:[10.1016/j.cgh.2022.02.016](https://doi.org/10.1016/j.cgh.2022.02.016)
35. Lenhart A, Ferch C, Shaw M, Chey WD. Use of Dietary Management in Irritable Bowel Syndrome: Results of a Survey of Over 1500 United States Gastroenterologists. *J Neurogastroenterol Motil* 2018;24:437–451. doi:[10.5056/jnm17116](https://doi.org/10.5056/jnm17116)
36. Simons M, Taft TH, Doerfler B, et al. Narrative review: Risk of eating disorders and nutritional deficiencies with dietary therapies for irritable bowel syndrome. *Neurogastroenterol Motil* 2022;34:e14188. doi:[10.1111/nmo.14188](https://doi.org/10.1111/nmo.14188)
37. Rej A, Buckle RL, Shaw CC, et al. National survey evaluating the provision of gastroenterology dietetic services in England. *Frontline Gastroenterol* 2020;12:380–384. doi:[10.1136/flgastro-2020-101493](https://doi.org/10.1136/flgastro-2020-101493)
38. Whigham L, Joyce T, Harper G, et al. Clinical effectiveness and economic costs of group versus one-to-one education for short-chain fermentable carbohydrate restriction (low FODMAP diet) in the management of irritable bowel syndrome. *J Hum Nutr Diet* 2015;28:687–696. doi:[10.1111/jhn.12318](https://doi.org/10.1111/jhn.12318)
39. Williams M, Barclay Y, Harper L, Marchant C, Seamark L, Hickson M. Feasibility, acceptability and cost efficiency of using webinars to deliver first-line patient education for people with Irritable Bowel Syndrome as part of a dietetic-led gastroenterology service in primary care. *J Hum Nutr Diet* 2020;33:758–766. doi:[10.1111/jhn.12799](https://doi.org/10.1111/jhn.12799)