Long-term symptom severity in people with irritable bowel syndrome following dietetic treatment in primary care – a service evaluation.

Transparency Declaration

The lead author affirms that this manuscript is an honest, accurate, and transparent account of the study being reported. The lead author affirms that no important aspects of the study have been omitted and that any discrepancies from the study as planned have been explained.

ABSTRACT

Background: Evidence suggests dietary interventions can improve symptoms in people with irritable bowel syndrome (IBS), but most data explores short-term (immediate) impact; data on long-term (>6 months) impact are limited, especially from primary care settings. This study aimed to investigate the long-term effect of dietetic-led interventions for IBS delivered in primary care.

Method: A service evaluation of a dietetic-led IBS clinic was completed, analysing data on symptom severity, stool frequency and consistency, and healthcare input. Data were collected before and immediately after dietary intervention as part of patients’ routine clinical appointments. Long-term data was collected via a postal questionnaire at least 11 months later.

Results: 211 patients responded to the long-term follow-up questionnaire at 13 months (median; interquartile range 12-16 months) post follow-up appointment. 84% had been advised to follow the low FODMAP diet. All symptoms were reported significantly less frequently short-term, and all, except heartburn and acid regurgitation, remained so long-term. The four most commonly reported bowel symptoms reduced in frequency by 62% abdominal pain, 50% bloating, 48% increased wind, and 49% urgency to open bowels (p<0.001). Percent patients reporting satisfactory relief of gut symptoms was 10% baseline and 55% long-term follow up (p<0.001). Visits to the GP reduced (96% vs 34% p<0.001), and to the gastroenterologist (37% to 12%; p=0.002) during the year prior to long-term follow up compared to the year prior to dietary intervention.

Conclusion: Patients with IBS, who received dietetic-led interventions in primary care reported long-term symptoms improvements, which may result in reduced healthcare usage.

1: INTRODUCTION
Irritable bowel syndrome (IBS) is a chronic and debilitating functional gastrointestinal disorder with an estimated global prevalence of 4-9% (1). It has a significant impact on healthcare utilisation with up to 50% of IBS patients seeking medical advice, with the majority of these (90%) visiting their General Practitioner (GP) (2). Repetitive appointments with GPs are common in this patient group, with rates of attendance in primary care shown to be between 8.1–9.7/year in the UK (3). The impact on secondary care services is also substantial, with 29% of IBS patients being referred to specialists, including gastroenterologists and surgeons (4). Between 63-84% of patients have expensive diagnostic procedures, including abdominal ultrasounds and colonoscopies (5), despite a low probability of finding any organic pathology (6). Although IBS is not associated with serious disease or mortality, it has been shown to have a negative effect on health-related quality of life (7–8). When the financial implications associated with reduced quality of life are combined with direct healthcare costs, IBS has been estimated to cost between £45.6-£200 million/year in the UK alone (5).

In order to alleviate the global burden of IBS, timely diagnosis and effective management of symptoms is essential. Both the UK’s National Institute of Care and Health Excellence (NICE) and the British Society of Gastroenterology recommend primary care as being the most appropriate setting to achieve this (9-10), however, other countries’ guidelines are yet to focus on delivering treatment specifically in primary care. Historically, the lack of effective IBS treatment options has been the main challenge in isolating its management in primary care. However, because a large proportion of people with IBS commonly report that foods induce or exacerbate their symptoms, dietary treatments have now been explored as potential therapeutic options (7,11-13). A systematic review, which was part of the development process of the British Dietetic Association’s practice guidelines for the dietary management of IBS, reported that various dietary interventions, including altering intakes of alcohol, spicy foods, fat, as well as reducing intakes of fermentable oligosaccharides, disaccharides, monosaccharides and polyols carbohydrates (FODMAPs) were effective in improving certain symptoms in people with IBS (14). Improvements in symptoms of people with IBS whilst following a low FODMAP diet have frequently been reported (15-17). As a result, a low FODMAP diet is now recommended within the IBS management guidelines of several countries (9,14,18-22). The gluten free diet has also been explored as a potential dietary treatment and found to improve symptoms in people with diarrhoea predominant IBS (21-25).

With dietary interventions now recognised as an integral part of the management of IBS, dietitians should play an essential role in the effective delivery of this therapeutic option. Prior to recommending a dietary treatment, a dietitian must first complete an assessment with patients to confirm the diagnosis of IBS and determine the most appropriate intervention. Other conditions,
including undiagnosed coeliac disease, non-coeliac gluten sensitivity and gastrointestinal food
allergy, can all present with similar symptom profiles to IBS, and are often misdiagnosed.

However, each of these conditions require different diets and variable levels of dietary stringency,
emphasizing the need for specialist dietetic intervention (26-29). Coeliac disease must first be excluded
via appropriate tests (9), and exploring a patient’s atopic history may provide an indicator for a
potential food allergy (29). Non-coeliac gluten sensitivity involves intestinal and extra-intestinal
symptoms that are triggered by gluten ingestion in the absence of coeliac disease and wheat allergy
(30) and may also include ‘foggy mind’, tiredness, headaches, fibromyalgia-like joint or muscle
pain, and leg or arm numbness (31).

The majority of available evidence demonstrates the benefits of diet, including the low FODMAP
diet, on IBS symptoms immediately following implementation, and up to 9 months afterwards (15-17,
32-33, 24). However, there is little reported on the benefits of diet beyond 11 months of
implementation. Studies that have examined the longer-term effects of the low FODMAP diet on
IBS symptoms (34-36) have primarily delivered the dietary advice in secondary care. Providing
dietetic input for IBS patients within primary care offers an opportunity to reduce the burden of the
condition on healthcare resources, including reducing unnecessary secondary care referrals and
associated costs (37). The aim of this study was to assess the impact of dietetic-led interventions for
IBS patients delivered in primary care, a year after treatment completion.

METHOD

Study design

This is an observational service evaluation of a specialist dietetic-led gastroenterology clinic
[blinded for peer review] that was set up to provide dietary advice for patients with IBS in primary
care in January 2013. Patients referred into the clinic were initially diagnosed with IBS by their GP,
which as per the local diagnosis pathway, included assessment of alarming symptoms and exclusion
of coeliac disease via a negative tissue transglutaminase blood test. It was assumed GPs would
have considered alternative diagnoses as part of their assessment. Prior to referral patients were
encouraged to implement first line dietary advice discussed in the British Dietetic Association’s
practice guidelines for the management of IBS (14), and support for this was delivered either by the
GP, or the general community dietetic clinics. Only those with intractable symptoms were referred
on to the specialist clinic. Those who attended the dietetic-led gastroenterology clinic were
assessed and counselled by a specialist gastroenterology dietitian. The patient attended at least two
dietetic appointments; an initial appointment for assessment and education on recommended dietary
intervention; and a follow up appointment at least 4 weeks later when they had implemented the advised dietary changes. Some patients attended subsequent appointments if further dietetic intervention was recommended at their first follow-up. At the final follow-up appointment, patients were educated on how to complete relevant food challenges, and advice was provided on food reintroductions and long-term self-management.

All patients seen in the clinic between May 2013 and April 2017 were included. Data was collected at three time points: prior to their initial appointment (baseline), prior to their final follow-up appointment (short-term follow-up) (both of which were part of the routine clinical care), and approximately 11 months later (long-term follow-up) via postal questionnaire. Ethical approval via the UK Health Research Authority was not required because it was deemed an evaluation of the dietetic service. Local approval was given by [blinded for peer review] to carry out the data collection.

**Dietary advice**

Patients were seen in the dietetic-led gastroenterology clinic by one of three specialist gastroenterology dietitians. As per routine clinical practice, a medical, social and diet history was completed along with an assessment of gut and non-gut related symptoms, followed by a discussion regarding previous treatments and dietary habits. Following careful consideration of these parameters, and in consultation with the patient, at the initial appointment one of the following dietary interventions was recommended: low FODMAP diet, gluten free diet, or another single or multiple food exclusion diets. Education was provided on the specific diet and patients received practical advice on how to implement the dietary intervention along with appropriate written booklets to provide additional support.

The patients were asked to implement dietary changes for a period of 4-8 weeks, and were then reviewed in clinic as soon as possible after this time. If the initial dietetic intervention resulted in minimal symptom improvements, an alternative dietary change may have been recommended if appropriate for a further 4-8 weeks. At the final follow-up appointment with the dietitian, education was provided on how to complete relevant food challenges, and advice was provided on food reintroductions and long-term self-management.

The following data were collected from the clinical notes for baseline and short-term follow-up and from the questionnaire for the long-term follow-up:
Gastrointestinal symptoms and stool output

At each of the three time-points, patients were asked to assess severity of individual gastrointestinal symptoms, based on frequency and the extent to which they affected their social activities, using the Gastrointestinal Symptom Rating Scale (GSRS) (38). Symptoms assessed included abdominal pain/discomfort, abdominal bloating/distension, increased wind, belching/burping, gurgling noises from stomach, urgency to open bowels, incomplete evacuation of stools, nausea, heartburn, acid regurgitation and tiredness. Patients were also asked about their stool frequency and consistency according to the Bristol Stool Form Scale (BSFS) (39), which is a 7 point scale of stool types ranging from type 1 (separate hard lumps) to type 7 (entirely liquid with no solid pieces).

Satisfaction with gut symptom relief was assessed by asking the question “Do you currently have satisfactory relief of your gut symptoms?”

Healthcare utilisation and resources

At baseline and long-term follow-up, patients were asked to recall, in the previous 12 months, how many times they had visited their GP or gastroenterologist for their IBS symptoms and whether they had any investigations for gut symptoms. Patients were also asked to confirm whether or not they were currently taking any prescribed medication for their gut symptoms.

Statistical analysis

Statistical analysis was performed using IBM SPSS (version 25) statistical software package.

Demographics, dietary intervention and baseline symptoms were analysed descriptively. Symptom responses were assessed by changes in the proportion of patients reporting the presence of moderate or severe symptoms on the GSRS. Stool frequency was reclassified into four categories depending on number of times stools were passed; once every 4 or more days, between once every 3 days and up to 3 times a day, 4 or more times a day, and variable. Stool frequency was also dichotomised as normal (between once every 3 days and up to 3 times a day) or abnormal (any of the other three categories). Similarly, stool consistency was grouped into four categories; BSFS 1-2 (hard), 3-4 (normal), 5-7 (loose) and mixed, and additionally dichotomised as normal (BSFS 3-4) or abnormal (BSFS 1,2,5,6,7 and mixed).

A Wilcoxon ranked test was applied to determine if there were any significant differences over time for individual symptom severity, number of GP and gastroenterologist visits, and number of
gastrointestinal investigations. A McNemar’s test was applied to determine if there were any significant associations across the time frames for satisfactory relief of symptoms, presence of normal stool consistency and stool frequency, and current use of prescribed medication. P values <0.01 were considered to be statistically significant. A p value lower than the usual 0.05 was applied to counteract the increased risk of a type 1 error associated with the multiple comparisons completed.

RESULTS

There were 742 patients seen in the primary-care dietetic-led gastroenterology for their initial appointment between May 2013 and April 2017. Of these, 547 attended at least one follow-up appointment. 499/547 (91%) patients were sent postal questionnaires at least 11 months after their final follow-up appointment as part of the service evaluation. The remaining 48/547 (9%) patients were not sent postal questionnaire at 11 months due to: not completing recommended dietary intervention (n=6); providing incomplete paperwork at initial and follow-up appointments (n=35); or receiving on-going dietetic review (n=7). Of the 499 patients sent postal questionnaires, 227 patients (45%) returned completed questionnaires. Of these, 16 patients were referred for other reasons than IBS, therefore 211 (44%) patients were analysed at long-term follow-up. The mean age was 53.6 years (sd=15) and 182 (86%) were female. The median duration from baseline to short-term follow-up appointment was 9 weeks, (interquartile range 9-13 weeks), and the median duration from short-term to long-term follow-up was 13 months (interquartile range 12-16 months). Five patients (2%) were sent postal questionnaires before the planned 11 months, due to an administrative error. In 38 patients (18%) there was a >6 month delay in sending out questionnaires after their final appointment due to other work priorities at the time.

As shown in Table 1, the majority of patients (84%) were advised to follow the low FODMAP diet, either in isolation or combined with an additional dietary intervention. This is similar to the proportion of the original cohort (n=547) who were advised to follow the low FODMAP diet (81%).

Gastrointestinal Symptoms

At baseline, the most common gastrointestinal symptoms were abdominal pain and bloating, increased wind, and urgency to open bowels (Figure 1). Over 60% of patients rated the severity of these symptoms as moderate or severe, with those included in the long-term follow-up analysis
(n=211) presenting with similar baseline symptom profiles as the whole cohort (n=547). Tiredness was the most common symptom, reported by 71% and 69% of patients in the whole cohort and long-term follow-up group respectively. There was a significant reduction (p<0.001 for all symptoms) in the proportion of patients reporting presence of moderate or severe symptoms between baseline and short-term follow-up (Figure 1) for both the whole cohort and the long-term follow-up group. The significant difference from baseline was maintained at long-term follow-up for all symptoms apart from heartburn (13% vs 10% p=0.059) and acid regurgitation (13% vs 12% p=0.354). The four mostly commonly reported gastrointestinal symptoms reduced in frequency by approximately half (abdominal pain by 62%; bloating by 50%; increased wind by 48%; and urgency to open bowels by 49%).

A sub-analysis was completed to determine if symptom improvements from baseline to long-term follow-up were affected by the type of dietary intervention (Figure 2). Diets were re-classified into two types: those that include the low FODMAP diet (n=177) and those that used other dietary interventions (n=34), and an improvement in a symptom was defined as a positive change of at least one on the GSRS. With both dietary approaches all symptoms improved but the size of the improvement was not significantly different between the two approaches (Mann-Whitney U tests p>0.3 for all symptoms) (Figure 2).

At baseline 10% of patients (n=22) reported having satisfactory relief of gut symptoms. At short-term follow-up this increased to 66% (n=139, p<0.001) and was maintained at 55% (n=116; p<0.001) at long-term follow-up.

**Stool Output**

At baseline, only 23% of patients reported a normal stool consistency (BSFS 3 or 4) (Table 2). The most common stool types were mixed and loose stools (BSFS 5-7), and the least common was constipation (type 1-2). At short-term follow-up the proportion of patients reporting normal stool consistency significantly increased to 49% (p<0.001). At long-term follow-up this reduced to 45% but remained significant when compared to baseline (p<0.001).

At baseline, 74% of patients reported a normal stool frequency (between once every 3 days and 3 times a day) (Table 2). This significantly increased to 89% (p<0.001) at short-term follow-up and 82% (p=0.005) at long-term follow-up.
Healthcare utilisation and resources

Table 2 shows the proportion of 140 patients who answered the question regarding number of GP visits in the previous 12 months at baseline and 138 at long-term follow-up. Data indicates a dramatic decrease in any patient visits to their GP (96% vs 34% p<0.001). Only 128 patients provided information on the number of times they had seen a gastroenterologist in the previous 12 months at baseline and 125 at long-term follow-up (Table 2). Similar to GP visits, the proportion visiting a gastroenterologist at least once reduced from 37% to 12% (p=0.002).

Whether investigations for gut symptoms occurred was reported by 130 patients at baseline and long-term follow-up. Endoscopic investigation was the most common type, followed by ultrasound (Table 2). At baseline, 49% patients reported having at least one investigation in the previous 12 months and 18% reported multiple investigations. At long-term follow-up this reduced to 17% and 5% respectively (p<0.001).

Results for medication usage showed a similar pattern; 57% reported using prescribed medication for their gut symptoms at baseline, and this reduced to 49% at long-term follow-up, however this was not significant based on our defined criteria (p=0.034) (Table 2).

Discussion

This observational service evaluation focuses on the long-term symptom severity of patients with IBS, who have received dietetic-led dietary interventions, and it includes data from the largest cohort of primary care based patients to date. The study demonstrated that after receiving dietetic advice from a specialist dietitian based in primary care, patients with IBS reported improvements in the severity of symptoms, and these improvements were sustained at least 11 months after treatment completion. With over a half of patients reporting long-term satisfactory relief of symptoms, the study supports the use of diet as a potential effective therapeutic option for the long-term management of IBS. A reduction in the utilisation of healthcare services, including those in secondary care, was reported in the year following dietary treatment, thereby suggesting a primary care dietitian may be able to facilitate a reduction in healthcare usage in IBS patients.

Satisfactory control of gut symptoms was reported by 55% of patients, after a median of 13 months following the completion of dietary intervention and this is consistent with the findings of O’Keeffe et al (35). These authors used a similar study design to the current study and found 57% of patients had satisfactory relief of symptoms at long-term follow-up, which was between 6-18 months after the completion of dietetic-led low FODMAP education. An earlier study that had a median follow-
up period of 16 months, reported 57% and 29% of IBS patients had a partial and full response to the low FODMAP diet respectively (34). These reported levels of satisfaction, are less than the more recent findings of Nawawi et al (36), who at 12 months demonstrated 76% of patients were satisfied with the improvements in their symptoms. This study analysed data from 30 patients at long-term follow-up, compared to the 211 patients in the current study. Nawawi et al (36) also had patients complete the long-term follow-up questionnaire in clinic during their final follow-up appointment, whereas the current study used postal questionnaires for long-term data collection. These differences in study design may contribute to variations in observed results.

Our study reported that after following dietetic advice, all individual gastrointestinal symptoms, apart from heartburn and acid regurgitation, significantly improved in the long-term, but there were differences between lower and upper gastrointestinal symptoms. Lower gastrointestinal symptoms were the most commonly reported at baseline, with over 60% of patients reporting moderate or severe abdominal pain, bloating or excess wind, and these symptoms reduced by approximately half in the long-term for these symptoms. Although less common, upper gastrointestinal symptoms, including heartburn and acid regurgitation, had a frequency of 13%, suggesting that although they are seldom included in diagnostic criteria for IBS they are still symptoms that are reported by IBS patients. Despite a significant improvement in these symptoms at short-term follow-up, changes at the long-term follow did not remain significant for these upper gastrointestinal symptoms. These findings are consistent with existing long-term studies (34-36).

Stool consistency significantly improved in our study at long-term follow-up (abnormal 77% vs 53%), and this is in keeping with findings of both O’Keeffe et al (35) and Maagaard et al (34). Stool frequency also improved in our study and was deemed statistically significant, concurring with O’Keeffe et al (35). These findings along with the significant reduction in urgency to open bowels, and incomplete evacuation, suggest dietary interventions may produce lasting improvements in bowel habits in IBS patients. With a large proportion of patients stating that issues with bowel habits have the most detrimental impact on their daily lives, effective therapeutic options addressing this area may to lead to the most significant improvements in the quality of life of IBS patients.

We also showed that reported healthcare usage significantly reduced in IBS patients in the period after receiving dietary advice. Both GP and gastroenterologist appointments went down significantly after dietary intervention. This reduction may be explained by the symptom improvements, however further work is required to compare healthcare utilisation in IBS patients who do and do not receive dietetic advice. Dietetic intervention may have the potential to reduce secondary care input and associated healthcare costs in the case of younger patients (<45 years of age), by providing a therapeutic treatment option to a population who do not generally need
secondary care investigations to exclude alarming pathology, prior to their IBS diagnosis. With the average age of the studied cohort being 54 years, one may argue the potential cost-savings from reduced secondary care on a diagnostic basis is limited. However, in this cohort of patients, effective dietetic-led interventions have the potential to reduce secondary care input by stopping the revolving door effect of poor symptoms management leading to repeated secondary care referrals and investigations. Nearly half the cohort (49%) reported having had at least one investigation in the year prior to initial dietetic input; however clinical experience suggests if we had looked at the number of investigations over the last 15 years, this number would have significantly increased, and included repeated investigations. Patients often reported in clinic having suffered with IBS symptoms for many years, and due to lack of effective treatment options, they had repeatedly visited their GP and had repeated referrals to secondary care over many years. Therefore, there is the potential to reduce healthcare usage in all age groups by offering effective dietetic treatments.

Additionally, due to the number of patients reporting having visited their GP and gastroenterologist on numerous occasions before seeing the dietitian, it raises the question of whether earlier referral to a dietitian could have resulted in further reductions in healthcare usage. Having the delivery of dietary treatments based in primary care, rather than secondary care, is essential to optimise potential cost savings. If GPs have access to dietitians offering effective dietary treatment options within a primary care setting, it could reduce the number of referrals to secondary care and referrals for unnecessary expensive investigations.

Patients included in this service evaluation, would have been encouraged to implement first-line dietary approaches, recommended by the British Dietetic Association (14), before being referred onto the specialist dietetic clinic. As these interventions were delivered in the patient’s GP practice or by another part of the community dietetic service, data on changes in symptoms following such advice was not available for this service evaluation. As studies have shown traditional first-line dietary approaches for IBS can be effective in reducing IBS symptoms (40-41) and are less restrictive, future studies should include analysis of these types of dietary interventions. The most frequently used dietary intervention in this service evaluation was a low FODMAP diet in isolation or combined with another dietary restriction. Only a few other diets were used, including a gluten-free diet and other single dietary restrictions. However, the comparison of low FODMAP to ‘other’ diets showed no significant differences in symptom improvements from baseline to long-term follow-up. Patients on both dietary approaches improved equally well, suggesting that diets such as gluten-free and other dietary exclusions may deliver long-term symptom improvements, and a dietitian has the appropriate skills to make the assessment and recommend the most appropriate dietary intervention. The mechanisms for how the low FODMAP diet leads to symptom
improvements include reductions in small intestinal water volume and colonic gas production (42). However, further studies including randomised control trials (RCTs), are required to assess the mechanisms for the other diets used in clinical practice, along with the long-term implications and safety, before the diets can be included in formal guidelines.

It may be that the improvements seen in patients following alternative diets (not low FODMAP) was due to the diets being effective treatments for alternative diagnoses, rather than an effective treatment for IBS. IBS is difficult to diagnose due to the vague symptoms, thus this diagnosis may not always be accurate. Undiagnosed coeliac disease, non-coeliac gluten sensitivity and gastrointestinal food allergy all present with similar symptom profiles to IBS. Further research is needed to explore this area, however, this real-life service evaluation supports the view that a ‘one-size fits all’ approach to dietary treatment of patients who present with IBS is not appropriate. Dietitians, especially those with expertise in gastroenterology, can play an essential role in the appropriate assessment and effective delivery of the dietary treatment options for IBS patients.

The main limitation of this study is that as it was an observational service evaluation, it is not possible to draw clear conclusions on the cause and effect relationship, between symptoms improvement and healthcare usage, and dietetic-led dietary intervention. Other factors including stress levels, management strategies to help manage emotions, other dietary changes, use of prebiotics and probiotics were not reported in this study, and may have all played a role in the changes reported at long-term follow-up. Additionally, with approximately half of the patients using medication for their gut symptoms at baseline and long-term follow-up, we can not exclude medication as playing a role in improvements seen. Due to this, further RCTs are needed that explore benefits of dietary treatments on IBS management, which also take into account these other factors. Other limitations to this study include the increased risk of non-response bias associated with a postal questionnaire design, as those patients who decided not to respond to the questionnaire at long-term follow-up may differ from those who did. Questionnaire designs also increase the risk of recall bias, which can lead to a deviation from true results. In this study, we included patients who were referred for IBS, but we did not apply strict ROME IV criteria for inclusion. This was because in real-life clinical practice, patients often report a wide range of variable gut symptoms and bowel habits, which can potentially benefit from dietary interventions. Another limitation of this study is that we did not assess adherence to dietary interventions. Nawawi et al (36) demonstrated stricter adherence to a diet resulted in greater symptom improvements; assessment of adherence would provide a greater clarification on the size of impact of the dietary interventions.

In conclusion, our service evaluation demonstrated that IBS patients who received dietary interventions, delivered by specialist gastroenterology dietitians in primary care, reported long-term
reductions in gastrointestinal symptom severity and improvements in bowel habits. Healthcare usage following dietetic intervention was also reduced, indicating the potential for cost savings by including dietetic-led dietary interventions in the management pathways for IBS patients. However, further RCTs are needed to explore the cause and effect relationship of dietetic-led interventions on IBS management and healthcare usage.

References


42. Staudacher HM & Whelan K. The low FODMAP diet: recent advances in understanding its mechanisms and efficacy in IBS. Gut. 2017; 66: 1517-1527
Figure 1. Proportion of patients reporting the presence of individual symptoms (moderate or severe) at a) baseline and short-term follow-up for whole group (n=547) and b) at baseline, short-term follow-up and long-term follow-up for the long-term follow-up group (n=211).

a) Whole Group

b) Long-term follow-up group

- Baseline
- Short-Term Follow-Up
- Long-Term Follow-Up

Figure 2. Proportions of patients following low FODMAP or other dietary interventions who reported an improvement in individual symptoms at long-term follow-up compared to baseline.
Dietary interventions that included the low FODMAP Diet

Dietary interventions that did not include the low FODMAP diet
Table 1. Dietary interventions followed by patients

<table>
<thead>
<tr>
<th>Dietary Intervention</th>
<th>For Whole Group n=547</th>
<th>For Long-Term Follow-up Group n=211</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low FODMAP</td>
<td>361 (66)</td>
<td>155 (74)</td>
</tr>
<tr>
<td>Low FODMAP with additional dietary exclusions</td>
<td>84 (15)</td>
<td>22 (10)</td>
</tr>
<tr>
<td>Gluten Free</td>
<td>22 (4)</td>
<td>8 (4)</td>
</tr>
<tr>
<td>Other single dietary exclusion</td>
<td>39 (7)</td>
<td>14 (7)</td>
</tr>
<tr>
<td>Other multiple dietary exclusions</td>
<td>31 (6)</td>
<td>9 (4)</td>
</tr>
<tr>
<td>Other</td>
<td>10 (2)</td>
<td>3 (1)</td>
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Table 2. Reported stool type and frequency, number of GP and gastroenterology visits and gastrointestinal investigations, and use of prescribed medication at baseline, short-term follow-up and long-term follow-up

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Whole group at Baseline n=547</th>
<th>Whole group at Short Term Follow-up n=547</th>
<th>Whole group at Short Term Follow-up n=547</th>
<th>Whole group at Short Term Follow-up n=547</th>
<th>Whole group at Long Term Follow-up n=547</th>
<th>Whole group at Long Term Follow-up n=547</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stool Type, n (%)</td>
<td>n=547</td>
<td>n=211</td>
<td>n=211</td>
<td>n=211</td>
<td>n=211</td>
<td>n=211</td>
</tr>
<tr>
<td>BSFS 1-2 (hard)</td>
<td>46 (9)</td>
<td>54 (10)</td>
<td>19 (9)</td>
<td>26 (12)</td>
<td>23 (11)</td>
<td>23 (11)</td>
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<td>BSFS 3-4 (normal)</td>
<td>122 (22)</td>
<td>254 (47)</td>
<td>48 (23)</td>
<td>103 (49)</td>
<td>96 (46)</td>
<td>96 (46)</td>
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<tr>
<td>BSFS 5-7 (loose)</td>
<td>187 (34)</td>
<td>62 (11)</td>
<td>70 (33)</td>
<td>26 (12)</td>
<td>43 (20)</td>
<td>43 (20)</td>
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<td>Mixed stool</td>
<td>191 (35)</td>
<td>133 (24)</td>
<td>74 (35)</td>
<td>56 (27)</td>
<td>45 (21)</td>
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<td>44 (8)</td>
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<td>0 (0)</td>
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<td>Stool Frequency, n (%)</td>
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<td>n=211</td>
<td>n=211</td>
<td>n=211</td>
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<td>n=211</td>
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<tr>
<td>Once every 4 or more days</td>
<td>27 (5)</td>
<td>14 (3)</td>
<td>7 (3)</td>
<td>3 (1)</td>
<td>11 (5)</td>
<td>11 (5)</td>
</tr>
<tr>
<td>Between once every 3 days and 3 times a day (normal)</td>
<td>353 (65)</td>
<td>420 (77)</td>
<td>156 (74)</td>
<td>188 (89)</td>
<td>172 (82)</td>
<td>172 (82)</td>
</tr>
<tr>
<td>4 times or more a day</td>
<td>122 (22)</td>
<td>39 (7)</td>
<td>43 (21)</td>
<td>14 (7)</td>
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<td>Variable</td>
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<td>4 to 6</td>
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<td>29 (21)</td>
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<td>178 (47)</td>
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<td>Colonoscopy</td>
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<td>Sigmoidoscopy</td>
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<td>Ultrasound</td>
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<td>Multiple endoscopies</td>
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<tr>
<td>Multiple Others</td>
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<td>Yes</td>
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<tr>
<td>No</td>
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