IBD Diet Knowledge and Education of GI Fellows

by

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Inflammatory Bowel Disease (IBD) is one of the most rapidly growing chronic diseases worldwide. Although the exact cause of the disease is still unknown some epidemiological studies suggest that factors related to diet might exacerbate the signs and symptoms of the disease. The value of a multidisciplinary approach, combined with dietary counseling, has been well documented across literature in various chronic disease management, and could be further adapted in the care of IBD patients. My problem of practice is that the gastroenterology practitioners at the Digestive Disorder Center (DDC) at UPMC underutilize nutritional services to manage the symptomology of the disease. Currently, our gastroenterology clinics operate without the use of dietary services to care for Crohn's and ulcerative colitis patients; both patients and practitioners could greatly benefit from the use of nutritional services at the DDC. In this inquiry, I sought to investigate if educating gastroenterology fellows about the role of diet in IBD management would increase nutrition knowledge and the referral rate to nutritional counseling. My proposed intervention was to design and implement a brief online education module on the role of diet in the management of IBD for gastroenterology fellows. In Phase I, fellows completed a baseline survey assessing their knowledge of IBD diets and nutritional services at the DDC, and current referral practices. In Phase II, they participated in the online education module. In Phase III, I assessed their knowledge immediately post-module and in Phase IV, their behavior (i.e., referral rates and conversations with patients) 30 days later. Analysis comparing the pre- and post-

intervention responses revealed that there was significant intervention effect in participants' familiarity of patient dietary services at DDC, knowledge of natural diet modalities in IBD; change in participants' frequency of talking to patients about natural diet modalities were borderline significant. The education module was easy to implement online, low cost, and fellows reported high levels of learning and intentions to refer patients. Based on these findings, I recommend this training be integrated into the fellows' standard training curriculum. Future PDSA cycles should consider feedback from the fellows to strengthen the module, include a longer follow up period, and more interaction/prompts for fellows after the training.

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Preface

This dissertation presents the research, findings and recommendations to inspire and influence the gastroenterology physician- patient dialog of tomorrow to identify the clinical trajectories in treatment response. Driven by this conviction, I could not have achieved my current level of success without support from my expert committee. I hope this unique project will create a new path for healthcare professionals and researchers, and lead to interesting discoveries and advances. [redacted]

1.0 Naming and Framing the Problem of Practice

1.1 Broader Problem Area

1.1.1 Etiology of Inflammatory Bowel Disease

Inflammatory Bowel Disease (IBD) is growing globally and it has quickly become one of the most rapidly increasing diseases worldwide (M'Koma et al., 2013). IBD is a condition characterized by chronic inflammation of the gastrointestinal tract and is an umbrella term used for two conditions: Crohn's disease and ulcerative colitis (Crohn's & Colitis Foundation, 2014). Signs and symptoms that are characteristic of both diseases include persistent diarrhea, abdominal pain and cramping, bloody stools, and unintended weight loss. An estimated 70,000 new cases of IBD are diagnosed in the United States each year and as many as 1.6% (3.5 million) Americans are said to have IBD. Both conditions are chronic and often begin in young adults. Although the exact cause of the disease is still unknown, epidemiological studies suggest that the disease is triggered by a combination of immune system responses, genetics, and a number of external environmental agents (Yeshi et al., 2020). Factors such as low fiber, high animal fat, and high sugar diets may affect the short chain fatty acid production and the microbiota of the gut, thereby suggesting that dysbiosis is a contributing factor in the increasing incidence of IBD (Gill et al., 2018). Broadly defined, dysbiosis is a disruption of the microbial ecology or microbial imbalance of the gut, "good" vs. "bad" bacteria used in digestion. This loss of diversity of microbial species has been linked to immunity and certain diseases, such as IBD (Petersen et al., 2014).

1.1.2 Current Treatments and Therapies for Inflammatory Bowel Disease

There is no cure for IBD and currently available and common treatment options are usually limited to pharmacological and surgical management. The relapsing nature of the disease requires chronic treatment and often leads to substantial medical interventions and massive cost to the patient and the healthcare system (Yeshi et al., 2020). There are several categories of medications used to treat IBD and the goal in each approach is either to manage flare-ups by inducing remission when symptoms are present or to help maintain remission by preventing future flare-ups and decreasing the time between episodes.

Anti-inflammatory drugs, immune system drugs and a more sophisticated family of biologic drugs are often used to get symptoms under control. Enteral nutrition or tube feeding has been used quite successfully for the pediatric population and the probiotic E.coli Nissle has been approved for the UC patient population in Europe (Schultz, 2008). However, there is no one ideal treatment as therapies lack potency and have significant side effects. Because of this, patients often go on a lifetime journey to find the best medication or a combination of treatments that fit best for them. When first diagnosed, depending on the severity of those cases, patients do not always realize that IBD is a chronic and lifelong disease, requiring regular follow-up and compliance with medications to effectively manage the condition. Unfortunately, one third of all IBD patients relapse from symptom free period twelve months after stopping even the most sophisticated family of medication (Mankodi et al., 2019).

1.1.3 Emerging Treatments for Inflammatory Bowel Disease

While most traditional IBD treatment centers do not offer dietary counseling as standard of care, integrating such model of care to support patients in IBD has shown promise (Regueiro et al., 2016). Specifically, studies have documented lower cost of care and improved patient outcomes. There is growing scientific evidence suggesting the central role of diet in the condition of the gastrointestinal tract (Bennet et al., 2017), and that natural diet modifications can offer a possible therapeutic intervention for IBD (Green et al., 2019). Because of this, nutritional interventions are a possible disease management option in IBD that can be used to improve short- and long-term disease activity and symptoms. As per Lewis et al. (2017), patient's food consumption patterns (e.g. diets high in fats and meat, but deficient in fruits and vegetables) correlate with high IBD incidence and present themselves as an ideal therapeutic target that can be addressed through dietary modifications. While there is compelling evidence that diet can be helpful for targeting the most common pattern associated with an increased risk of IBD manifestation, diet as IBD therapy has not been integrated into the standard of care in my place of practice. Dietary changes, while difficult, can improve patients' lifestyle and quality of life. Moreover, as Waters et al. (2005) have shown, patients who have a better understanding and knowledge of IBD disease display better compliance with treatments and medication, and are less likely to experience disease complications.

1.1.4 Multidisciplinary Model of Care in Inflammatory Bowel Disease

Multidisciplinary management of IBD brings together a group of health care professionals— gastroenterology and dietary management— to collaborate in their medical and

procedural expertise to best manage the patient's medical condition (Healio, 2017). Involving regular diet counseling in the treatment of IBD care fits well with complex, hard to manage chronic diseases with comorbid behavioral conditions. The involvement of nutritional counseling modality of patient care has its origin in primary care, but has not been sufficiently implemented in specialty care domains.

While diet can be potentially helpful in managing periods of IBD flare-ups and remission, most gastroenterologists are unprepared to provide evidence-based recommendations to patients (Weber et al., 2019). This stems from the fact that most U.S. gastroenterology practitioners are not trained to use natural diet modalities and rely primarily on procedural and pharmacologic approaches to treatment (Zezos et al., 2017). Overall there is scant data regarding diet and IBD, particularly in adults so the natural reluctance for physicians is not to provide dietary advice. There are not as many well done trials to demonstrate its importance particularly when compared to the many pharmaceutical companies that have completed well conducted randomized controlled trials. In contrast, the Dietary Approaches to Stop Hypertension, the DASH diet, has been well studied in the cardiac population and successfully applied for years. (Maddock et al., 2018). Moreover, recent scientific discussions of complementary and alternative medicine (CAM) support diet as a potential treatment and disease management of IBD (Winter et al., 2017.) Since many IBD patients experience nutritional deficiencies, integrating nutritional counseling at my place of practice into each patient visit would prioritize preventive care and likely provide a unified and stratifying patient experience.

The value of a multidisciplinary approach has been well-documented across disease management, especially in oncology care for cancer patients (Taberna et al., 2020). The same can be said about the above mentioned "cardiac diet" in cardiology and recently the multidisciplinary

approach in treating IBD patients at UPMC (Regueiro et al., 2016). In 2016, Regueiro and others at UPMC adapted the medical home model to centralize patient care in order to enhance the quality of the medical experience and to reduce the cost of care . Integrating dietary referrals among behavioral therapies into the routine care of IBD patients would likely benefit patients and potentially result in fewer hospitalizations, emergency department (ED) visits, unplanned services, surgeries, and pharmacotherapies (Regueiro et al., 2016).

1.2 Organizational System

The Digestive Disorders Center (DDC) is under the Division of Gastroenterology, Hepatology, and Nutrition at University of Pittsburgh Medical Center (UPMC). The IBD Center's goals are to provide excellent, high-quality patient care integrating compassion for the challenges patients face each day and translating latest scientific and laboratory discoveries into patient care. The mission of the UPMC Inflammatory Bowel Disease Center is to conduct IBD research and to test novel therapies in order to individualize patient care as the disease can affect any part of the digestive tract.

Our IBD clinics operate with the help of eleven health care providers on staff and seventeen fellows. Seven of the health care providers are full-time faculty with a three-year specialized fellowship training in Gastroenterology, and three-year residency in Internal Medicine. Fellows are physicians who are pursuing a specialized training in GI. The remaining three are mid-level providers who hold either a Physician Assistant (PA) license or Certified Nurse Practitioner Degree (CNP) and specialize in digestive disorders.

My role in the department is clinical research coordinator where I independently oversee and manage pharmacological research studies under a faculty physician. I collaborate with the clinical and scientific staff on research projects and am responsible for the effective execution of several research protocols aimed at finding new therapeutic ways to treat IBD. I also work directly with both Crohn's and ulcerative colitis patients and I witness daily the struggle that most patients experience with this disease. I work directly under the physician who is the Director of Nutrition Support services and Translational IBD Research at UPMC and his clinical team involved in patient care. My educational and professional training in the field and literature review on the topic, as well as my professional background in health care working with IBD patients, introduces some bias toward understanding my PoP. In my professional role, I have witnessed patients exhaust both pharmacological and surgical treatment options without being offered other disease management options such as nutritional counselling. I believe that I am able to effect change in my current position, as I am fortunate to have the support and guidance of one of the top practitioners in the field of IBD care here at UPMC. While I expect logistic and institutional resistance to some aspects of the proposed change, my PoP is strongly grounded in previously piloted by Dr. Regueiro's efforts to employ a multidisciplinary paradigm of IBD patient care here at UPMC.

1.2.1 Current Nutritional Support at the Digestive Disorders Center

Nutritional support care is not integrated into the DDC in such a way that our nutritionists are routinely involved in the patient care as standard practice. While GI specialists can refer patients to dietary services, there is little outpatient nutritional management with IBD patients, and DDC physicians rarely make referrals to outpatient nutrition. Once a patient is diagnosed with

either Crohn's or ulcerative colitis, our gastroenterologists will formulate and prescribe medical intervention and/or refer the patient to a surgeon if he/she believes surgical treatment is necessary. The surgeon will later refer the patient back to the gastroenterologist for further management and the care is sometimes coordinated with the patients' primary care physician. For patients clearly struggling with malnutrition or weight issues, some GI practitioners will refer the patient to dietary services if the patient's insurance allows it and if the patient is interested in working with outpatient nutrition.

Dietician use for IBD is currently limited to the medical home insurance holders (Affordable Care Act), which has a dedicated dietician; the census in the medical home at UPMC is approximately 800 individuals. While medical home patients at UPMC have 24/7 access to gastroenterology services including behavioral health and dietary specialists (see Figure 1. Regueiro et al., 2015). For all other patients the DDC gastroenterologist is the patient's only point of contact.

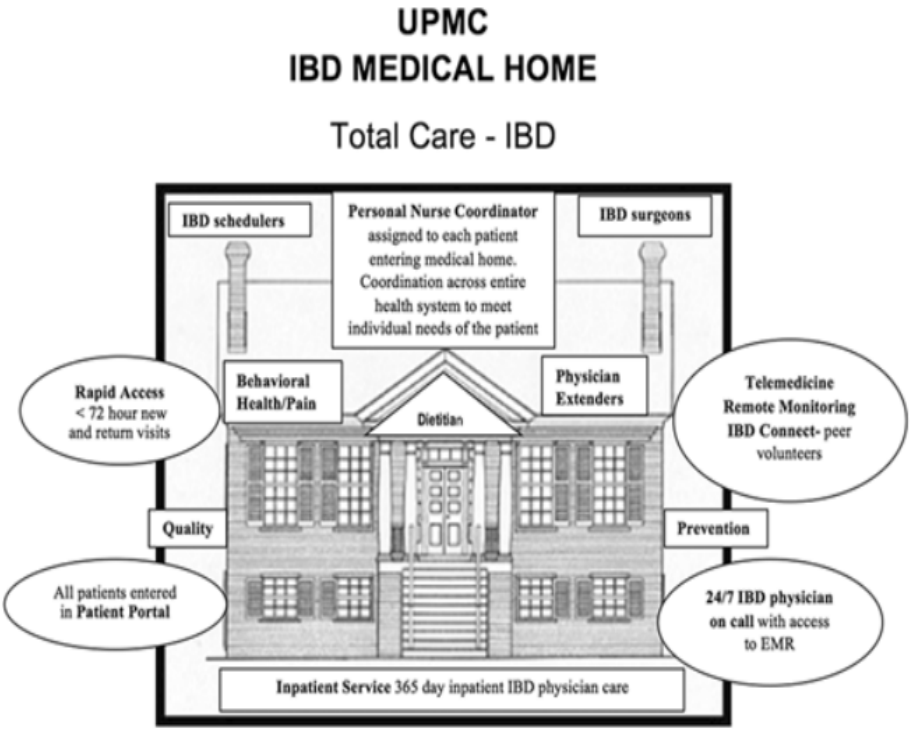


Figure 1. UPMC Medical Home Coordination of Multidisciplinary IBD Care

Currently, there is no multidisciplinary or multimodality paradigm of care in the DDC outside of medical home patients, and no outpatient dietary service clinics are integrated into the overall management of Crohn's and/or ulcerative colitis putting those patients at significant disadvantage and driving the cost of care both to the patient and the system. According to data from UPMC health plan, IBD patients who had concomitant health problems (14% of the total patient pool) including mental illness, poor support system and pain utilized 46% of total care derived from injectable drugs, surgery and cost of medication (Figure 2. Regueiro et al., 2015).

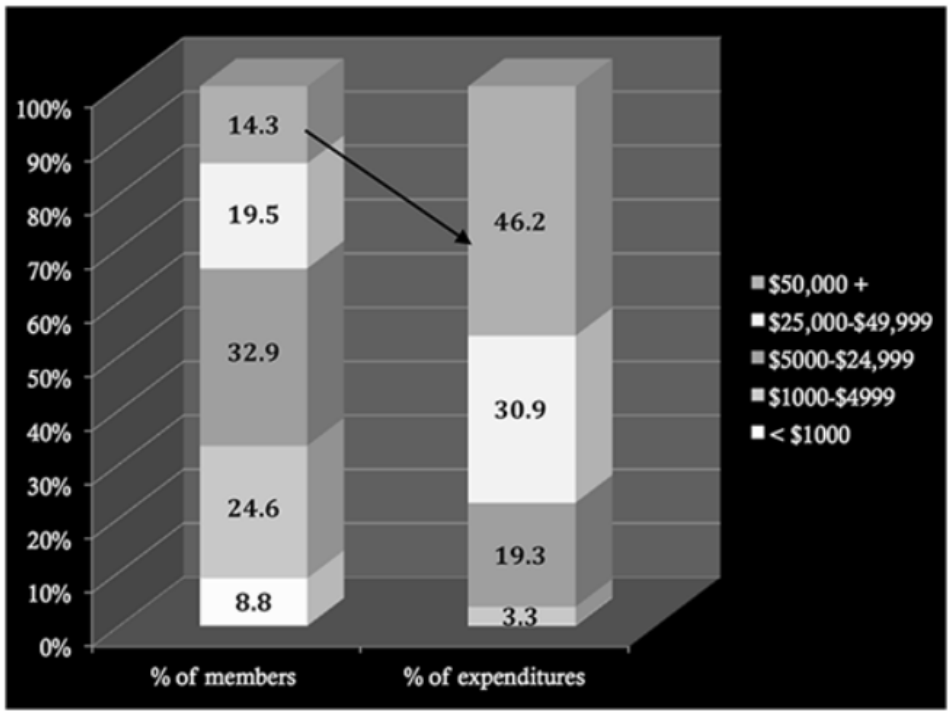


Figure 2. Results from Regueiro et al. (2015) Demonstrating That 14% of UPMCPpatients with IBD Contributed to 46% of All Total Cost

This data clearly demonstrates the need and an opportunity for the individual GI providers to follow a certain clinical pathway in which they integrate both nutritional and behavioral referral system to support and care for their patients. Although our division leadership is in favor of improving care and implementing dietary services into the standard of care, the rest of the practitioners may not be. This is strongly related to the current attitudes and knowledge base most physicians hold regarding the role diet might play in the disease management of Crohn's and ulcerative colitis.

1.3 Stakeholder Analysis

I based my stakeholder analysis on a network view that supporters, resisters, and influencers enhance the benefits and value creation toward mutuality (Sachs and Ruhli, 2011). When the group's acceptance is required prior to implementation, almost all stakeholders must feel that the benefits outweigh the cost. This has helped me in identifying potential beneficiaries for addressing my (PoP). Key stakeholders involved in this PoP are (a) UPMC Healthcare System (b) the Gastroenterology Hepatology and Nutrition Program Division Chief; (c) Gastroenterology Practicing Physicians (d) Second and Third Year Gastroenterology Fellows (d) Dieticians (e) Current and Future Patients.

1.3.1 UPMC Healthcare System

My next stakeholder is UPMC. UPMC prides itself as a "life changing medicine" healthcare paradigm of care. I would like to think that UPMC would be supportive of the proposed multidisciplinary approach in treating IBD patients, as this would directly touch upon the organization's core values of shaping tomorrow's future and clinical innovation. Figure 1. (Regueiro et al., 2015). However, the division would need support from the higher level of management in order for the new practices to take place at the DDC. The division and department administrators are just as important as the chief in determining whether nutrition will be a focus as they determine if money will be supplied. Challenges such as conflicts of interest may arise if the department's patient treatment philosophies among physicians or if departmental business practices do not align with each other, or if there is a threat of loss of business. One would think departments would be eager to remind physicians to refer more patients to nutritional counseling

as this brings business to the hospital and likely results in improved patient care, but this is not the case here. Physicians and staff have less control than what is intimated and work under administrators who mandate what can and cannot be done.

Last, but not least, physician's pay at UPMC is mostly based upon a salary and not on how productive they are and regardless of referrals made to other services. That said there are production bonuses and if some individuals do not meet productivity goals, they may be eventually penalized or dismissed. Currently, ancillary services are billed directly to the hospital and physicians are not incentivized. One should keep in mind that UPMC is in intense competition nationally for patients and research market, and it aims to be viewed as a destination treatment institution for national and international patients. Regardless of what is at stake, this stakeholder has significant power in my PoP.

1.3.2 Gastroenterology Hepatology and Nutrition Program Division Chief

The Division chief is tasked with management and supervision of all the activities and operations of managing the DDC. Currently, the Division employs a total of eleven full-time teaching faculty and seventeen fellows in training. The chief assumes management responsibilities for assigned programs, policy, and trainings and monitors the overall efficiency and effectiveness of services rendered. He also monitors and approves expenditures and implements adjustments. In his view, the problem with nutritional interventions is that "*the science is weak on demonstrating a [diet] difference in outcome.*" When prompted to consider new treatment paradigms integrating multidisciplinary teams he confirmed this "*would not find strong objections*" at the DDC. However, in order for the change to take place all physicians have to agree that nutritional factors improve long-term patient outcomes.

1.3.3 Gastroenterology Practicing Physicians at the Digestive Disorders Center

Since treating physicians are committed to serving their patients and are charged with prescribing the best available treatment, they are the most evident stakeholders in this PoP. Currently, the problem of practice that I have identified at the DDC is that gastroenterology practitioners do not utilize dietary referrals routinely. While some physicians that I have interviewed make referrals to nutrition for reasons such as malnutrition or weight management, others remark that nutritionists who are part of the group "*can sometimes jump in and answer questions.*"

On the other hand, my interviews with faculty physicians suggested that diet knowledge and attitudes of GI practitioners varied. One GI physician shared that some of "*the providers do not put enough emphasis on diet*" in managing IBD symptoms. Doctors often feel pressed for time during their visit with the patient, which often leads to loss of opportunity to discuss options and result in unaddressed health questions. One of the mid-level provider interviewees shared that the physicians subjectively decide on a case-to-case basis on how much time they should spend on educating the patient. This might be determined by the level of the patient education or background, patient involvement in their own care and/or family support and resources. It often begins with education by the physician and then moves downward to the ancillary staff during the patient's initial visit. This education process does not always allow addressing questions related to diet and lifestyle adjustments and are highly individualized based on the providers' own personal bias.

Lack of clinical trials demonstrating diet efficacy to discuss the nuances of dietary therapy was also voiced. Still, most of my responders agree that that there is a knowledge gap in physician understanding of IBD diets as therapy. My empathy interviews with seasoned GI physicians

suggest these practitioners have varied degrees of understanding regarding nutritional interventions and their scientific value. This is also supported by my literature review, which highlights the same problem among gastroenterologists. In a study by Holt et al. (2017), researchers explored whether patients and various providers considered diet important in the management of IBD. The study demonstrated that 82% of gastroenterology specialists considered diet to have a role in symptomatology and nutritional deficiency as it relates to malabsorption and dietary restriction. On the other hand, only 26% percent of patients reported receiving dietary advice from their treating physician.

As mentioned by another physician I interviewed, "*The GI doctors are likely either not involve or only tangentially involved [diet], and my opinion is that any particular physician's opinion on diet does not necessarily permeate to the patient."* Furthermore, some mid-level providers felt that "*patients need to be educated on day one and understand the role that diet plays in their disease management*." How effective physicians are at improving patient outcomes contributes to a stronger relationship and trust/confidence in the patient toward the physician.

1.3.4 Gastroenterology Fellows

The next group of stakeholders are early career gastroenterology practitioners who are about to depart from the DDC upon their graduation from the UPMC fellowship program. Many of them will start careers as independent GI physicians and either plan to join private multispecialty groups or hospital-based practice. While this group has the lowest stakes, the fact that they will have spent much of their time training as fellows is worth investigating. I believe their diet knowledge and attitudes in treating IBD patients are worth examining as I expect their attitudes

and beliefs surrounding diet to be formed early. This is mostly due to their prior experience with the fellowship training program received at UPMC. This new group of gastroenterologists will dedicate their life-long approach in treating patients based on the opportunities and challenges that practitioners are experiencing. Because of this, I estimate that this group of stakeholders have a potential role in creating a culture where new ideas and approach to treatments can be tested and evaluated.

Currently, fellows do not have a dedicated nutrition service rotation, which limits their knowledge of nutrition and nutrition interventions. In other words, fellows have limited time to complete an elective training in nutrition services as the program curriculum is currently packed with inpatient rotation requirements.

1.3.5 Dieticians

Another important group of stakeholders are the DDC nutritionists. As per my empathy interviewing they had reported a great challenge in getting patients to be seen or to be referred to medical nutrition for many reasons such lack of knowledge from a physician standpoint on the importance of nutrition, but also lack of insurance coverage for these types of referrals. Based on their knowledge, medical nutrition appointments with dietitians are only covered by insurance if it is coded for Diabetes Mellitus or Chronic Kidney Disease. Patients tend to not want to attend these appointments since they would have to be charged co-pays, but nutritionists were not certain on the out of pocket cost of an appointment with a dietitian. In addition, they reported that as a society we do not have the best nutritional values which makes many patients devalue this type of appointment.

1.3.6 Digestive Disorders Center Patients

In my opinion, the most important and most affected group of stakeholders are current and future patients. Patient voice is rarely sought in the physician treatment making models (Kane et al., 2014). The relationship between patient and a physician is at the heart of good medical care and it is especially vital when choosing and implementing medical treatment. Empathy interviews with and observations of patients and providers at the DDC support the current literature that the department rarely refers IBD patients to professionally guided dietary plans.

My empathy interviews with three male and female patients in their 20-30s confirmed that those who had been diagnosed with IBD lacked the proper understanding and guidance for years on how to adjust to their life post-diagnosis. The symptoms of IBD can be draining and lead not only to unplanned life changing surgeries like colectomies, but also affect patients' mental health, inducing anxiety and lifetime of depression. Additionally, a study by Anderson et al. (2018) reported that IBD patients who experience poor quality of life are at risk for opioid use, which can lead to addictions. Because of this, many patients agreed that it would have been very helpful to have met with both a dietitian and a behavioral health specialist and then continued to meet with them post-diagnosis to adjust their lifestyle. Many struggled with how Crohn's (and other digestive diseases) can uniquely affect them in their daily living.

Additionally, lack of physician time in the patient encounter provides only a few minutes of time dedicated to patient education. This approach is rarely sufficient as the likelihood that the patient understands the disease in the short amount of time given during an office visit undermines the patient's confidence in the nutritional care. Studies show that in order to manage that thin line between how much information is necessary and when it is not enough, patients must be adequately

informed about their disease. (McDermott et al., 2018). With the currently practiced model of care at the DDC, the average amount of time that a physician spends with patients varies.

1.3.7 UPMC Demographic and Clinical Predictors of Inflammatory Bowel Disease

The IBD clinic serves approximately 300-400 IBD patients per year with the bulk of the patients diagnosed with Crohn's and Colitis (75%) and there are approximately a total of 3,500 patients followed clinically at UPMC. Crohn's disease appears to be more prevalent in women; however, ulcerative colitis is more common in men (Betteridge et al., 2013). In general, IBD risk factors include family genetics, ethnicity (more common among Caucasians vs. other racial/ethnic groups) and family history. Spearheaded by David Binion, MD researchers learned that the groups with the highest prevalence of IBD included those who were unemployed, black, or with comorbidity psychiatric and other illnesses (Click et al., 2016). Our IBD clinic serves new and returning patients, and approximately 10% of the total 30 - 40 patients annually who are newly diagnosed within the UPMC system are seen in the DDC.

1.4 Other Lessons Learned From Improvement Tools

In my investigation of this problem of practice, I observed that many of the DDC faculty are not committed to the integrative approach of combining conventional and complimentary strategies to manage IBD patients. I detected that , in lieu of helping patients navigate the difficult terrain of IBD diets, many physicians often fail to address the possible root causes for the disease (i.e., environmental factors such as gut flora or diet) with varying philosophies. On the other hand,

insurance compensation might be a key limitation in involving some nutrition support in patient care. I speculate that if the cost of nutritional counseling were reimbursed, some GI providers would be more likely to refer their patients, particularly as this intervention poses no risk to the conventional pathway of treating IBD patients. Based on my investigation of the referral process, medical nutrition appointments with dietitians are only covered by insurance if it is coded for Diabetes Mellitus or Chronic Kidney Disease. Patients who do not qualify tend to avoid these appointments since they would have to cover the cost of such visits. Nonetheless, the lack of knowledge from a physician standpoint on the role of diet in IBD often undermines and devalues this type of appointment for patients. Additionally, most patients are simply not aware that nutritional management might be helpful in reducing their IBD symptoms as well as to lead to improved well-being. Currently at the DDC the majority of physicians do not offer a regular opportunity to the patient to consult with a dietitian.

1.5 Statement of the Problem of Practice

My problem of practice is that the gastroenterology practitioners at the DDC underutilize nutritional services when managing signs and symptoms of inflammatory bowel disease.

1.6 Review of Supporting Knowledge

Although scientific research points to the positive effect of diet adjustments as an integral part of disease management, using diets as IBD therapy is rarely utilized within my place of

practice. Grounded in this problem, I sought to review literature potentially related to the deficit in nutritional referrals rate among IBD physicians. In the subsequent section, I will review the supporting knowledge regarding what is currently known about IBD treatments, the use of diet therapy in IBD, GI physicians current referral practices, and their knowledge of diet.

1.6.1 Current Medications Used In Treating Inflammatory Bowel Disease

Corticosteroids are anti-inflammatory drugs that are used to induce remission via suppressing the immune system in order to treat moderate to severe CD (Crohn's disease) symptoms. (Yang et al., 2002). These medications are intended for short-term use as they can cause serious side effects. They are non-specific in nature as they target the entire immune system rather than specific sections of the affected tract where the inflammation occurred. Corticosteroids are generally very powerful, but cannot be used long term.

Immunomodulators are used to maintain long-term remission by modifying the immune system's reaction to inflammation. This family of medication usually works over extended period of time by calming down the body response, (Lichtenstein et al., 2009). It usually takes three to six months to assess the medication's effectiveness. Immunomodulators are often used in combination with faster acting treatments like corticosteroids. They can be injected or taken in pill form, but can have serious side effects such pancreatitis or liver test abnormalities. Some immunomodulators cannot be used in pregnancy, and others can lead to increased rates of cancer and infection.

Antibiotics are used to treat active CD or complications of IBD such as abscess (pocket of pus), post-surgery pouchitis (swelling of intestinal pouch), or fistulas (abnormal connections of

the intestine), or to fight intestinal bacterial infections such as C. difficile that cause persistent diarrhea, (Nitzan et al., 2014).

Biologic therapies are used both in CD and UC and are a relatively new, but very costly form of therapy used in individuals who failed to achieve remission using conventional therapies. In some cases biologic therapies are used from the onset of the disease. (Yu et al., 2018). These types of drugs are a group of genetically engineered antibodies made from living organisms in a laboratory. Biologic therapies target part of the overactive immune system. They can be very effective for some people, especially those at risk of progression and disease complication. However, most patients fail or do not respond to biologics in the long term. Unlike others, these drugs do not suppress the whole immune system, but rather, work in precision to target certain proteins and enzymes precipitating the inflammation. The side effects of these drugs can range from reactivating infections, such as TB, to developing skin conditions or some cancers. A percentage of individuals will eventually develop resistance to these drugs and experience a decrease in its effectiveness, while some have allergic reactions from the start. Some biologics are administered as infusions a few times a year.

Aminosalicylates (5- ASA) are not approved by the FDA to specifically target IBD; however, they can be effective in reducing local intestinal inflammation in mild UC in some individuals. Used as pills, enemas, or suppositories, they are especially effective in decreasing inflammation of the lining of the intestine. They are considered the safest IBD medication, as they usually do not increase the risk of infections or cancer in patients. (Crohn's & Colitis Foundation, 2020).

1.6.2 Surgical Interventions

Surgery may also be performed, from bowel resections (removal of small or large intestine) and colectomies (colon removal) to fistulas and strictureplasty procedures (tunneling and blockages of digestive tract). Unfortunately, many patients at some point in their life face the risk of life-altering surgery to manage their condition. An estimated 70% of CD and 25% of UC patients will need some type of surgical intervention as a result of the disease progression and complications or poor response to medication. Many patients end up with permanent stoma, which diverts emptying of the bowels to an external pouch. (Crohn's & Colitis Foundation, 2020).

1.6.3 Historical Background on Inflammatory Bowel Disease Diets

The anti-inflammatory diet or the elemental diet have been available for decades (Yamamoto et al., 2005), but are underutilized as dietary management for patients with IBD at the DDC. This dietary management is usually presented in a model that offers three enteral nutrition dietary strategies: polymeric, semi-elemental diet and elemental diet, all of which have been proven to provide the tools necessary to improve patient results (Verma et al., 2000). Enteral nutrition (either oral diet or tube feeding) improved patient outcomes in 80% of patients on elemental diet (ED) and at least 55% on polymeric diet (PD) leading to clinical remission in those patients. (Verma et al., 2000). These therapies need to be uniquely adjusted to reach every patient via integrative approach to treating and healing the gut using a combination of anti-inflammatory diets. I feel especially optimistic about this problem, as the supervising physician I work with is a physician scientist living with Crohn's disease himself and is especially dedicated to improving patient outcomes.

Like most university hospitals, the DDC has a mission which encompasses high-quality care, innovative therapies, and positive patient outcomes. As I consider our organization, I find our physicians and staff are very committed to helping our patients to vanquish inflammation, manage disease symptoms, and restore quality of life. Because of this, I find the center's comprehensive approach to offering opportunities to participate in personalized treatment plans as encouraging in affecting my problem of practice. The emphasis on funded research, dedicated staff, and finding a cure for IBD, permeates all aspects of caring for those diagnosed with the disease, including quality of life issues. These goals are shared with all the stakeholders involved in the patient care.

1.6.4 Inflammatory Bowel Disease and the Western Diet

In a systematic review of nineteen studies evaluating dietary factors, such as the western pattern diet (i.e., high in fat and animal protein, low in fruits and vegetables), Hou et al., (2011) concluded an increased risk of both CD and UC prevalence. Moreover, a study by van den Bogaerde et al., (2001) concluded that Crohn's patients reacted to food, yeast and bacterial antigens at a notably higher level compared to the control group. In a similar study, Shivashankar et al., (2017) found that food additives such as emulsifiers and preservatives caused significant inflammatory reactions in the gut in animal studies. The same study established that IBD is more common in industrialized countries such as North America and Europe and those who recently immigrated to western countries are at higher risk to develop both diseases.

This finding suggests a complex relationship between the role of the environment and genetics in the onset of the disease, hypothesizing the causative role of diet in some individuals

(Shivashankar et al., 2017). While the cause and effect of inflammation and diet continues to be under investigation, a number of research studies have concluded that dietary antigens can be activated by certain foods. (Shivashankar et al., 2017). This mechanism appears to have a direct effect on the mucosal layer of the intestinal tract that ultimately triggers the body's autoimmune system reaction leading to the onset of inflammation.

1.6.5 Environmental Risk Factors and Inflammatory Bowel Disease

A number of environmental theories have been explored over the last several decades defining environmental causation or risk factors, such as the use of antibiotics and childhood hygiene hypothesis among others (Molodecky et al., 2010). The use of antibiotics and especially prolonged use of greater spectrum of microbial coverage of antibiotics has been found to interfere with the normal bacterial flora of the gut found in healthy individuals and leading to an onset of inflammatory bowel disease (Nguyen et al., 2020). To prevent this from happening, certain therapies such as diets or the oral use of probiotics were found to help restore the natural microbiome. Patients were given a particular diet in order to restore gut health and microbe diversity to repopulate the natural bacterium found in natural foods such as fruits and vegetables (Khan et al., 2019). While this approach might not necessarily be the cure all, it has a significant chance to improve the signs and symptoms in those who are affected by IBD.

Similarly, childhood hygiene hypothesis suggest that individuals raised in rural conditions that are less sanitary and away from hygienic urban environment and in close contact with nature (children playing in and even eating dirt) had a lower chance at developing IBD (Klement et al., 2008). This stems from the theory that an exposure to certain germs and childhood infections helps

the intestinal microbiome to develop a strong immune system. Postulated by Furness et al. (1999), roughly 80% of the immune system is found in the gut and diets that are composed of highly processed foods contribute to gut dysbiosis. When dysbiosis (bad bacteria) are fed by high fat and sugar diets, and deprived of natural fibers found in fruits and vegetables, it causes an overgrowth of specific bacteria species.

Pathogens such as yeast, mold, fungi and parasites are hypothesized to be heavily related to leaky gut syndrome and the imbalance of mediators, such as prostaglandins, which manifest in autoimmunity and chronic inflammation of the gut in some individuals (Limdi et al., 2016). Because of this, is theorized that many IBD patients can be helped by implementing natural diet modifications and replacing old eating habits with healthy (e.g., low-fat, low-sugar, and sometimes gluten- and dairy-free) foods prepared from fresh ingredients (Lewis et al., 2017).

1.6.6 Complementary and Alternative Medicine in Inflammatory Bowel Disease

The utilization of non-medical therapies such as the use of herbs and minerals to address signs and symptoms of IBD has been growing and slowly changing the health care of individuals with IBD especially in the last few years. They can be generally broken down into three categories of complementary (used together with conventional medicine), alternative (used in place of conventional medicine) and integrative (combining of conventional and complementary) therapies. (Winter et al., 2017). The use of vitamins, probiotics and mineral supplementation along with medical cannabis, acupuncture, diet, sleep and stress management puts patient in charge of their own personal care. According to Winter et al., (2017) as this trend continues to grow it is

important that some models of CAM be integrated into IBD care as they bring the possibility of substantially improving patient outcomes and lowering the cost of care.

1.6.7 The Use of Diet in Inflammatory Bowel Disease

While nutrition is a component of disease management, the use of specific diets have not been fully integrated into the IBD paradigm of care. Since there is limited research in the area, physicians find it hard to advocate for certain approaches as there is a limited understanding of how diet can have a modulatory effect on the clinical course of the disease (Weber et al., 2019). However, recent findings on how the microbiome affects health and its overall importance in immunity suggests that the microbiome has a potential role in IBD and it should no longer be underestimated (Khan et al., 2019).

A subgroup of participants in a Dutch study for instance, concluded that diet manipulation in IBD is more successful than the use of medication used to treat the disease (de Vries et al., 2019). Additionally, a study by Kakodkar & Mutlu (2017) suggested food elimination and diet as IBD therapy to be a mechanism to decrease inflammation as some individuals experience immunogenicity or allergies to certain foods such as gluten or diary. While the variability in response varies from person to person and data is often inconclusive, there are many diets in the medical literature to lay precedence for IBD. (Kakodkar & Mutlu. 2017).

In the U.S., the use of IBD specific diets has not been fully integrated into the paradigm of care by the American Gastroenterological Association (AGA). The cost of evidence-based medicine and its rigorous pharmacological trials are substantial and time consuming and this weighs heavy on the potential prospect of medical diet studies (Weaver 2017). Currently the

gastroenterological community finds diets to have a very subtle effect as it takes an extended time to have an impact on the clinical history, but offers a promising treatment modality.

According to the co- director of the UPMC IBD Center, the lack of a formally guided system to assist physicians in tracking food elimination strategies like a laboratory test tends to discourage many practitioners from attempting this approach. Furthermore, the huge emphasis on drug therapies and surgical interventions likely prevent many in the industry from conducting nutritional studies, as they are not particularly well funded, suggesting an ethical barrier. Along the same lines, a research by Limdi (2018) finds that basic and clinical research, guiding conventional gastroenterology practitioners finds limited evidence of dietary support in preventing or triggering IBD. The scientific evidence is often inconclusive or too difficult to decipher citing lack of objective evidence for the use of any specific diet modifications. For the same reason, gastroenterology practitioners historically are not trained in natural diet modalities and rely on registered dietitians to only coordinate aspects of care related to malnutrition and weight management in patients. Aside from bowel rest, a period of time where oral nutrition is stopped and substituted with intravenous or tube feeding (food goes directly to either the vein or stomach/small intestine to bypass the mouth), dietary advice plays only a small part in the established AGA guidelines (Durchschein et al., 2016).

On the other hand, a number of alternative specialties such as natural or integrative medicine practitioners and the American Academy of Nutrition and Dietetics (eatrightPRO) have been filling the gap and helping IBD patients to navigate the difficult terrain of inflammatory bowel disease. Currently, eatrightPRO offers an array of dietary approaches to help manage inflammatory bowel conditions. Diets such as carbohydrate exclusion diets, Mediterranean, low fiber, low FODMAP, gluten or dairy free diets along with anti-inflammatory nutritional plans

might serve as a symptomatic treatment of IBD. (Crohn's & Colitis Foundation. 2020). Because of the individualized nature of IBD (different patients might be affected differently), no single diet works for everyone. As such, it is important to emphasize for each patient to work closely with a registered nutritionist to best address the signs and symptoms of the disease and to promote gut healing during periods of flare ups. Additionally, a study by Zimmer and colleagues concluded that maintaining either vegan or vegetarian diet significantly improved gut microbiota by reducing the number of terobacteriaceae that are usually found in IBD patients (Zimmer et al., 2020).

1.6.8 Referring Patterns in Gastroenterology

The utilization of outpatient dietary support by gastroenterologists is currently limited to cases of nutritional deficits or weight management. In a study conducted by Tinsley et al. (2016),

only 64.9% of all providers routinely (every, or almost every visit) assessed their patients for nutritional deficiencies. The remaining 31.2 % evaluated patients "occasionally" when malnutrition was suspected and 2% of providers admitted to never assessing patients for malnutrition. Since malnutrition is highly prevalent in IBD, early identification of patients could potentially prevent disease complications in the most vulnerable individuals. Consecutively, 84.2% of GI providers reported their diet knowledge was "very good" or "good" and only 15.8% of providers assessed their IBD nutrition knowledge as either "fair" or "poor." On the other hand, a patient survey found that only 7% of patients talked to their physicians about nutrition while 11.6 % of patients reported that dietitians discussed the topic with them. The remaining 15.4% of IBD patients stated that they never discussed nutrition with any provider. On the other hand, when asked about their knowledge of nutrition in IBD, 87% of dietitians rated their knowledge as "very good". The study concluded that significant nutrition knowledge gaps are evident with most

physicians and nurses stating that they were not aware of a published guidance pertaining to manifestation of malnutrition among IBD patients. This is even more concerning than lack of dietary management alone, because patients with malnutrition are at higher risk for disease complications such as sarcopenia (skeletal mass loss), decreased bone strength, and ultimately physical disability (Scaldaferri et al., 2017).

1.6.9 Inflammatory Bowel Disease Dietary Practices and Understanding Among Patients

A dangerous path of self-regulating and food restricting patterns is not uncommon among IBD patients who are trying to manage their own diet (Larussa et al., 2019). Since some patients believe that diet modification has a role in the disease progression, many patients take upon themselves to change their diet in the absence of professionally guided dietary referrals and oversight. In other words, they may limit or restrict certain food or food groups to prevent disease exacerbation. The self-adoption of dietary exclusion can sometimes lead to nutritional deficiencies if not done under the supervision of a health care professional (Larussa et al., 2019). Advice taken from the internet or other questionable sources can sometimes backfire or simply be found ineffective.

A common long-term consequence of nutrients that are withheld are weight management problems and serious nutritional deficiencies. For example, Zallot et al. (2013) identified that close to 40% of their responders who had IBD diagnosis restricted fruits and vegetables to prevent future relapse, creating unintended consequences. Additionally, there may be changes in appetite and enjoyment of eating which can negatively affect the individuals' relationship with food (Limdi et al., 2015). While dietary modifications can be a very effective tool in moderating episodes of

disease flare-ups, food exclusion in IBD patients should not be done without guidance from trained professionals. This underpins the importance of gastroenterology practitioners having detailed discussions with patients regarding their dietary habits and management.

1.6.10 Practitioners' Diet Knowledge

Most physicians reported that nutritional education was not part of their medical training, and because of this, can only provide basic recommendations to patients (Tinsley et al., 2016). In situations like this, patients might interpret the physician's lack of expertise as a form of disapproval for the interaction that diet might play in the disease. As previously stated, the American Gastroenterology Association lacks well-established guidelines related to natural diet modalities. My review of literature suggests that a selected group of IBD patients often ask their physicians for dietary recommendations, but rarely receive satisfactory answers from their physicians (Shivashankar et al., 2017). Because of low knowledge and comfort among GI practitioners related to the current strengths and limitations of IBD dietary interventions, a registered dietitian should be required to counsel with each patient.

A new approach aimed to integrate alternative medicine is also on the rise. However, results are mixed regarding physician acceptance and endorsement of complementary and alternative therapies. A study by Gallinger et al., (2014) found that most physicians agree that complementary and alternative medicine would not compromise the conventional therapies currently available and its utilization should be recommended to patients. On the contrary, a study conducted by Lindberg et al., (2014) offered the opposite perspective; physicians expressed a concern that non-pharmacological approaches to treating IBD (e.g., CAM) would become more popular, ultimately eliminating the need for conventional medicine. This is an interesting

perspective as it speaks to some of the barriers and limitations (subjective bias) that some physicians might have about the therapeutic nature of dietary interventions.

1.6.11 Summary

Upon review of the professional knowledge and literature, I have realized that many stakeholders are able to recognize that IBD is shaped by patients' dietary practices and we can now assert with confidence that there is a knowledge gap in part due to physicians' training. Both patients and practitioners have voiced the need for written guidance of IBD specific dietary information in accordance with validated tools to empower all stakeholders. Patients are in relationship with their doctors and their interest in diet therapies often depends on those very relationships. Therefore, it is essential that doctors initiate such conversations with patients and that nutritionists who have that knowledge engage with patients on regular basis.

Educating GI fellows about dietary recommendations and nutritional therapies sets an important precedent in guiding clinicians on the use of natural food modalities for relief of signs and symptoms of IBD. An increase in the number of dietary referrals at the DDC could provide all stakeholders (physicians, patients, dietary service staff and the UPMC healthcare system) with an important treatment strategy for not only improving patient outcomes, but also reducing the cost of care associated with this illness.

Because nutrition plays an important role in not only promoting health, but also preventing disease, it is imperative that patients at the DDC are offered additional options to manage their Crohn's and ulcerative colitis disease. This is what we know so far and what we hope to achieve, at least that is my interpretation of how my PoP shapes how I am seeing the problem. A stronger

focus on promoting early dietary intervention and looking at patient nutrition would likely result in lower disease complications and a reduction in major complications. Not endorsing any specific dietary protocols for IBD patients, despite the fact that large meta- analysis of randomized clinical trials (RCT) and observational studies demonstrated the effectiveness of dietary intervention in chronic disease management in the general population, make me question why similar measures currently are not present at the DDC.

Several reports and scientific resources have been published to provide evidence-based guidance to support nutritional monitoring in IBD patients. One way to increase dietary referrals among GI practitioners could potentially be to increase physician knowledge of IBD diets and dietary services, which aligns with my theory of change.

2.0 Theory of Improvement and Implementation Plan

In order to affect my problem of practice and to increase outpatient nutritional referral rates, my theory of improvement was designed to improve GI fellows' knowledge base about the role that diet plays in treating IBD. My aim statement was that by the end of August 2023, the GI referrals of IBD patients to nutritional services would improve by 20% or more.

The following three key drivers provided an opportunity for driving the change: GI fellowship training program, DDC faculty and fellows, and patient support/advocacy. Each of these primary drivers have secondary drivers which can contribute to achieving the proposed aim (see **Appendix A**).

2.1 Primary & Secondary Drivers

2.1.1 Gastroenterology Fellowship Training Program

The fellowship program at UPMC is a three-year program accredited by the private advisory board of ACGME (Accreditation Council of Graduate Medical Education) which evaluates residency and fellowship programs internationally. The clinical scholar track includes approximately 36 months of clinical training and within the second half of the program trainees are able to purse research interests. During this time, they are given the opportunity to focus on individualized training based on their specific career goals to tailor their training.

The goal of each program is to provide fellows with foundation in clinical knowledge and practice, as well as to provide experience in integrating elements of basic translational science in gastroenterology and hepatology. These tracks usually have protected research time and provide fellows with flexibility based on specific interests. Currently, the division offers seven tracks involving the pancreas, liver, neuro-gastroenterology and IBD among others. The Intestinal Health and Nutritional Support track is very specific to temporary or permanent feeding disorders involving tube or intravenous feeding regimens also known as TPN. Fellows are trained to help patients avoid serious complications of TPN, but are not trained in natural diet modalities for IBD. Similarly, the lack of formal AGA guidelines for the treatment of IBD patients, as well as lack of diet-focused fellowship curriculum, pose limitations on this driver.

If the proposed education modules were deemed effective and engaging in conveying key diet information, then this would directly influence this primary driver to create a level of change within my secondary drivers. If successful, I hope to observe effects of my intervention by comparing baseline and follow-up GI fellows' knowledge scores, which could directly impact my aim statement of ultimately increasing referral rates.

2.1.2 Digestive Disorders Center Faculty and Fellows

DDC faculty and fellows are my next primary driver. Their limited knowledge of DDC nutritional services as well as lack of endorsement of nutritional services and understanding of nutrition as a potential disease management option contributes to my PoP, and likely change in this driver could affect change in referral rates. Taking root in a large training program, faculty at the DDC are fully committed and engaged in preparing fellows to become the next generation of practitioners under the very carefully crafted built in process of collaborative learning. Preparing

fellows is time consuming and a delicate task, as it entails giving fellows tangible support with hands on training and overseeing their overall experience. Fellows strongly rely on the knowledge and expertise of experienced physicians and the department compensates faulty for their instructional time. Fellows, by the nature of their training, rotate at different hospitals every few weeks (Presbyterian, Montefiore, Shadyside, Veterans Affairs [VA]) to enhance the variety of settings and complexity of patients.

In order for this driver to be effective, faculty and fellows must practically and intellectually engage in improving and expanding patient care options. The support can take many forms, but both drivers must possess a mindset to broaden their knowledge and dedication to improve patient outcomes in meaningful ways. They are the perfect support to my aim, as both groups stretch out the learning process and participate in scholarly and educational activities and adhere to established practices and the mission of innovative patient care. Because the teaching collaboration and dynamics between faculty and fellows is so complex, changes in this area might be challenging, as they involve new initiatives and affect the currently set paradigm of patient care. However, the learning incentive provides an opportunity to both the DDC faculty and fellows to tap into the talents of carefully selected trainees and to motivate them to be change agents integrating best practices of care.

2.1.3 Patient Support/Advocacy

Patient support and advocacy is my third primary driver. Limitations identified under this driver relate to patients limited knowledge about nutritional services, their limited understanding

of nutrition as a potential disease management option, the quality of patient-provider relationship, and patient self-efficacy to make lifestyle changes.

The nature of patient advocacy groups are that they have a mission to assist and take action to support people afflicted by disease. They are patient-oriented, non-profit and provide educational and emotional support to improve the quality of life to both patients and their caregivers (Rose, 2016). Patient advocacy meetings are very informal and members consist of their families and sometimes community opinion leaders. Depending on the positionality, they often collaborate with other local and national chapters in order to bridge their insights and experience into best treatment options. They serve as key opinion leaders and often connect to social media with their messaging and content and link with their local clinics and hospitals (Rose, 2016). Based on my empathy interview with the local chapter stakeholder, the Pittsburgh IBD Patient Support group is run twice a month at the Digestive Disorder Center with an average number of 6-8 patients per session. Some individuals float in and out, while others prefer more one-on-one interaction. The group organizer has had Crohn's for 40 years and has been supporting and advocating for her fellow IBD patients for years. She is also very active with the Crohn's & Colitis Foundation and the group runs through the Crohn's & Colitis Foundation in partnership with UPMC. This driver already connects to the mission of educating and organizing resources and has a great chance of affecting change. The effects from this level of modulation will directly impact the patients and likely enhance the change idea given the goal to produce improved patient outcomes.

2.2 Other Potential System Change Ideas

Future change ideas should include revisions to the local GI fellowship curriculum to supplement the existing GI training program outside of the surgical and pharmacological applications, integrate diet on some level at the DDC through model of care at UPMC and finally pursue revisions to AGA recommendations nationally. These were not selected in my PoP because they were not as feasible given my realm of influence. My intervention was to develop and implement a brief online education module on the role of diet in the management of IBD for gastroenterology fellows utilizing the Plan-Do-Study-Act of improvement science cycle. The goal of this PDSA study was to increase knowledge of IBD diets among GI fellows via the online education module. I aimed to investigate the current knowledge base of GI fellows as well as to gather key information to further target what changes I could make that would result in improvement. Standardized competencies can address the lack of knowledge and be later tailored to provide useful and appropriate knowledge to future cohorts of GI fellows.

2.3 Intervention Description

The education module outline is found in **Appendix E.** To determine which areas of natural diet modalities would be the most relevant to the current GI fellows, I sought out guidance from the UPMC-dedicated IBD nutritionist and investigated the most recent clinical trials with groundbreaking evidence of dietary approaches in managing IBD patients. I have designed and launched a four-phase education module for our gastroenterology fellows with a focus on the types of recommended IBD diets and current ongoing research. This online education module was

designed to introduce fellows to ideas of natural diet modalities in the management of IBD and their potential value in improving patient outcomes. The learning objectives of the education module were for the fellows to (1) identify dietary options for IBD patients, (2) identify the benefits of nutritional counseling, and (3) locate and understand outpatient dietary services at UPMC.

The education module covered the importance of nutrition in IBD as well as discussed the currently available dietary recommendations for IBD patients. Additionally, the module presented research on the multidisciplinary model of care and discussed the major problem of malnutrition in IBD patients. After the education module, fellows were asked to identify dietary options for IBD patients and respond to why some patients might significantly benefit from nutritional counseling.

2.4 Improvement Target & Inquiry Questions

The intervention was to design and implement an online education module for the 1st, 2nd 3rd and 4th year gastroenterology fellows on the role of diet in the management of IBD. The theory of change for this project was that engagement with this educational module would increase fellows' knowledge of IBD diets and lead to increased IBD patient referral rates to nutrition services. This investigation was driven by several inquiry questions:

1. *What are GI fellows' current referral rate of IBD patients to nutritional services and how does this change following participation in the education module?*
2. *What is fellows' current knowledge base regarding IBD diets and DDC nutritional services and how does it change following participation in the education module?*

3. *How often do GI fellows talk to patients about diet and does this number increase following participation in the education module?*

My theory of improvement is predicated on the theory of reasoned action, which is part of the physician decision-making model (Reyna, 2008). This theory proposes that physicians make subjective health care decisions that stem from their own personal bias and pertain whether certain measures are beneficial to prescribe. For instance, if they have a disapproving attitude toward the role of nutrition, they will be unlikely to make referrals to dietary management, despite the known advantages available to patients.

In general, medical fellowships aim to accomplish a variety of goals established by the governing bodies and depend on a complex net of relationships between faculty, staff and the academic enterprise. They benefit both the individual trainee as well as the institutional culture via distinct standards and processes enhancing the reputation and the scholarly environment via individualized, clinical and research driven development (Karpinski et al., 2017). Prior limited attempts to assess gastroenterology fellows' knowledge have primarily focused on determining nutritional knowledge as it pertains to TPN (intravenous) or enteral (tube feeding) nutrition support (Scolapio et al., 2008); however, it has not been explored in natural diet modalities. It is worth noting that the degree of nutritional curriculum in most GI fellowship programs is also thought to be grossly undersupplied. (Scolapio et al., 2008). My theory of improvement was proposed to address the cause and effect summarized in my Fishbone diagram (**Appendix B**). My theory of improvement included knowledge training of GI fellows and aimed to change the division's culture as it relates to patient referral to dietary services. Our current culture is that GI fellows are not prompted to consider alternative means to the disease management, diminishing the opportunities to recognize and promote change.

2.5 PDSA cycle

2.5.1 Overview

The PDSA cycle is a four-step scientific process (Plan-Do-Study-Act), which is used as an analytical tool in the field of improvement science to guide the process of carrying out change (Perry et al., 2020). To address the above inquiry questions, in Phase I of my study (Baseline Assessment) I deployed a baseline (pre-intervention) survey with GI fellows within the University of Pittsburgh Department of Medicine. The setting of this study was the DDC housed in the Presbyterian Hospital. I employed an online survey with both qualitative (open-ended) and quantitative (closed-ended) items to evaluate fellows' current knowledge and understanding of natural diet modalities. In Phase II, fellows' participated in the education module. In Phase III and IV of the study, I aimed to determine if the change idea had improved the problem of low dietary service referral rates. **Figure 1** highlights the study phases for the current inquiry project.

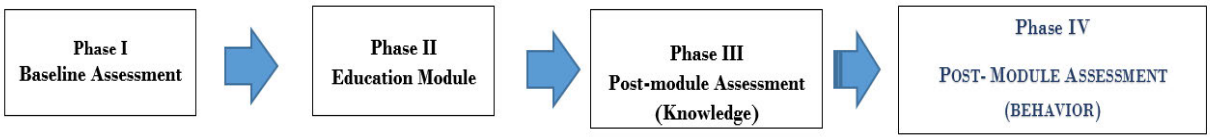


Figure 3. Inquiry Project Phases Plan

Physicians' knowledge (i.e., what they know about treatment options) is shaped during their residency and later reinforced during fellowship training. I hypothesized that if fellows are educated on the role and importance of natural diet modalities in IBD, then they will refer more

patients to outpatient dietary services. I proposed to assess the second and third year cohort because, unlike the first year cohort who just began their training, they are the most advanced in the program. However, due to the initially low enrollment (12 participants), I decided to expand the survey to the 1st and 4th year fellows as well (total of 16). I predicted that GI fellows would approach the education module with some curiosity about the possibilities that this paradigm of care might offer in terms of viable treatment options for patients. On the other hand, I recognized that this change idea proposed above may also face challenges in getting buy-in from some fellows, as the recommendations lack formal AGA endorsement. In planning this PDSA cycle, I attempted to answer several inquiry questions as listed under my *Improvement Target & Inquiry Questions* section. Additionally, I expected that fellows would leave the education module with new knowledge regarding natural diet modalities in IBD, which would contribute to more conversations with their patients about diet, as well as increased referrals to dietary services.

2.5.2 Do

Baseline Assessment Survey (Phase I)*:* I evaluated GI fellows' knowledge and behaviors through a survey I developed and adapted for this improvement project **(Appendix D).** Specifically, the survey was based in the literature and adapted from previous studies of Duncan, Natarajan & Schwalm (2016) and Dahhan et al. (2015). This adapted survey included four items to assess fellows' baseline knowledge of IBD diets, two items to measure awareness of nutritional services at the DDC, two items asking how often they speak with their patients about diet, and one item to gauge their current referral practices. It also asked additional background information such training year, fellowship specialty, any previous training in natural diet modalities, criteria for nutritional referral, and whether and how often they consult outpatient dietary services. The survey

items included multiple choice, Likert-type scales, and open-ended questions. Surveys were self-administered by GI fellows using Qualtrics, a web-based software designed to develop and administer data collection and to export survey data into programs used for data management.

Online Education Module (Phase II). This phase of the study introduced the fellows to the current literature and diet options in IBD. See **Intervention Description** and **Appendix E** for more information.

Post-Module Knowledge Assessment Survey (Phase III)*:* This phase of the study assessed fellows' knowledge of IBD diets and nutritional services at the DDC immediately following participation in the education module. The survey items were identical to those in the Baseline survey (**Appendix F**).

Post-Module Behavior Assessment Survey (Phase IV): This survey assessed fellows' behavior changes 30 days after participating in the education module. The survey items were identical to those in the Baseline survey (**Appendix G**).

Data Collection Overview: First, I sought approval and support from the Division Chief to engage the DDC fellows to take part in my inquiry project. Subsequently, I proceeded with gathering email addresses of all GI fellows, which were available on the University of Pittsburgh's DOM Gastroenterology, Hepatology and Nutrition Fellowship website. With the support of the Director of GI Fellowship Program at UPMC, I sent an email introducing fellows to the training and inviting them to participate. See **Appendix C** (Recruitment Letter) for details. I purposely collaborated with the Director to distribute the study information to get the attention of all fellows in the program. Participation in this study was voluntary; however, with the endorsement from the Director, I expected the majority of fellows to take part in the study.

Fellows were expected to complete the baseline assessment prior to the education module. After completion of the baseline assessment survey, they were able to select a link to take them directly to the education module designed as part of this intervention (Phase II). The respondents were not be able to return to the baseline assessment once they left the webpage to assure the integrity of the data. The total time for both survey and the training module was approximately 40 minutes.

Phase III post-module knowledge assessment was available immediately following the education module. Participants were able to select a link in Qualtrics to take them directly to this follow-up survey (**Appendix F**). Phase IV (post-module behavior assessment **Appendix G**) was completed via a Qualtrics link sent 30 days later via email to those fellows who participated in the education module (**Appendix E**). They had one (1) week to complete the survey; however, I ran into issues with low participation and I needed to send a few additional reminder emails outside of the planned 5 days after the study was initially deployed, as fellows were extremely busy with their rotations. Ultimately, all 2nd, 3rd and 4th year fellows and a smaller group of 1st year fellows participated in the study.

2.5.3 Study

I used descriptive statistics to summarize the survey results and categorical coding to analyze open-ended survey items. My plan was to use statistical tests to compare referral rates and knowledge pre/post module with statistical significance level set at $p<0.05$. I wanted to compare pre/post results to demonstrate whether the education module had any impact on fellows' knowledge and behaviors (i.e., making outpatient referrals, talking with their patients about diet).

2.5.4 Act

My goal for this PDSA cycle was to investigate whether a brief education module was able to increase GI fellows' patient referral rates and frequency of conversations with patients about IBD diets (i.e., behavior change in the fellows). Increasing outpatient nutrition referrals is key to improving patient outcomes, and ultimately the quality of life of our patients. If the intervention was successful, I could recommend that stakeholders include this training module as mandatory for all fellows moving forward. If the intervention did not produce any change in the primary outcomes, I could seek feedback from stakeholders and revisit the driver diagram to test a subsequent PDSA cycle with revised inquiry questions.

2.6 Systems Measures

My selected measures helped me determine if the intervention I was employing was making a difference. All assessment questions have been deduced from validated literature and assessed for validity and relevance by the faculty at the University of Pittsburgh School of Education. Process measures included in the current inquiry include the education module and fellows experience. The driver measures include key drives, and outcome measures included in the current study addressed presumed deficiencies of the system. Last but not least, balance measures monitored for hidden effects as they relate to outcomes.

2.6.1 Process Measures

To evaluate if the process of incorporating the online module was effective, I have implemented baseline and post intervention assessments. Another process measure were fellows participating in the module and their gauging of the process. Elements such as the perception of the value of the content as well the mode of online delivery were assessed and concluded to support the study process.

2.6.2 Driver Measures

The driver diagram in Appendix A was developed for the purpose of articulating and testing my theory of improvement as well as recognizing the connections to primary and secondary drivers. All three key drivers -GI Fellowship Training Program, DDC Faculty and Fellows, Patient Support/Advocacy- provided an opportunity to affect change and each of these drivers contributed to achieving the proposed aim. I was able to observe effects of my intervention by comparing baseline and follow-up GI fellows' knowledge scores, which directly impacted my aim statement of affecting referral rates.

2.6.3 Outcome Measures

Currently our GI clinic operates without the routine use of dietary services to care for Crohns & UC patients. Increasing GI fellows' knowledge base and discussion with patients was directly related to my aim statement of increasing patient referral. The implementation of my

education module will address this deficiency and ultimately improve the frequency with which GI fellows refer patients to outpatient dietary services for the support of the disease management.

2.6.4 Balance Measures

Steps were taken to avoid any stressors or to risk confounds among fellowship trainees during the data collection period. While I have initially run into issues with low subject enrollment likely caused by overwhelming duties and rigorous GI training program, the potential for negative impact was minimized at conception. The goal was to make the education module brief and to the point as well as engaging. The analysis of the open-ended questions at post intervention supported the measures for this cycle.

2.7 Analysis of Data

I downloaded the survey results from Phase I, III, and IV from Qualtrics into Microsoft Excel, and calculated descriptive statistics (means (SD) and percentages). Open-ended questions were treated as nominal data and qualitatively coded and categorized. To compare pre- and post-intervention survey results to examine whether the education module had any impact on fellows' knowledge or behaviors, additional statistical analyses were conducted using R 4.0.3 (2020) statistical software. I consulted with the Statistics Department to support me in conducting these analyses. Specifically, Wilcoxon signed-rank test was used to calculate the p-values for paired ordinal variables, and McNemar-Bowker test was used to compare nominal data. For the "select all that apply" questions, McNemar-Bowker tests were used to examine the difference in whether

the participants selected answers such as “unsure,” or “none of the above” at baseline vs. follow-up. For questions without such options, McNemar-Bowker tests were also used to examine pre- and post-intervention differences in the selection of each possible option, and Bonferroni corrections were used to adjust for inflated number of false positives. Statistical significance level was set at $p < 0.05$.

3.0 PDSA Results

3.1 Phase I: Baseline Assessment

My study enrolled a total of seventeen (17) medical fellows who were part of the UPMC Gastroenterology Fellowship Program. One participant only partially completed the study and their data was excluded from any analyses, representing an overall participation rate of 95%. Among the 16 participants, four of the participants were 1st year fellows, six were 2nd year fellows, four were 3rd year fellows, and two were 4th year fellows. Specific sociodemographic data was not collected on the participants; however, 31% specialized in pancreatobiliary, 25% specialized in general GI, 26% specialized in the liver, 19% specialized in IBD, and 6% reported "Other" interests (**Figure 4**). At baseline, all fellows (100%) reported they had never taken a nutrition course in medical school (results not shown).

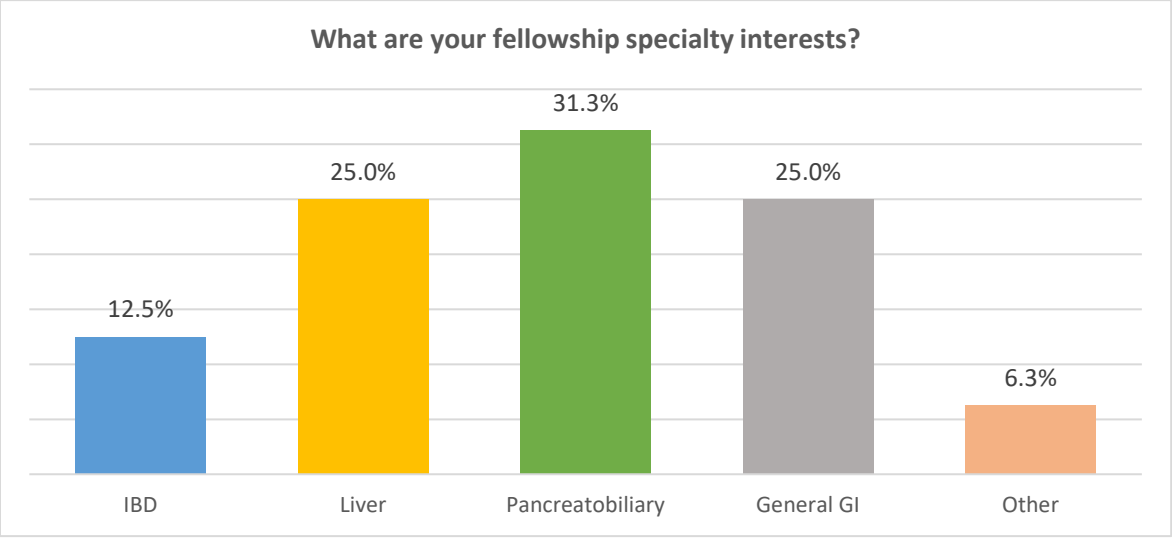


Figure 4. Fellows' Specialty Interests by Category

3.2 Phase III: Post-Module Assessment

After participating in the module, the majority of fellows (87.5%) reported the education module was ‘very effective,’ while 12.5% reported it was ‘somewhat effective,’ and none reported it was ‘not effective’ (results not shown). Additionally, after completing the module, 87.5% of fellows reported ‘yes’ that they plan to refer more patients to outpatient nutritional services, while 12.5% reported they would ‘maybe’ plan to refer more patients, and no one said ‘no’ that they wouldn’t plan to refer patients.

Table 1 includes the results of the open-ended questions from the post-module knowledge assessment survey. The overwhelming majority of the fellows indicated that the information was very helpful in understanding the importance of integrating diet in IBD, and the variety of available diet options. Nearly 44% of fellows reported that they would use this information to have more conversations with patients and/or provide dietary recommendations to patients, while 31.2% said they would use the information for patient referral. About 25% of comments included positive feedback about the module, 18.7% requested additional data comparing the different diets and a printable version of the module to be used as a future resource, while 50% left no responses. One participant also suggested incorporating this training into the fellows’ standard curriculum.

Table 1. Phase III Post-Module Open-Ended Responses

Question	% (n)
What was the most important information you learned?	
Importance of diet in IBD	37.5% (6)
Variety/available options of diet	37.5% (6)
Other	25.0% (4)
How do you plan to use the information on natural diet modalities in IBD?	
Patient referral	31.2% (5)
Provide recommendations/have more conversations	43.7% (7)
Other	25.0% (4)
Any other comments or feedback on the education module?	
Positive feedback/comments	25.0% (4)
Requested additional data/resources	18.7% (3)
"This should be consistently incorporated in the fellows' curriculum"	6.2% (1)
None/no response	50.0% (8)

3.3 Comparing Fellows' Knowledge from Baseline to Follow-up

At baseline (Phase I), the majority of fellows reported they were 'not familiar' (68.8%) or only 'somewhat familiar' (31.3%) with the outpatient services offered at the DDC (**Table 2**). After participating in the education module, the percentage of fellows 'not familiar' with outpatient dietary services decreased to only 12.5%, while 87.5% reported to be 'somewhat familiar' and none of the fellows selected 'very familiar.' The McNemar test results indicated that participants' familiarity with outpatient dietary services has significantly changed after the intervention ($p<0.001$).

Table 2. Fellows' Familiarity with Outpatient Dietary Services at Phase I (baseline) and Phase III (immediate follow-up)

Phase I Survey: How familiar are you with outpatient dietary services at the DDC?	
Not familiar	68.75% (11)
Somewhat familiar	31.25% (5)
Very familiar	0% (0)
Phase III Survey: How familiar are you with outpatient dietary services at the DDC?	
Not familiar	12.5% (2)
Somewhat familiar	87.5% (14)
Very familiar	0% (0)

NOTE: McNemar test was used to test difference in participants' familiarity ('somewhat' or 'very familiar' vs. 'not familiar') with outpatient dietary services at the DDC before and after the intervention; p = 1.00 (non-significant).

Table 3 includes the results of fellows' knowledge of IBD natural diet modalities at baseline (Phase I) and follow-up (Phase III). At baseline, 45.5% of fellows reported that IBD natural diet modalities were 'optional treatment options available to patients,' while 36.4% said natural diet modalities were 'not well studied/unsure,' and only 18.2% reported they were 'standard of care.' Change in participants' knowledge of the utilization of natural diet modalities in IBD was not statistically significant; however, descriptively more fellows recognized IBD natural diet modalities were 'standard of care,' while no fellows reported 'not well studied/unsure' at follow-up.

Table 3. Fellows' Knowledge of Utilization of Natural Diet Modalities in IBD from Baseline (Phase I) to Follow-up (Phase 3)

	Phase I	Phase III	p-value
Question	**% (n)**	**% (n)**	
In IBD natural diet modalities are…			0.3496
Standard of care	18.38% (2)	41.7% (5)	
Optional treatment options available to patients	45.6% (5)	58.3% (7)	
Not well studied/unsure	36.4% (4)	0% (0)	

NOTE: McNemar-Bowker test was used to test whether there was a significant difference in participants' choice of the options before and after the intervention.

Table 4 includes fellows' knowledge of the benefits of IBD natural diet modalities from baseline (Phase I) to follow-up (Phase III). At baseline, 30% of fellows reported that natural diet modalities in IBD 'can improve signs and symptoms of IBD' and 'can reduce and help control episodes of flare-ups,' while 20% said natural diet modalities 'can reduce disease complications such as ED visits, disease progression, etc.,' 16.7% reported they were 'unsure,' and 3.3% reported 'none of the above.' Descriptively, more fellows recognized IBD natural diet modalities can improve the disease, while 0% of fellows were 'unsure' or checked 'none of the above' at follow-up. A McNemar test was used to compare whether each participant's probability of selecting 'none of the above' had changed after the intervention. It was shown that participants' knowledge of the natural diet modalities changed significantly ($p = 0.04$).

Table 4. Fellows' Knowledge of Benefits of Natural Diet Modalities in IBD at Baseline (Phase 1) to Follow-up (Phase 3)

	Phase I	Phase III	p-value
Question	**% (n)**	**% (n)**	
Which of the following are benefits of natural diet modalities in IBD? (Choose all that apply):			0.04123
Can improve signs and symptoms of IBD	30% (9)	34.9% (15)	
Can reduce and help control episodes of flare ups	30% (9)	32.6% (14)	
Can reduce disease complications (e.g., ED visits, disease progression)	20% (6)	32.6% (14)	
I am unsure	16.7% (5)	0% (0)	
None of the above	3.3% (1)	0% (0)	

NOTE: McNemar test was used to test whether the probability of selecting 'none of the above' or 'I am unsure' has changed after intervention.

Table 5 includes the results comparing fellows' knowledge of IBD diets from baseline (Phase I) to follow-up (Phase III). At baseline, 91.3% of fellows selected at least one correct example of an IBD diet, while 8.3% said they 'never heard of natural diet modalities' and at least 2.3% of respondents reported 'none of the above.' At follow-up, all fellows recognized the majority of IBD diets and none reported 'none of the above' or said they 'never heard of the use of natural diet modalities in IBD disease management.' The McNemar test comparing pre- and post-intervention difference in participants' selection of 'I am unsure' and/or 'none of the above' was not statistically significant ($p = 0.1336$).

Table 5. Fellows' Knowledge of IBD Diets at Baseline (Phase I) to Follow-up (Phase III).

Question	% (n)	% (n)	p-value
Which of the following are examples of IBD diets? (Choose all that apply):			
Carbohydrate Exclusion Diet	13.9% (5)	13.8% (13)	
Mediterranean Diet	2.8% (1)	12.77% (12)	
Anti-inflammatory Diet	19.4% (7)	16.0% (15)	
Low Fiber Diet	8.33% (3)	11.7% (11)	
Low FODMAP Diet	25% (9)	13.8% (13)	0.1336
Gluten-Free Diet	13.9% (5)	9.6% (9)	
Elimination Diet	5.6% (2)	12.8% (12)	
Maker's Diet	0% (0)	9.6% (9)	
None of the above	2.8% (1)	0% (0)	
Unsure	8.3% (3)	0% (0)	

NOTE: McNemar test was used to test whether the probability of selecting 'none of the above' or 'unsure' has changed after intervention.

3.4 Comparing Fellows' Behavior from Baseline to Follow-up

The majority of fellows reported seeing 1-10 IBD patients at both time points (baseline: 56.3%; follow-up: 50%) while 31.2% of fellows said they saw 11-20 patients at follow-up (Phase III), a 12.5% increase from baseline. However, the Wilcoxon signed-rank tests revealed there was no significant change in the number of IBD patients each fellow had seen in the past month (p-value=0.1817) (**Table 6**).

Table 6. Number of IBD Patients Seen at Baseline (Phase I) and Follow-up (Phase 3)

Question	Phase I	Phase III	
	% (n)	% (n)	
In the past month (30 days), how many IBD patients have you seen?			
0	12.5% (2)	6.2% (1)	**p-value**
1-10	56.2% (9)	50% (8)	0.1817
11-20	18.7% (3)	31.2% (5)	
21-50	12.5% (2)	6.2% (1)	
51-70	0% (0)	6.25% (1)	

NOTE: Wilcoxon signed-rank tests was used for paired comparisons.

Figure 5 includes the frequency of fellows' consults with outpatient dietary services at baseline (Phase I) and follow-up (Phase III). According to the results of the Wilcoxon signed rank test, there was not a statistically significant difference in participants' frequency of consulting with outpatient dietary services at the DDC from baseline to follow-up (p = 1.00).

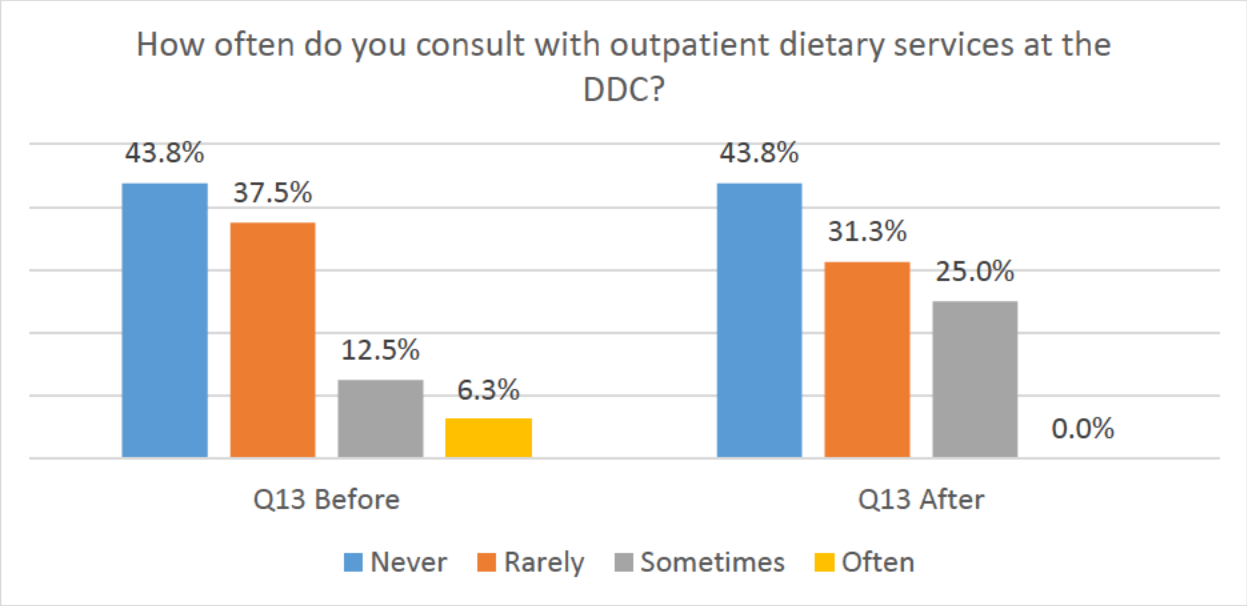


Figure 5. Frequency of Fellows' Consults with Outpatient Dietary Services at Baseline (Phase I) and Follow-up (Phase III).

To build on these results, **Table 7** includes the number of IBD patient referral rates to outpatient dietary services at baseline (Phase I) and follow-up (Phase III). At baseline, 78.6% of fellows reported that they referred zero IBD patients to outpatient dietary services and 21.4% reported referring 1-2 patients. At follow-up, 53.3% said they referred zero patients, 26.7% of fellows referred 1-2 patients, and 20% referred 3-5 patients. The results of the Wilcoxon signed-rank test reported a trend toward significance in the number of IBD patients referred to outpatient dietary services after the intervention ($p = 0.0969$). We can appreciate the descriptive difference in referral rates shown in **Figure 6.**

Table 7. Fellows' IBD Patient Referral Rates to Outpatient Dietary Services in the Past Month at Baseline (Phase 1) to Follow-up (Phase 3).

Question	Phase I	Phase III	
	% (n)	% (n)	
In the past month (30 days), how many of those patients did you refer to outpatient dietary services?			
0	78.6% (11)	53.3% (8)	p-value 0.0969
1-2	21.4% (3)	26.7% (4)	
3-5	0% (0)	20% (3)	
6-8	0% (0)	0% (0)	
9-11	0% (0)	0% (0)	
12+	0% (0)	0% (0)	

Note: Wilcoxon signed-rank tests was used for paired comparisons.

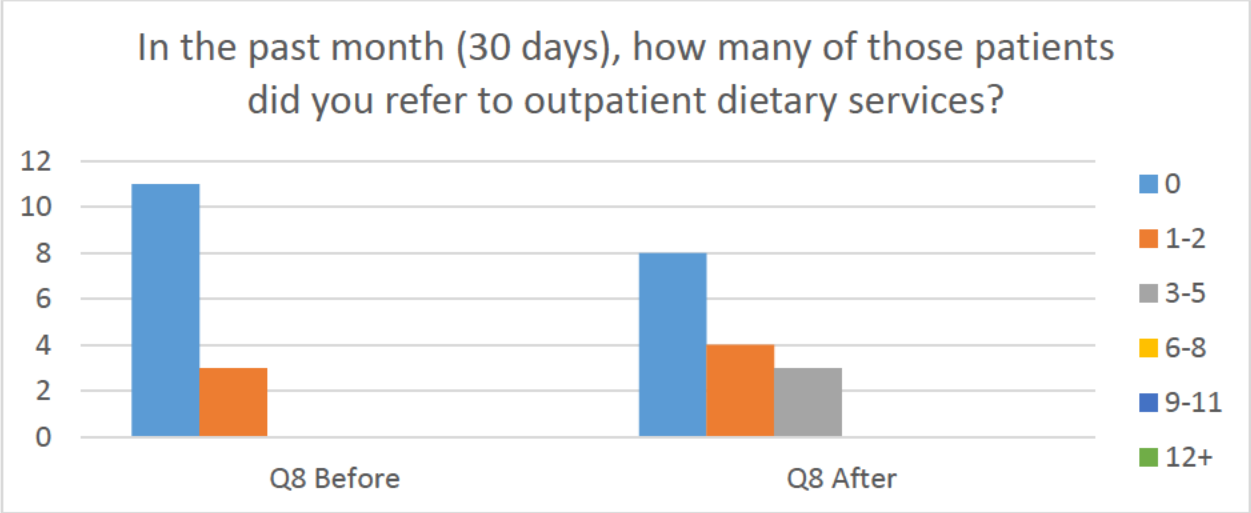


Figure 6. Fellow's IBD Patient Referral Rates to Outpatient Dietary Services in the Past Month at Baseline (Phase I) and Follow-up (Phase III).

Table 8 includes the results of the frequency with which fellows' spoke with their IBD patients about natural diet modalities at baseline (Phase I) and follow-up (Phase III). At baseline, 50% of fellows reported that they 'never' talked to patients about natural diet modalities, 37.5% reported 'rarely,' and 12.5% reported 'sometimes.' None of the fellows reported that they 'always' talked to patients about natural diet modalities. At follow-up, only 25% said they 'never' talked to IBD patients about natural diet modalities, while 37.5% reported talking to patients 'rarely' and 'sometimes.' Wilcoxon signed rank test showed that the difference in the frequency of talking to IBD patients about natural diet modalities were borderline significant ($p = 0.056$).

Table 8. Frequency of Fellows Speaking with IBD Patients About Natural Diet Modalities at Baseline (Phase 1) and Follow-up (Phase 3).

Question	Phase I	Phase III	
	% (n)	% (n)	
In the past month (30 days), how often have you talked with your patients about natural diet modalities to help to control the signs and symptoms of the disease?			**p-value** 0.0564
Never	50% (8)	25% (4)	
Rarely	37.5% (6)	37.5% (6)	
Sometimes	12.5% (2)	37.5% (6)	
Always	0% (0)	0% (0)	

Note: Wilcoxon signed-rank tests was used for paired comparisons.

4.0 Section 4: Learning & Actions

4.1 Discussion

My problem of practice is that the gastroenterology practitioners at the DDC underutilize nutritional services to manage the symptomology of the disease. Currently, our gastroenterology clinics operate without the use of dietary services to care for Crohn's and ulcerative colitis patients although both patients and practitioners could greatly benefit from the use of nutritional services at the DDC. In my inquiry, I sought to investigate if educating gastroenterology fellows about the role of IBD diets in IBD management could increase nutrition knowledge and improve the referral rate to nutritional counseling. My intervention was grounded in the literature that purports that improving physician practices and increasing patient health outcomes can be achieved through providing educational opportunities to practicing physicians (Davis, 1995). A good example of such intervention would be the study on hand hygiene among physicians, and its compliance outcomes in hospital settings. The 2019 study by Shim et al. found that staff, fellow, and resident compliance with handwashing was greater if the instructions or if the initiative originated from the teaching or leadership hierarchy. This current inquiry suggested that leadership influence and fellowship training could be an effective method of shaping new or recommended practices among GI fellows.

4.1.1 Inquiry Question 1

There were three primary inquiry questions that guided my investigation. First, I aimed to assess fellows' current referral rate of IBD patients to nutritional services and determine whether this practice changed following participation in the education module. My study demonstrated no significant change in the number of patients each participant referred to outpatient dietary services following the education module. However, there were descriptive differences, with more fellows reporting they referred 3-5 IBD patients to outpatient nutrition. Moreover, the overwhelming majority of fellows reported immediately after participating in the module that they planned to refer more patients. It is possible that I was unable to observe their intentions translate into behavior change during this brief follow-up period (30 days). As in the case of Reyna's "Theories of Medical Decision Making and Health*: An Evidence-based Approach,* "attitudes about the "retrieval values" of a particular action often rely on approval of others, and the new behavior takes time to form. In this case, the reasons why physicians generally do not refer eligible patients to outpatient dietary support might be partially rooted in the perception of limited value and personal perception. In other words, patients and providers often mirror each other's perception of the risks and benefits of a given action or intervention if they both lack with familiarity about the subject. I expect more time with additional prompts/reminders would lead to a change in behavior following this education module.

Although I failed to see a statistically significant increase in the number of IBD patients that the fellows referred to outpatient in the last 30 days before and after the intervention, I did see a trend toward increasing these numbers, which may suggest clinical significance. Further, I only provided a one-time, self-paced educational intervention in this study. In the future, weekly email

reminders/prompts following the module could be provided to potentially enhance the intervention effect and improve the referral rate.

4.1.2 Inquiry Question 2

The second inquiry question sought to assess the fellows' current knowledge base regarding IBD diets and DDC nutritional services and whether it changed following participation in the education module. The results demonstrated that the participants' knowledge of the natural diet modalities improved significantly following the education module, providing initial evidence for the effectiveness of the brief intervention. This is a considerable success of this short, cost effective intervention, since more practitioners recognized IBD diets as evidenced in the post intervention test scores. Previous studies attempting to improve professional skill and knowledge base among medical professionals noted the constant need to deliver evidence-based practice and quality improvement approaches in health settings. According to Worsley et al. (2016), improvement should be an integral and continuous process for all medical professionals, a workplace habit and culture of refinement in healthcare systems. In this case, improving knowledge of fellows empowers both practitioners and the patients, and it may result in benefits to all stakeholders. Currently, the primary model of care in IBD patients delivers fragmented support where diets or natural modalities are rarely discussed (Regueiro, 2017). Drawing upon expertise of DDC nutritionists in care of IBD patients, this inquiry lays the important groundwork for changing the current system/paradigm of care.

Similarly, the study demonstrated that participants' familiarity with outpatient dietary services has significantly improved after participating in the online module. The study raised important awareness about the role of diet in IBD, and coupled with culture change and support

from physicians, this could spark a shift in the how care is delivered at the DDC to IBD patients in the future. We can observe that post data clearly demonstrates that fellows are now more likely to recognize the role of diet in IBD and more likely to advocate and recommend dietary counseling.

4.1.3 Inquiry Question 3

The third and final question in this inquiry sought to investigate how often GI fellows spoke with patients about natural diet modalities and whether this occurrence increased following participation in the education module. Fellows' frequency of consulting with outpatient dietary services at the DDC did not significantly change following the intervention. This could be attributed to the limited time that fellows had to modify their behavior in the post intervention period, since the question asked specifically about their referral patterns in the last 30 days. Also, it is possible that actual referral rates may differ from self-reported referral rates. According to Gardner's (2012) science of habit formation, whether it is the patient or the physician, bringing up behavior change such as dietary modification is not without risk, as it could affect the patient–doctor relationship. As it turns out, the psychology of habit formation and general practice especially when it pertains to lifestyle changes in patients, requires time and trust, and take a special process to implement (Gardner, 20121).

I saw descriptive improvements in the frequency of fellows speaking with patients about natural diet modalities. Fewer fellows reported 'never' and more reported 'sometimes' at follow-up; however, no fellows reported 'often.' Because this was only a single intervention introduced into the system, future PDSA cycles will likely take additional system-level interventions to make a true culture change. Additionally, this study did not explore potential barriers and facilitators of the electronic patient referral management system at UPMC, the established models for patient or

professional reimbursement, possible insurance barriers, or patient access to ancillary care. Future studies need to determine which factors affect how often GI fellows are willing to initiate referral discussions with patients.

4.1.4 Theory of Improvement and Future PDSA Cycles

Current findings suggest that system change produced improvements in some aspects, but failed to increase the current referral rates and was unable to fully shift the current system during this PDSA cycle. These findings confirm that a system change is a very complex process that takes several cycles to shift the system and requires constant adjustments and revisiting of the study measures. Future PDSA cycles should extend the follow-up period and provide periodic encouragement to help reinforce the intended behavior change among GI fellows. On the other hand, the education module has affected the primary and secondary drivers as knowledge base of GI fellows significantly changed following the intervention, which will shift the system moving forward. My predictions for the inquiry and future analysis are that the module will orient future GI cohorts to produce the desired behavior over time and serve as a benchmark for long term change, which is tied to my aim statement.

4.1.5 Strengths and Weaknesses

Noted strengths of the study include the brief, online, self-paced education module. The training was welcomed and highly rated by fellows, as it was effective in introducing new treatment options for IBD patients. Although the module was relatively succinct and compressed in nature, it generated significant interest and appreciation for the topic. It also resulted in requests

for additional information from fellows and with one suggestion to implement this training into their standard training curriculum. This inquiry confirmed that standard medical school curricula are void of nutritional science courses and/or likely underpreparing future physicians to counsel patients on the role of nutrition in chronic disease.

The project also highlighted some weaknesses that could be targeted as next steps for research. I can speculate that the fellows did not have sufficient opportunities to see a significant number of patients, as some of the providers actually reported seeing fewer patients for unknown reasons following the education module. It is likely that the follow-up period was relatively short in duration to see sustained change. I would recommend allowing more time for follow-up in the future intervention (not just 30 days, as in this case), extending the timeline to possibly several months, and providing periodic encouragement and reminders from leadership to bolster support and to improve behavior (Davis, 1995).

Additionally, one major limitation of this study is the small sample size. Although I included majority of participants from the Gastroenterology Fellowship Program at UPMC, there were a few participants from the 1st year who did not take part with only have 16 out of 19 participants in total. This would lead to limited power in detecting intervention effect and may fail to capture the intervention effect in some aspects. In the analysis of the "select all that apply" questions, the McNemar test was used, but other tests may have provided different results. As such, caution is needed when interpreting the results of these questions.

4.2 Next steps and Implications

The education module developed for this inquiry could be improved upon based on fellows' feedback and integrated into the local IBD curriculum as it offers an inexpensive option to supplement the existing GI training program outside of the surgical and pharmacological applications. The educational tool could be easily utilized for onboarding future cohorts of GI fellows to familiarize them with IBD diets and dietary services at the DDC in their first year of training. Additionally, we should follow-up with the fellows over their time in the program to support them in this change.

As for implications for practice, my next important step will be to work with IBD patients and nutritionists to develop patient materials to empower patients to work with their physicians for better outcomes. If fellows are more willing to have conversations and refer patients, this might also result in increased interest among patients; however, we must remember that it is a two-way street. Patients who are interested in exploring natural diet modalities or are ready to make diet changes can raise the discussion with their doctors. A brochure with information about the DDC nutritionists, services, and potential diet options, as well as current research in the field, could potentially encourage direct patient-doctor discussions. These materials could prompt patients to have conversations with their doctor, and if the providers are already equipped with this knowledge, this could also lead to more referrals. With a brochure, the DDC could facilitate the referral process without necessitating more consultation time during regular doctor visits in the office.

5.0 Reflections

5.1 Reflections on the Improvement Process

Working in the field of healthcare as a research coordinator, I have observed that best practices and improved patient outcomes are most often attainable over time via the ambitious and relentless attempts to improve patient and physician knowledge base. Things always look easier on the outside, but this is not the case in the improvement process. The science of improvement within the healthcare system poses unique challenges as it involves a strata of departments and individuals that are constantly involved in a mutual interplay of governing bodies, policies, health care regulatory standards, and other regulatory elements. In other words, change in healthcare is never easy or quick and this was very evident in my own pursuit of this project as well.

Luckily for me, the concept of nutritional support in the management of chronic diseases is not entirely foreign in traditional medicine; however, its value has been greatly underestimated in the case of IBD. Both patients and physicians are best empowered when the so-called elephant in the room is acknowledged: in this case, this chronic disease stems from inflammation in the gut and yet the role of nutrition in the management is rarely discussed by either the doctor or the patient. If there are significant deficits in either party's knowledge about potential for alternative treatments that should be approached with care and a transparent desire to accommodate the patient's needs in the clinical settings. Knowledge of prescribed treatment options is especially limited (and expected) in patients; if the lack of education is rooted in the medical system itself, then patients might lose trust and confidence in their physicians.

My strong desire to make a difference and offer alternative solutions to the struggling patients and the hardworking physicians via simply educating all stakeholders on the treatment options has motivated my actions from before my first semester in the EdD program. I believe in integrating the best elements of traditional and alternative medicine (i.e., integrative medicine) and I wanted to make my own imprint at the DDC by promoting it via fellow education within my department. As per a recently published meta-analysis study, integrative medicine is the future of medicine as more and more patients and medical schools look to integrate traditional medicine with natural therapies (Grant, 2014).

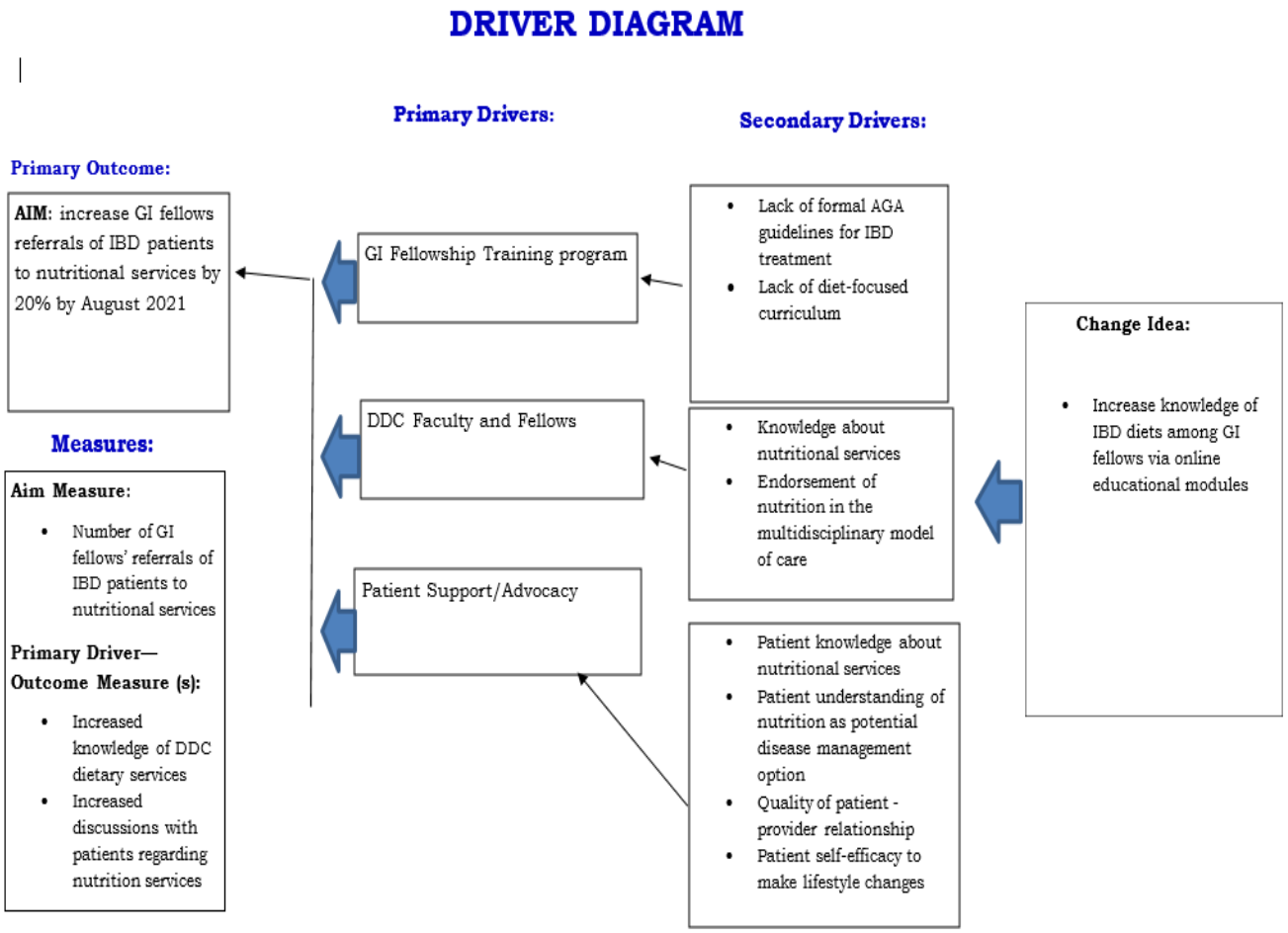
In my own journey of designing and promoting this improvement science project, I have learned a lot. First, that one needs to break down and analyze all aspects of the problem through an "all inclusive" lens in order to formulate a solution that is free of bias, such as personal experiences or beliefs about the problem. Elements such as analytic skills, resourcefulness, grasp of system theories, understanding of clinical practice and science, as well as statistics and other fields, all play an important role in generating a plan and results for the improvement of healthcare delivery (Institute for Healthcare Improvement: Science of Improvement, 2021). I have further realized the importance of impassioning other key players in the process. I have experienced first-hand issues with attaining full participation of the fellows. My subject pool was limited to a finite number of individuals within the GI fellowship program and I ran into issues of limited participation, even with the support of the department head and the director of the fellowship program. Working in the field of clinical research, I have personally experienced daily challenges with the implementation process. However, this time, I grew a greater appreciation for those who struggle to develop a road map for any system-level change within an organization. I think that I anticipated many hurdles, hassles, and roadblocks; however, I now have a new appreciation for

those who design and conceptualize studies and solutions, as my professional role so far has been limited to executing/coordinating such projects.

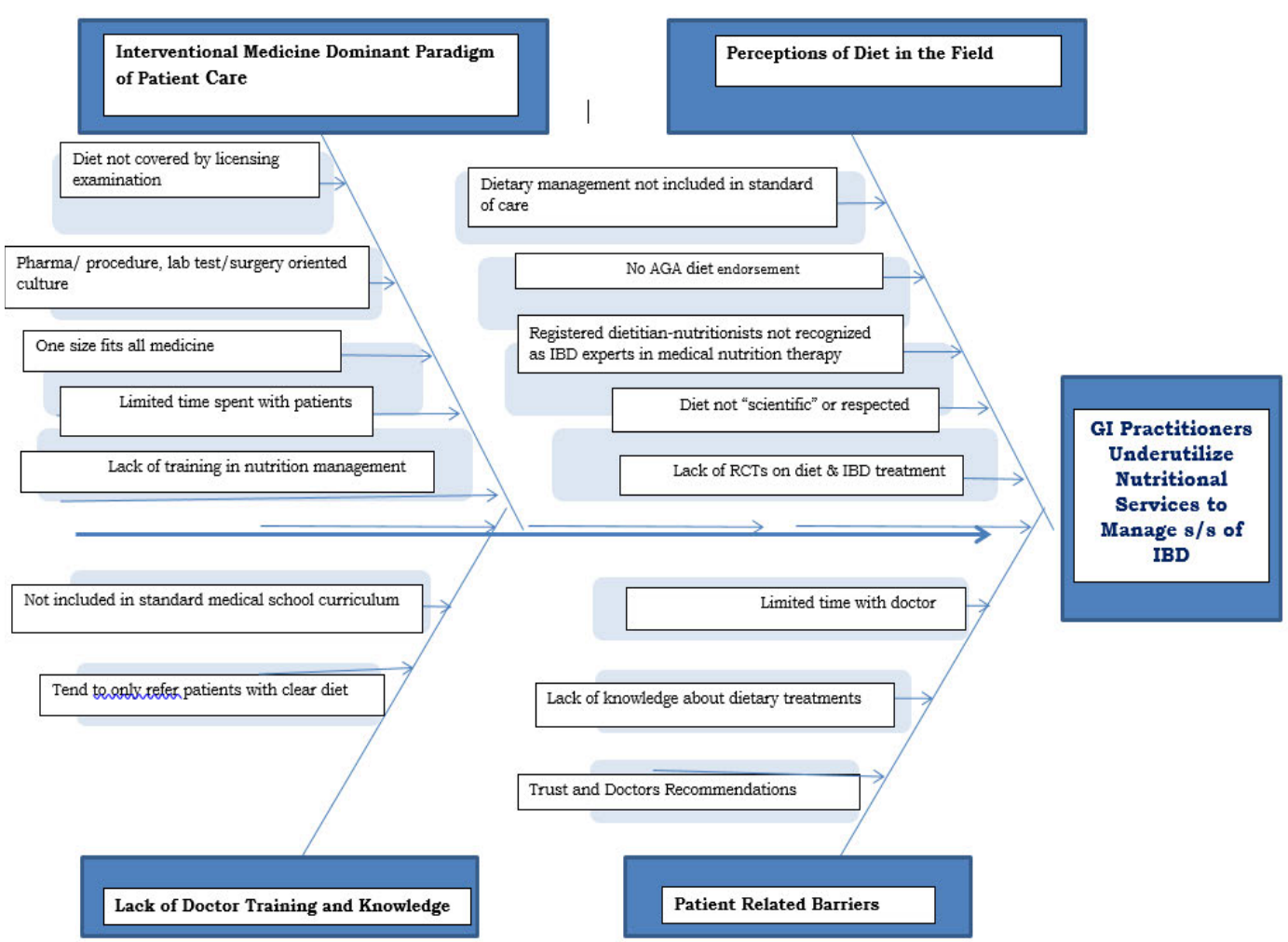
My main takeaway is that analytical thinking and skills, creativity, and process planning are key, but also challenges in the improvement process. I have also recognized that buy-in from the stakeholders is invaluable. A proposal cannot move forward no matter how important or big unless it has the support of the key players at all levels of the organization. According to a 2015 Forbes article "70% of all organizational change efforts fail" and the reason for failure can be attributed to the fact that its execution did not win enough hearts or minds of the key movers (Hedges, 2015 p 1.) . I am reminded yet again that without my own determination, hard work, and personal and professional commitment to the process, combined with the kind professional support and invaluable mentoring from others more senior and accomplished in the field, I would have been unable to arrive to this point.

The process of improvement, whether in science or personal life, is an iterative process with endless opportunities for improvement and fortunately or unfortunately, we are never allowed to give up. We can begin on a small scale to try out a change idea, assess the early results, and revise the change if needed. If satisfied with the progress, we settle to implement the change locally, expand the change, or scale-up. As leaders and scholar practitioners, we will likely never stop this process as we are set up to learn from our successes as well as our failures. This is what I will personally apply in my own professional journey to other problems of practice moving forward.

Appendix A Driver Diagram.



Appendix B Fishbone Diagram.



Appendix C Phase I (Recruitment Letter).

Dear DOM Gastroenterology Fellow,

I am a doctoral student in the University of Pittsburgh's Health and Physical Activity EdD Program. I am currently conducting an inquiry project as part of my doctoral dissertation work to gain a better understanding of GI fellows' knowledge of natural diet modalities in IBD and current patient referral rates to nutritional services. You have been chosen to participate in this study because you are a 1st, 2nd, 3rd, or 4th year Department of Medicine Gastroenterology Fellow.

The study will occur in 4 Phases. In Phase I (Week 1/Day 1), you will be asked to complete a baseline assessment via an online survey management platform called *Qualtrics* that will take no more than ten minutes to complete. You will be assigned an ID number and all of your survey responses will be kept anonymous. Following completion of this baseline survey, in Phase II (Week 1/Day 1), you will be asked to view a brief education module that discusses the current literature and diet options in IBD, as well as provides information on nutritional services at the DDC. In the Phase III of the study, also on the same day, you will be asked to complete a post module assessment questionnaire. The total time for the study should not be more than 45 minutes. In the final phase of the study, Phase IV (Week 4/Day 1), you will complete one final short survey at the end of the study.

There are no direct benefits for participation in this study, nor is there any compensation. Your participation in this study is entirely voluntary and you can stop at any time.

Should you wish to receive results of the study, you may request a copy be emailing me at bbp10@pitt.edu. The study data will only be available to me as the researcher, as well as my Doctoral Advisor and Committee Chair, Dr. Sharon Ross. If you have questions or concerns about the study, you can also contact Dr. Ross at seross@pitt.edu for additional information.

Thank you in advance for your consideration.

Respectfully,

Beata Pasek

Health and Physical Activity EdD Doctoral Candidate

Appendix D Appendix D. Phase I (Baseline Assessment Survey)

Gastroenterology Fellow Natural Diet Modalities Knowledge

Thank you for taking the time to participate in this short survey to assess your knowledge about natural diet modalities in IBD and nutritional services at the DDC.

Q1. What year in fellowship program are you?

- ○ 1st
- ○ 2nd
- ○ 3rd
- ○ 4th

Q2. What are your fellowship specialty interests?

- ○ IBD
- ○ Liver
- ○ Pancreatobiliary
- ○ General GI
- ○ Other (Please specify: ..)

Q3. According to the American Gastroenterology Association (AGA), natural diet modalities in IBD are…

(Check all that apply):

- ○ Standard of care
- ○ Optional treatment options available to patients
- ○ Have not been well studied
- ○ There are no AGA recommendations related to natural diet modalities
- ○ Unsure

Q4. Which of the following are benefits of natural diet modalities in IBD? (Choose all that apply):

- ☐ Can improve signs and symptoms of IBD
- ☐ Can reduce and help control episodes of flare ups
- ☐ Can reduce disease complications (e.g., ED visits, disease progression)
- ☐ I am unsure
- ☐ None of the above
- ☐ All of the above

Q5. Which of the following are examples of IBD diets? (Choose all that apply):

- ☐ Carbohydrate Exclusion Diet
- ☐ Mediterranean Diet

☐ Anti-inflammatory Diet

☐ Low Fiber Diet

☐ Low FODMAP diet

☐ Gluten-Free Diet

☐ Elimination Diet

☐ Maker's Diet

☐ All of the above

☐ None of the above

☐ I never heard of the use of natural diet modalities in IBD disease management

Q6. Which of the following patients meet criteria for outpatient nutrition referral? (Choose all that apply):

☐ Crohn's disease

☐ Ulcerative colitis

☐ Other unspecified GI

☐ Nutritional deficiencies/malnutrition

☐ Other (Please specify:...)

Q7. In the past month (30 days), how many IBD patients have you seen?

- ○ 1-10
- ○ 11-20
- ○ 20-50
- ○ 50-70
- ○ Other (Please specify: ..)

Q8. . In the past month (30 days), how many of those patients did you refer to outpatient dietary services?

- ○ 0
- ○ 1-2
- ○ 3 -5
- ○ 6-8
- ○ 9-11
- ○ 12+
- ○ Other (Please specify:..)

Q9. In the past month (30 days), how often have you talked with your patients about natural diet modalities <u>to help</u> to control the signs and symptoms of the disease? Always

- ○ Sometimes
- ○ Rarely
- ○ Always
- ○ Never

Q10. Have you ever taken nutrition course that covered the importance of the role of natural diet modalities in disease management in either medical school or anytime during your GI fellowship training?

- ○ Yes (please specify):
- ○ No
- ○ Unsure

Q11. If so, how many credit hours was the course?

- ○ 1-3 credits
- ○ 4-6 credits
- ○ 7-12 credits
- ○ Other (Please specify):

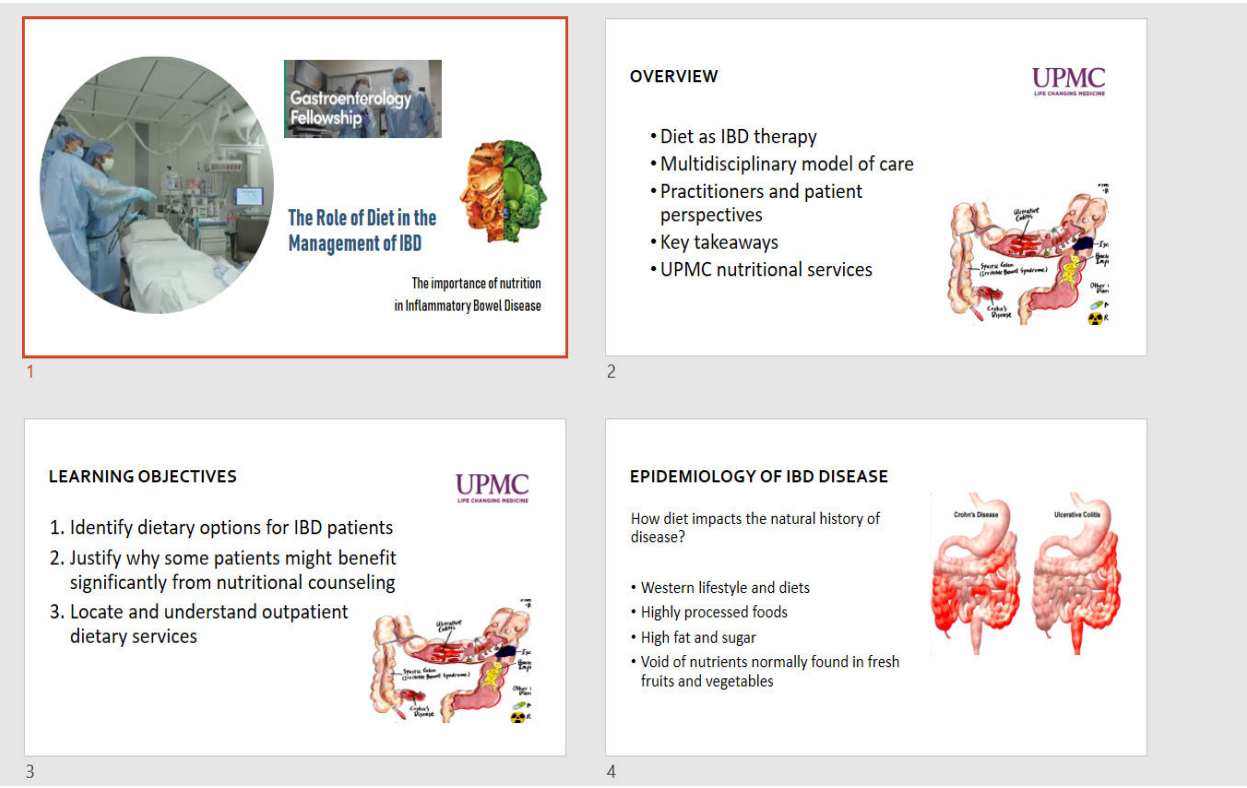
Q12. How familiar are you with outpatient dietary services at the DDC?

- ○ Very Familiar
- ○ Somewhat familiar
- ○ Not familiar

Q13. How often do you consult with outpatient dietary services at the DDC?

- ○ Often
- ○ Sometimes
- ○ Rarely
- ○ Never

Appendix E Phase II (Education Module Outline)



DIET AS THERAPY

- Multidisciplinary management in IBD (gastroenterology and dietary management) to manage IBD patient care
- UPMC Total Care-IBD

5

DIET RECOMMENDATION FOR IBD PATIENTS (Click on video)

AIG. Diet Recommendation for IBD Patients (2020).

6

AMERICAN GASTROENTEROLOGICAL ASSOCIATION

- Lack of formally guided system to assist physicians in tracking food elimination strategies
- Mechanical barriers such as laboratory tests tend to discourage many practitioners from attempting this approach

LATEST FROM THE EXPERTS

- Emphasis on drug therapies and surgical interventions likely prevent many in the industry to conduct nutritional studies
- Dietary studies are not well funded

7

LITERATURE REVIEW

UPMC LIFE CHANGING MEDICINE

PERSPECTIVE 1

Currently, GI practitioners underutilize nutritional services to refer patients to manage signs and symptoms of IBD.

PERSPECTIVE 2

Alternative specialties and the American Academy of Nutrition and Dietetics (eatrightPRO) have been filling the gap to navigate the difficult terrain of inflammatory bowel disease.

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MALNUTRITION IN IBD

Deficiency	CD	UC	Treatment
Negative nitrogen balance	69%	Unknown	Adequate energy and protein
Vitamin B12	48%	5%	1000 mcg/d x 7 d then Q mo
*Folate	67%	30-40%	1 mg/d
Vitamin A	11%	Unknown	5,000-25,000 IU/d
*Vitamin D	75%	35%	5,000-25,000 IU/d
Calcium	13%	Unknown	1,000-1,200 mg/D
Potassium	5-20%	Unknown	Variable
Iron	39%	81%	Fe Gluconate 300 mg TID
Zinc	50%	Unknown	Zn Sulfate 220 mg daily or BID

Gerard E. Mullin, MD. What is the right diet for IBD.

9

TEAM – WHAT'S A DOCTOR TO DO?

CASE 1

Dr. Myway Orhighway sees patient 1:

22-year-old male Pitt college student with no significant past medical history presents to the clinic for initial evaluation of rectal bleeding in the setting of recent ER visit with CT scan showing proctocolitis. (likely UC patient initial presentation)

10

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CASE 2

Dr. Ironman sees patient 4:

22-year-old male with PMH of Crohn's disease in remission for two years, now presents to the emergency room with feeling lightheadedness in the setting of increased abdominal pain and vomiting. Spent spring break with college friends. Patient consumed alcohol.

DR. IRONMAN

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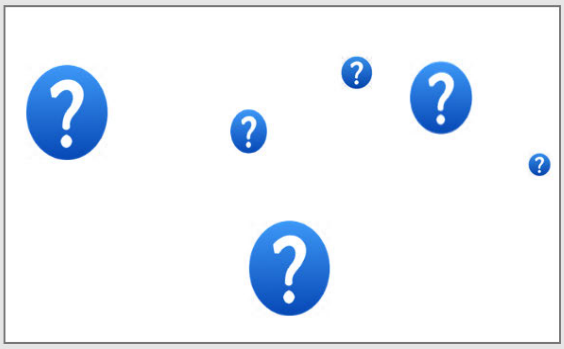

13

IBD DIETs

CARBOHYDRATE EXCLUSION DIET

limit or totally exclude grains, fiber, and certain sugars, including the Specific Carbohydrate Diet™ (SCD™)

MEDITERRANEAN DIET

rich in fiber and plant-based foods, including olive oil, low-fat dairy, herbs, and spices.

ANTI-INFLAMMATORY

foods rich in flavonoids and phytonutrients. Avoid red meat, dairy-favor vegetables, fish, olive oil, walnuts, etc.

LOW-FIBER DIET

Decreasing fiber, avoiding green leafy vegetables, nuts, seeds, popcorn, whole grains, and raw fruits with peels.

Eating a low-fiber diet can be especially helpful in a stricture or bowel obstruction, or after surgery to allow gut healing

Crohn's & Colitis Foundation/ Mayo Clinic 2020

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IBD DIETs

LOW-FODMAP DIET

Acronym for fermentable, oligo-, di-, monosaccharides and polyols, cuts back on sugars that can be poorly absorbed fructose, lactose, sugar polyols -sorbitol and mannitol-, fructans (found in garlic, leeks, artichokes, and wheat), and galacto-oligosaccharides (found in lentils, chickpeas, and black beans).

GLUTEN-FREE DIET

Diet cuts out gluten (wheat, barley, rye). Some IBD patients have found that a gluten-free diet reduces their symptoms. Gluten-free products lack some necessary nutrients, and they are often higher in fat, which can lead to weight gain.

ELIMINATION DIET

Eliminate known and suspected provocative foods 2-4 weeks then reintroduce: 1 new food per day. Process may take 2-3 months. (Mishkin, 1997).

MAKER'S DIET

"Clean" non-processed, organic, all-natural, unrefined, hormones, additives, emulsifier-free, etc.,

Crohn's & Colitis Foundation/ Mayo Clinic 2020

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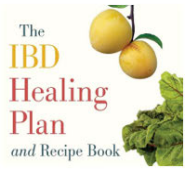
A WORD FROM THE NUTRITIONIST

- Elimination diet
- FODMAP diets
- Low fiber diets



The IBD Healing Plan and Recipe Book: Using Whole Foods to Relieve Crohn's Disease and Colitis Christie A. Korth CHC and Christine Petras

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IBD DIETS ENTAIL THE FOLLOWING:

- Using food group exclusion
- Eating small amounts and breaking down meals through the day (5-8)
- Using food diaries
- Using food allergies identification
- Using general nutritional education

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BENEFITS OF NATURAL DIET MODALITIES

- May improve signs and symptoms of IBD
- May reduce and help control episodes of flare ups
- May reduce disease complications (e.g., ED visits, disease progression)

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RESEARCH AND DATA: GUT AND IMMUNE SYSTEM CONNECTION

- **Dysbiosis**
- **Short chain fatty acid production**

80% percent of the immune system is found in the gut

John B. Furness, Wolfgang A. A. Kunze, J Nadine Clerc Anatomy and Cell Biology, University of Melbourne, Parkville, Victoria 3042, Australia; andLaboratoire de Neurobiologie, Centre National de la Recherche Scientifique, 13402 Marseille Cedex 20, France

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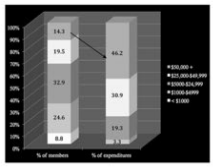
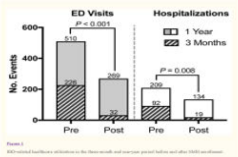
MULTIDISCIPLINARY MODEL OF CARE

Results from Regueiro et al. (2015) demonstrating that 14% of UPMC patients with IBD contributed to 46% of all total cost.



Significant reduction in unplanned care cost and disease activity following Medical Home model of care (Involvement of Nutrition and Behavioral Health). (2018).



Regueiro, M., Click, B., Anderson, A., Strand, W., Kogan, J., McAnallen, S., & Szigethy, E. (2018). Reduced Unplanned Care and Disease Activity and Increased Quality of Life After Patient Enrollment in an Inflammatory Bowel Disease Medical Home. *Clinical gastroenterology and hepatology : the official clinical practice journal of the American Gastroenterological Association*, *16*(11), 1777–1785. https://doi.org/10.1016/j.cgh.2018.04.007

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Digestive Disorders Clinic UPMC practitioner :

"The GI doctors are likely to either not involve or only tangentially involve [diet], and my opinion is that any particular physician's opinion on diet does not necessarily permeate to the patient."

MD practicing for 12 years.

22

DIET INTERVENTIONS FOR CROHN'S DISEASE PATIENTS

"Patients with Crohn's disease always wonder what they should eat"

High-Fiber, Low-Fat Diet May Help People With Ulcerative Colitis (2020)

Dr. Maria Abreu – University of Miami Health System

https://clinicaltrials.gov/ct2/show/NCT04213729?cond=A+Holistic+Diet+Intervention+for+People+with+Crohn%E2%80%99s+Disease&draw=2&rank=1

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DINE-CD STUDY …

Trial of Specific Carbohydrate and Mediterranean Diets to Induce Remission of Crohn's Disease (September 2017 – July 2021)

1. Primary Outcome Measures : Symptomatic remission
[Time Frame: 6 weeks] Assessed by Short Crohn's Disease Activity Index (sCDAI) - diarrhea, abdominal pain and general well being

2. Reduction in bowel inflammation
[Time Frame: 6 weeks] Calprotectin <250 mcg/gm and >50% reduction from baseline

Dr. James D. Lewis – University of Pennsylvania

https://clinicaltrials.gov/ct2/show/NCT03058679

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THE PRODUCE STUDY

The PRODUCE study, which stands for Personalized Research on Diet in Ulcerative Colitis and Crohn's Disease

CO-PRINCIPAL INVESTIGATOR
HEATHER KAPLAN, MD, MSCE
Cincinnati Children's Hospital Medical Center
PRODUCE Study

CO-PRINCIPAL INVESTIGATOR
LISA OPIPARI-ARRIGAN, PhD
Cincinnati Children's Hospital Medical Center
PRODUCE Study

https://www.improvecarenow.org/produce_study

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CDED-ADULTS STUDY

Pilot Study of Partial Enteral Nutrition With a Unique Diet for the Treatment of Adult Patients With Crohn's Disease (CDED-ADULTS) December 2016-Decembr 2020

Arie Levine, MD
Wolfson Medical Center

https://clinicaltrials.gov/ct2/show/NCT02231814

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CHARACTERIZING THE IMPACT OF DIET AND NUTRITION ON IBD NATURAL HISTORY

Dr. Binion's research focuses on defining the cellular and molecular mechanisms underlying human chronic gut inflammation and the translation of this knowledge into improved care for patients suffering from Crohn's disease and ulcerative colitis.

David Binion, MD
University of Pittsburgh Medical Center

https://dom.pitt.edu/gi/research/

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PATIENT 1 TESTIMONY

" One of the things I wish I had known upon diagnosis is the importance of having a care team with nutrition. I literary had to go and figure out everything on my own; I eliminated foods, saw what flared up, a lot of the roughage, fiber foods, would trigger my Crohn's disease. For example I stopped eating grapes, apples, salads for a year, literary, and then I had to go into juicing to even get those nutrients. (..) Also, the medication that they prescribed that they said I needed to take it everyday; in my opinion I did not need to take it everyday. I literary just needed to switch my diet and learn several things including my own body to see what's triggering my flare ups" .

I was literary on my own trying to figure out what is wrong"

Lauren 35 y.

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PATIENT 2 TESTIMONY:

"Going back (..) it would have been very helpful to have met with (..) dietition/nutritionist then continued to meet with them throughout my post-diagnosis lifestyle adjustments. (..) I think it is crucial to have a professional assist you in understanding what food will likely be harmful for you and to also do research in your own time to understand your disease/condition as best as possible. (..) You are going to find out the hard way that some foods considered safe for you will actually make you incredibly ill and likely have some other issues that you can not be prepared for. (..) That is what I wish was communicated to me (..) the most".

Ronnie 26 y.

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HAPPY PATIENT = HAPPY DOCTOR

our patients are counting on us to provide them with best treatment options available

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KEY TAKEAWAYS

Research suggests the need for GI providers to follow an examined clinical pathway to integrate nutritional support and care for their patients.

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KEY TAKEAWAYS

While natural diet modifications **can offer a possible therapeutic intervention** to improve short- and long-term disease activity and symptoms, no single diet works for everyone.

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NUTRITIONIST FOR TOTAL CARE - IBD

UPMC Inflammatory Bowel Disease dedicated nutritionist

Therezia Alchoufete, MS, RD, LDN
Clinical Dietitian Specialist
UPMC Total Care IBD

ALCHOUFETET@UPMC.EDU

OFFICE: 412-647-7540 | MOBILE: 412-935-8367 | FAX: 412-578-9537

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NUTRITION SERVICES AT UPMC

- Diet and nutrition information and counseling on a variety of topics, including eating disorders, heart disease, and weight management.
- Medical nutrition therapy to support treatments for celiac disease, diabetes, and other medical conditions.
- Nutrition resources like our NutriNews newsletter and Ask A Dietitian e-mail feature.
- (...) our network of registered dietitians can guide you toward enhanced well-being.

UPMC Life Changing Medicine (2021)

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Appendix F Phase III. (Post Module Assessment: Knowledge)

After completing the education module, please answer the following questions below about your current IBD knowledge:

Q1. According to the American Gastroenterology Association (AGA), natural diet modalities in IBD are…(Check all that apply):

- ○ Standard of care
- ○ Optional treatment options available to patients
- ○ Have not been well studied
- ○ There are no AGA recommendations related to natural diet modalities
- ○ Unsure

Q2. Which of the following are benefits of natural diet modalities in IBD? (Choose all that apply):

- ☐ Can improve signs and symptoms of IBD
- ☐ Can reduce and help control episodes of flare ups
- ☐ Can reduce disease complications (e.g., ED visits, disease progression)
- ☐ I am unsure
- ☐ None of the above
- ☐ All of the above

Q3. Which of the following are examples of IBD diets? (Choose all that apply):

- ☐ Carbohydrate Exclusion Diet
- ☐ Mediterranean Diet
- ☐ Anti-inflammatory Diet
- ☐ Low Fiber Diet
- ☐ Low FODMAP diet
- ☐ Gluten-Free Diet
- ☐ Elimination Diet
- ☐ Maker's Diet
- ☐ All of the above
- ☐ None of the above
- ☐ I never heard of the use of natural diet modalities in IBD disease management

Q4. Which of the following patients meet criteria for outpatient nutrition referral? (Choose all that apply):

- ☐ Crohn's disease
- ☐ Ulcerative colitis
- ☐ Other unspecified GI

☐ Nutritional deficiencies/malnutrition

☐ Other (Please specify:..)

Q5. Which of the following patients meet criteria for outpatient nutrition referral? (Choose all that apply)

☐ Crohn's disease

☐ Ulcerative colitis

☐ Other unspecified GI

☐ Nutritional deficiencies/malnutrition

☐ Other (Please specify:…)

Q6. How familiar are you with outpatient dietary services at the DDC?

○ Very Familiar

○ Somewhat familiar

○ Not familiar

Q7. After reviewing the module, do you plan to refer more patients to outpatient nutrition services?

○ Yes

○ No

○ Maybe

Q8. How effective was the education module at increasing your IBD knowledge of natural diet modalities?

- ○ Very effective
- ○ Somehow effective
- ○ Not effective
- ○ Other (Please specify):

Q9. What was the most important information you learned? (text write in)

Q10. How do you plan to use the information on natural diet modalities in IBD?

Q11. Any other comments or feedback on the education module? (text write in)

Appendix G. Phase IV. (Post Module Assessment: Behavior).

Q1. In the past month (30 days), how many IBD patients have you seen?

- ○ 1-10
- ○ 11-20
- ○ 20-50
- ○ 50-70
- ○ Other (Please specify: ..)

Q2. In the past month (30 days), how many of those patients did you refer to outpatient dietary services?

- ○ 0
- ○ 1-2
- ○ 3 -5
- ○ 6-8
- ○ 9-11
- ○ 12+
- ○ Other (Please specify:..)

Q3. In the past month (30 days), how often have you talked with those patients about natural diet modalities to help to control the signs and symptoms of the disease?

- ○ Always
- ○ Sometimes
- ○ Rarely
- ○ Never

Q4. How often did you consult with outpatient dietary services at the DDC?

- ○ Often
- ○ Sometimes
- ○ Rarely
- ○ Never
- ○ Not familiar

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