Improving the Nutritional Management of Inflammatory Bowel Disease through the Development of Patient-Focused Educational Materials

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TABLE OF CONTENTS

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INTRODUCTION

Problem Statement

Medical nutrition therapy guidelines and best practices for inflammatory bowel disease (IBD) are continuously changing due to improved research methods with larger study populations.[1] Research focused on therapeutic diets for Crohn's disease (CD) and ulcerative colitis (UC) are leading to the creation of better, more informed, and effective nutrition interventions for this patient population. However, integrating this information into educational material that can be understood by patients is limited. Creating educational materials that are understandable and accessible for patients is crucial for patient adherence after a visit with a provider.[2] Providing more opportunities for this population to receive accurate educational materials is important to help curb any harm misinformation may cause. As techniques to promote and spread misinformation become more accessible, the responsibility to provide reliable and accurate information for nutrition therapy of IBD becomes greater.[3]

This project focused on the creation of educational materials on the nutritional management of IBD. Specifically, the materials addressed evidence supporting therapeutic diets, the connection between diet and symptoms during active and quiescent disease, diet to induce and maintain remission, and general nutrition education on how to follow these diets during differing disease states. The materials also included information on ostomy care, how to shop for someone's diet, and how to properly monitor one's IBD and the signs and symptoms associated with disease activity. By providing patients with IBD specific nutrition education and supportive materials, patients will be empowered to ask their providers for further guidance and collaboration on the nutritional management of their illness.

Project Goals

The goal of this project was to develop an evidenced based, educational booklet for patients with IBD that discusses the current evidence of diet therapies to induce and maintain remission. This booklet is intended to enhance patient knowledge and facilitate informed

discussions with healthcare providers or registered dietitians. Content is presented at a readability level appropriate for the general population to ensure accessibility and comprehension. This booklet will serve as a tool for patients to use as they navigate the challenges of an IBD diagnosis and assist them while receiving care from their interdisciplinary team.

ORGANIZATIONAL OVERVIEW

Oregon Health and Science University's Digestive Health Center is a multi-specialty clinic that includes divisions such as bariatric, surgery, and gastroenterology and hepatology. This project collaborated with the latter two divisions, which work with patients who have a variety of bowel-related diseases and conditions. This clinic offers interdisciplinary services and providers to deliver optimal and individualized care for their patients. This team includes a variety of specialists including gastroenterologists, surgeons, nurses, pharmacists, dietitians, gastrointestinal (GI) psychologists and other supportive staff. Conditions treated by this clinic include colorectal disorders, esophageal disorders, gastric disorders and obesity, and liver, pancreas and biliary disorders. This project targets the estimated 3,000 patients with IBD seen at the Digestive Health Center.

BACKGROUND

It is estimated that IBD affects 2.4 – 3.1 million people in the United States.[4,5] IBD is diagnosed less often in Black, Asian, and Hispanic populations compared to White.[4] IBD, described as chronic inflammation of the GI tract, can alter nutrient absorption and lead to malnutrition without proper intervention.[6] While this inflammation can occur throughout the GI tract, it is often secluded to the ileum, large intestine, and rectum.[7] The two main subtypes of IBD are CD and UC. A variant of IBD called IBD unclassified or indeterminant IBD is described as experiencing signs and symptoms of both CD and UC. This affects 5-15% of all IBD diagnoses.[8] Common symptoms associated with IBD are nausea, vomiting, diarrhea, abdominal

pain, and flatulence.[1,9,10] These symptoms can lead to disordered or altered eating patterns that can manifest in protein-calorie malnutrition.[1,10,11] Currently, prevalence rates of malnutrition among patients with IBD ranges between 16-87%.[10,11] Even during times of remission, those with IBD are still at risk for malnutrition.[1,12,13] With malnutrition comes other complications such as loss of body mass, sarcopenia, micronutrient deficiencies, and increased risk of mortality.[1]

There are many factors in IBD that lead to malnutrition or deficiency such as malabsorption, medication regimens, bacterial overgrowth, and decreased overall food intake. Malabsorption in IBD can generally be related to chronic inflammation from pro-inflammatory mediators like tumor necrosis factor-α (TNF) and interlukins-1 and -6.[14] These mediators can interact with the CNS and cause other cytokines to affect hunger signaling molecules like leptin, maintain systemic inflammation, decrease anabolic hormone production, which can affect muscle development and protein synthesis.[6]

This inflammation occurs for a variety of proposed mechanisms including genetic defects, environmental and lifestyle factors, and inappropriate immune responses against the intestinal mucosa and flora.[14–16] In particular, this effect on the intestinal mucosa alters its function of the intestines natural barrier against pathogens and other harmful molecules within the lumen. Chronic inflammation causes the mucosal barrier to breakdown through a decrease in mucosal viscosity, alterations of tight and adherent junctions, which block and regulate molecules through the apical membrane, harmful interactions between luminal bacteria and epithelial cells, which may produce even more pro-inflammatory cytokines and chemokines, or by altering epithelial cell development.[15,17] Pertaining to nutrition, the loss of epithelial integrity can increase intestinal motility and impair epithelial transport across the cell.[11] This creates an environment that decreases digestion and absorption of nutrients. As epithelial integrity decreases, electrolytes are likely to be lost, and blood and protein loss continue with GI tract inflammation.[11]

Malabsorption of nutrients in IBD generally stems from inflammation or resection of intestine. Inflammation can impact epithelial cell function, which can affect microvilli and the brush border for carbohydrate absorption. Malabsorption of carbohydrates can allow undigested carbohydrates to enter the colon. When this happens, bacteria within the colon feed on the carbohydrates, which can produce excess gas and lead to abdominal pain, increased motility and secretion.[18] Because of the large number of low molecular weight sugars, water is pulled into the lumen and osmotic diarrhea can occur.[19] A healthy individual can handle some undigested carbohydrates but eventually the sugars and starches are passed through the colon into the stool.[20] In addition to GI dysfunction and reduced quality of life (QoL), the passing of undigested carbohydrate through the GI leads to decreased calorie absorption. The symptoms experienced from carbohydrate malabsorption may also play a role in the desire to restrict carbohydrate in some IBD patients.

As mentioned earlier, protein loss is a side effect of chronic inflammation. This is caused by the destruction of epithelial cells and other tissues affected by inflammation in the gastrointestinal tract. This large increase in blood and protein loss causes systemic catabolism to help supplement for lost nutrients in the intestines. This leads to significant loss in lean muscle mass and can increase the risk of malnutrition.[11]

Primarily in CD, malabsorption of fat can occur due to inflammation of the terminal ileum. The ileum is where bile acids are reabsorbed and circulated to the gallbladder and aide in absorption of fatty acids. As the ileum is the section of the small intestine most affected by CD, bile acid reabsorption can become impaired and malabsorption of fatty acids can occur.[21] This can lead to diarrhea, steatorrhea, and reduced serum cholesterol levels.[21]

Micronutrient absorption can be impaired for several reasons in IBD, and different deficiencies may present dependent on the type of IBD diagnosis. The most common deficiencies in IBD are iron, vitamin D, vitamin K, folic acid, selenium, zinc, vitamin B6, and vitamin B1.[13] Many of these deficiencies occur from diarrhea, fat malabsorption or

medications.[12] Medications can affect absorption and how certain micronutrients are used. Glucocorticoids can affect zinc, phosphorus and calcium utilization and absorption. These medications are used for their ability to impair or inhibit inflammatory cytokines and inflammatory genes.[22] Chronic use of these can lead to osteoporosis/osteopenia, which is why it is recommended to monitor and supplement with vitamin D and/or calcium when necessary in this population.[1,23] Folic acid antagonists, such as sulfasalazine, used primarily in UC patients can cause folic acid deficiency and megaloblastic anemia.[12,22] The European Society of Clinical Nutrition and Metabolism (ESPEN) recommends to prophylactically supplement folic acid if taking folic acid antagonists.[1] Cholestyramine is a CD medication, which acts as a sequestrant of bile acids, which can cause further malabsorption of fat-soluble vitamins and steatorrhea.[12]

Monitoring for micronutrient deficiencies differs between active and inactive disease. Research has looked at how treating deficiencies for zinc, vitamin D, and iron in IBD affects clinical outcomes, but few or no studies have been performed for other micronutrients.[7] Therefore, recommendations relating to monitoring specific nutrients can be challenging to create. Though, we do know the importance of correcting micronutrient deficiencies for maintaining bone mineral density, reducing risk of surgery and improving QoL.[1,7,12] ESPEN recommends that those with remission or mild disease should be assessed for iron every 6-12 months and those with active disease should be assessed at least every 3 months.[1] While there are no consensus guidelines for vitamin D and zinc supplementation, vitamin D supplementation has been shown to be safe and tolerable for IBD patients at varying concentrations.[1,24] Zinc supplementation in higher doses can be safe for IBD patients, though zinc can interfere with iron and copper absorption, therefore monitoring these serum values is important if taking large doses.[25] Frequency of monitoring other micronutrients should occur based on disease activity and other risk factors of the disease such as history of bowel resection.

Complications other than malnutrition and malabsorption in IBD manifest as intestinal strictures/stenosis, abscesses, fistulas, and small intestine bacterial overgrowth (SIBO).

Intestinal fibrosis is commonly found in patients with IBD and can lead to strictures in CD patients and motility issues with UC patients.[26] Dietary therapies can remove insoluble fibers from the diet to avoid luminal obstruction and create better motility in the lumen.[27] Similar to strictures, up to half of all IBD patients will develop a fistula in their lifetime.[28] Fistulizing disease can lead to abdominal pain, fatigue, rectal bleeding (if perianal) and bloody diarrhea.[28] Intestinal abscesses manifest in the same process, though cells of the epithelium do not fully separate, whereas the opposite occurs in a fistula, leaving an opening.[28] SIBO is characterized as bacterial overgrowth from the large intestine through the ileocecal value and into the small intestine.[11,29] This creates a dysbiosis within the microbiota with expansion of pathobionts contributing to further inflammation and loss of epithelial integrity.[11,29,30] SIBO is reported in one third of all IBD patients.[1] SIBO is frequently related to the removal of the ileocecal valve in patients with IBD.[11] This removal can lead to vitamin B12 deficiency if not properly supplemented and monitored.

Evidence for Diet Therapy

Given the impact of IBD on the GI tract, medical nutrition therapy is a key component of IBD treatment. Research on dietary interventions on IBD has shown some evidence for induction of remission with diets such as exclusive enteral nutrition (EEN), which is the first line of therapy for pediatric patients with newly diagnosed IBD[31,32], Crohn's disease exclusion diet (CDED)[33,34] often paired with partial enteral nutrition (PEN)[35,36], specific carbohydrate diet (SCD)[37], and the Mediterranean diet (MD)[38]. Though these diets have shown the ability to induce remission, studies looking at maintenance of remission while on these diets are scarce. ESPEN does not recommend any particular diet for induction or maintenance of remission for those with IBD. While general recommendations for all patients with active IBD cannot be made, subgroups of IBD patients are given diet recommendations. For example, those with obstructive disease may benefit from using an adapted texture of soft foods diet or beginning EEN.[1]

Exclusive Enteral Nutrition

EEN is a temporary diet therapy used for induction of remission in CD patients that usually lasts from 8-12 weeks.[36] A patient is given a regimen of oral nutrition supplements or nutrition supplements for tube feeds. These supplements will supply 100% of the patient's estimated calorie and protein needs. EEN has some of the strongest evidence for induction of remission in CD patients. This is reflected in an earlier statement that pediatric patients with CD are to use this treatment as first-line therapy. This recommendation is made as a steroid-sparing intervention as corticoids can have a permanent effect on the child's growth and development.[31]

It is not recommended to begin primary enteral nutrition or parenteral nutrition in those with UC.[1] ESPEN explains that there is insufficient evidence to show efficacy of nutrition therapy for this population. Since these guidelines, some randomized control trials have emerged with use of EEN in patients with UC. Sahu et al.[39] found significant reduction in fecal calprotectin and serum C-reactive protein in the EEN group compared to the standard of care group. In adults with CD, this intervention has still shown effectiveness, though it cannot be recommended as first-line therapy as drug treatment may provide greater efficacy.[40] However, EEN may be recommended for adults who do not tolerate drug therapy. Caution should be taken when using corticoids long-term as they may increase risk of diabetes, adrenal suppression, and osteoporosis.[41]

EEN may be useful in CD populations with complicating disease. Yang et al.[42] assigned CD patients with complicating disease to EEN for 12 weeks and observed 80.5% clinical remission rates, 75% fistula closure rates, significantly decreased Crohn's disease activity index scores (223.43 ± 65.5 vs. 106.77 ± 42.73, $p \leq .001$), and mucosal healing in nearly half of the patients who had ulcers. EEN remission rates may also be improved when used as adjuvant therapy. Wang et al.[32] had 197 patients with mild-to-moderate CD grouped by using biologics or biologics plus EEN for 16 weeks and found significantly greater clinical response (95.0% vs. 66.0%), clinical remission rates (87.0% vs. 52.6%), endoscopic response (91.4% vs. 47.4%),

and mucosal healing (85.7% vs. 23.7%) in the biologics plus EEN group at 16 weeks compared to the biologics only group. While using EEN as first-line therapy for adults is not recommended currently, it can still be a useful therapy in specific populations.[1]

Partial Enteral Nutrition and Crohn's Disease Exclusion Diet

PEN has become an alternative therapy for those who are intolerant to EEN or drug therapy. ESPEN recommends PEN + CDED for children with mild-to-moderate CD as an alternative to EEN.[1] Most research using PEN includes CDED, though some studies have looked at other diets to use with PEN with significant but less favorable results compared to some CDED + PEN studies.[43,44]

CDED is a whole-foods diet that limits foods and ingredients that are believed to be inflammatory or harmful to gut microbiota. The diet excludes or limits animal fats, wheat/gluten, dairy products, processed meats, emulsifiers and additives, and alcohol. This limits most processed and nearly all ultra-processed food items. CDED covers three phases, which gradually increase the variety of food allowed and decreases the amount of liquid nutrition required. CDED is often paired with PEN, though some evidence suggests it may be followed independent of PEN. A pilot, randomized trial with 94 patients with mild-to-moderate CD showed similar induction of remission rates between CDED + PEN and CDED alone (68% versus 57%). Sustained endoscopic remission at 24 weeks was present in 14/40 patients who were in remission at week 6.[33] ESPEN recommends that CDED can be followed with or without PEN in adults with mild-to-moderate CD.[1]

When CDED is used in combination with PEN, results may indicate that remission rates are equal or greater than those who follow an EEN treatment plan.[45] A Cochrane review of EEN found remission rates of 62.5% when using non-elemental formulas or 63.8% when using elemental, though the evidence had a "very low" grade.[40] Levine et al.[45] randomized 74 children with mild-to-moderate CD to CDED + PEN or EEN for 12 weeks. The CDED + PEN group had 75% of children in corticoid-free remission at 6 weeks compared to 59% of the EEN group. At

12 weeks, the groups had remission rates of 75.6% versus 45.1%, respectively. A retrospective study with 61 children with CD found similar results of equal remission rates when using CDED + PEN versus EEN (27/41 versus 15/20, respectively).[46] A prospective observational study had 32 adults with CD follow CDED for 12 weeks. At week 6, 76.7% of participants were in remission and at week 12, 82.1% of participants were in remission. Fecal calprotectin markers also improved significantly at 12 weeks.[35] Not only does CDED + PEN show efficacy in inducing remission, it is also a diet that can be easier to follow and maintain compared to EEN. Adherence to EEN is a struggle seen in adults and children. One theory as to why EEN shows more efficacy in children than adults is diet adherence in the pediatric population.[47] Diet and meals are generally controlled by the guardians of the child, whereas adults have more choice to or not to follow their diet. As this diet allows for inclusion of solid food, PEN plus a whole foods diet may be more sustainable for all patients.

Specific Carbohydrate Diet

SCD is a diet that was originally created as a treatment for celiac disease and popularized in the 90s.[38] Foods excluded from the diet include all grains, sweeteners (except for honey) and artificial sweeteners (except for saccharin), most dairy products (except for hard cheeses and homemade yogurt fermented for 24-hours), most processed foods including processed meats, and alcohol. Like many of these diets, the evidence to support the use of SCD for induction of remission is limited and results are inconsistent, with many of the studies using children as the primary participant demographic. In a study with 18 children with mild-to-moderate CD who followed the SCD, modified SCD (mSCD), or a whole foods diet all achieved and maintained clinical remission for 12 weeks for those who completed the study (10 participants).[37] The SCD and mSCD groups also had reduced C-reactive protein (CRP) values compared to baseline. The same author found similar results with CD and UC pediatric patients in a smaller multi-center study.[48] A study that used 54 single-subject children with IBD compared SCD and mSCD versus a usual diet in a double crossover randomized trial.[49]

Twenty-one participants finished both crossovers and among those, symptom improvement (67% versus 52%) and fecal calprotectin response (65% versus 53%) was observed in SCD and mSCD, respectively, when compared to the usual diet. Those who only finished one crossover or neither had a greatly reduced response. This study illustrates how difficult this diet may be to follow. One of the only studies available that assesses the SCD at a large scale is the study by Lewis et al.[38] published in 2021. This study used 191 adult participants with CD, randomized to SCD or MD. The study found similar rates of remission at 6 weeks (46.5% versus 43.5%, respectively), fecal calprotectin response (34.8% versus 30.8%, respectively), and CRP response (5.4% versus 3.6%, respectively) between the diets. Other notable outcomes were similar improvements in QoL. This study helped provide evidence for the use of a less restrictive diet, the MD, and a better studied diet that has shown to provide a host of other benefits not related to IBD.

Mediterranean Diet

The MD is well known for its benefit in cardiovascular health and has strong research supporting its use for prevention and the management of metabolic disease, fatty liver disease, major cardiovascular events, hypertension, breast cancer, and type 2 diabetes mellitus.[38,50–54] The MD is considered an anti-inflammatory diet with a focus on high intake of fruits and vegetables, nuts, legumes, unsaturated fats, whole grains, fish and olive oil.[47] Given these benefits and qualities of this diet, the MD would be a preferrable diet for IBD patients if the literature shows this diet is safe and effective.

Adherence to the MD in CD patients showed improved QoL scores and decreased disease activity when properly adhering to the MD. Though, adherence to the diet was higher in participants with inactive disease compared to participants with active disease.[55] A case-control study looked at this statement in more depth and found lower MD adherence for those with complicating CD or extensive UC as well as lower diet quality scores among all IBD patients.[56] Some studies have shown clinical benefit for those with IBD who follow MD. A prospective

interventional study had 165 participants with UC or CD follow MD for 6 months. At 6 months, BMI and waist circumference was significantly lower in “diet-adherent” CD and UC groups; a non-significant reduction in fat-mass occurred in both groups. Those who adhered to the diet for 6 months had fewer cases of active disease (UC [baseline] 31 of 84 [36.9%] vs [6 months] 18 of 84 [21.4%], $P = 0.0016$; CD [baseline] 27 of 58 [46.6%] vs [6 months] 18 of 58 [31.0%], $P < 0.001$) and reduced inflammatory markers compared to baseline.[50] This study also found significantly reduced instances of liver steatosis and significantly improved QoL scores. A randomized control trial comparing CDED + PEN and a control group following MD found remission rates of 70.8% vs. 38.1% at 12 weeks and 79.2% vs. 42.9% at 24 weeks; $p = .027$ and $p < .0001$, respectively.[34] While this study provides more evidence for the use of CDED, induction and maintenance of remission is still shown in the control group. MD may be a useful diet for those in remission, those looking for a more culturally inclusive diet, or those wanting a diet that may have more variety. Though, evidence has yet to show whether this is a consistently effective intervention for treatment of IBD.

Low-FODMAP Diet

The low fermentable oligosaccharides, disaccharides, monosaccharides, and polyols (low-FODMAP) diet has shown some evidence to help improve GI symptoms in irritable bowel syndrome[57], reduce GI symptoms for IBD patients with mild-to-moderate disease[58] and may reduce specific GI symptoms for those with quiescent IBD.[59] This diet helps reduce functional GI symptoms by eliminating foods that pull water into the lumen, and create excess colonic gas, which can cause luminal-distention-induced visceral hypersensitivity.[60] It must be noted that research has shown little to no evidence to support the idea that this diet induces remission or improves disease activity or inflammatory markers. The low-FODMAP diet should be directed under a dietitian as it requires expertise and understanding of nutrition, FODMAPs, and how to properly exclude and reintroduce them into a person’s diet.[61,62] If the diet is followed improperly, it could lead to worsened GI symptoms or malnourishment due to over restriction.

A randomized control trial compared low-FODMAP diet to a normal diet in 78 participants with IBD in remission or mild-to-moderate disease and co-existing IBS-like symptoms. IBS severity scores were significantly reduced ($P = 0.02$) and QoL scores were significantly improved ($P < 0.01$) compared to the normal diet. A similar trial with 52 participants with quiescent CD or UC with persistent GI symptoms were allocated to low-FODMAP diet or normal diet with dietary advice for 4 weeks.[59] Symptoms relief was reported in 52% of participants on the low-FODMAP diet compared to 16% on the normal diet, but no statistically significant change in IBS severity scores. QoL scores improved in the low-FODMAP diet compared to the normal diet ($P = 0.042$) though had no improvements in inflammatory markers in either group. A 6-week randomized control trial with IBD patients in remission or mild disease following the low-FODMAP diet found a statically significant decrease in disease activity score in CD patients on this diet ($P = 0.024$), though no change in inflammatory markers were found.[62] A slight, but significant increase in QoL scores for the low-FODMAP group occurred ($P = 0.05$). This diet could be useful for management of IBS-like symptoms in people with IBD who are in remission or have quiescent disease.

Dietary Fiber

Historically, a "low-ruffage/residue" diet was recommended to patients to help decrease GI symptoms and reduce inflammation within the GI tract, especially for those with GI obstruction.[11] In complicating disease, a diet low in insoluble fiber may be recommended, as well as a soft-food diet, but data to support this recommendation is limited.[1] According to ESPEN and a 2019 Cochrane review on dietary interventions for induction of remission in IBD, fiber supplementation cannot be recommended for the induction or maintenance of IBD. Though, there is an apparent benefit when overall fiber intake is increased as the typical American diet does not meet the adequate intake for dietary fiber.[63] Lambert et al.[64] performed a meta-analysis of dietary patterns of adults with IBD and found that the overall dietary fiber intake averaged around 14 grams per day, which is well below the recommended amount. Another

meta-analysis that looked at high fiber diets and CD found only three participants with adverse events attributable to fiber of the 11 total studies when participants followed a high fiber diet.[65] The authors also noted that a diet higher in dietary fiber may help maintain remission for those with CD, particularly when in combination with other therapies, such as biologics. While recommendations for UC and fiber intake are based on expert opinion and smaller sample studies, increasing fiber intake is likely to increase QoL and potentially help the maintenance of UC.[63,65]

Nutrition Before and After Surgery

As mentioned previously, malnutrition is prevalent among those with IBD and those with malnutrition are likely to experience worse outcomes when admitted to a hospital. Those admitted with IBD are 2.9-3.1 times more likely to experience protein-calorie malnutrition compared to non-IBD patients.[9] These IBD patients with malnutrition experienced a higher risk of readmission and mortality, along with increased hospital costs and length of stay. Because of this, prehabilitation is being adopted by hospital care teams. It generally is prepared by an outpatient clinic, and in this case, for patients preparing for surgery for their complications or other procedures. This team can include gastroenterologists, surgeons, nurses, dietitians, pharmacists, psychologists, and physical therapists if indicated. This prehabilitation allows the provider to best prepare their patient for the best outcomes post-operation. From a nutrition perspective, this includes having a patient drink two oral nutrition supplement per day for at least 5 days, prior to surgery, but counseling and nutrition assessment should begin at least 7-10 days before the surgery. Much of the research regarding prehabilitation looks at muscle function[66] and cancer, though a cohort study of 61 IBD patients underwent prehabilitation as soon as surgery was scheduled and found significant improvement in weight, BMI, free-fat mass, and free-fat mass index scores.[67] Body composition of both CD and UC patients did not change during the perioperative period, and following the Enhanced Recovery After Surgery

guideline, earlier feeding was associated with shorter length of stay and quicker return of bowel function. Further evidence is warranted to see the effects of perioperative intervention.

Additional Information

Exercise is currently recommended for those with IBD regardless of disease activity.[1] However, exercise may be challenging for patients with IBD as those with active disease may feel fatigue or lethargic.[68] Another issue is those with active disease are often in a catabolic state, which may require modification of their typical exercise regimens such as engaging in walking or yoga rather than running. Those with decreased muscle function or sarcopenia can engage in resistance training. These methods of exercise have shown improvement in QoL scores, and disease activity.[69,70] Exercise is generally considered safe for those with IBD due to the benefit of preventing other chronic diseases, decreasing visceral adipose tissue, and increasing lean muscle mass.[68] Though, ensuring other variables such as proper nutrition and hydration are important for safe exercise.

Patient Education

While research on diet therapy and management of IBD is important, it is also critical to educate patients on their disease. Patient education has shown some benefit relating to symptom knowledge and management in chronic disease such as diabetes.[72] Education programs in IBD have been created and studied in varying formats. One study randomized two groups to receiving individual face-to-face education with education books or web-based media. The study found that there were no significant differences in symptom management, QoL, or remission rates between education groups. Though, both groups showed improved symptom management, ability to identify when to seek care at a healthcare facility, and rates of remission.[73] Another study in 2021 looked at the efficacy of patient education using educators and an illustrated booklet. All participants completed a survey that would evaluate and score their psycho-pedagogic level. This measured the disease's concepts and skills, health behavior, and daily organization/communication. This score, along with other IBD-related surveys and

QoL assessments, were assessed at baseline, 6 months, and 12 months, with 6 months being the primary endpoint. It was found that at 6 months, those in the educated group improved their skills related to their disease more than those in the control group with no education (45.9% versus 24%, respectively). Importantly, those who met the primary endpoint had a significant increase in all psycho-pedagogic scores, sIBDQ (short inflammatory bowel disease questionnaire), WPAI (work productivity and activity impairment), and RFIPC (patients' concerns) scores.[74] This informs us that those who receive education may have QoL improvements that are unseen outside of endoscopic tools and symptomatic remission.

Research in IBD and patient education has shown some improvements of QoL measures, though it can have results that vary when looking at symptom management and remission rates.[75] This type of variability may not be due to patient education having a negative or neutral effect, but rather the factors of the study or disease state may impact these results; factors such as length of study, sample size, and duration of disease. A Cochrane review of IBD by Gordan et al.,[76] mentions that patient education probably has no effect on disease state, flare-ups, or QoL for those with IBD who receive patient education versus standard care. However, it is important to note for all the studies reviewed that they did not specify what was covered in the education, and the measured outcomes may not have been appropriate to assess patient education. Future research should better report the details of their educational programs for IBD patients, as well as look at how this education affects healthcare access and adherence to treatment. Overall, the importance of including patients in the treatment plan cannot be ignored, though to do this with any success, patients must be provided accessible, evidence-based educational materials.

PROJECT DESIGN AND METHODS

The Digestive Health Center had limited education material pertaining to nutrition in IBD, which allowed for this booklet to contain a variety of nutrition-related information and education.

Through collaboration with the Digestive Health Center and the clinic's RD, a list of topics for the booklet was developed. It encompassed several areas focused on diet therapy and other nutrition aspects, though dietary therapy for induction and maintenance of remission remained a focal point. Refinement of these subjects occurred as the booklet was developed, and each draft was reviewed.

Once an outline was constructed on the agreed upon topics, a thorough review of the existing literature was conducted. This included peer-reviewed journal articles, consensus guidelines, and reviewing publicly available resources for this patient population. Databases such as PubMed and Google Scholar were used to find primary literature, consensus guidelines, systematic reviews, and expert opinion articles pertaining to IBD prevalence, common symptoms associated with IBD, medical nutrition therapy for IBD, malnutrition and micronutrient deficiencies in IBD, current diet therapies and supplements available (e.g., fiber, pre-/probiotics), hydration requirements, exercise recommendations, and proper ostomy management practices. Public resources such as Nutritional Therapy for IBD and Crohn's and Colitis Foundation were utilized. These websites contain credible education, recipes, and advice for those who live with IBD. These sites were also used as a reference for what other IBD education may look like, and they provided ideas for useful for tools for the booklet such as food lists and recipes.

While research regarding nutrition in IBD is not limited, the availability of randomized control trials comparing certain diet therapies used for the induction or maintenance of remission was variable. For example, there are a greater number of studies looking at SCD compared to EEN. Therefore, the use of guidelines or expert opinion articles were used for recommendations when necessary. Though, these recommendations were often corroborated with other literature found outside of the guidelines.

PROJECT OUTCOMES

The educational booklet developed through the literature review included a wide-breadth of nutrition-related information that can be used as a resource to help address patient concerns. Each nutrition topic was explained in a simple manner and evidence regarding each topic was presented in a format that is easy to follow. For diet therapies, each section included a simplified explanation of how to follow each diet, why the diet is useful for this population, and any benefits and drawbacks presented within the literature. This format of information allowed the booklet to contain a wide variety of nutrition information while remaining organized and cohesive. To aide in quickly finding information for their specific questions, an extensive table of contents was developed with direct links to the educational material within the table of contents.

As the booklet was developed, it was reviewed by the clinic RD for accuracy and readability. The health literacy of the general population was kept in mind during the development of this booklet and is reflected in its 8^{th}-10^{th} grade reading level. This was confirmed by the Flesch-Kincaid reading grade level score.

SUMMARY OF WRITTEN DELIVERABLE

The written deliverable of this project was a 69-page educational booklet for patients with IBD at the Digestive Health Center at Oregon Health and Science University. This booklet was organized in the following manner: the “why” of the booklet, diet therapies for induction and maintenance of remission, and additional nutrition-related information. These categories contained the following content:

I. The “why” of the booklet

This section included the introduction and purpose of the booklet, general background of the disease and diet therapy in IBD, the importance of variety within any diet, and how to adjust diets based on cultural foods. The booklet opens with a page on how nutrition is affected by IBD and describes the booklet’s general purpose of providing

an organized, easy-to-read place for evidence-based nutrition therapy. It is followed by a few pages on IBD and their disease states. The background on diet therapy acknowledges its use and why it may be used compared to other treatments. This is where the primary diet therapies in the booklet are introduced and a disclaimer about the importance of following any of these diets under the guidance of a dietitian. A page discussing the restrictive nature of these diets and the need for variety is also included. This same page mentions the fear some people with IBD experience around food and displays a statistic that 1 in 8 IBD patients experience food insecurity.[77] Finally, many of these diets may not align with a patient's usual eating habits or cultural food preferences. To address this, a section on sociocultural considerations in dietary planning was included.

II. Diet therapies for induction and maintenance of remission in IBD

This section covers the most well researched diet therapies for induction and/or maintenance of remission in IBD. There are many diets available, though the ones selected for this booklet had the greatest amount of research. These diets were in the booklet as follows: exclusive enteral nutrition, partial enteral nutrition, Crohn's disease exclusion diet, specific carbohydrate diet, low-FODMAP diet, and Mediterranean diet. All except the low-FODMAP diet had evidence to support induction of remission in IBD. The low-FODMAP diet is primarily used for GI symptom management for those with quiescent disease. Each diet has several pages that provide a basic concept of how to follow the diet, what foods may be excluded/included, potential benefits or drawbacks, and either educational tools and/or visuals. To provide transparency as well as resources for those who may be interested in reviewing the research, a brief summary of the literature was provided at the end for each specific diet therapy, except for EEN.

This section also contained information about ultra-processed foods, how to shop on the MD, types of plant proteins, stricturing disease, current research on high fiber diets and pre-/probiotic use, prehabilitation and nutrition after surgery.

III. Additional nutrition-related information

This section included other nutrition education that may be helpful for this population such has hydration status, exercise recommendations, how to properly monitor a person's symptoms and when to contact their providers, ostomy management, an educational table comparing the different types of fiber, and other general shopping strategies. The end of the booklet included online resources for assistance with finding food for those who are food insecure, as well as how to apply for or access that resource.

Hydration plans are typically individualized to patients, though the importance of hydration was noted, particularly avoiding dehydration as this is a general recommendation for those managing IBD.[1]

Exercise research in IBD were also limited or not available for certain populations and recommendations were made based on consensus guidelines. Education for this section included recommendations to rest when tired or feeling unwell, if in active disease, favor low-impact, low-intensity exercise, ensure proper hydration before, during, and after exercise, and plan to exercise around areas where there are available bathrooms.

An ostomy care section was included in this booklet as proper management is crucial to maintain a successful nutrition plan. While there are more developed and informative educational materials for ostomy care, this section provides a focus on nutrition and their ostomy. The ostomy education includes two brief backgrounds on ileostomy and colostomy surgeries, and how much output is expected and the consistency of stools after surgery. It is followed by a page with advice on when to clean/empty the ostomy

pouch and concluded with dietary strategies to reduce odor and output. This page provides recommendations on avoiding alcoholic, caffeinated, and/or sweetened beverages. These particular beverages may lead to increased stoma output and further dehydration.[71] Other recommendations include increasing the amount of soluble fiber into the diet, chewing food well, eating smaller and more frequent meals, and adjustment of enteral feed rate.[71] The bottom of the page notes if a person is experiencing greater than 1.5-2 liters of output per day, they should contact their IBD team or primary care provider. Immediately following this page is a table provided to identify many different foods that contain soluble fiber, insoluble fiber, or both. This was done to help aid in identification of varying fiber classifications in foods.

CONCLUSION

Potential Implications for Practice

This educational booklet is designed to support dietitians in helping patients understand the range of dietary therapy options available, empowering them to make informed decisions about their care. It provides the most recently available literature regarding available diet therapies and other nutrition-related management strategies for IBD. This may allow for a better-informed patient and can potentially enable more in-depth conversations pertaining to nutrition between the patient and provider.

Given that it is available in a digital format, the dietitian could send this directly to a patient by email or the electronic medical record, before or after an in-person or virtual meeting. Certain sections may also be printed out to help guide an educational session as the dietitian deems necessary. Sending the booklet prior to new patients prior to their appointment may allow for greater opportunities for patients to come to the dietitian with questions and help establish treatment goals.

Newly diagnosed IBD patients are often overwhelmed by the volume of information they receive. This booklet provides a concise summary of key aspects of their nutritional care. While intended to educate and inform, it is not meant to serve as a standalone guide for managing IBD. Patients should be monitored by a dietitian while following most, if not all, of the diet therapies in the booklet. IBD management is very individualized, thus a recommendation for one person may not be the same for another. This booklet can help create educated and well-informed conversations between those with IBD and their providers.

Strengths and Limitations

Strengths

This booklet cited the most current research and guidelines regarding nutritional management of IBD, particularly with available diet therapies. It covered a wide range of topics and incorporated text, visual aids and other educational tools to enhance usability. The booklet incorporates a summary of current research and guidelines, presented primarily in plain language to enhance patient understanding. As research is not considered lay literature for the public, the importance of interpreting and translating this research into easily readable recommendations and advice was crucial for the success of this booklet.

Limitations

While this booklet attempted to summarize the current and most recent literature, quality evidence studies were limited, and this hindered the development of some recommendations. The ESPEN guidelines, which were used frequently for this booklet, failed to find enough evidence to support any particular diet for the induction or maintenance of remission in IBD. Many of the studies available in meta-analyses were graded with “low” to “very low” quality due to varying factors such as sample size, inconsistent diet criteria among studies, and poorly controlled cohort studies. With further investment into nutritional management of IBD, higher quality studies will become available.

Studies assessing diet therapy in IBD were found globally, though this booklet was not prepared for a variety of cultures and customs. A brief section in this booklet discusses some food items that can be used to substitute other “western” food items, but there is opportunity for improvement in this area.

While the goal was to meet the literacy needs of the general public, the booklet only reached a reading level of 8th-10th grade. Oregon Health and Science University recommends patient education to have a reading grade level of 5th-6th. A strong recommendation for improving this booklet would include attempting to lower the reading grade level closer to the recommended level to provide benefit to a greater portion of the population.

Those with IBD seen at the clinic were not surveyed before the creation of this booklet. While previous studies and surveys asking IBD patients what information they wanted to know were found and used to guide the direction of topics for this booklet, the population that will largely use this booklet were not consulted. Therefore, it is unknown if this booklet will provide information relevant to the clinic’s population.

Review of this booklet was conducted under the guidance of a single dietitian. While they provided expert feedback and suggestions, having more content experts may have benefited the development of the booklet.

Future Directions

This booklet provides an excellent foundation for a high-quality educational resource for IBD patients. To ensure its accuracy and usability, this booklet could be validated through additional expert review and/or patient focus groups. It could also be utilized in quality improvement or research projects to examine the impact of the booklet on clinical outcomes. Through research and further validation, the booklet could be used beyond the Digestive Health Clinical to provide vital nutrition education to more patients with IBD.

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EVIDENCE TABLE

Citation	1st author (Year)	Population	Methods	Sample Size	Results	Information Relevant to IBD
Hashash JG, Elkins J, Lewis JD, Binion DG. AGA Clinical Practice Update on Diet and Nutritional Therapies in Patients With Inflammatory Bowel Disease: Expert Review. *Gastroenterology*. 2024;166(3):521-532. doi:10.1053/j.gastro.2023.11.303	Hashash JG (2024)	NA	Expert review; internal peer review; best practice advice was given by using best current evidence and expert opinion. Formal rating of quality of evidence was not given.	NA	12 Best practice advice statements were made from using the best current evidence for IBD nutrition therapy and expert opinion.	Research regarding IBD and nutrition is advancing rapidly and food can play a role in therapy for patients with IBD.
Pedersen N, Ankersen DV, Felding M, et al. Low-FODMAP diet reduces irritable bowel symptoms in patients with inflammatory bowel disease. *World J Gastroenterol*. 2017;23(18):3356. doi:10.3748/wjg.v23.i18.3356	Pederson N (2017)	Patients with IBD in remission or with mild-to moderate disease and coexisting IBS-like symptoms (Rome III)	RCT; assigned to low-FODMAP (LFD) or normal diet (ND) for 6 weeks	89 patients, 78 completed the study; 65 were in remission and 13 had mild-to-moderate activity at baseline.	LFD showed significantly lower median IBD-symptom severity scale than the ND group. LFD had greater increase in median short IBD questionnaire than ND where the higher score is better.	LFD reduced IBS-like symptoms and improved quality of life. Diet could be used when dietitian led and for short-term therapy in patients who are in remission and who are experiencing IBS-like symptoms.
Suskind DL, Lee D, Kim YM, et al. The Specific Carbohydrate Diet and Diet Modification as Induction Therapy for Pediatric Crohn's Disease: A Randomized Diet Controlled Trial. *Nutrients*. 2020;12(12):3749. doi:10.3390/nu12123749	Suskind DL (2020)	Patients with mild/moderate CD aged 7-18 years old.	Single-center, double blind study; assigned to either SCD, modified SCD (MSCD)or whole foods (WF). Evaluated at baseline, 2, 4, 8 and 12 weeks. PCDAI, labs, and multi-omics tests were evaluated.	18 patients; 10 completed the study at 12 weeks	All participants achieved remission at 12 weeks. Microbiome shifted in all patients throughout the study period. Inflammatory labs returned to normal in MSCD and SCD, but not WF.	These diets may be able to induce remission and improve inflammatory markers, though the more restrictive a diet is, the more likely positive outcomes will occur. The restrictive nature of these diets may be challenging for some patients to adhere to.

Lewis JD, Sandler RS, Brotherton C, et al. A Randomized Trial Comparing the Specific Carbohydrate Diet to a Mediterranean Diet in Adults With Crohn's Disease. *Gastroenterology*. 2021;161(3):837-852.e9. doi:10.1053/j.gastro.2021.05.047	Lewis JD (2021)	Diet to Induce Remission in Crohn's Disease study; Patients with CD with mild/moderate symptoms	Randomly assigned, blind allocation to either SCD or MD; received prepared meals for 6 weeks, then given online edu to follow diet at home for another 6 weeks; measured symptomatic remission and inflammatory markers hsCRP and FC.	197 participants across 33 sites; 191 included in analysis	Percentage of participants who achieved symptomatic remission was nit superior with SCD compared to MD (52% vs 49% at week 6, respectively); rare for both symptomatic remission and significant decrease in inflammatory markers	SCD and MD produce similar remission rates among mild/moderate activity in CD. Quality of life are also improved in both, though neither are superior to one another. Potential benefit to following MD or modified MD over more restrictive SCD in patients with mild/moderate symptoms with IBD.
Yanai H, Levine A, Hirsch A, et al. The Crohn's disease exclusion diet for induction and maintenance of remission in adults with mild-to-moderate Crohn's disease (CDED-AD): an open-label, pilot, randomised trial. *Lancet Gastroenterol Hepatol*. 2022;7(1):49-59. doi:10.1016/S2468-1253(21)00299-5	Yanai H (2022)	Biologic naïve adults with mild/moderate CD and maximal duration of 5 years	Open-label, pilot randomized trial; randomly assigned to CDED plus PEN or only CDED for 24 weeks.	44 patients assigned to a diet; 40 completed included in analysis across 3 sites in Isreal.	CDED plus PEN and CDED groups achieved clinical remission at 6 weeks at rates of 68% and 57%, respectively. 80% of those patients sustained remission at 24 weeks. 14 were in endoscopic remission at weeks 24.	Both treatments were able to induce and sustain remission in this population. They may also induce endoscopic remission. CDED alone may be a viable diet therapy to induce remission.
Bischoff SC, Bager P, Escher J, et al. ESPEN guideline on Clinical Nutrition in inflammatory bowel disease. Clinical Nutrition. 2023;42(3):352-379. doi:10.1016/j.clnu.2022.12.004	Bischoff SC (2023)	NA	Updated guideline for ESPEN that was developed with a multidisciplinary team to develop 71 recommendations for the clinical management of IBD.	NA	71 evidence based recommendations	Guidelines regarding prevention, general nutrition, recs during active disease, MNT during active IBD, microbiota modulation, and recs for remission phase.

Miller TA. Health literacy and adherence to medical treatment in chronic and acute illness: A meta-analysis. Patient Education and Counseling. 2016;99(7):1079-1086. doi:10.1016/j.pec.2016.01.020	Miller TA (2016)	NA	Meta-analysis; 220 articles included	NA	Health literacy was positively associated with adherence (r=.14), health literacy interventions increased both health literacy (r=.22) and adherence outcomes (r=.16).	Patient education is positively associated with adherence. Greater effect was noticed in lower-income and racial-ethnic minority patients than in non-minority and higher income samples.
Lewis JD, Parlett LE, Jonsson Funk ML, et al. Incidence, Prevalence, and Racial and Ethnic Distribution of Inflammatory Bowel Disease in the United States. Gastroenterology. 2023;165(5):1197-1205.e2. doi:10.1053/j.gastro.2023.07.003	Lewis JD (2023)	NA	Data from 4 administrative claims sets. Validated combinations of diagnostic variables were used to determine prevalent disease and incidents.	NA	Incidence of IBD peaked in the third decade of life. The age-, sex- and insurance-standardized prevalence of IBD was 721 per 100,000 population. An estimated 2.39 million Americans are diagnosed with IBD. Prevalence of IBD per 100,000 was 812 in white, 504 in Black, 403 in Asian, and 458 in Hispanic Americans.	Prevalence of IBD within the US was estimated and prevalence among racial groups.
Dahlhamer JM, Zammitti EP, Ward BW, Wheaton AG, Croft JB. Prevalence of Inflammatory Bowel Disease Among Adults Aged ≥18 Years — United States, 2015. MMWR Morb Mortal Wkly Rep. 2016;65(42):1166-1169. doi:10.15585/mmwr.mm6542a3	Dahlhamer JM (2016)	NA	National Health Interview Survey data were used and assessed for prevalence of IBD in the US.	NA	Estimated that 3.1 million Americans have ever received a diagnosis of IBD. Older adults received more diagnoses of IBD compared to younger adults. Hispanics and non-Hispanic whites had more diagnoses compared to non-Hispanic blacks.	Prevalence of IBD within the US was estimated and prevalence among socioeconomic status.

Massironi S, Viganò C, Palermo A, et al. Inflammation and malnutrition in inflammatory bowel disease. The Lancet Gastroenterology & Hepatology. 2023;8(6):579-590. doi:10.1016/S2468-1253(23)00011-0	Massironi S (2023)		Review of the potential mechanisms that cause malnutrition in IBD and the cycle inflammation has on malnutrition. Overview of treatment/management in clinical practice.		Malnutrition and inflammation create a cycle that leads to further malnutrition and inflammation. Nutritional interventions in combination with drug treatment may resolve both issues.	Malnutrition is very prevalent among patients with IBD and will lead to worsened clinical outcomes if not corrected.
Kilby K, Mathias H, Boisvenue L, Heisler C, Jones JL. Micronutrient Absorption and Related Outcomes in People with Inflammatory Bowel Disease: A Review. Nutrients. 2019;11(6):1388. doi:10.3390/nu11061388	Kilby K (2019)		Systematic review of how IBD affects micronutrient absorption and utilization.		IBD affects vitamin A, D, K, B9, B12, calcium, iron, zinc, selenium, and this has adverse interactions with the immune system.	Most knowledge regarding how micronutrients effect clinical outcomes is unknown, aside from iron.
Venkateswaran N, Weismiller S, Clarke K. Indeterminate Colitis - Update on Treatment Options. J Inflamm Res. 2021;14:6383-6395. doi:10.2147/JIR.S268262	Venkateswaran N (2021)		Review on indeterminate colitis (IC) regarding current medical and surgical treatments.		IC mimics UC, though treatment is based on disease severity. Several surgical and medical treatments are available. This paper regarded little to no nutritional studies.	Prevalence is 22/100,000. Osteopenia and Osteoporosis rates in IBD are 35% and 15%, respectively.
Dua A, Corson M, Sauk JS, Jaffe N, Limketkai BN. Impact of malnutrition and nutrition support in hospitalised patients with inflammatory bowel disease. Aliment Pharmacol Ther. 2023;57(8):897-906. doi:10.1111/apt.17389	Dua A (2023)	Nationwide Readmissions Database from 2010 to 2018 for hospitalizations with and without IBD.	Observational study; analyzed patients with both IBD and protein calorie malnutrition and identified who received nutrition support. Evaluated associations between PCM and nutrition support and readmission and mortality. Multiplied linear regression described the association between compared variables and length of stay and total hospitalizations.	1,216,033 patients with CD and 832,931 with UC and 240,488,656 patients without IBD.	Admitted were 2.9-3.1 times more likely to have PCM than non-IBD patients. Pts with IBD and PCM had higher risk of readmission and mortality and longer LOS and higher hospital costs. Nutrition support reduced risk of readmission.	IBD pts who are admitted are more likely to develop PCM. Those who do, are more likely to experience readmission, longer LOS, and mortality.

Zhang Y, Zhang L, Gao X, et al. Impact of malnutrition and sarcopenia on quality of life in patients with inflammatory bowel disease: A multicentre study. J cachexia sarcopenia muscle. 2023;14(6):2663-2675. doi:10.1002/jcsm.13341	Zhang Y (2023)	IBD patients with IBD admitted to 1 of four hospitals in China.	Multicenter, prospective study; IBD patients anthropometrics were assessed and nutrition assessment and diagnosis were complied based on GLIM criteria.	238 IBD patients (177 CD, 61 UC)	Prevalence of GLIM defined malnutrition and sarcopenia was 60.1% and 25.2%, respectively. Nutrition status was worse in CD than UC. Co-occurance of malnutrition and sarcopenia was between 16.4% and 21.8%, which reduced quality of life	Prevalence of malnutrition is high in IBD patients.
Balestrieri P, Ribolsi M, Guarino MPL, Emerenziani S, Altomare A, Cicala M. Nutritional Aspects in Inflammatory Bowel Diseases. Nutrients. 2020;12(2):372. doi:10.3390/nu12020372	Balesterieri P (2020)		Review of mechanisms of IBD, role of MNT and diet in IBD			Malnutrition is prevalent in IBD. Many factors contribute to malnutrition in IBD such as malabsorption, blood and protein loss, intestinal and bacterial overgrowth. Dietitians should be involved in the care of patients with IBD.
Scaldaferri F, Pizzoferrato M, Lopetuso LR, et al. Nutrition and IBD: Malnutrition and/or Sarcopenia? A Practical Guide. Gastroenterology Research and Practice. 2017;2017:1-11. doi:10.1155/2017/8646495	Scaldaferri F (2017)		Review of IBD and malnutrition		Information regarding pathophysiology of IBD, clinical aspects, nutrient malabsorption/utilization in IBD, sarcopenia and malnutrition, and nutritional assessment.	Poor nutrition in IBD can lead to worsened response to therapy, quality of life and clinical outcomes. Dietitian and nutritional support are an important aspect to the multidisciplinary team.

Weisshof R, Chermesh I. Micronutrient deficiencies in inflammatory bowel disease: Current Opinion in Clinical Nutrition and Metabolic Care. 2015;18(6):576-581. doi:10.1097/MCO.0000000000000226	Weisshof R (2015)		Review of micronutrient deficiencies in IBD and their effect on disease outcome.		Information regarding prevalence of micronutrient deficiencies and how these nutrients effect disease activity.	Iron, B12, vitamin D, K, B9, selenium, zinc, B6, and B1 deficiencies are common in patients with IBD. Vitamin K and D may have a role in inflammation in IBD. B12 deficiency is common in those with ileal resection of more than 30 cm.
Mentella MC, Scaldaferri F, Pizzoferrato M, Gasbarrini A, Miggiano GAD. Nutrition, IBD and Gut Microbiota: A Review. Nutrients. 2020;12(4):944. doi:10.3390/nu12040944	Mentella MC (2020)		Review on dietary therapy in IBD as well as how nutrients are affected by IBD.		Evidence isn't conclusive for recommendation of a specific diet for management of IBD. Assessment of dysbiosis should be standard practice to determine which diet therapy would be best for a patient.	Evidence isn't conclusive for diet therapy in IBD. Useful information and studies regarding solid food diets in IBD management.
Roda G, Sartini A, Zambon E, et al. Intestinal epithelial cells in inflammatory bowel diseases. World J Gastroenterol. 2010;16(34):4264-4271. doi:10.3748/wjg.v16.i34.4264	Roda G (2010)		Review and physiology of the epithelial barrier and its role in IBD and intestinal health/absorption.		Intestinal epithelial cells are integral for several mechanisms in maintaining gut health. In IBD, immune function can alter the intestinal barrier leading to inflammation.	Epithelial cells are altered in IBD which may lead to worsened disease activity.

Dixon LJ, Kabi A, Nickerson KP, McDonald C. Combinatorial effects of diet and genetics on inflammatory bowel disease pathogenesis. Inflamm Bowel Dis. 2015;21(4):912-922. doi:10.1097/MIB.0000000000000289	Dixon LJ (2015)		Review on how diet influences IBD occurrence. Section on dietary additives.		IBD susceptibility has a combinatorial nature of risk. Diet isn't the lone factor in causing IBD. It combines with genetics and other risk factors. More research needed to make clinical recommendations for a specific diet for IBD; much promising evidence regarding fiber/prebiotics, diet composition, and genetic influence.	Diet isn't the only factor that influences incidence of IBD or disease activity. Solid research regarding diet, individual macronutrients, and fiber.
Pastorelli L, De Salvo C, Mercado JR, Vecchi M, Pizarro TT. Central role of the gut epithelial barrier in the pathogenesis of chronic intestinal inflammation: lessons learned from animal models and human genetics. Front Immunol. 2013;4:280. doi:10.3389/fimmu.2013.00280	Pastorelli L (2013)	Mouse models and human genetic studies.	Review on how changes in the intestinal epithelial cells alter the intestinal immune response and following inflammation.		Defects in the epithelial barrier and the innate immune response within epithelial cells may cause inflammation. Development of IBD likely stems from concomitant presence of varying defects in varying compartments.	Alterations in the epithelial barrier and immune system affect inflammation.
Omer A, Quigley EMM. Carbohydrate Maldigestion and Malabsorption. Clinical Gastroenterology and Hepatology. 2018;16(8):1197-1199. doi:10.1016/j.cgh.2018.01.048	Omer A (2018)		Overview of carbohydrate maldigestion and absorption.		The process of maldigestion and malabsorption is well understood but their true impact has less supporting evidence.	Important physiology of carbohydrate digestion and absorption, including alterations to these processes.
Robayo–Torres CC, Quezada–Calvillo R, Nichols BL. Disaccharide Digestion: Clinical and Molecular Aspects. Clinical Gastroenterology and Hepatology. 2006;4(3):276-287. doi:10.1016/j.cgh.2005.12.023	Robayo-Torress CC (2006)		Overview of disaccharide digestion, including malabsorption/maldigestion.		Physiology of disaccharide digestion/absorption and tests available for diagnosing enzyme deficiencies.	Important physiology of disaccharide digestion and absorption.

Ghishan FK, Kiela PR. Epithelial Transport in Inflammatory Bowel Diseases: Inflammatory Bowel Diseases. Published online March 2014:1. doi:10.1097/MIB.0000000000000029	Ghishan FK (2014)		Review on transport of macro- and micronutrietns through the epithelial membrane, including how IBD affects this process.		Information regarding carbohydrates, amino acids, and micronutrients and how there affected. Information regarding IBD-related diarrhea and varying ion exchanges.	Those with IBD are affected by malabsorption and altered transport of nutrients.
Uchiyama K, Kishi H, Komatsu W, Nagao M, Ohhira S, Kobashi G. Lipid and Bile Acid Dysmetabolism in Crohn's Disease. J Immunol Res. 2018;2018:7270486. doi:10.1155/2018/7270486	Uchiyama K (2018)		Review on lipid metabolism and how absorption is affected, particularly in the distal ileum.		Information regarding pathways of lipid absorption and how this is affected in CD. Factors affecting this include disease location, phenotype and diet.	Those with CD may have malabsorption of lipids.
Cai Z, Wang S, Li J. Treatment of Inflammatory Bowel Disease: A Comprehensive Review. Front Med (Lausanne). 2021;8:765474. doi:10.3389/fmed.2021.765474	Cai Z (2021)		Review on pharmaceutical and dietary therapies for treatment of IBD.		Information on aminosalicylates, corticosteroids, immunomodulators, biologics, pro- and prebiotics.	Many patients do not respond to pharmacotherapy, indicating need for alternative therapies.

Pierote NR, Braz AF, Barros SL, et al. Effect of mineral status and glucocorticoid use on bone mineral density in patients with Crohn's disease. Nutrition. 2018;48:13-17. doi:10.1016/j.nut.2017.10.016	Pierote NR (2018)	Patients with CD aged 20y-40y	Cross-sectional study; Measured macro- and micronutrient intake with 3-day food record. Lumber spine and femoral neck bone mineral densities were determined using a densitometry technique. CRP levels and erythrocyte sedimentation rate (ESR) values were also noted.	62 patients with CD	Dietary intake of calcium, zinc, and magnesium were below reference values but not phosphorus. Osteopenia and osteoporosis patients accounted for 17.7% and 14.5%, respectively. Significant bone loss was found in 22.6% of patients taking glucocorticoid meds. BMD was significantly reduced and observed in pts in active phase of disease. Low calcium and zinc intake, glucocorticoid use, and active disease phase are favorable conditions for bone loss in pts with CD.	Pts with CD have increased risk of osteopenia and osteoporosis. Bone loss in pts with CD is associated with glucocorticoid therapy.
Tan B, Li P, Lv H, et al. Treatment of vitamin D deficiency in Chinese inflammatory bowel disease patients: A prospective, randomized, open-label, pilot study. J of Digest Diseases. 2018;19(4):215-224. doi:10.1111/1751-2980.12590	Tan B (2018)	UC and CD pts with vitamin D insufficiency/deficiency	RCT; UC and CD pts were randomly assigned to 1 of 3 arms for 12 months: arm A (VitD3 150 000 IU once per 3 months plus elemental calcium 200 mg 3 times/daily) arm B (elemental calcium 200mg three times/daily) arm C (control) in addition to conventional treatment. Primary outcome was 25(OH)D level. Secondary were changes in BMD and disease activity.	65 UC and 59 CD patients completed the study.	Arm A had significantly higher difference of pre- and post-treatment 25(OH)D levels. No significant difference between pre- and post-treatment BMD and disease activity in arm S compared to the other arms. Conventional treatment decreased disease activity scores, though serum 25(OH)D did not improve in arm C w/o vitD supplementation.	Vit D supplementation is necessary to treatment hypovitaminosis D in UC and CD, even with improvement of disease activity.

Chao HC. Zinc Deficiency and Therapeutic Value of Zinc Supplementation in Pediatric Gastrointestinal Diseases. Nutrients. 2023;15(19):4093. doi:10.3390/nu15194093	Chao HC (2023)		Review; Literature search on several databases, using keywords related to zinc deficiency, concentrations, supplementation in specific gastrointestinal diseases.		Evidence regarding zinc supplementation on GI diseases show beneficial effect.	Zinc deficiency may exacerbate GI diseases by altering the epithelial barrier leading to more inflammation. Zinc supplementation may be an important prophylactic.
Rieder F, Mukherjee PK, Massey WJ, Wang Y, Fiocchi C. Fibrosis in IBD: from pathogenesis to therapeutic targets. Gut. 2024;73(5):854-866. doi:10.1136/gutjnl-2023-329963	Rieder F (2024)		Review on fibrosis in CD and UC.		Information on mechanisms of fibrogenesis, how cells react under this process, mediators in fibrosis, and therapies for fibrosis.	Complications in CD and UC are common among IBD patients. Fibrosis pathophysiology. New drugs are being developed to manage and prevent fibrosis.
Rubbino F, Greco L, Di Cristofaro A, et al. Journey through Crohn's Disease Complication: From Fistula Formation to Future Therapies. JCM. 2021;10(23):5548. doi:10.3390/jcm10235548	Rubbino F (2021)		Review on fistulas in CD.		Information regarding pathophysiology of fistula formation and other related complications, as well as medical and surgical therapies.	Development of fistulas with 20 years of CD diagnosis is common. Pathophysiology of fistulas.
Shah A, Morrison M, Burger D, et al. Systematic review with meta-analysis: the prevalence of small intestinal bacterial overgrowth in inflammatory bowel disease. Aliment Pharmacol Ther. 2019;49(6):624-635. doi:10.1111/apt.15133	Shah A (2019)	Patients with IBD and SIBO	Databases were searched for prevalence of SIBO with IBD and/or CD and/or CD. Prevalence of SIBO among IBD patients and the odds ratio and 95% CI of SIBO and IBD patients compared to controls were calculated.	1175 adults patients with IBD and 407 controls. Breath tested for SIBO diagnosis.	Those with SIBO and IBD was 22.3%. OR for SIBO in IBD patients was 9.51 compared to non-IBD controls. CD was 10.86 and UC was 7.96. In CD, previous or current fibrostenosing disease, bowel section, increased the odds of SIBO.	SIBO is very prevalent in IBD patients. GI surgery and fibrostenosing disease are risk factors for SIBO in IBD.

Chandra H, Sharma KK, Tuovinen OH, Sun X, Shukla P. Pathobionts: mechanisms of survival, expansion, and interaction with host with a focus on Clostridioides difficile. Gut Microbes. 2021;13(1):1979882. doi:10.1080/19490976.2021.1979882	Chandra H (2021)		Review on pathobionts		Information on pathobionts and either effect on dysbiosis within the microbiome.	Physiology of the microbiome and the role of pathobionts in dysbiosis and inflammation.
Ruemmele FM, Veres G, Kolho KL, et al. Consensus guidelines of ECCO/ESPGHAN on the medical management of pediatric Crohn's disease. Journal of Crohn's and Colitis. 2014;8(10):1179-1207. doi:10.1016/j.crohns.2014.04.005	Ruemmele FM (2014)		Consensus guidelines; international group of specialists in IBD from ESPGHAN and ECCO.		Guidelines discussing medical and nutritional therapies for pediatric populations. Management strategies for induction and maintenance of remission were discussed.	EEN is first line therapy for pediatric populations; ability to promote mucosal healing, restore bone mineral density and improve growth.
Wang W, Yin A, Wang J, et al. Real-world evidence of combined treatment of biologics and exclusive enteral nutrition in patients with ileum-dominant Crohn's disease: A multicenter study. Clinical Nutrition. 2024;43(6):1291-1298. doi:10.1016/j.clnu.2024.04.013	Wang W (2024)	Patients with ileal or ileocolonic CD in moderate-to-severe activity.	Multicenter, retrospective; medical records reviewed. All patients received treatment of biologics with concomitant 16-week EEN (BioEEN) or biologics alone (Bio). Endoscopic, radiological and laboratory data extracted. CDAI recorded at each visit. Lab values measured at intro then every 8 weeks afterwards. Clinical and endoscopic outcomes were measured at week 16 and 52.	97 Bio pts and 100 BioEEN pts.	Compared to Bio, pts with BioEEN treatment achieved higher rates of clinical response, clinical remission, endoscopic remission including mucosal healing at week 16. BioEEN was superior in maintance with 84.7% clinical response, 77.8% clinical remission, 69.2% endoscopic response and 51.9% mucosal healing at week 52.	Combination treatment of biologics and EEN is effective at inducing remission and mucosal healing for those with active CD. BioEEN may prolong maintance of remission.

Pasta A, Formisano E, Calabrese F, et al. The use of the Crohn's disease exclusion diet (CDED) in adults with Crohn's disease: A randomized controlled trial. Eur J Clin Investigation. Published online January 24, 2025:e14389. doi:10.1111/eci.14389	Pasta A (2025)	Adult CD pts with mild-to-moderate symptoms.	Open label, RCT; randomly assigned to CDED+PEN or control (mediterranean diet). Anthropometrics, HBI, fecal calprotectin and serum inflammatory markers at baseline, 12, and 24 weeks. BIA was used every 12 weeks.	24 to CDED 21 to control.	5 CDED dropped d/t intolerance at first 6 weeks. At 12 weeks, CDED pts showed significantly lower HBI and higher remission rates than controls. By 24 weeks, remission rates increased from 70.8% vs. 38.1% at 12 weeks and 79.2% vs. 42.9% at 24 weeks; $p = .027$ and $p < .0001$, respectively), with significantly lower fibrinogen levels in the CDED groups. CDED associated with lower BMI with significant decrease in fat mass, while free-fat mass and body cellular mass significantly increased at week 12 and remained stable at week 24.	CDED was effective in inducing remission in pts with mild-to-moderate CD and was safe.
Szczubełek M, Pomorska K, Korólczyk-Kowalczyk M, Lewandowski K, Kaniewska M, Rydzewska G. Effectiveness of Crohn's Disease Exclusion Diet for Induction of Remission in Crohn's Disease Adult Patients. Nutrients. 2021;13(11):4112. doi:10.3390/nu13114112	Szczubelek M (2021)	Pediatric CD with mild-to-moderate activity.	Prospective; pts followed CDED for 12 weeks. Anthropometrics and laboratory tests were collected, CDAI and IBDQ were completed.	32 pts	Clinical remission was obtained in 76.7% pts after 6 weeks and 82.1% after 12 weeks. Calprotectin levels were significantly lower in the second follow-up compared with baseline.	CDED is effective in inducing remission in pts with mild-to-moderate CD.

Nguyen DL, Palmer LB, Nguyen ET, McClave SA, Martindale RG, Bechtold ML. Specialized enteral nutrition therapy in Crohn's disease patients on maintenance infliximab therapy: a meta-analysis. Therap Adv Gastroenterol. 2015;8(4):168-175. doi:10.1177/1756283X15578607	Nguyen DL (2015)	Adult patients with CD comparing specialized enteral nutrition therapy (polymeric diet with low-fat or regular diet) with infliximab versus infliximab monotherapy without dietary restrictions	Meta-analysis; 4 articles in final analysis.	342 pts	Enteral therapy with infliximab results in 69.4% pts reaching clinical remission compared with 45.4% with infliximab monotherapy (OR: 2.73). 74.5% pts receiving EN and infliximab remained in clinical remission after on year compared with 49.2% receiving infliximab monotherapy.	Specialized enteral therapy in combination with infliximab appears more effective at inducing and maintaining clinical remission in pts with CD than infliximab monotherapy.
Sahu P, Kedia S, Vuyyuru SK, et al. Randomised clinical trial: exclusive enteral nutrition versus standard of care for acute severe ulcerative colitis. Aliment Pharmacol Ther. 2021;53(5):568-576. doi:10.1111/apt.16249	Sahu P (2021)	Adults with acute severe UC	Open-label, RCT; randomized 1:1 to EEN or standard of care (SOC). EEN group lasted for 7 days along with SOC. Primary outcome was corticosteroid failure. Decal microbial analysis was preformed on day 1 and day 7 in some patients.	32 EEN and 30 SOC pts	Corticosteroid failure was lower in the EEN group compared to SOC (19% vs 43%) without any difference in colectomy rate. Pts on EEN had shorter LOS, higher day 7 albumin level, greater reduction in CRP and calprotectin levels (both p=0.04) and lower composite outcome of colectomy/hospitalization at 6 months (16% vs 39%)	EEN for 7 days may improve corticosteroid responsiveness in pts with acute severe UC.

Narula N, Dhillon A, Zhang D, Sherlock ME, Tondeur M, Zachos M. Enteral nutritional therapy for induction of remission in Crohn's disease. Cochrane IBD Group, ed. Cochrane Database of Systematic Reviews. 2018;2018(4). doi:10.1002/14651858.CD000542.pub3	Narula N (2018)	CD pts	Meta-analysis; 27 studies included in final analysis.	1,011 participants	No difference in remission rate when using elemental versus non-elemental formulas (63.8% vs 62.5%). EN formulas with differing fat-content had no difference of effect on remission. Very low long chain triglycerides showed higher remission rates than higher content EN formulas. No difference in adverse events between elemental and non-elemental formulas. No difference in remission rates between steroid therapy and EN (72% vs 50%, respectively). In adults this difference was significant (73% vs 43%), but not in children (61% vs 83%). Pts more likely to withdrawal from adverse events when on EEN than steroid therapy.	EEN is relatively safe and induces remission in adults in children. In adults, EEN may be less effective than steroid therapy, but not in children.

Mitrev N, Huang H, Hannah B, Kariyawasam VC. Review of exclusive enteral therapy in adult Crohn's disease. BMJ Open Gastroenterol. 2021;8(1):e000745. doi:10.1136/bmjgast-2021-000745	Mitrev N (2021)		Review of EEN in adults with CD; 79 studies reviewed.		EEN in adults CD pts showed improved clinical, biomarker, endoscopic, and radiologic measures of disease activity. It has shown benefit for those with stricturing and fistulating CD. Preoperative EEN shows evidence to be protective against post-operation complications and recurrence. Benefit in combining EEN with anti-TNF agents. Poor compliance is major drawback. Need for large scale studies	EEN can induce remission in adults with CD.. There may be benefit for CD pts with complications like stricturing. Adherence to the diet is challenging. Pre-operative EEN should be recommended.

Yang Q, Gao X, Chen H, et al. Efficacy of exclusive enteral nutrition in complicated Crohn's disease. Scandinavian Journal of Gastroenterology. Published online June 9, 2017:1-7. doi:10.1080/00365521.2017.1335770	Yang Q (2017)	Adult pts with active CD with complications.	Prospective study; Pts offered EEN for 12 weeks. Primary outcomes included clinical remission rate and mucosal healing rate. Endoscopy was performed at baseline and week 12 after EEN. CDAI were measured at baseline, week 4 and 12. BMI, albumin, hemoglobin, high sensitive CRP, platelet and ESR were measured at baseline week 4 and 12. NRS 2002 was used to evaluate nutrition status before and after EEN.	41 pts with CD and intestinal fistula/abdominal abscess or inflammatory intestinal stricture. 10 pts with stenosis, 33 with fistula/abscess.	After 12 weeks of EEN, CDAI significantly decreased (223.43 ± 65.5 vs. 106.77 ± 42.73, $p \leq .001$) and 80.5% of pts achieved full clinical remission. Fistula closure after EEN was observed in 75% of pts. Pts with stenosis, 20% had no response and were transferred for surgery. Partial and full remission were observed in 20% and 60% of pts after 12 weeks of EEN. Abscess resolved in 76% of pts. Of the 17 pts who had mucosal ulcers, 47% achieved mucosal healing after treatment. Inflammation index significantly decreased, nutritional parameters increased, and NRS 2002 scores decreased.	EEN was effective in inducing clinical remission, mucosal healing, promoting fistula closure and reducing sized of abscess in adult CD pts with complications.

Yang H, Feng R, Li T, et al. Systematic review with meta-analysis of partial enteral nutrition for the maintenance of remission in Crohn's disease. Nutrition Research. 2020;81:7-18. doi:10.1016/j.nutres.2020.06.006	Yang H (2020)	CD pts who use Partial Enteral Nutrition	Meta-analysis; 8 studies included. Primary outcome was clinical relapse.	429 pts using PEN for maintance therapy in CD.	Rate of clinical relapse at 0.5 years to 2 years was significantly lower in pts receiving PEN than those not receiving nutritional therapy (RR: 0.67). Pts on PEN had higher frequency of clinical remission maintenance at 0.5 to 1 years (67%) than those not using nutritional therapy (48%, RR:1.32, p=0.01). Adverse events were comparable between groups.	PEN may be more effective than absence of nutritional therapy for the maintenance of remission in CD. Safe.
Narimani B, Sadeghi A, Daryani NE, et al. Effectiveness of a novel diet in attenuation of clinical activity of disease in patients with ulcerative colitis: a randomized, clinical trial. Sci Rep. 2024;14(1):13791. doi:10.1038/s41598-024-64512-8	Narimani B (2024)	Those with mild-to-moderate UC who follow a combined Mediterranean and low-FODMAP diet in combination with PEN.	Open-label RCT; 50 pts received the combine diet mentioned in the population section or a regular diet for 6 weeks. All participants were given face-to-face dietary counseling by a dietitian at beginning and end of intervention. Intervention group given 6 week menu place and powdered formula. At baseline and after intervention, disease activity, QoL index, inflammatory and oxidative stress data, and dietary intake. Primary outcome was significant reduction in disease activity scores. Secondary was QoL scores, high sensitive CRP and total anti-oxidant capacity, and anthropometric values.	50 pts with mild to moderate UC	Disease activity index was significantly decreased in the combined diet group compared to control (p=0.001). QoL scores significantly increased in the combined diet group compared to the control (p<0.001). High sensitive CRP significantly decreased in the combined group and increased non-significantly in the control.	This diet may be safe to improve disease activity and quality of life for those with mild-to-moderate UC. Longer duration of studies are needed.

Levine A, Wine E, Assa A, et al. Crohn's Disease Exclusion Diet Plus Partial Enteral Nutrition Induces Sustained Remission in a Randomized Controlled Trial. Gastroenterology. 2019;157(2):440-450.e8. doi:10.1053/j.gastro.2019.04.021	Levine A (2019)	Children with mild-to-moderate CD.	Prospective RCT; randomly assigned children to CDED+PEN and another group to EEN for 12 weeks. Primary outcome was pts tolerance to diet by week 6 (if they dropped out by week six or not), secondary outcomes were response or remission.	40 in the CDED group, 38 in the EEN group. 74 included for remission analysis.	4 pts withdrew d/t intolerance in first 48 hours. CDED was tolerated in 39 children (97.5%), EEN was tolerated in 28 children (73.6%). At week 6, 30 of 40 (75%) children given CDED+PEN were in corticosteroid free remission vs 20 of 34 (59%) children given EEN (P=0.38). At week 12, 75.6% given CDED remained in remission compared to 45.1% given EEN (P=0.01). Children given CDED, corticosteroid-free remission was associated with sustained reductions in CRP and calprotectin.	CDED + PEN was better tolerated than EEN in children with mild to moderated CD. CDED+PEN sustained remission at higher rates than EEN, and produced changes in the microbiome associated with remission.
Niseteo T, Sila S, Trivić I, Mišak Z, Kolaček S, Hojsak I. Modified Crohn's disease exclusion diet is equally effective as exclusive enteral nutrition: Real-world data. Nut in Clin Prac. 2022;37(2):435-441. doi:10.1002/ncp.10752	Niseteo T (2022)	Children with CD	Retrospective; retrospective study on children with CD who received CDED + PEN or EEN as remission induction therapy. Primary outcome was the difference between EEN and CDED+PEN in the proportion of pts in which nutrition therapy failed.	61 pts	42 children (68.9%) achieved remission, 27 of 41 (65.9%) received EEN and 15 of 20 (75%) received CDED+PEN. No significant different in failure of nutrition therapy between groups. Pts receiving CDED+PEN had significantly higher weight gain and increases in BMI z-score compared with patients who received EEN alone.	EEN and CDED+PEN maybe equally as effective at inducing remission for children with CD.

Reznikov EA, Suskind DL. Current Nutritional Therapies in Inflammatory Bowel Disease: Improving Clinical Remission Rates and Sustainability of Long-Term Dietary Therapies. Nutrients. 2023;15(3):668. doi:10.3390/nu15030668	Reznikov EA (2023)	Those with IBD	Review on current nutritional therapies for those with IBD		Nutritional interventions are effective in adult and pediatric populations by inducing clinical remission, promoting mucosal healing, and improving quality of life measures. Other information regarding EEN, CDED, low-FODMAP, SCD, and MD are discussed in this review.	Nutrition interventions are a useful tool for management and treatment of IBD.
Suskind DL, Cohen SA, Brittnacher MJ, et al. Clinical and Fecal Microbial Changes With Diet Therapy in Active Inflammatory Bowel Disease. Journal of Clinical Gastroenterology. 2018;52(2):155-163. doi:10.1097/MCG.0000000000000772	Suskind DL (2018)	Pediatric IBD pts with mild to moderate disease	Multicenter, open-label, prospective; pts followed SCD for 12 weeks and evaluated at weeks 2, 4, 8, and 12. 3 -day food intake record before each eval. Diet Edu can counseling provided by dietitian.	12 pts	PCDAI decreased from 28.1 ± 8.8 to 4.6 ± 10.3 at 12 weeks. PUCAI decreased from 28.3 ± 23.1 to 6.7 ± 11.6 at 12 weeks. Ineffective for 2, 2 others were unable to maintain diet. Significant decreases in CRP values. Microbiome composition changes after intervention	SCD can induce clinical remission and improve laboratory values. Larger scale studies are warranted.
Kaplan HC, Opipari-Arrigan L, Yang J, et al. Personalized Research on Diet in Ulcerative Colitis and Crohn's Disease: A Series of N-of-1 Diet Trials. Am J Gastroenterol. 2022;117(6):902-917. doi:10.14309/ajg.0000000000001800	Kaplan HC (2022)	Pediatric IBD pts with active inflammation.	2 week usual diet, then pts randomized to one of two sequences of 4 alternating 8-week SCD and modified SCD (mSCD).	54 pts	21 (39%)participants completed the trial, 9 (17%) completed a single crossover, and 24 (44%) withdrew. 11 adverse events occurred. SCD and mSCD performed similarly. No difference in fecal calprotectin between diets. Some individuals had improvement in symptoms and fecal calprotectin compared with usual diet.	Diets did not improve symptoms or inflammation consistently, though some participants benefitted.

Chicco F, Magrì S, Cingolani A, et al. Multidimensional Impact of Mediterranean Diet on IBD Patients. Inflammatory Bowel Diseases. 2021;27(1):1-9. doi:10.1093/ibd/izaa097	Chicco F (2021)	Adult IBD pts who follow MD	Prospective, interventional; 165 adults followed the MD for 6 months who varied in their disease activity; mostly those in remission. Primary outcome were anthropometric parameters, serum lipid profile, liver function and steatosis, and disease activity.	165 adults	Of 165 participants, 142 (86.1%) completed the trial. BMI, waist circumference, liver enzymes had significant reductions as well as significant improvements of liver steatosis, disease activity, CRP, calprotectin and QoL in UC participants. In CD, there were significant decreases in BMI and waist circumference, significant improvement of liver steatosis disease activity, CRP, calprotectin, and QoL.	MD may be a useful diet for maintaining remission and/or induction. It may also improve anthropometric, laboratory, and QoL values, as well as steatosis in adults with UC and CD.
Delgado-Lista J, Alcala-Diaz JF, Torres-Peña JD, et al. Long-term secondary prevention of cardiovascular disease with a Mediterranean diet and a low-fat diet (CORDIOPREV): a randomised controlled trial. The Lancet. 2022;399(10338):1876-1885. doi:10.1016/S0140-6736(22)00122-2	Delgado-Lista J (2022)	Adults with CHD following MD or low-fat diet	RCT; participants grouped to MD or low-fat diet.	500 in the MD and 502 in the low-fat diet.	198 reached primary endpoint (87 MD, 111 low-fat; p = 0.039). Multivariable adjusted harder ratios ranged from 0.719 to 0.753 in favor of MD. Effects more evident in males.	MD is superior to low-fat diet in preventing major adverse cardiac events.
Filippou C, Thomopoulos C, Konstantinidis D, et al. DASH vs. Mediterranean diet on a salt restriction background in adults with high normal blood pressure or grade 1 hypertension: A randomized controlled trial. Clinical Nutrition. 2023;42(10):1807-1816. doi:10.1016/j.clnu.2023.08.011	Filippou C (2023)	Adults with high normal BP or type 1 hypertension following varying salt restriction diets or MD	RCT; 240 participants with high norma BP or type 1 hypertension were grouped to either salt restriction group, DASH diet, MD with salt restriction, or control for 3 months. Primary outcome was the attained mean office systolic BP difference among the randomized arms at the end of the study.	240 participants	Office and 24 h Ambulatory systolic and diastolic BP were reduced in all intervention groups. Greater reduction in mean office systolic BP was seen in the MD compared to other study groups. MD group and DASH group did not differ in lowering BP but were more effective than the salt-restriction group.	MD may be as effective for management of hypertension compared to the DASH diet.

Papada E, Amerikanou C, Forbes A, Kaliora AC. Adherence to Mediterranean diet in Crohn's disease. Eur J Nutr. 2020;59(3):1115-1121. doi:10.1007/s00394-019-01972-z	Papada E (2020)	Adult outpatients with CD	observational; participatns had diet assessed over previous 6 months using mediterranen diet scores. Also collected were disease activity scores, QoL scores, laboratory values and anthropometrics.	86 pts	Adherence to MD was greater in pts with inactive disease. MedDiet score was positively correlated with QoL scores and negatively with disease activity.	Adherence to MD may improve QoL and disease activity.
Cadoni M, Favale A, Piras R, et al. Adherence to Mediterranean Diet and Diet Quality in Patients with Inflammatory Bowel Disease: A Single-Center, Observational, Case-Control Study. *Nutrients*. 2024;16(11):1557. doi:10.3390/nu16111557	Cadoni M (2024)	Adult IBD patients in remission or with mild disease activity	Observational; pts with CD and UC were matched to healthy controls and measured the participants adherence to MD through a Medi-Lite questionnaire. Primary outcome was to compare MD adherence and general diet quality in IBD pts compared to a reference population.	50 CD, 50 UC pts compared to 100 healthy controls.	Diet quality was significantly lower in IBD, independent of disease location and behavior and disease extent. Medi-Lite scores were significantly lower in stricturing and ileo-colonic CD and in extensive UC.	Those with IBD may have worse diet quality compared to healthy populations and disease complications worsen MD adherence.
Nybacka S, Törnblom H, Josefsson A, et al. A low FODMAP diet plus traditional dietary advice versus a low-carbohydrate diet versus pharmacological treatment in irritable bowel syndrome (CARIBS): a single-centre, single-blind, randomised controlled trial. *The Lancet Gastroenterology & Hepatology*. 2024;9(6):507-520. doi:10.1016/S2468-1253(24)00045-1	Nybacka S (2024)	Adult outpatients with moderate to severe irritable bowel syndrome.	RCT; participants randomized to a low-FODMAP plus traditional IBS dietary advice (LFTD) , a fiber-optimized diet low in carbs, high in protein and fat, or an optimized medical treatment based on predominant IBS symptom. Interventions lasted 4 weeks and were given instructions on how to continue/reintroduce foods into the diet after the primary intervention. Primary endpoint was reduction of IBS-SSS by 50 points or more.	96 LFTD, 97 low carb, 101 medical treatment	76% of LFTD group, 71% in low carb group. And 58% in medical treatment had a reduction of 50 or more IBS-SSS compared with baseline. 95% participants completed the 4 week LFTD trial, 95% completed the low carb trial, and 90% completed the optimized medical treatment. No serious adverse events occurred.	low-FODMAP diet can reduced GI symptoms in IBS patients.

Cox SR, Lindsay JO, Fromentin S, et al. Effects of Low FODMAP Diet on Symptoms, Fecal Microbiome, and Markers of Inflammation in Patients With Quiescent Inflammatory Bowel Disease in a Randomized Trial. *Gastroenterology*. 2020;158(1):176-188.e7. doi:10.1053/j.gastro.2019.09.024	Cox SR (2020)	Adults with quiescent UC or UC and persistent GI symptoms at 2 clinics	single blind trial; participants randomly assigned to low-FODMAP diet or control diet with dietary advice for 4 weeks. GI symptoms and QoL scores measured using validated questionnaires. Stool and blood samples collected at baseline and end of trial.	27 to LFD, 25 to control	52% of participants reported Gi symptom relief compared to 16% within the control diet (P=0.007). Pts had greater reduction in IBS-SSS following LFD compared to control, not significant (P=0.075).	LFD may improve GI symptoms and QoL scores.
Peng Z, Yi J, Liu X. A Low-FODMAP Diet Provides Benefits for Functional Gastrointestinal Symptoms but Not for Improving Stool Consistency and Mucosal Inflammation in IBD: A Systematic Review and Meta-Analysis. *Nutrients*. 2022;14(10):2072. doi:10.3390/nu14102072	Peng Z (2022)	IBD pts with functional gastrointestinal symptoms	meta-analysis; 9 studies; relative risk of symptoms improvement and normal stool B60consistency, disease activity of CD and UC, and fecal calprotectin markers were synthesized from data. 4 RCT, 5 before and after studies.	446 participants (351 pts on LFD vs 95 controls)	LFD alleviated overall FGSs (RR: 0.47, p=0.0000) and obtained higher QoL scores (P=0.0000), and lower disease activity scores within CD (Median difference: -1.09; p=0.002). No statistically significant differences in normal stool consistency, disease activity index scores for UC, and inflammatory biomarker scores.1	LFD can improve QoL and reduce FGS in those with IBD and persistent GI symptoms.
Bodini G, Zanella C, Crespi M, et al. A randomized, 6-wk trial of a low FODMAP diet in patients with inflammatory bowel disease. Nutrition. 2019;67-68:110542. doi:10.1016/j.nut.2019.06.023	Bodini G (2019)	Those with IBD and functional intestinal disorders	Prospective; participants randomized to LFD or standard diet for 6 weeks. Disease activity, fecal calprotectin and disease specific QoL scores were assessed at baseline and end of intervention.	55 participants with IBD in remission or with mild activity.	Median CD disease activity scores decreased in the LFD but not in the SD. UC disease scores were numerically decreased but not significant and no change in the SD. Barely significant increase in median QoL scores in the LFD group and not in the SD.	LFD is safe for IBD patients with GI symptoms with quiescent disease and may improve QoL and inflammatory markers.

Fritsch J, Garces L, Quintero MA, et al. Low-Fat, High-Fiber Diet Reduces Markers of Inflammation and Dysbiosis and Improves Quality of Life in Patients With Ulcerative Colitis. Clinical Gastroenterology and Hepatology. 2021;19(6):1189-1199.e30. doi:10.1016/j.cgh.2020.05.026	Fritsch J (2021)	Patients with UC in remission or mild disease	prospective; randomized to LFD or improved standard American diet (iSAD) for 4-week period with a 2 week washout period and then switched to the other diet for 4 weeks. Meals were catered and delivered to participants homes. Serum and stool samples collected at baseline and week 4 of each diet. Primary outcome was QoL, secondary outcomes included changes in health survey, partial Mayo score, markers of inflammation, microbiome and metabolome analysis and adherence to diet.	17 patients	Participants diets were unhealthier than either study diet. All participants remained in remission throughout study. Compared with baseline, iSAD and LFD each increased QoL scores. Serum amyloid A decreased significantly in LFD but not ISAD. CRP levels decreased numerically but not significantly in the LFD. LFD reduced bacteria associated with dysbiosis in fecal samples.	LFD may improve QoL in UC patients and improve dysbiosis.
Lambert K, Pappas D, Miglioretto C, et al. Systematic review with meta-analysis: dietary intake in adults with inflammatory bowel disease. Aliment Pharmacol Ther. 2021;54(6):742-754. doi:10.1111/apt.16549	Lambert K (2021)	Dietary intake of healthy populations versus IBD populations	meta-analysis; 19 included; Data pooled and reported as weighted mean intake for: all adults with IBD, CD, UC, active disease, remission, males, females. Random effects model compared intake with healthy controls.	4070 participants (1867 UC, 2093 CD, 110 IC, 11,504 controls)	All subgroups of adults with IBD consumed inadequate energy (1980 +/- 130kcal), fiber (14 =/- 4 grams), folate (246 =- 33 mg) and calcium (529 +/- 114 mg). Other inadequate intake of foods include breads and cereals, legumes, F/V, and dairy. Those with IBD consume significantly less dietary fiber than health individuals.	Dietary intake can be inadequate for those with IBD, especially fiber intake.

Serrano Fernandez V, Seldas Palomino M, Laredo-Aguilera JA, Pozuelo-Carrascosa DP, Carmona-Torres JM. High-Fiber Diet and Crohn's Disease: Systematic Review and Meta-Analysis. Nutrients. 2023;15(14):3114. doi:10.3390/nu15143114	Serrano Fernandez V (2023)	High fiber intake in CD populations	meta-analysis; quality of studies evaluated by the Johanna Briggs Institute scale. Meta-analysis performed with a 95% CI and random effects model.	2389 pts with CD	Applying a diet rich in fiber with or without the administration of routine therapies improved CD remission rates. Only 3 patients within all studies had adverse effect, only 2 could be attributed to fiber consumption.	Implementing greater fiber in CD patient's diet may prove beneficial for disease activity, QoL, and is generally safe.
Fiorindi C, Cuffaro F, Piemonte G, et al. Effect of long-lasting nutritional prehabilitation on postoperative outcome in elective surgery for IBD. Clinical Nutrition. 2021;40(3):928-935. doi:10.1016/j.clnu.2020.06.020	Fiorindi C (2021)	IBD patients who were scheduled to undergo surgery	prospective; IBD pts who were scheduled to undergo surgery are given personalized nutrition counseling and oral nutrition supplements. Anthropometrics were measured as well as intake, GI symptom prevalence and bowel function.	61 (45 CD and 16 UC)	Muscle wasting present in 28% of pts at baseline, which was significantly associated with presence of ileostomy and previous IBD surgery. During preoperative phase there was a significant improvement in weight, BMI, fat free mass. During intra-hospital phase, weight and FFM decreased due to catabolism from surgery, but body comp did not change throughout perioperative phase.Pts with earlier resumption of oral feeding had significantly shorter hospital stay and faster recovery of bowel function with no significant associated with early post-op complications.	Prehabilitation is beneficial at maintaining body composition and avoiding malnutrition before and after surgery.

Engels M, Cross R, Long M. Exercise in patients with inflammatory bowel diseases: current perspectives. CEG. 2017;Volume 11:1-11. doi:10.2147/CEG.S120816	Engels M (2017)	Exercise in those with IBD	systematic review of effect on exercise for those with IBD	NA	Inconclusive data on PA for those with IBD. Studies have not found exercise to be dangerous or unsafe for IBD patients with mild-to-moderate disease. Exercise may have other proposed benefits related to decreasing disease activity and other anthropometric benefits.	Exercise likely doesn't worsen symptoms or disease activity in mild to moderate IBD. It may also provide other benefits related to disease, inflammation, prevention of other chronic diseases.
Jones K, Kimble R, Baker K, Tew GA. Effects of structured exercise programmed on physiological and psychological outcomes in adults with inflammatory bowel disease (IBD): A systematic review and meta-analysis. Sagami S, ed. PLoS ONE. 2022;17(12):e0278480. doi:10.1371/journal.pone.0278480	Jones K (2022)	Exercise programs for adults with IBD	meta-analysis; Studies that assessed the effects of structured exercise of at least 4 weeks on physiological and/or psychological outcomes in adults with IBD. Meta-analysis performed with random-effects model.	637 participants	15 studies (9RCT) included. Exercise improved disease activity, but not disease specific QoL when compared to controls. Benefits were found in fatigue, muscular function, body composition, cardiorespiratory fitness, bone mineral density and psychological well-being. Overall certainty of evidence was low for disease activity and very low for QoL.	Exercise may improve disease activity and other aspects of life.

Derbey L, Charlois AL, Buisson A, et al. Physical Activity and IBD: State of Art and Knowledge, Patients and Healthcare Professionals Points of View, A French Multicenter Cross Sectional Study. Inflammatory Bowel Diseases. 2024;30(12):2306-2313. doi:10.1093/ibd/izae009	Derbey L (2024)	Those with IBD who exercise	Multi-center cross-sectional; identified patients filled several questionnaires to assess sociodemographic, physical activity, and QoL data.	298 adults with IBD	Decrease in training frequency since IBD diagnosis regardless of age, gender, symptom intensity, or type of disease. Increase in low intensity activities and a decrease in competitions and sports club registrations. Intensity of symptoms have a negative impact on QoL. A high PA intensity was correlated with a higher QoL score, regardless of symptoms intensity. The main barrier to PA was fatigue, the main fear was diarrhea. Most felt they were insufficiently informed of how to exercise and most were interested in coaching. Most healthcare providers reported they had already discussed exercise with their patients and 98% felt they lacked knowledge.	Those with IBD are less likely to be as physically active as they were before baseline. Exercise likely isn't harmful for QoL. Providers should be provided more training regarding PA for IBD patients.
Wang Y, Peng H, Cui C, Zou Q, Yang M. Summary of Best Evidence for the Dietary Management in Patients with High-Output Ileostomy. J Multidiscip Healthc. 2025;18:877-888. doi:10.2147/JMDH.S506561	Wang Y (2025)	Patients with high-output ileostomy	Systematic review; two researchers independently evaluated the quality of literature and extracted and summarized the evidence.	NA	18 articles include; There are many strategies to reduce output, odor in this population. Other recommendations regarding hydration, malnutrition screening, and education are made.	There are many strategies to reduce output and other nutrition interventions for ileostomy management.

Ozgursoy Uran BN, Yildirim Y, Senuzun Aykar F, Unsal B. N031 The effect of web-based education on disease activity, symptom management, and quality of life on patients with inflammatory bowel disease. Journal of Crohn's and Colitis. 2018;12(supplement_1):S582-S582. doi:10.1093/ecco-jcc/jjx180.1045	Orgursoy U. (2018)	IBD patients using web-based education	RCT; patients randomized to web-based education versus standard training group. Questionaries distributed measuring disease activity, symptoms, QoL. Intervention lasted 8 weeks.	60 pts	No significant difference in disease activities. Abdominal pain symptom in the web-based training group and symptoms of diarrhea, stool mucus and abdominal pain in the standard training group were significantly reduced. No difference between the web-based and standard training groups in terms of the time average in severity of diarrhea, abdominal pain, stool blood, mucus in stool and tenesmus. QoL scores were similar between groups. Overall QoL did increase in both groups.	No significant difference between web-based education and standard training. Education may improve severity of symptoms, disease activity and QoL.

Moreau J, Hammoudi N, Marthey L, et al. Impact of an Education Programme on IBD Patients' Skills: Results of a Randomised Controlled Multicentre Study [ECIPE]. Journal of Crohn's and Colitis. 2021;15(3):432-440. doi:10.1093/ecco-jcc/jjaa195	Moreau J (2021)	Longterm education effect on QoL in IBD patients.	Prospective multicenter RCT; randomized to 6 month education program or no education with intention to educate analysis. A psycho-pedagogic score (ECIPE) was evaluated by a blinded physician at baseline, 6 months and 12 months. Primary endpoint was increase of ECIPE score at M6 of more than 20%.	263 pts in 19 centers (73% CD)	Median increase in ECIPE score at M6 was higher in the educated group as compared with controls (16.7% versus 7%; p=0.0008)). Primary endpoint was met 46% versus 24% of the patients in the educated and control groups, respectively (P=0.0003). Predictors of at least 20% of the ECIPE score were randomization in the education group and no previous surgery (OR 1.92). In intention to education analysis, both groups ended in similar median ECIPE scores.	Longterm education likely provides improvement of skills related to IBD.
Gordon M, Sinopoulou V, Ibrahim U, Abdulshafea M, Bracewell K, Akobeng AK. Patient education interventions for the management of inflammatory bowel disease. Cochrane Gut Group, ed. Cochrane Database of Systematic Reviews. 2023;2023(5). doi:10.1002/14651858.CD013854.pub2	Gordon M (2023)	IBD patients and varying educational interventions.	meta-analysis; compilation of all RCT that compare educational interventions targeted at people with IBD to any other intervention or no intervention. Primary outcomes were disease activity, relapse, and QoL at end of study.	2708 participants with IBD aged 11 to 75 years old.	14 studies included. Education added to standard care is likely not beneficial when compared to standard care. Current studies do not provide enough information regarding specific of their education programs. This could be beneficial to determining how education can be helpful.	Further research should provide better details regarding education administered and efforts should focus on closing gaps of healthcare access.

Nguyen NH, Khera R, Ohno-Machado L, Sandborn WJ, Singh S. Prevalence and Effects of Food Insecurity and Social Support on Financial Toxicity in and Healthcare Use by Patients With Inflammatory Bowel Diseases. Clinical Gastroenterology and Hepatology. 2021;19(7):1377-1386.e5. doi:10.1016/j.cgh.2020.05.056	Nguyen NH (2021)	IBD adults affected by poor social determinants of health	National Health Interview Survey 2015 data used to identify adults with IBD and estimate prevalence of food insecurity and/or lack of social support. Evaluated association between financial toxicity and emergency department use.	3.1 million IBD adults	42% of all adults with IBD reported at least one negative social determinate of health, with 12% reporting both insecurity and lack of social support. Patients with food insecurity were significantly more like yet experience financial hardship due to medical bills (OR: 3.31) financial distress (OR 6.92) and cost-related medication non-adherence (OR: 8.07). Patients with inadequate social support experienced similar problems. Food insecurity and/or lack of social support was not associated with increased risk of emergency department use.	A large portion of adults with IBD experience negative social determinates of health. 1 in 8 patients with IBD experience food insecurity and lack social support.

Inflammatory Bowel Disease and Nutrition Therapy

An educational booklet that discusses current evidence for diet therapies to induce or maintain remission for those with IBD

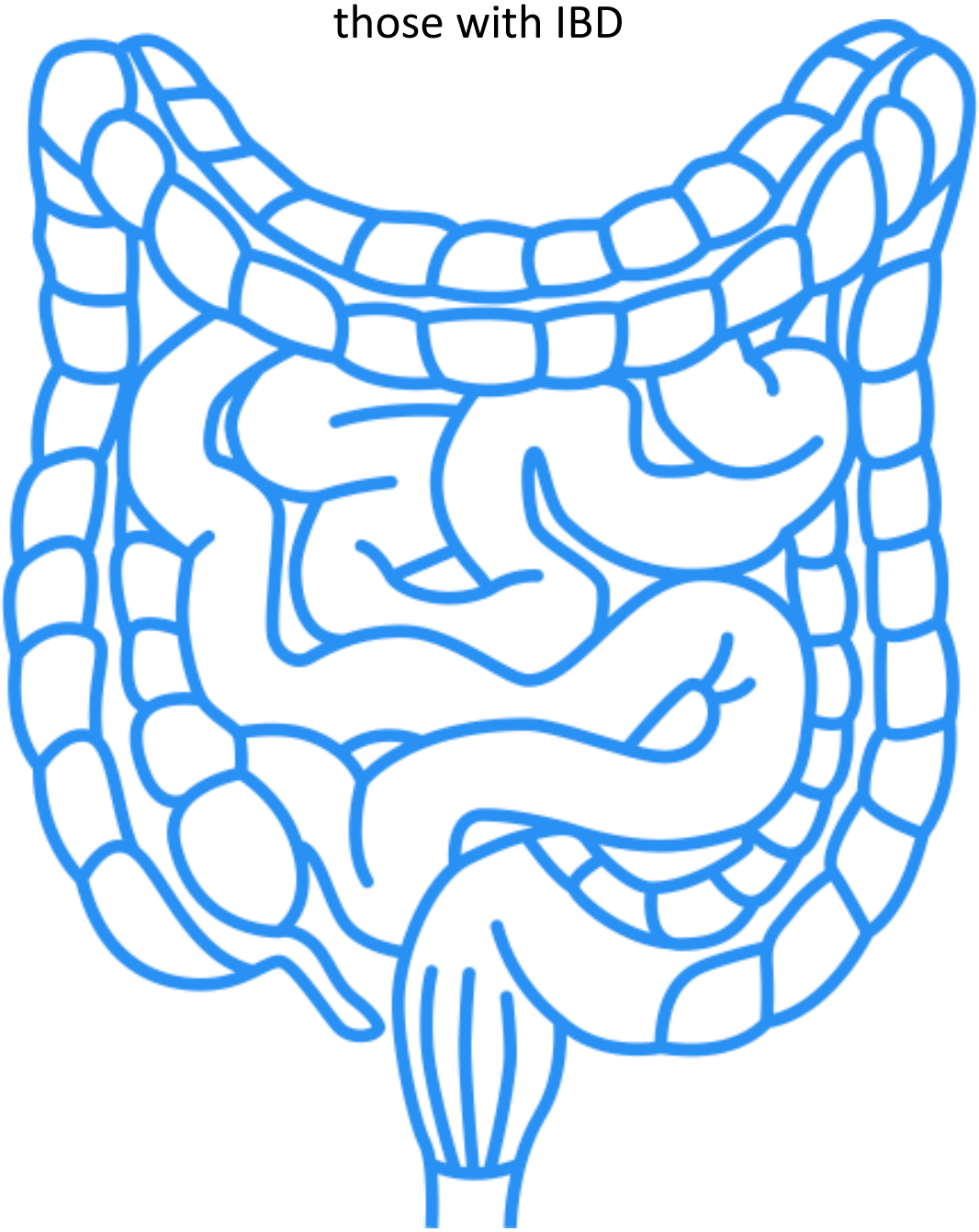


Table of Contents

Introduction

Inflammatory Bowel Disease (IBD) affects an estimated 2.4 – 3.1 million people in the United States. Those affected by this disease may experience changes to their daily routine including meals, bowel movements, and social life. These changes can be challenging and confusing, though a whole team of providers is available to help guide you through these changes.

Nutrition is one aspect of life that may likely change when diagnosed with IBD. Certain foods can increase gastrointestinal symptoms and/or further aggravate flare symptoms. This may cause some to restrict and/or avoid certain foods entirely. You may hear about different diets that claim to help or prevent flare-ups, improve inflammation or cure your disease. Looking up these diets online can lead to several sources that may be confusing, poorly written and/or hard to understand.

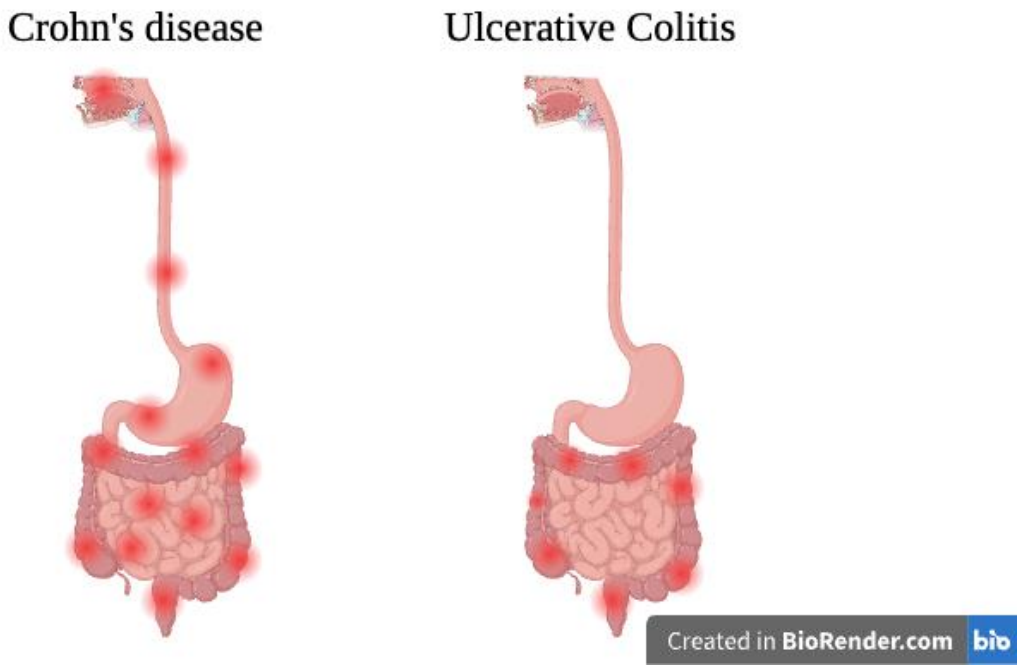
This booklet was created to help organize nutrition information in an easy-to-read format. All information in this booklet is supported by evidence-based research to show you what is and isn't working in IBD nutrition therapy.

There is a great amount of information online about diet and IBD. This document should give a clearer picture of how to best approach your diet based on your individual medical needs.

The aim of this booklet is to serve as a guide on nutrition for those with IBD. This will help aid your education and the decision-making process for you and your providers.

What is Inflammatory Bowel Disease?

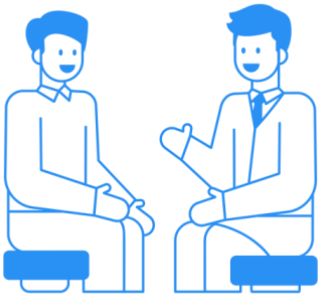
Inflammatory Bowel Disease can occur for a variety of reasons but stems from inflammation of the walls of the gastrointestinal tract.



Where the inflammation occurs will then determine the type of IBD such as **Crohn's disease** or **Ulcerative Colitis**. A third type of IBD, indeterminant IBD, has signs and symptoms from both Crohn's disease and Ulcerative Colitis.

Those with IBD may experience gastrointestinal symptoms such as diarrhea, nausea, vomiting, abdominal pain, and gas.

Treatment for IBD will vary by person. The patient and the **gastroenterologist** will come together to discuss the best medical treatment. This may include medications to help control inflammation.



For those with IBD, meeting with a **registered dietitian** is helpful, though it may not be an option for some. These health professionals can help evaluate a person's nutrition needs and give guidance on which diet aligns with their goals for their own IBD care.

Every section within this booklet is something your registered dietitian can help you with. They are available to answer any questions you may have.

Disease States of IBD

Crohn's disease and Ulcerative Colitis go through periods of active disease and remission, or quiescent disease.

Active disease can be described as a period of inflammation confirmed by imaging and/or an endoscopic procedure with or without persistent gastrointestinal symptoms and/or clinical disease activity.

- Some people may have active disease while <u>not experiencing any gastrointestinal symptoms</u>.

Remission is a period in which there is no inflammation within the gastrointestinal tract.

- Some people may still experience ongoing gastrointestinal symptoms, and this is described as **quiescent disease**.

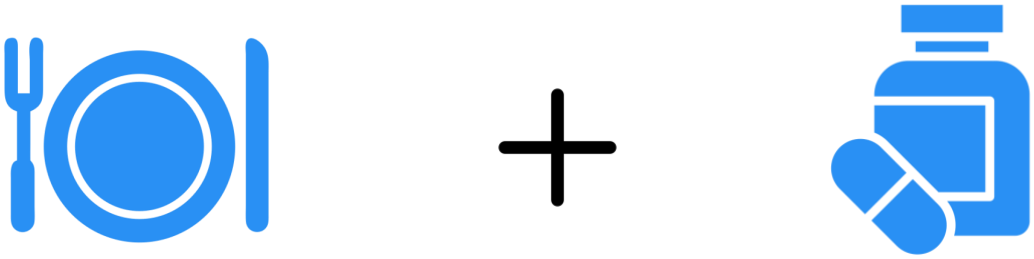
Our goal is to induce remission with our treatment plans. Diet has shown to be useful in achieving remission. While there are promising results from using diet therapy alone or in combination with other medications and therapies, positive results are not guaranteed and may vary from person to person.

IBD and Diet Therapy

Research regarding nutrition therapy and IBD began around the 1950's. It has come a long way since then, though there are still limitations and gaps in research that do not allow for certain conclusions about these diets.

There is no one diet that can control your IBD, but some diets can change the foods you eat, which may help relieve your symptoms and inflammation.

While this may be the case, there is quality research that has shown beneficial results for those with IBD who use diet therapy in combination with other treatments.



In this booklet, we will review the role of the most studied diets and their impact on IBD. Some of these diets have seen more supporting evidence than others: Exclusive Enteral Nutrition, Partial Enteral Nutrition in combination with Crohn's Disease Exclusion Diet, Specific Carbohydrate Diet and the Mediterranean Diet.

The low Fermentable Oligo- Di- Monosaccharide and Polyol diet (low-FODMAP) has produced results that show a reduction of gastrointestinal symptoms for those with IBD. Though, this diet has little to no evidence to support that it induces remission and not recommended or those with active disease. This diet protocol may be helpful in quiescent disease.

Disclaimer: If you want to adopt any diet therapy, reach out to your IBD team or dietitian before you begin.

This booklet is meant to be used as a guideline, not as a sole source of intervention. It is highly recommended to talk to your dietitian before beginning any new diet or making changes to your current diet.

Importance of Variety While Following These Diets

Many of these diets we discuss can be restrictive, meaning we may end up eating less than normal as we accustom ourselves to a new diet. Though our goal is not to eat less, but to become more familiar with foods that maintain remission and/or induce it.

It is possible that fear could cause us to limit ourselves to only a few “safe” foods.

A goal to keep in mind for these diets is that variety is key to help make this a long-lasting diet, as well as an enjoyable one.

1 in 8 IBD patients struggle with access to nutritious foods and having adequate social support.

If this sounds like your situation, there are resources for you. For more information, go to **page 67**.

Sociocultural Considerations for Diet

Though some examples of foods and meals are shown in this booklet, it does not mean that your diet must look like our examples. Your diet should reflect the foods you are accustomated to and would like to eat.

Your dietitian will be able to help create an idea of what foods would fit into your diet based on your traditions and customs.

Many of the foods and examples we give can be substituted or replaced with other foods and still meet the expectations of the diet.

Some culturally appropriate foods that may be tolerated by some with IBD include:

- Rice
- Mango
- Tomatoes
- Lentils
- Oats
- Spinach
- Tea
- Chickpeas

Exclusive Enteral Nutrition

Exclusive enteral nutrition (EEN) is a method of nutrition used to induce and maintain remission in Crohn's disease patients. It includes having a person drink liquid oral nutrition supplements as their primary source of calories. This diet is temporary and lasts between 6-12 weeks. This treatment is also available for those who are using a feeding tube.

This treatment option has shown evidence of inducing remission when the diet is followed strictly. This evidence supports use in people with Crohn's disease but has shown little effect in people with Ulcerative Colitis.

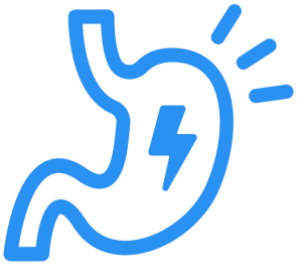
	Crohn's Disease	Ulcerative Colitis
EEN Inducing Remission	✓	✗

In Crohn's disease patients, those who follow this diet in combination with their biologic medications may have a greater likelihood of remission and have a longer lasting remission.

> **Research:** 200 adult Crohn's disease patients retrospectively grouped into biologics and EEN for 16 weeks or only taking biologic medications. The group with the EEN + biologic had an 87% clinical remission rate at 16 weeks. 78% of this treatment group continued to be in clinical remission after a year, even after stopping the EEN treatment. All results were significantly greater than the treatment group using only biologics.

The amount of oral nutrition supplements that you take depends on your body type and the formula used. If you wish to use this diet, ask to consult with your dietitian and they will discuss with you if EEN is right for you. The nutrition supplements used for EEN can be an out-of-pocket expense for some and should be considered before beginning this treatment.

While following this diet, some may feel symptoms such as diarrhea, gas, bloating, nausea and vomiting. However, working with your dietitian can help adjust your regimen to try and help improve symptoms.



If using a feeding tube, your dietitian may recommend:

- Reducing the amount of fluid you take at feedings
- Decreasing the rate of feeding being delivered to you if you use a pump
- Changing to a different formula

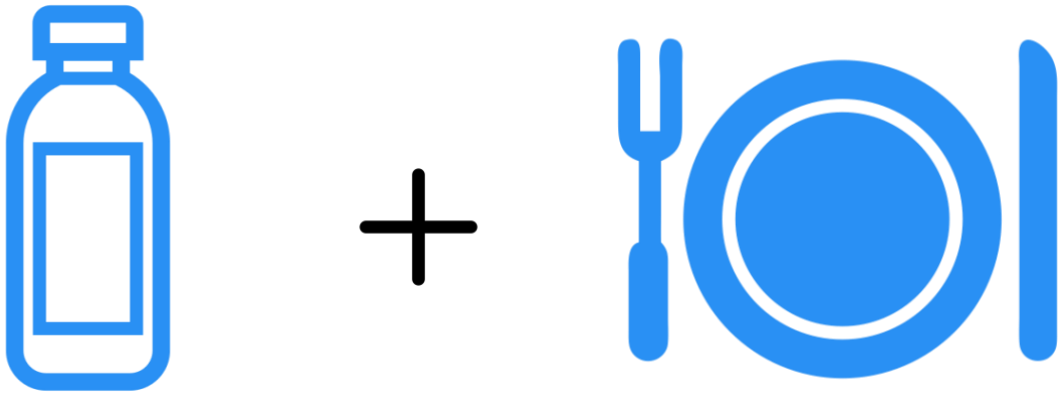
If drinking these by mouth, your dietitian may recommend:

- Not lying down for 30 minutes after a feeding
- Reducing the volume and/or drinking more slowly
- Going for a walk after a “meal”

Those with stricturing disease may attempt EEN or an adapted texture diet to induce symptomatic remission. Stricturing disease will be discussed on **page 41.**

Partial Enteral Nutrition

Partial enteral nutrition is a similar method of nutrition to exclusive enteral nutrition except the person is drinking the nutrition supplement *and* eating food by mouth.



25% - 50% total daily calories

50% - 75% total daily calories

Most patients will consume 25-50% of their total daily calories from an oral nutrition supplement. The rest of the calories are to be met through intake of healthy foods. This approach has been studied in those on anti-TNF biologic therapies with more superior results as compared to anti-TNF medications on their own.

Partial enteral nutrition can be paired with the **Crohn's Disease Exclusion Diet** (CDED). CDED can be summarized as a whole foods diet.

Crohn's Disease Exclusion Diet

This diet was created to limit foods that can change or impact the balance of microbiota in our gut. This diet is considered anti-inflammatory. The ingredients limited are generally additives, preservatives, and foods with pro-inflammatory potential that has evidence to show that they may cause inflammation to our digestive system.

This diet may be a better option for those who need more flexibility in their diet compared to **Exclusive Enteral Nutrition**.

Depending on your nutrition goals, Crohn's Disease Exclusion Diet can be followed **with or without Partial Enteral Nutrition**. It may even show similar remission rates as compared to following exclusive enteral nutrition.

Some diet therapies used for induction of remission can be restrictive and hard to follow. Though, this diet allows for enjoyment of solid and tasteful foods while still promoting healing and inducing remission.

Foods avoided in this diet and their replacements:

Foods Not Allowed or Limited	Potential Food Replacements
Gluten/wheat (bread, pasta, cereals)	White rice, rice noodles, rice flour
Dairy products (milk, most cheeses)	Yogurt
Animal fats (Red meat (beef, pork, lamb)), butter	Olive oil, canola oil
Processed meats	Fresh chicken breast, eggs, lean fish (once/week)
Products containing preservatives/emulsifiers	Dressings, mayonnaise, natural peanut butter
Canned goods	Canned soups, canned fruits & vegetables (in 100% fruit juice)
Most packaged products	Varying fruits and vegetables
Alcohol, coffee, carbonated soft drinks and energy drinks	Water, formula, smoothies
Soy	Lentils, quinoa, legumes
Artificial sweeteners	Honey, small amounts of refined sugar

Always talk with your dietitian before beginning any diet or restricting any food from your diet.

This diet should only be attempted under supervision of a dietitian.

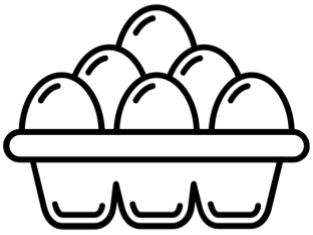
The Crohn's Disease Exclusion Diet follows this format:

First Phase Week 1 - 6	Most restrictive phase and lasts for 6 weeks. Limits insoluble fiber. Oral nutrition supplements will cover half of your energy needs.
Second Phase Week 7 - 12	Some foods that were avoided are reintroduced such as fruits and vegetables. Lasts for another 6 weeks.
Third Phase Week 13+	Maintenance phase that lasts for at least 9 months. Many foods are reintroduced back in. This allows for the supervision of reintroduced foods and to monitor any symptoms or flare-ups.

Partial enteral nutrition is often paired with CDED, however there are some studies that support the use of CDED without enteral nutrition for maintenance of remission. Research with this diet for induction and maintenance of remission is limited, though the most promising results come from its use in combination with partial enteral nutrition. **One study found clinical remission rates of over 80% at 12 weeks while following CDED.**

Example Meal Plan for Partial Enteral Nutrition and Crohn's Disease Exclusion Diet (Phase 1)

Breakfast:



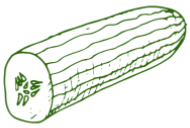
1 carton of Oral Nutrition Supplement (ONS)

2 scrambled eggs cooked with olive oil

1 banana

Snack:

½ cucumber, sliced and 5 strawberries



Lunch:

1 carton of ONS

Summer Salad:

Makes 1 serving

- 3-4 ounces of cooked chicken breast (seasoned with salt and pepper/herbs as desired)
- 2 tomatoes cut into wedges (or 6 cherry tomatoes)
- 1/2 cucumber, sliced and cut into halves
- ½ avocado, pitted, peeled, and cubed (not to consume more than ½ avocado per meal)
- ¼ cup chopped basil
- 2 tablespoons olive oil
- Juice of 1/2 orange
- Salt and pepper to taste

Snack:

1 carton of ONS

1 fresh apple, peeled

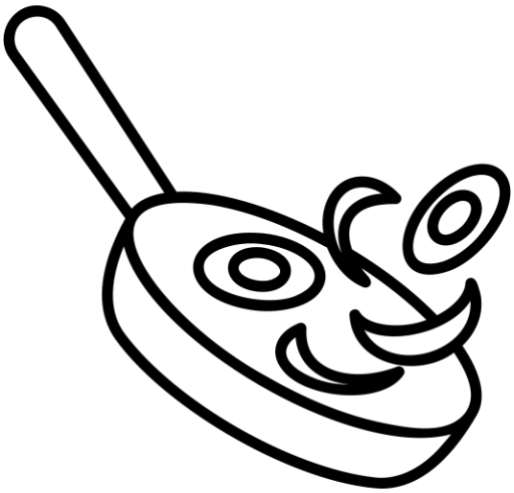
Dinner:

1 carton of ONS

Stir-fried chicken and rice noodles:

Makes 3 – 4 servings

- ½ package of thin rice noodles, prepared according to package instructions
- 1 pound chicken breast
- 2-3 carrots, cut into strips
- Salt
- Paprika
- 1-2 teaspoons sugar
- Turmeric
- Olive oil



Snack/Dessert:

Banana Honey Muffins

Makes 10 servings

- 1 cup white rice flour
- ½ teaspoon salt
- 2 tablespoons sugar or honey
- 1 egg
- ¼ cup water

- 2 tablespoons canola oil
- 2 bananas, mashed
- Canola oil for greasing muffin pan

Instructions:

Step 1

Preheat oven to 350°F/175°C and grease a 12-cup muffin pan with canola oil.

Step 2

In a medium bowl stir together the rice flour, salt, and sugar (if using). In a small bowl, whisk the egg, water, canola oil, banana, and honey (if using). Add the wet ingredients to the dry ingredients and stir until well combined.

Step 3

Spoon the batter evenly across 10 slots in the muffin pan. Bake for 15 minutes or until a toothpick inserted in the center of a muffin comes out clean.

Step 4

Let muffins cool before removing from the pan.

All recipes found at Nutritional Therapy for IBD or Crohn's and Colitis Foundation

Research with PEN + CDED

Partial enteral nutrition in combination with biologic medication may increase the likelihood of inducing remission in patients with Crohn's disease.[1]

Use of PEN + CDED is still effective in inducing remission in patients with failing biologic therapy.[2]

Effectiveness of PEN + CDED shows similar or better remission rates than Exclusive Enteral Nutrition.[3,4]

Research with children and adults using PEN + CDED and maintenance of remission is more limited than induction of remission studies. Studies available show induction of remission rates that can range from 68%-82%.[3-8]

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8. Yanai H, Levine A, Hirsch A, et al. The Crohn's disease exclusion diet for induction and maintenance of remission in adults with mild-to-moderate Crohn's disease (CDED-AD): an open-label, pilot, 24andomized trial. *Lancet Gastroenterol Hepatol*. 2022;7(1):49-59. Doi:10.1016/S2468-1253(21)00299-5

Specific Carbohydrate Diet

Specific Carbohydrate Diet has its origins in treatment of celiac disease in children. It was later found to have some effect in the treatment of bowel disease. This diet can be used for the treatment of Crohn's Disease or Ulcerative Colitis.

This diet's purpose is to eliminate most or all foods that could cause irritability and inflammation in our digestive system. It is considered more restrictive than the Crohn's Disease Exclusion Diet, though it can be modified to allow more foods.

It has also shown evidence to support **healing of the intestinal walls, reduce inflammation, and improve disease activity**.

Foods avoided in this diet and their replacements:

Foods Not Allowed	**Potential Food Replacements**
All Grains	Legumes/Beans
Sweeteners and artificial sweeteners (except for honey)	Honey, fruits, vegetables
Most dairy products (except for hard cheeses and homemade 24-hour fermented yogurt)	Parmesan, hard and sharp cheddar, homemade 24-hour fermented yogurt, egg
Most processed foods	Varying fruits and vegetables
Alcohol, formula	Water, black coffee, smoothies

Research with Specific Carbohydrate Diet

The Specific Carbohydrate Diet has similar effects in reducing clinical markers of inflammation and symptoms as compared to the Mediterranean Diet. A limitation of this study is there was no endoscopic evaluation, however it shows that a less restrictive diet, such as the Mediterranean diet, has potential to reduce symptoms and clinical markers of inflammation.[1]

Much research regarding the SCD contains pediatric populations, though these studies often find reduced inflammatory markers, improved disease activity scores, and mucosal healing. [2-4,6]

The modified Specific Carbohydrate diet may be as effective as the Specific Carbohydrate diet in CD and UC, which allows for more diet inclusion and flexibility.[2,3] Though the results from these studies did not show consistent improvement of symptoms or inflammatory markers. Further, larger scale studies are warranted to understand the effect of this diet.

Some individuals can follow this diet long term without using medications.[5]

References:

1. Lewis JD, Sandler RS, Brotherton C, et al. A Randomized Trial Comparing the Specific Carbohydrate Diet to a Mediterranean Diet in Adults With Crohn's Disease. *Gastroenterology*. 2021;161(3):837-852.e9. doi:10.1053/j.gastro.2021.05.047
2. Suskind DL, Cohen SA, Brittnacher MJ, et al. Clinical and Fecal Microbial Changes With Diet Therapy in Active Inflammatory Bowel Disease. *Journal of Clinical Gastroenterology*. 2018;52(2):155-163. doi:10.1097/MCG.0000000000000772
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Low-FODMAP Diet

The low fermentable oligosaccharides, disaccharides, monosaccharides, and polyols diet (low-FODMAP diet) is a diet that eliminates several types of food and slowly reintroduces them one food at a time. This is done so we can document how the food makes you feel and if any symptoms reoccur.

This diet has research to suggest that it is helpful for management of symptoms in **quiescent IBD** and **irritable bowel syndrome**, a different bowel condition.

Irritable Bowel Syndrome ≠ Inflammatory Bowel Disease

While these two conditions are different, irritable bowel syndrome can coexist with inflammatory bowel disease.

Most research finds the low-FODMAP diet can reduce or eliminate symptoms in active and/or quiescent IBD but **likely will not reduce inflammation**.

This diet is temporary, not lasting longer than 6 weeks at a time. It includes different phases where you and your dietitian will slowly reintroduce foods in small amounts.

- Removing high-FODMAP foods like apples and onions from your diet in exchange for low-FODMAP foods like nuts, berries and green leafy vegetables.
- A less restrictive approach may be applied to help identify any potential FODMAP sensitivities based on individual foods in one's diet.

The low-FODMAP diet can be restrictive to your overall energy intake if not followed properly. **This diet should be followed under the supervision of a licensed registered dietitian**. Working with a dietitian is crucial for improvement of your symptoms and success of this diet.

Research with Low-FODMAP Diet

Low-FODMAP diet may reduce IBS symptoms and improve quality of life in patients with quiescent IBD or in remission compared to a normal diet.[1-3]

Low-FODMAP diet does not appear to reduce inflammation in IBD patients.[1-3]

References:

1. Pedersen N, Ankersen DV, Felding M, et al. Low-FODMAP diet reduces irritable bowel symptoms in patients with inflammatory bowel disease. *World J Gastroenterol*. 2017;23(18):3356. doi:10.3748/wjg.v23.i18.3356
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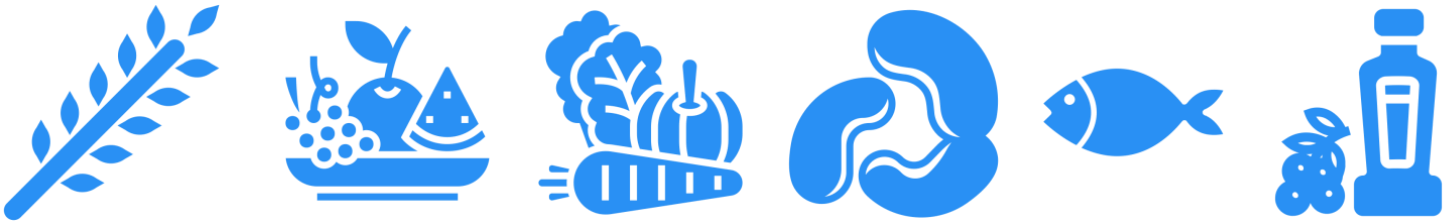
3. Cox SR, Lindsay JO, Fromentin S, et al. Effects of Low FODMAP Diet on Symptoms, Fecal Microbiome, and Markers of Inflammation in Patients With Quiescent Inflammatory Bowel Disease in a Randomized Trial. *Gastroenterology*. 2020;158(1):176-188.e7. doi:10.1053/j.gastro.2019.09.024

Mediterranean Diet

The previously mentioned diets can be restrictive and may make it challenging to incorporate variety into the diet. The Mediterranean diet is a diet that focuses on high intake of **fruits**, **vegetables**, **whole grains**, **nuts**, **legumes**, **cold water fish**, and **olive oil**.

This diet is known to be an anti-inflammatory diet and is **generally recommended by registered dietitians as a healthful and safe diet for those with IBD**.

The Mediterranean diet includes all of the major food groups and is mostly plant-based.



Other than being a diet used for prevention and management of IBD, it is also well known to protect against **cardiovascular disease**. There has been much research to show that the Mediterranean diet can also help prevent **diabetes**, **cancer, fatty liver disease**, **obesity** and **risk of death**.

While evidence is limited to show that the Mediterranean diet induces remission, this diet is much more flexible and naturally has more variety than the previously mentioned diets.

Research: A randomized control trial with 194 adults with CD attempted the Specific Carbohydrate diet or the Mediterranean diet for 12 weeks. Symptomatic remission was found in nearly the same number of adults in each group (**46.5% versus 43.5%).** No difference in reduction of inflammation was found between the diets. **The Specific Carbohydrate diet may not produce better results than the Mediterranean diet**.

This diet can also be modified to alter the texture of food items based on your individual nutrition goals.

Research with Mediterranean Diet

Mediterranean Diet may reduce incidence of fat build-up in the liver of CD and UC patients. This may reduce incidence of fatty liver disease.[1]

Those with CD and UC who follow the Mediterranean diet may have reductions in BMI and waist circumference which can help cardiovascular function.[1]

Following the Mediterranean diet with stable therapy in CD and UC patients may reduce disease activity.[1,2]

The Mediterranean diet may have a stronger effect at preventing major cardiovascular events compared to a low-fat diet.[3]

The Mediterranean diet may help reduce blood pressure in individuals with high normal blood pressure of grade 1 hypertension.[4]

The Mediterranean diet may be preventative against breast cancer.[5]

The Mediterranean diet may be associated with lower incidence of type 2 diabetes mellitus.[6]

References:

1. Chicco F, Magrì S, Cingolani A, et al. Multidimensional Impact of Mediterranean Diet on IBD Patients. Inflammatory Bowel Diseases. 2021;27(1):1-9. doi:10.1093/ibd/izaa097
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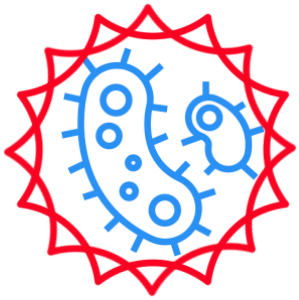
Ultra-Processed Foods

"Western" diets, such as the standard American diet, are known to include many servings of **ultra-processed foods**. These food items contain additives and preservatives that help increase shelf-life and consistency of food product.

Some of these additives and preservatives in large amounts may increase inflammation and GI symptoms.

Emulsifiers and additives may alter our gut by reducing beneficial bacteria which increases bacteria that cause inflammation.



We can limit these ingredients by avoiding or limiting foods that are highly processed or ultra-processed.

Other benefits of reducing the amount of ultra-processed foods we eat, eating less of them **reduces our risk** of excess weight gain, cancer, and heart disease.

Common ultra-processed foods

Soda and sport drinks

Frozen Meals/Ready-to-Eat

Deli meats

Baked goods

Ultra processed foods (UPFs), when consumed in large amounts per day, show greater incidence of developing Crohn's disease and greater risk of IBD-related surgeries.

The Mediterranean diet focuses on minimally processed, whole foods that limit processed and ultra-processed foods.

This diet replaces those foods with higher amounts of vegetables, fruits, nuts, legumes, whole grains and olive oil which can be anti-inflammatory.

Tips for Shopping on the Mediterranean Diet

As with all of our diets, we want to limit food additives, emulsifiers, and unnecessary processing in our foods. Our priorities for foods are **fruits** and **vegetables**, **whole grains**, **fish**, **legumes** (beans, lentils, soy), **nuts**, and **olive oil**.

To help visualize what a meal may look like, use the MyPlate Method:

A quarter of your plate should be fruits, a quarter should have vegetables, a quarter should have grains, and a quarter should have protein.

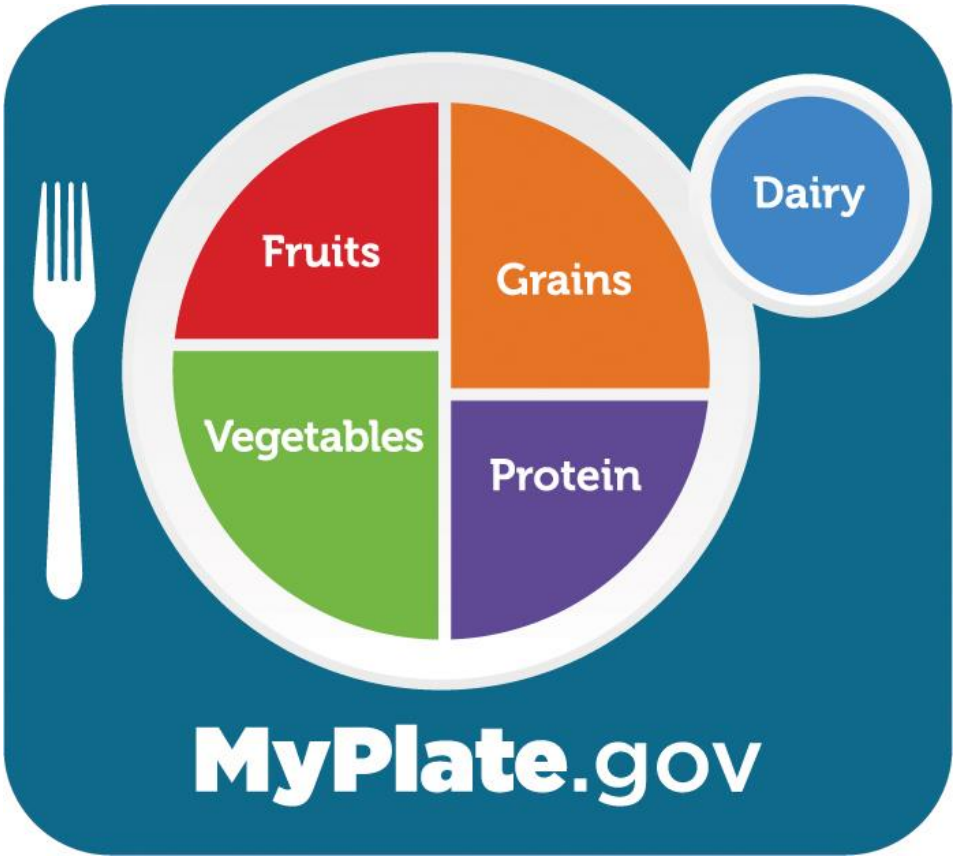


Image from U.S. Department of Agriculture. Accessed 2025. https://www.myplate.gov/resources/graphics/myplate-graphics

When shopping for **fruits** and **vegetables**, shop for fresh, frozen, or canned in 100% juice or water. Frozen vegetables will usually be the cheapest and offer the same nutrition value as fresh.

When shopping for **whole grains**, look for products that contain at least 3 grams of fiber per serving.

Dual Column Display, Per Serving and Per Container

Nutrition Facts

2 servings per container
Serving size **1 cup (255g)**

	Per serving		Per container	
Calories	**220**		**440**	
		% DV*		**% DV***
Total Fat	5g	**6%**	10g	**13%**
Saturated Fat	2g	**10%**	4g	**20%**
Trans Fat	0g		0g	
Cholesterol	15mg	**5%**	30mg	**10%**
Sodium	240mg	**10%**	480mg	**21%**
Total Carb.	35g	**13%**	70g	**25%**
Dietary Fiber	6g	**21%**	12g	**43%**
Total Sugars	7g		14g	
Incl. Added Sugars	4g	**8%**	8g	**16%**
Protein	9g		18g	
Vitamin D	5mcg	25%	10mcg	50%
Calcium	200mg	15%	400mg	30%
Iron	1mg	6%	2mg	10%
Potassium	470mg	10%	940mg	20%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Image from Federal Drug Administration, Department of Human and Health Services. Accessed 2025. 21 CFR 101.9(e)(6)(i).

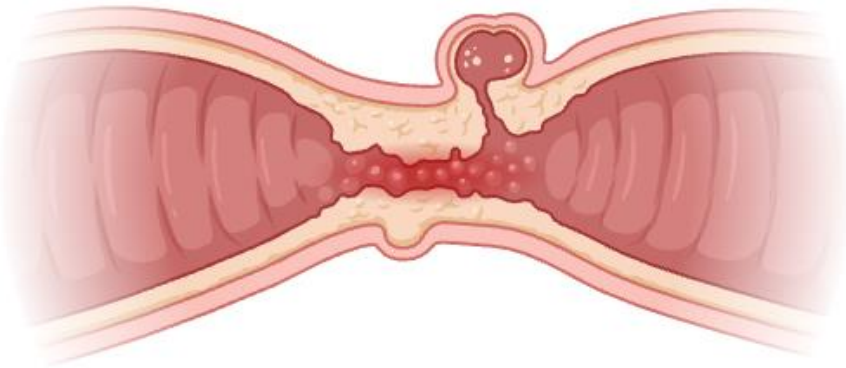
Plant Proteins

While excluding animal proteins from the diet may seem challenging, the variety of plant proteins can be surprising and have other nutrients such as **fiber** that animal proteins do not provide.

List of possible plant proteins
Edamame
Chickpeas
Broccoli
Nuts and nut butters
Oats
Peas
Quinoa
Sorghum
Lentils
Spinach

Stricturing

Stricturing is a complication in Crohn's disease, and rarely in Ulcerative Colitis, that causes the narrowing of where food and water travels within the intestines. It can lead to more GI symptoms and create a blockage in your intestines.



The severity of stricturing can vary and is diagnosed through radiological imaging.

If the stricturing does not require immediate surgery and/or are experiencing symptoms, diet modification may be required. Including smooth textures can improve passage of these nondigestible fibers through the digestive tract, minimizing complications while still including these important foods. Each person's degree of diet modification is based on severity of disease and symptoms.

Those with stricturing CD can also try an **exclusive enteral nutrition** diet which has shown some evidence of relieving strictures.

Another diet method to alleviate strictures is to begin **partial enteral nutrition** plus a modified consistency and textured diet as described earlier.

Note on Alternative Therapies

Evidence on alternative diet therapies for induction of remission or management of symptoms is limited. If you have questions regarding a diet not previously mentioned, **talk to your team's dietitian about if the diet would be right for you**.

Prebiotic and Probiotic use in IBD:

There is limited evidence to support the use of these for treatment of IBD. Using prebiotics or probiotics on their own does not appear to show benefit, currently. Encouraged to include fermented foods such as Greek yogurt, kefir, kimchi, among many others to improve gut microbiota.

High-fiber diet in IBD:

Most people with IBD are recommended to include high fiber foods in their diet. Texture modification can help improve diet tolerance with disease complications, such as stricturing.

A high-fiber diet may help prevent future flare-ups compared to a traditional diet without a focus on fiber. This effect may be greater when combined with your biologic medication(s).

Pouchitis in Ulcerative Colitis:

Multistrain probiotic use may prevent pouchitis.

Eating greater amounts of fruit may protect against pouchitis.

References:

Limketkai BN, Godoy-Brewer G, Parian AM, et al. Dietary Interventions for the Treatment of Inflammatory Bowel Diseases: An Updated Systematic Review and Meta-analysis. *Clinical Gastroenterology and Hepatology*. 2023;21(10):2508-2525.e10. doi:10.1016/j.cgh.2022.11.026

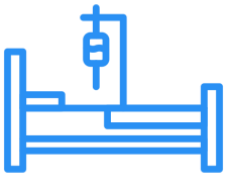
Serrano Fernandez V, Seldas Palomino M, Laredo-Aguilera JA, Pozuelo-Carrascosa DP, Carmona-Torres JM. High-Fiber Diet and Crohn's Disease: Systematic Review and Meta-Analysis. *Nutrients*. 2023;15(14):3114. doi:10.3390/nu15143114

Bischoff SC, Bager P, Escher J, et al. ESPEN guideline on Clinical Nutrition in inflammatory bowel disease. *Clinical Nutrition*. 2023;42(3):352-379. doi:10.1016/j.clnu.2022.12.004

Godny L, Maharshak N, Reshef L, et al. Fruit Consumption is Associated with Alterations in Microbial Composition and Lower Rates of Pouchitis. *Journal of Crohn's and Colitis*. 2019;13(10):1265-1272. doi:10.1093/ecco-jcc/jjz053

Nutrition Before Surgery

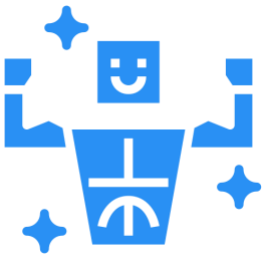
Those with IBD have a higher risk of **malnutrition**. This can cause **muscle loss**, a **longer length of stay in a hospital**, **longer recovery time from surgery** and many other issues if left untreated.

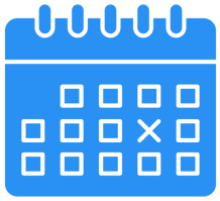

Because malnutrition is a such a common occurrence for those with IBD, **prehabilitation** was created. Prehabilitation includes meeting with a dedicated team of specialists before you have surgery. This allows you and your providers time to create a plan that will lead to a successful surgery and recovery.


Those who *participate in a prehabilitation program before and after surgery* before and after surgery may have better post-operative outcomes such as:

- Shorter length of stay in a hospital
- Faster recovery from surgery
- Quicker return of bowel function
- Less likelihood of muscle loss



Prehabilitation would ideally happen at least **4 weeks** before scheduled surgery, at the very latest between 7-10 days prior to surgery.



You will meet with a dietitian, and they will evaluate for any diet optimization in preparation for surgery. You will also discuss possible post-surgery diet and nutrition management strategies to help improve your healing.

Those who participate in prehabilitation **may recover quicker** and have **fewer complications** after surgery compared to those who do not participate.

Specific nutrition recommendations for pre-surgery include:

Ensure Surgery Immunonutrition drink: It will be recommended to consume **2 oral nutrition supplements per day**, **5 days before surgery**.

Ensure Pre-Surgery Clear Carbohydrate loading beverage. You will be asked to drink 1-2 cartons the night before surgery, and 1 the morning of surgery by 5 AM. Data on this includes **reduced** post-operative nausea and vomiting, **better** glycemic control and less loss of muscle.

Directions: Consume 2 cartons a day for at least 5 days prior to surgery.

	Cartons	
Date	**1**	**2**
	Surgery Date:	

Adapted from OSHU Digestive Health Center educational material

Nutrition After Surgery

Surgery puts your body through a lot of stress. To help it recover, it needs you to be properly fed and hydrated.

You will likely be placed on different diets during your stay in the hospital that may look like this:

No food by mouth (NPO)

Temporary diet before surgery.

Clear Liquids

Juice, Jello, Broth, Water

Full Liquids

Strained soups, Pudding, other foods allowed during clear liquid diet.

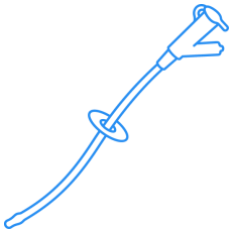
Normal Diet

Limited to no food restrictions. Restrictions may reflect your diet set by your IBD team.

Your diet in the hospital may change due to symptoms you experience, and how quickly your body adapts after surgery.

Patients after bowel surgery are often moved to clear liquid diet the first day after surgery. If they are not any problems after the first day, they are then moved to a solid foods diet.

This change in diet is to allow our gut time to adjust to the surgery and allow nutrients to slowly enter our body.



Sometimes, it may be necessary to begin feeding through a tube in our nose or one that has been surgically placed.

Regardless of how you get your energy, feeding your body is crucial to having the best outcomes after surgery.

Symptoms After Surgery

Symptoms such as diarrhea, nausea and vomiting are common after surgery. There are ways to help relieve or lessen your symptoms. Your in-patient care team will help with this.

Once you are discharged from the hospital, these symptoms may persist. If they do, it is important to tell your surgery team or other primary provider about your symptoms.

Diarrhea can continue for a variety of reasons, so it may be necessary for you to monitor your stools. Note if they have any **unusual color**, **odor**, or **size**. This can help your team identify why you have diarrhea. They can often adjust your feeding, mediation or hydration plan.

It is also important to let your primary care team know if you experience feeling nauseous or vomit. Ensuring that you can eat is key to continuing the healing process. Again, your team can help resolve these symptoms, though they will often need a detailed report of your daily feedings, medications, and other factors.

This report isn't to judge you, but to understand what may be causing your symptoms.

Additional Information for Your IBD

Hydration

Hydration is a crucial part of everyone's health, especially when preparing and recovering from surgery.

Because of problems caused by IBD, hydration and nutrition can be difficult to maintain.

Your team of providers will create an **individualized plan** for your hydration.

Depending on your hydration status, your plan can include putting fluids into your veins or drinking rehydration solutions.

It may also include you having a goal of drinking a certain number of ounces of fluid per day.

Exercise

Exercise is important as it affects our muscle, organ, and bone function.

In IBD, exercise may become challenging due to fatigue and other symptoms that occur during active disease.

While there are no consensus guidelines on exercise for people with IBD, expert opinion and several IBD foundations recommend:

- Low impact exercise such as walking, biking, swimming or yoga.
- If you are feeling tired or bad, do not exercise for the day and rest.
- Ensure you are staying properly hydrated before, during, and after exercise.
- Ensure you are eating enough to handle exercise. Especially if you have active disease when your body requires more energy.
- Check for nearby bathrooms wherever you are exercising, if this is a concern to you.

Exercise in patients with mild-to-moderate IBD is not likely to worsen IBD symptoms or disease activity.[1]

Exercise may improve disease activity and show benefits for fatigue, bone mineral density, cardiorespiratory fitness, and mental health.[2,3]

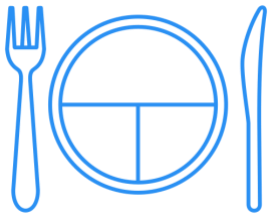
References:

1. Engels M, Cross R, Long M. Exercise in patients with inflammatory bowel diseases: current perspectives. *CEG*. 2017;Volume 11:1-11. doi:10.2147/CEG.S120816
2. Jones K, Kimble R, Baker K, Tew GA. Effects of structured exercise programmes on physiological and psychological outcomes in adults with inflammatory bowel disease (IBD): A systematic review and meta-analysis. Sagami S, ed. *PLoS ONE*. 2022;17(12):e0278480. doi:10.1371/journal.pone.0278480
3. Derbey L, Charlois AL, Buisson A, et al. Physical Activity and IBD: State of Art and Knowledge, Patients and Healthcare Professionals Points of View, A French Multicenter Cross Sectional Study. *Inflammatory Bowel Diseases*. 2024;30(12):2306-2313. doi:10.1093/ibd/izae009

Monitoring your IBD

During active disease, our body requires more energy and protein.

It is recommended to consume at least 60-80 grams of protein daily, but **your individual protein needs may be higher**. You will discuss with your dietitian in more depth about this.



In remission, our energy and protein needs aren't as heightened compared to active disease, but ensuring we are eating balanced meals will help keep our energy and protein stores full.

Micronutrient Deficiencies

Micronutrient deficiencies are common among people with IBD due to medications, diarrhea, changes in absorption, and lack of proper nutrient intake. Therefore, it is important to be routinely checked for micronutrient deficiencies.

Vitamins and minerals such as iron, vitamin B12 and Vitamin D, among others, will be monitored as medically indicated. Testing is done by taking a blood sample. These tests can occur from every 3 months to a year or more depending on the nutrient and how deficient someone is.

Because of the risk of deficiency, it is very important that you take your prescribed nutrient supplements and follow the diet you and your dietitian were able to create.

If you are struggling with either of these, **contact your IBD team or dietitian** and they can work with you to find a solution.

Ostomy

The need for surgery in people with Crohn's Disease and Ulcerative Colitis has reduced but may still be a part of a treatment plan. It can come with new challenges such as different feeding patterns, stool frequency, and maintaining and cleaning the ostomy.

An **ileostomy** is when the end of the small intestine is brought to the surface of your belly to create a **stoma** or opening.

- Your stool will likely be runny, liquid and/or pasty as the water in the stool is unable to be absorbed in the large intestine.
- You can expect 1 liter to 1.5 liters of output per day after surgery.
    - This output should decrease as healing continues.

A **colostomy** is when a section of the colon or large intestine is brought to the surface of your belly to create a stoma or opening.

- Your stool may be like the consistency before your surgery, depending on which part of the intestine is used for the stoma or opening.

Managing Your Ostomy Pouch

Your care team will help you learn how to proper care for your ostomy.

Empty the pouch when it becomes **a third to halfway full**.

A person with an ileostomy can empty their pouch **up to 5 or 6 times per day**.

A person with a colostomy may only empty theirs **once per day**.

Diet with Your Ostomy

Having an ostomy can come with unwanted issues such as high-volume output from the ostomy and foul odor.

<u>This can be managed by some dietary strategies</u>.

- Eating small, frequent meals can help reduce gas
- Chew foods well and eat slowly
- Avoid drinking from straws
- Avoid or eat less amounts of fried and greasy foods
- Increase soluble fiber within your diet
- If on enteral feeds, adjusting feeding times, rates, or formula may help resolve symptoms
- Avoid alcoholic, caffeinated, and sweetened beverages

If you are experiencing output greater than 1.5 – 2 liters per day, **contact your team.**

Soluble and Insoluble Fiber

Many foods that contain fiber have both soluble and insoluble fiber, though some have higher amounts of one or the other.

Soluble Fiber	Both	Insoluble Fiber
Apple	Strawberry	Pear
Banana	Avocado	Almonds
Whole grain bread, whole wheat bread	Tomato	Orange
White pastas, white rice, white breads	Oatmeal	Garbonzo beans
Wheat bran	Black beans	Russet potatoes with skin
Pinto beans	Lentils	Walnuts
Psyllium husk	Kale	Raspberries
Green peas	Brussels sprouts	Romaine Lettuce
Kiwi	Sweet potato	Figs
Blackberries	Quinoa	Broccoli

This should **not** be used as a guideline for your individual diet.

Contant your dietitian or IBD team before making any changes to your diet.

Tips for Shopping for Your Diet

Make a grocery list on your phone or on a piece of paper.

Buy pantry staples that you can use for several dishes.

- Staples such as pasta, rice, frozen vegetables, lentils, yogurt

Plan a few “easy” meals during the week for when you are too tired to cook a large meal.

Cook larger meals so you can have as leftovers for other meals. This can be very helpful for when you lack the energy to cook a full meal.

The following pages will give some suggestions for how to shop for your diet. These recommendations are to help guide your choices while in the store. If your diet guidelines go against some of these recommendations, **follow the advice of your dietitian or your structured diet’s guidelines.**

Produce

Begin shopping in the produce section to help fill your cart with nutrient dense fruits and vegetables.

Try to buy the rainbow. Buying fruits and vegetables of different colors will help give you a variety of nutrients your body needs.

If money is tight, buy food items that are on sale first. Some stores offer digital coupons that you can use for additional discounts at check-out.

Frozen fruits and veggies are just as good as fresh. They also have generally the same nutrient content.

- Fruits in juices are okay if the juice is 100% juice, limit to 4 ounces daily if unable to obtain from fresh or frozen fruit first.

Fruits and vegetables that are pre-cut and pre-packaged may be a time saver. Though more expensive, if you do not have a lot of time to prepare these, you can easily grab a serving and leave the house with it.

Grains

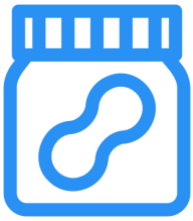
Whole grains and other non-white grains will have more fiber than white grains. Depending on your individual diet, whole grain products may be a better option for you.

Dairy

Dairy-free options are common in stores but check for added sugars and additives. If your diet excludes or minimizes ultra-processed foods and additives/emulsifiers, these products may not be appropriate for you. Choosing alternatives that are refrigerated have fewer emulsifiers added compared to shelf-stable products.

Greek yogurt is a great source of protein and comes in fat and low-fat options. Depending on your diet, Greek yogurt may not be appropriate for you.

Fats



Natural nut butters are a great source of protein, though check the ingredients to avoid unnecessary additives, emulsifiers, and added sugar.

Animal and Plant-based Protein

Lean animal protein can include chicken, turkey, pork (pork chops and tenderloins), and fish.

Plant-based proteins come in many options. Options such as beans, lentils, quinoa, and nuts are great sources of proteins and other nutrients. Go to **page 40** for more plant-based protein sources.

Online Food Resources

Online Food Finders

- **Oregon Food Bank Food Finder:**
  - Link: https://foodfinder.oregonfoodbank.org/
- **211.info**
  - Type in what food resource you need (Food Pantries, Food Bank) and your ZIP code or city. This can be used to find resources other than food such as housing and social support.
  - Link: https://www.211info.org/

Online Recipe Resources

- **Nutritional Therapy for IBD:**
  - Link: https://www.nutritionaltherapyforibd.org/recipes
- **Crohn's & Colitis Foundation:**
  - Link: https://www.crohnscolitisfoundation.org/gutfriendlyrecipes-list

Food Assistance Programs in Oregon

WIC (Women, Infants and Children)

Serves pregnant, postpartum or breastfeeding women or children under 5 years old. Dads, grandparents, foster parents or other guardians may apply for WIC for their children.

- Link to apply in Oregon: https://www.oregon.gov/oha/PH/HEALTHYPEOPLEFAMILIES/WIC/Pages/interest-form.aspx

SNAP (Supplemental Nutrition Assistance Program)

Supplemental income to purchase food that can be used at grocery stores, farmers markets, CSAs, and other participating locations.

- Link: https://one.oregon.gov/

Double Up Food Bucks

SNAP dollars can be doubled when purchasing from locally sourced producers.

- Link: https://doubleuporegon.org/

Meals on Wheels

Provides nutritious meals to older adults in their home or in a community dining center.

- Link: https://www.mowp.org/

Senior Farm Direct Nutrition Program

For those 62 years or older and on SNAP who have limited access to food.

- Link: https://www.oregon.gov/oha/ph/healthypeoplefamilies/wic/fdnp/pages/senior-farm-direct-participants.aspx