



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.

Practical Guidance for Dietary Management of Patients With Inflammatory Bowel Disease During the SARS-CoV2 Pandemic



THE OUTBREAK OF THE NEW coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV2), has affected almost every country worldwide since first reported in China in December 2019. Coronavirus disease (COVID-19) was declared a pandemic by the World Health Organization, and there are >13 million cases worldwide (as of July 13, 2020). Although the majority of patients will experience a mild disease course, around 10% of symptomatic patients will require hospitalization or intensive care treatment, with a mortality rate of around 5% overall.¹ The clinical manifestations of COVID-19 include fever; chills; cough; malaise; gastrointestinal symptoms including nausea, diarrhea, vomiting; and

respiratory symptoms including cough, dyspnea, and bilateral pneumonia.²

Alongside older patients and those with medical comorbidities, patients with inflammatory bowel disease (IBD) taking immunosuppressive therapy are considered to be at higher risk of COVID-19.³ The virus binds to target cells through angiotensin-converting enzyme 2, which is constitutively expressed by both lung and the gut.⁴ Angiotensin-converting enzyme 2 is upregulated in the setting of intestinal inflammation, creating a theoretical entry portal for SARS-CoV2. Fecal shedding of the virus has been widely reported, persisting for up to 10 days beyond negative oropharyngeal swab results and raising the possibility of fecal-oral route of transmission.²

Despite theoretical risks, current evidence does not suggest that patients with IBD have an increased risk of developing COVID-19.⁴ The international SECURE-IBD Registry reported on 1696 cases of COVID-19 in patients with IBD (on July 13, 2020), with marginally higher rates in those with Crohn's disease (CD) (943/1696, 55%).⁵ Most patients had mild disease and were managed as outpatients (70%). Sixty patients (4%) among this cohort died, 14 of whom were receiving biologic therapy, which is comparable with non-IBD populations. Current guidelines therefore advocate for minimizing exposure to COVID-19 infection while continuing therapy for their underlying IBD to prevent flare-ups and complications, including escalation of immunosuppression as clinically indicated.^{6,7} It must be acknowledged that it is unlikely any high-quality evidence will allow timely production of guidelines specific for IBD patients during the COVID-19 pandemic, so observational data and anecdotal lessons learned from the first

countries affected by the novel coronavirus are providing direction for the rest of the world.²

Despite reassuring registry data and published guidelines, many patients with IBD and their treating clinicians alike may be reticent to persist with immunosuppressive therapy in the setting of the COVID-19 pandemic.¹ Anxiety as to therapy-related vulnerability may lead to widespread and often inappropriate cessation of medical therapy, as well as exploration of non-immunosuppressive alternatives for management of IBD. Dietary strategies represent an appealing option for those determined to avoid immunosuppression and for those in whom escalation of medical therapy is indicated for a disease flare-up. Exclusive enteral nutrition therapy (EEN), involving consumption of only nutritional formula without intake of food for a defined period, has a strong evidence base for remission induction in CD when barriers to adherence are overcome.⁸ Moreover, EEN has been shown to delay or avoid IBD surgery, which is critical at a time when hospitalization increases risk of COVID-19 exposure as well as in the setting of stretched health care resources.^{8,9} Beyond dietary management of IBD, nutritional optimization and evaluation and treatment of both malnutrition and obesity-related illness are important to best equip patients to face COVID-19.^{10,11} The need for dietary management of functional gut symptoms, already common in patients with IBD, is likely to increase during this period of enormous psychological stress.^{12,13}

In this article we discuss practical dietary considerations for patients with IBD during the SARS-CoV2 pandemic, including dietary recommendations to optimize nutritional status, manage weight gain, and use dietary therapies such as EEN and the potential for increased rates of

*This article was written by **Alice S. Day**, APD*, a senior academic dietitian, The Queen Elizabeth Hospital, Woodville South, South Australia, Australia, and PhD candidate, School of Medicine, Faculty of Health Sciences, University of Adelaide, Adelaide, South Australia, Australia; **Jessica A. Wood**, MCLinRes, APD*, PhD candidate, Department of Gastroenterology, Central Clinical School, Monash University, Melbourne, Australia; **Emma P. Halmos**, PhD, PGradDipBiomedSc, APD*, a research dietitian, Department of Gastroenterology, Central Clinical School, Monash University, Melbourne, Australia, and Department of Gastroenterology, Alfred Health, Melbourne, Australia; and **Robert V. Bryant**, PhD, MBBS, MScR (Oxon), FRACP, staff specialist gastroenterologist and head of Inflammatory Bowel Disease Services, The Queen Elizabeth Hospital, Woodville South, South Australia, Australia, and clinical senior lecturer, the School of Medicine, Faculty of Health Sciences, University of Adelaide, Adelaide, South Australia, Australia.*

*APD = accredited practising dietitian (certified in Australia).

<https://doi.org/10.1016/j.jand.2020.07.019>

functional gut symptoms needing dietary therapy. In the absence of specific evidence-based guidance for dietary management in the setting of COVID-19, a pragmatic approach to dietary management is presented, within the health care limitations imposed by the current crisis.

IBD DIETARY RECOMMENDATIONS DURING SARS-CoV2 PANDEMIC: OPTIMIZE NUTRITIONAL STATUS AND PROMOTE HEALTHY EATING BEHAVIORS

No diet prevents virus transmission or reduces the severity of respiratory illness; however, there is evidence to suggest that malnutrition worsens outcomes for critically ill patients or those with respiratory disease, and obesity increases risk of more severe disease and increases risk of hospitalization in younger patients.¹⁴⁻¹⁶ Therefore, both undernutrition and poor nutrition associated with obesity

and chronic disease during this pandemic must be considered.^{10,17} Monitoring nutritional status must remain a key component of IBD care to identify any patients requiring dietary strategies, micronutrient supplementation, nutrition support, or weight management counseling to prevent both under- and overnutrition during this period.¹⁰

Undernutrition

The prevalence of malnutrition in IBD populations is 15% to 80%.^{18,19} Patients with IBD are at increased risk of poor nutritional status, due to the catabolic effects of active inflammation, risk of malabsorption, impaired appetite, and fatigue.²⁰ Nutritional status of IBD patients should be routinely screened during this pandemic using a validated nutrition screening tool (eg, malnutrition universal screening tool) with routine monitoring of micronutrient levels including vitamin D (Figure 1).^{10,21,22} Any patients identified

to be at risk of malnutrition should be referred to an experienced IBD dietitian who can take a detailed dietary assessment. This also provides an alternative strategy for routine micronutrient monitoring in a climate in which nonurgent blood tests may be delayed. Vitamin D is a nutrient of particular interest during this pandemic; deficiency has been associated with COVID-19 disease severity and higher mortality.^{11,23} It is therefore reasonable to supplement low vitamin D levels and consider vitamin D supplementation for those IBD patients at risk of deficiency (eg, protracted periods of isolation, low sunlight exposure).¹¹ Similarly, a broad-spectrum multivitamin can be recommended where dietary intake is inadequate, and targeted individual nutrient supplements can be used to correct micronutrient deficiencies.

Overnutrition

Conversely, overweight and obesity are also highly prevalent in IBD

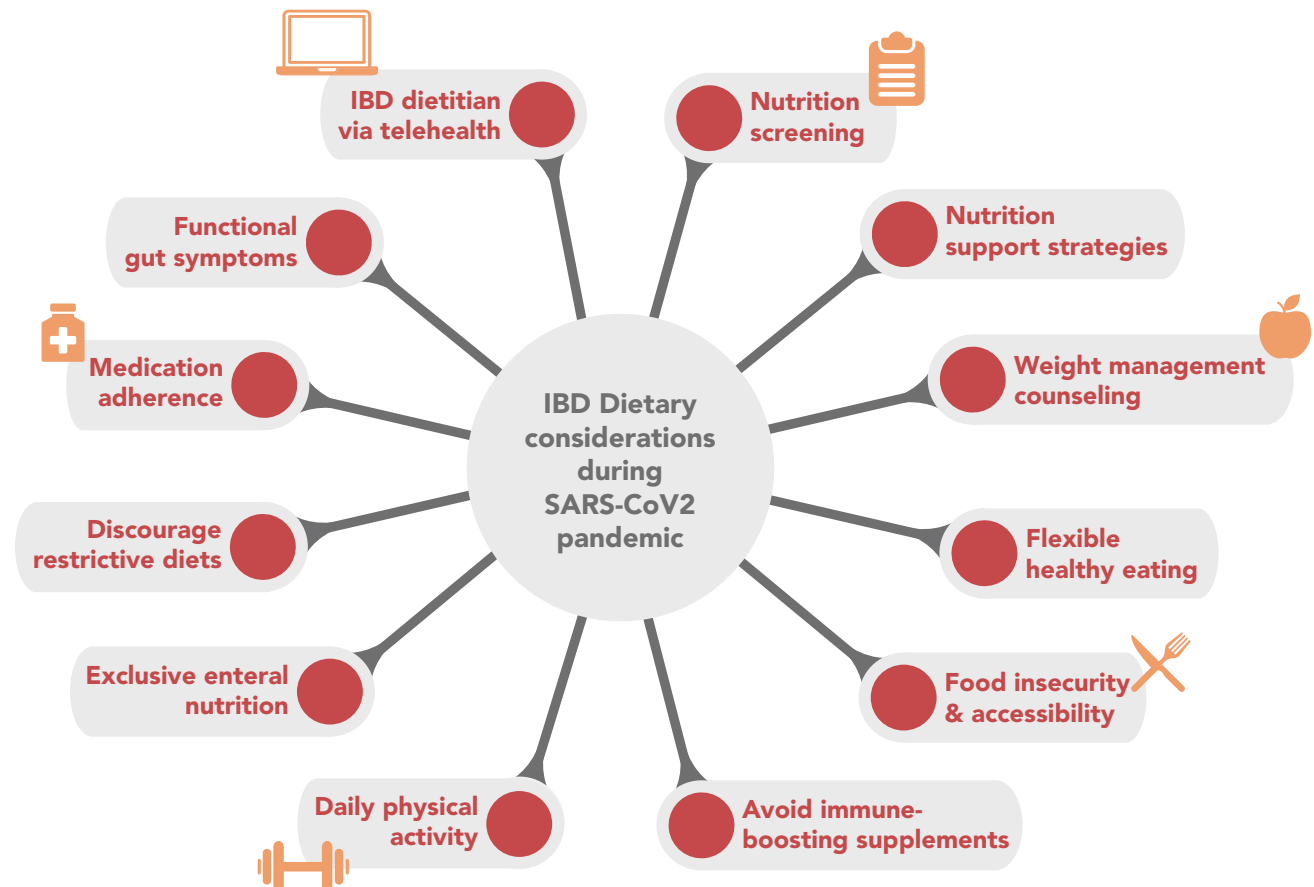


Figure 1. Key dietary considerations during SARS-CoV2 pandemic. IBD = inflammatory bowel disease; SARS-CoV2 = severe acute respiratory syndrome coronavirus 2.

populations, with 15% to 62% overweight or obese.^{18,24} Isolation restrictions broadly influence unhealthy dietary habits including less fresh food, increased snacking on ultra-processed foods, increased alcohol consumption, and less physical activity; therefore, weight gain and overnutrition in individuals with IBD is of concern during this pandemic.^{17,25,26} Obesity is associated with persistent disease activity, has been shown to negatively impact biologic therapy and surgical outcomes, and is associated with poorer mental health (anxiety and depression).^{27,28} Routine nutrition screening will also assist in early identification of unhealthy weight gain and patients requiring individualized counseling to prevent unwanted weight increases (Figure 1).¹⁰

Healthy, Flexible Eating With Daily Physical Activity

In the absence of clearly defined nutritional guidance for people with IBD during this pandemic, it is reasonable to advise healthy eating recommendations in line with the International Organization for the Study of Inflammatory Bowel Disease (Figure 2).^{29,30} It must be acknowledged that these guidelines do not take into account the practicalities of eating within the limitations imposed by a pandemic environment and require individualization for structuring disease. Food insecurity may result from financial hardship seen with declining global economy and job loss.³¹ Reduced food accessibility may be a consequence of stockpiling and increased demand of certain food products while people prepare for protracted self-isolation. High-risk patients are being recommend to isolate, which can present increased challenges. Practical strategies to overcome some of these issues include online shopping from a variety of shops, seeking support from friends and family to shop and deliver, or registering with volunteer services.

Dietary recommendations for patients with IBD to support health during the COVID-19 pandemic are outlined in Figure 2, alongside potential obstacles to healthy eating and alternative options. Patients in remission should continue to adhere to

healthy eating principles and not succumb to the unhealthy dietary behaviors during isolation.²⁶ It is also imperative to communicate to patients that adequate nutrition can be obtained through a habitual balanced diet rather than purchasing costly nutritional supplements marketed with immune-enhancing functions.³² In addition to consuming a balance diet, it is also essential to encourage daily physical activity while maintaining local social distancing guidelines to optimize physical and mental health, which has independently been shown to influence dietary behaviors.^{26,33} Beyond pandemic-specific recommendations, daily physical activity has already been shown to have multifactorial benefits to individuals with IBD, including maintaining lean muscle tissue, reducing inflammation, improving bone health, and assisting with weight management.³⁴ In these COVID-19 times, planned daily physical activity may also mitigate reduced activity levels and lower the risk of boredom or emotional eating.^{10,26,33}

USING EEN IN CD DURING SARS-CoV2 PANDEMIC: BENEFITS VS BARRIERS

EEN is a treatment for CD and refers to the consumption of a liquid formula as sole source of nutrition for a defined period of time, usually 6 to 8 weeks, depending on the clinical indication for use.^{8,35} EEN is of similar efficacy to corticosteroids for achieving clinical remission and is superior for mucosal healing.^{36,37} EEN can also lead to a reduction in inflammatory strictures, healing of enterocutaneous fistulae, surgery avoidance, and improvement in nutritional status.^{37,38} Although the wealth of existing data for EEN is in the pediatric IBD cohort, the same premise for efficacy also applies in adults.⁹ In contrast to corticosteroids, immunomodulators, and biologics, EEN poses no immunosuppressive risk of acquiring or becoming severely ill from the novel coronavirus, and thus may be a more suitable alternative to corticosteroids for certain patients with CD.^{7,11} See Figure 3 for description of potential benefits and risks of EEN in the current COVID-19 pandemic.

Beyond the clinical benefits, EEN can also offer a cost-effective alternative to

food for patients, particularly if available through health-subsidy programs.⁹ EEN may also be delivered directly to the patients, which reduces the need to visit grocery stores in high-risk public environments. Use of EEN may mitigate food insecurity and accessibility, particularly with community stockpiling of food being problematic for certain foods and geographical areas. Furthermore, because the efficacy of EEN is not impacted by formula type, switching formulas if some formulas become out of stock is an option.³⁹ It must be recognized that use of EEN is directed at remission induction in Western countries. EEN is not a common modality for longer-term maintenance therapy outside of Japan, where partial elemental enteral nutrition is used as a primary therapy, administered nocturnally via nasogastric tube, with proven efficacy to prolong clinical remission.^{8,40,41} EEN should not thus be commenced with a view to protracted use during the pandemic without consideration of these practical points of difference, because the duration of this pandemic is uncertain but likely to be prolonged. Rather, EEN is best used to avoid corticosteroid therapy for remission induction, acting as a bridge to a suitable maintenance therapy.¹¹

A major barrier to EEN is adherence, particularly in adults, although remission rates of 60% to 80% are similar to pediatric cohorts if adherence is achieved.³⁹ Ability to tolerate and follow an EEN regimen is commonly challenged by a multitude of factors, including the psychosocial aspects of eating.^{39,42} Now, in a period where global communities are practicing social distancing, working from home, or self-isolating, individuals may perceive barriers to completing a course of EEN less daunting. Concerns around immunosuppression or risk of obstructive symptoms may also represent an additional motivator for adherence.

In these unprecedented times where clinical outcomes of COVID-19 in people with IBD remain unknown, it is important that patients' concerns are heard and IBD care remains patient focused. Patients commencing EEN should be managed within multidisciplinary IBD services, with close

IOIBD ^a dietary recommendations for IBD ^{b,17}	Possible pandemic-specific dietary barriers	Suggested dietary substitutions and practical strategies for patients ^c
Adequate daily intake of fruits and vegetables	Limited availability of fresh produce, increased costs of fresh produce, omitted or substituted items in online order, limited access to shops	Snap frozen or canned fruit and vegetables with no additives, choose in-season varieties, plant varieties in pots or home garden, preplan meals and try new recipes with available items, swap items with friends, and family within social distancing parameters
Adequate daily intake of all carbohydrates including gluten containing foods	Limited availability of staples including dry pasta, rice, polenta, noodles, flour, bread	Preplan meals using available staples then top up cupboard as available, preorder bakery breads, take opportunity to try alternative staple grains and recipes
Moderate intakes of red meat, chicken, and fish with less intake of processed meats	Limited availability, increased cost	Preplan weekly menu; preorder from independent butcher; bulk buy when available and freeze portions; use tinned fish; include meals with plant-based proteins such as canned legumes, nuts, and tofu; try new recipes; freeze leftovers
Adequate intakes of pasteurized dairy products	Limited availability, particularly shelf-stable products	Use fresh, ultra-heat-treated, or powdered milk; try different brands and products; intermittent substitution with long-life plant-based sources of calcium (eg, plant milks)
Consumption of less saturated fat/myristic acid, avoidance of <i>trans</i> -fats, and consumption of more wild fish rich in n-3 fatty acid oils	Increased intake of fatty cuts of meat, high-fat discretionary foods, and delivery meals while housebound or eating on a budget	Trim animal fat and use more plant-based proteins (eg, lentils, kidney beans) to reduce intake of fatty cuts of meat, limit consumption of high-fat discretionary foods, minimize fried takeaway foods
Low intake of alcoholic beverages	Increased consumption of alcohol while at home and social distancing	Set parameters for safe consumption of alcohol
Limited intake of foods containing food additives including maltodextrin, artificial sweeteners, emulsifiers, and thickeners	Limited choice or availability of minimally processed or preservative-free food items	Read food labels, limit consumption of ultra-processed foods where feasible, plan and prepare snacks using staple foods
<p>^aIOIBD = International Organization of the Study of Inflammatory Bowel Disease. ^bIBD = inflammatory bowel disease. ^cStrategies requiring individualizing for stricturing disease.</p>		

Figure 2. Practical considerations of maintaining inflammatory bowel disease specific dietary guidelines during severe acute respiratory syndrome coronavirus 2 pandemic.

Benefits of using exclusive enteral nutrition	Challenges of using exclusive enteral nutrition
<ul style="list-style-type: none"> • Strong evidence for clinical remission induction and mucosal healing • Alternative to corticosteroids for remission induction • No known immunosuppressant properties • Bridging therapy to maintenance immunosuppressive medication • May delay need for surgery and hospital admission • May delay or prevent need to attend infusion centers • Reduction in inflammatory strictures • Improved healing of enterocutaneous fistula • Home delivery of nutrition support limits need to visit shops for essential supplies • May be cost-effective and partially or fully subsidized by health care services • Advantageous also in treating any underlying nutritional deficiencies or malnutrition • Regimen can also be manipulated to modify weight 	<ul style="list-style-type: none"> • Short-term use (only 6-8 weeks) • Clinical risks of poor adherence, including constipation • Adhering to a liquid diet may be more psychologically challenging during self-isolation • Supply lines of nutrition support may be affected by pandemic • Increase in demand on dietetic support during a time when services are being redirected or limited • Needs close monitoring and cessation if no clinical improvement within 2 weeks

Figure 3. Considerations for using enteral nutrition therapy for patients with Crohn's disease during severe acute respiratory syndrome coronavirus 2 (SARS-CoV2) pandemic.

monitoring and review of treatment efficacy after 2 weeks recommended.⁹

DEFINED DIETARY STRATEGIES FOR IBD: WHAT IS APPROPRIATE DIETARY THERAPY IN THIS CURRENT CLIMATE?

Beyond healthy eating guidelines and EEN, only limited evidence suggests that defined dietary strategies are effective for adults with CD or ulcerative colitis.⁴³ The broad principles of the role diet has in IBD are proposed by International Organization for the Study of Inflammatory Bowel Disease and summarized in Figure 2.²⁹ However, these recommendations are largely based on epidemiological and observational data or from animal studies. Despite the relative lack of evidence, many patients follow restrictive and non-evidence-based approaches popularized by Internet-based recommendations.⁴⁴ This being said, several evidence-based remission induction diets for CD have recently been proposed as real food alternatives to EEN, and many patients are also following popularized diets such as the Specific Carbohydrate Diet and paleo or plant-based eating approaches.^{43,45,46}

Patient-led maintenance diets are growing in popularity despite the lack of robust evidence to support their

therapeutic benefit.^{43,47} Diets with widespread use among the IBD community include the Specific Carbohydrate Diet, the Paleo Autoimmune Protocol, and a plant-based diet, and it is expected that a pandemic environment will not diminish their use, irrespective of a lack of controlled studies demonstrating their efficacy as maintenance diets.^{43,44} Rather, many patients may commence non-evidence-based dietary therapies as a substitute for their conventional medical therapy, with concordant risk of disease flare-up. Additionally, most of these diets are restrictive and without a defined period of use, and as such, risk of malnutrition or disordered eating, including binge eating, is increased.^{48,49} These diets should be discouraged during this pandemic period with redirection to more evidence-based approaches with appropriate dietetic supervision.

The recently published Crohn's Disease Exclusion Diet (CDED) offers a real food alternative to EEN in pediatric patients with luminal CD.⁴⁵ Patients are increasingly interested in this new diet; however, to date, only 1 pediatric randomized controlled dietary advice study and 2 retrospective case control studies have been published, with very limited data in adults and patients with stricturing

disease excluded.^{45,50,51} The CDED is a step-down therapy comprising 3 phases with clear parameters around foods that are allowed for consumption. The initial elimination phase relies on partial enteral nutrition for at least 50% of nutritional requirements, with the addition of 5 mandatory foods to be consumed daily, along with a list of 9 additional foods and specific condiments and drinks that may be consumed. Although phase 2 showed superior remission rates and tolerability to EEN, phase 3 maintenance diet cannot be recommended as maintenance therapy for CD without evidence of long-term efficacy, because at week 12, fecal calprotectin remained elevated in both groups. Given the uncertainty of COVID-19 timeline and the anticipated time needed for dietary therapy, one potential plan for individuals intolerant or adverse to corticosteroids could be to alternate use of EEN and CDED, or use a hybrid approach to overcome barriers of adherence and encourage prolonged clinical remission, which may cover the peak pandemic period.

Crohn's disease treatment with eating is in the early stages of therapeutic diet development. A recent, novel, mixed-methods study in healthy adult controls, rats, and small number

of children with active luminal CD demonstrated the potential for using ordinary food to mimic the therapeutic effects EEN has on the microbiome, inflammation, and clinical response.⁴⁶ There is not yet a defined dietary protocol for Crohn's disease treatment with eating trialed in a large cohort, therefore at this stage it cannot be recommended.

In the setting of a pandemic, the feasibility of accessing and sourcing mandatory foods while practicing social distancing or self-isolation poses a challenge and may compromise adherence to this regimen. Furthermore, less than complete adherence to rigid diets such as CDED has not been assessed, and it is important to note that partial enteral nutrition alone with free diet does not have demonstrated efficacy in maintaining longer-term remission in CD.^{51,52} Defined dietary therapy also requires the involvement of an experienced IBD dietitian to deliver complex dietary education, troubleshoot perceived dietary barriers, individualize advice in stricturing disease, and monitor to prevent consequences such as malnutrition or nonadherence.^{9,45,48} In the current climate, availability of an IBD-trained dietitian may be limited with changes in service modality, staff absence, and acute dietetic resources redirected to areas of increased demand (eg, intensive care, medical and respiratory wards).

INAPPROPRIATE USE OF DIETARY THERAPY IN IBD DURING SARS-CoV2 PANDEMIC: A WORD OF CAUTION

Vulnerable people, such as those on immunosuppression, may be understandably frightened by the risk of COVID-19. It has been observed during this pandemic that more patients with IBD are stopping their usual prescribed medical treatment of their own accord and commencing complementary or dietary therapies. Many are presenting to a dietitian without informing their doctor treating them for IBD, which places them at increased risk of flare-up, disease complication, and hospital admission. There is also a concern regarding lack of strategy for management of nonresponse to dietary therapy when

self-initiated, with associated risks of following a nutritionally inadequate and restrictive diet that lacks clinical efficacy as a maintenance therapy. A multidisciplinary IBD-treating team, including a gastroenterologist and dietitian, is essential during this pandemic for safe EEN application and implementation of dietary strategy with plans for monitoring.⁹ With temporary closure of outpatient services, moves toward telehealth, and redirection of resources in some services, patients may have reduced access to their normal services. Therefore, communication between members of the multidisciplinary team is imperative to maintain quality care.⁵³

RISK OF DEVELOPING FUNCTIONAL GUT SYMPTOMS DURING SARS-CoV2 PANDEMIC

The global pandemic has resulted in a huge change in almost all of our activities of daily living, including work, studies, social interactions, physical activity, and even access to essential shopping items and services. This pandemic may increase exacerbations of mental health disorders and associated conditions.¹² Indeed, survey data on students living in China during the coronavirus outbreak indicated increased anxiety and factors

associated with it, such as economic effects, effects on daily life, and delays in academic activities. However, social support was negatively correlated with the level of anxiety.⁵⁴ One-third of patients with IBD suffer from irritable bowel syndrome (IBS).¹³ Due to the bidirectional brain-gut pathway involved in IBS and other functional gut disorders,⁵⁵ it is expected that such an alteration in our daily living environment will result in a rise in IBS among the IBD population.

Dietary therapies targeting IBS and dietitians guiding such therapies are needed. The dietary therapy with the most evidence of efficacy is a low fermentable oligo-, di-, mono-saccharides and polyols (FODMAP) diet⁵⁶; however, very specific restriction of FODMAPs may not be feasible with alterations in food accessibility. Availability of low FODMAP staples (eg, lactose-free milk; low FODMAP fruits, vegetables, or breads) may be reduced. A modified version or FODMAP-gentle diet may be considered in such an environment.⁵⁷ This approach includes reducing a few foods highly concentrated in FODMAPs common within an individuals' habitual diet (eg, onion, garlic, milk, apples) rather than the whole traditional low FODMAP diet.⁵⁷ Conversely, it is also possible many patients may find it easier to comply

IBD Dietary Management During SARS-CovV2 Pandemic: The Take-Home Messages

1. Pursue routine dietary habits when in remission, being flexible with healthy dietary recommendations for IBD to accommodate food accessibility and cost.
2. Optimize nutritional status through an adequate dietary intake with nutrition support strategies as required.
3. Encourage healthy eating behaviors and daily physical activity for weight management.
4. Consider EEN for remission induction of Crohn's disease.
5. CDED may be used in place of EEN, or a hybrid approach of both therapies could be considered to promote adherence and remission during prolonged pandemic.
6. Discourage trial of restrictive-type diets that could increase risk of disordered eating or malnutrition.
7. Consider dietary and psychological treatment for development of functional gut symptoms.
8. Consider telehealth dietetic consultation for IBD patients to ensure safe and equitable access to dietetic services during this pandemic, the cost of which may be mitigated by government-supported health care schemes.

with a traditional low FODMAP diet during this period where social activities are limited.

ACCESS TO DIETETIC SERVICES DURING TIME OF PANDEMIC: THE RISE OF TELEHEALTH

In many countries, safety measures have been put in place to limit community transmission of coronavirus, including use of telehealth for medical services and restrictions on use of endoscopy for IBD disease activity assessment.¹¹ Fortunately, dietitians have the advantage of not needing to physically examine patients, so a switch to telehealth is generally straightforward, aside from an inability to assess nutritional status by physical examination. Cost and waiting lists may be a barrier to this new format of health care delivery, particularly with increased demand on health care services. Where available, patients should be encouraged to access government-supported health care schemes for chronic health conditions to reduce the financial burden of accessing necessary health services during this time.

CONCLUSION

In these unprecedented times, established paradigms for delivery of care must be reevaluated, and a pragmatic and practical approach to dietary management must be taken. Existing dietary recommendations must be adapted to current social, financial, and health service disruptions with a specific focus on safe, adequate nutrition, and optimization of nutritional status. Access to an experienced IBD dietitian is an essential service for IBD patients who may need their nutrition care plans adapted during this global health crisis.

References

- Danese S, Cecconi M, Spinelli A. Management of IBD during the COVID-19 outbreak: Resetting clinical priorities. *Nat Rev Gastroenterol Hepatol*. 2020;17:253-255.
- Fiorino G, Allocca M, Furfaro F, et al. Inflammatory bowel disease care in the COVID-19 pandemic era: The Humanitas, Milan experience. *J Crohns Colitis*. 2020;14(9):1330-1333.
- Mao R, Liang J, Shen J, et al. Implications of COVID-19 for patients with pre-existing digestive diseases. *Lancet Gastroenterol Hepatol*. 2020;5:426-428.
- Monteleone G, Ardizzone S. Are patients with inflammatory bowel disease at increased risk for Covid-19 infection? *J Crohns Colitis*. 2020;14:1334-1336.
- Kappelman MD, Brenner EJ, Colombel J-F, Ungaro R. Surveillance Epidemiology of Coronavirus Under Research Exclusion (SECURE-IBD). www.covidibd.org. Published 2020. Accessed July 13, 2020.
- British Society of Gastroenterology. *BSG Expanded Consensus Advice for the Management of IBD During the COVID-19 Pandemic*. London, UK: British Society of Gastroenterology; 2020. <https://www.bsg.org.uk/covid-19-advice/bsg-advice-for-management-of-inflammatory-bowel-diseases-during-the-covid-19-pandemic/>. Accessed April 10, 2020.
- Gastroenterology and Endoscopy Society of Australia. *Principles for Clinicians Caring for Patients With IBD During the COVID-19 Pandemic*. Melbourne, Australia: Gastroenterology and Endoscopy Society of Australia; 2020. <https://www.gesa.org.au/news-item/4264/principles-for-clinicians-caring-for-patients-with-ibd-during-the-covid-19-pandemic>. Accessed April 10, 2020.
- Narula N, Dhillon A, Zhang D, Sherlock ME, Tondeur M, Zachos M. Enteral nutritional therapy for induction of remission in Crohn's disease. *Cochrane Database Syst Rev*. 2018;4:CD000542.
- Day A, Wood J, Melton S, Bryant RV. Exclusive enteral nutrition: An optimal care pathway for use in adult patients with active Crohn's disease. *JGH Open*. 2020;4:260-266.
- Barazzoni R, Bischoff SC, Breda J, et al. ESPEN expert statements and practical guidance for nutritional management of individuals with SARS-CoV-2 infection. *Clin Nutr*. 2020;39(6):1631-1638.
- Al-Ani A, Prentice R, Rentsch C, et al. Review article: Prevention, diagnosis and management of COVID-19 in the inflammatory bowel disease patient. *Aliment Pharmacol Ther*. 2020. <https://doi.org/10.1111/apt.15779>.
- Torales J, O'Higgins M, Castaldelli-Maia JM, Ventriglio A. The outbreak of COVID-19 coronavirus and its impact on global mental health. *Int J Soc Psychiatry*. 2020;66(4):317-320.
- Farrokhvar F, Marshall JK, Easterbrook B, Irvine EJ. Functional gastrointestinal disorders and mood disorders in patients with inactive inflammatory bowel disease: prevalence and impact on health. *Inflamm Bowel Dis*. 2006;12:38-46.
- Lew CCH, Yandell R, Fraser RJL, Chua AP, Chong MFF, Miller M. Association between malnutrition and clinical outcomes in the intensive care unit: A systematic review [Formula: see text]. *JPEN J Parenter Enteral Nutr*. 2017;41:744-758.
- Collins PF, Yang IA, Chang YC, Vaughan A. Nutritional support in chronic obstructive pulmonary disease (COPD): an evidence update. *J Thorac Dis*. 2019;11:S2230-S2237.
- Lighter J, Phillips M, Hochman S, et al. Obesity in patients younger than 60 years is a risk factor for COVID-19 hospital admission. *Clin Infect Dis*. 2020;71(15):896-897.
- Busetto L, Bettini S, Fabris R, et al. Obesity and COVID-19: An Italian snapshot. *Obesity (Silver Spring)*. 2020;28:1600-1605.
- Casanova MJ, Chaparro M, Molina B, et al. Prevalence of malnutrition and nutritional characteristics of patients with inflammatory bowel disease. *J Crohns Colitis*. 2017;11:1430-1439.
- Scaldeferri F, Pizzoferrato M, Lopetuso LR, et al. Nutrition and IBD: Malnutrition and/or sarcopenia? A practical guide. *Gastroenterol Res Pract*. 2017;2017:8646495-8646495.
- Lomer MC. Dietary and nutritional considerations for inflammatory bowel disease. *Proc Nutr Soc*. 2011;70:329-335.
- Mijac DD, Jankovic GL, Jorga J, Krstic MN. Nutritional status in patients with active inflammatory bowel disease: Prevalence of malnutrition and methods for routine nutritional assessment. *Eur J Intern Med*. 2010;21:315-319.
- Lomer M. Nutrition support in inflammatory bowel disease. In: Hickson M, Smith S, Whelan K, eds. *Advanced Nutrition and Dietetics in Nutrition Support*. 2018;296-301.
- Rhodes JM, Subramanian S, Laird E, Kenny RA. Editorial: Low population mortality from COVID-19 in countries south of latitude 35 degrees North supports vitamin D as a factor determining severity. *Aliment Pharmacol Ther*. 2020;51:1434-1437.
- Bryant RV, Schultz CG, Ooi S, et al. Obesity in inflammatory bowel disease: Gains in adiposity despite high prevalence of myopenia and osteopenia. *Nutrients*. 2018;10(9):1192.
- Sidor A, Rzymiski P. Dietary choices and habits during COVID-19 lockdown: Experience from Poland. *Nutrients*. 2020;12(6):1657.
- Ammar A, Brach M, Trabelsi K, et al. Effects of COVID-19 home confinement on eating behaviour and physical activity: Results of the ECLB-COVID19 international online survey. *Nutrients*. 2020;12(6):1583.
- Jain A, Nguyen NH, Proudfoot JA, et al. Impact of obesity on disease activity and Patient-Reported Outcomes Measurement Information System (PROMIS) in inflammatory bowel diseases. *Am J Gastroenterol*. 2019;114:630-639.
- Kurnool S, Nguyen NH, Proudfoot J, et al. High body mass index is associated with increased risk of treatment failure and surgery in biologic-treated patients with ulcerative colitis. *Aliment Pharmacol Ther*. 2018;47:1472-1479.
- Levine A, Rhodes JM, Lindsay JO, et al. Dietary guidance for patients with inflammatory bowel disease from the International Organization for the Study of Inflammatory Bowel Disease. *Clin Gastroenterol Hepatol*. 2020;18(6):1381-1392.
- National Health and Medical Research Council. *Australian Dietary Guidelines*. Canberra, Australia: National Health and

- Medical Research Council. www.nhmrc.gov.au/guidelines-publications/n55. 2013. Accessed April 10, 2020.
31. Oliveira TC, Abranches MV, Lana RM. [Food (in)security in Brazil in the context of the SARS-CoV-2 pandemic]. *Cad Saud Publica*. 2020;36(4):e00055220. (in Portuguese).
 32. British Dietetic Association. *COVID-19 / Coronavirus—Advice for the General Public*. London, UK: British Dietetic Association; 2020. <https://www.bda.uk.com/resource/covid-19-corona-virus-advice-for-the-general-public.html>. Accessed April 10, 2020.
 33. Di Renzo L, Gualtieri P, Pivari F, et al. Eating habits and lifestyle changes during COVID-19 lockdown: An Italian survey. *J Transl Med*. 2020;18:229.
 34. Eckert KG, Abbasi-Neureither I, Köppel M, Huber G. Structured physical activity interventions as a complementary therapy for patients with inflammatory bowel disease—a scoping review and practical implications. *BMC Gastroenterol*. 2019;19:115.
 35. Ashton JJ, Gavin J, Beattie RM. Exclusive enteral nutrition in Crohn's disease: Evidence and practicalities. *Clin Nutr*. 2019;38:80-89.
 36. Swaminath A, Feathers A, Ananthakrishnan AN, Falzon L, Li Ferry S. Systematic review with meta-analysis: Enteral nutrition therapy for the induction of remission in paediatric Crohn's disease. *Aliment Pharmacol Ther*. 2017;46:645-656.
 37. Heerasing N, Thompson B, Hendy P, et al. Exclusive enteral nutrition provides an effective bridge to safer interval elective surgery for adults with Crohn's disease. *Aliment Pharmacol Ther*. 2017;45:660-669.
 38. Zhu Y, Xu L, Liu W, Qi W, Cao Q, Zhou W. Safety and efficacy of exclusive enteral nutrition for percutaneously undrainable abdominal abscesses in Crohn's disease. *Gastroenterol Res Pract*. 2017;2017:6360319.
 39. Wall CL, Day AS, Geary RB. Use of exclusive enteral nutrition in adults with Crohn's disease: A review. *World J Gastroenterol*. 2013;19:7652-7660.
 40. Takagi S, Utsunomiya K, Kuriyama S, et al. Effectiveness of an "half elemental diet" as maintenance therapy for Crohn's disease: A randomized-controlled trial. *Aliment Pharmacol Ther*. 2006;24:1333-1340.
 41. Yamamoto T, Nakahigashi M, Umegae S, Matsumoto K. Enteral nutrition for the maintenance of remission in Crohn's disease: A systematic review. *Eur J Gastroenterol Hepatol*. 2010;22:1-8.
 42. Wall CL, Geary RB, Day AS. Treatment of active Crohn's disease with exclusive and partial enteral nutrition: A pilot study in adults. *Inflamm Intest Dis*. 2018;2:219-227.
 43. Gu P, Feagins LA. Dining with inflammatory bowel disease: A review of the literature on diet in the pathogenesis and management of IBD. *Inflamm Bowel Dis*. 2020;26:181-191.
 44. Limdi JK. Dietary practices and inflammatory bowel disease. *Indian J Gastroenterol*. 2018;37:284-292.

45. Levine A, Wine E, Assa A, et al. Crohn's disease exclusion diet plus partial enteral nutrition induces sustained remission in a randomized controlled trial. *Gastroenterology*. 2019;157:440-450 e448.
46. Svolos V, Hansen R, Nichols B, et al. Treatment of active Crohn's disease with an ordinary food-based diet that replicates exclusive enteral nutrition. *Gastroenterology*. 2019;156:1354-1367 e1356.
47. Larussa T, Suraci E, Marasco R, Imeneo M, Abenavoli L, Luzzza F. Self-prescribed dietary restrictions are common in inflammatory bowel disease patients and are associated with low bone mineralization. *Medicina (Kaunas)*. 2019;55(8):507.
48. Halmos EP, Gibson PR. Dietary management of IBD—insights and advice. *Nat Rev Gastroenterol Hepatol*. 2015;12:133-146.
49. Wardle RA, Thapaliya G, Nowak A, et al. An examination of appetite and disordered eating in active Crohn's disease. *J Crohns Colitis*. 2018;12:819-825.
50. Sigall Boneh R, Sarbagili Shabat C, Yanai H, et al. Dietary therapy with the Crohn's disease exclusion diet is a successful strategy for induction of remission in children and adults failing biological therapy. *J Crohns Colitis*. 2017;11:1205-1212.
51. Sigall-Boneh R, Pfeffer-Gik T, Segal I, Zangen T, Boaz M, Levine A. Partial enteral nutrition with a Crohn's disease exclusion diet is effective for induction of remission in children and young adults with Crohn's disease. *Inflamm Bowel Dis*. 2014;20:1353-1360.
52. Logan M, Clark CM, Ijaz UZ, et al. The reduction of faecal calprotectin during exclusive enteral nutrition is lost rapidly after food re-introduction. *Aliment Pharmacol Ther*. 2019;50:664-674.
53. Lees CW, Regueiro M, Mahadevan U. Innovation in IBD care during the COVID-19 pandemic: Results of a global telemedicine survey by the International Organization for the Study of Inflammatory Bowel Disease. *Gastroenterology*. 2020;159(3):805-808.e1.
54. Cao W, Fang Z, Hou G, et al. The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Res*. 2020;287:112934.
55. Koloski NA, Jones M, Talley NJ. Evidence that independent gut-to-brain and brain-to-gut pathways operate in the irritable bowel syndrome and functional dyspepsia: A 1-year population-based prospective study. *Aliment Pharmacol Ther*. 2016;44:592-600.
56. Pedersen N, Ankersen DV, Felding M, et al. Low-FODMAP diet reduces irritable bowel symptoms in patients with inflammatory bowel disease. *World J Gastroenterol*. 2017;23:3356-3366.
57. Halmos EP, Gibson PR. Controversies and reality of the FODMAP diet for patients with irritable bowel syndrome. *J Gastroenterol Hepatol*. 2019;34:1134-1142.

AUTHOR INFORMATION

Address correspondence to: Alice S. Day, APD, The Queen Elizabeth Hospital, 28 Woodville Road, Woodville South 5011, South Australia, Australia.
E-mail: Alice.Day@sa.gov.au

STATEMENT OF POTENTIAL CONFLICT OF INTEREST

No potential conflict of interest was reported by the authors.

FUNDING/SUPPORT

There is no funding to disclose.

ACKNOWLEDGEMENTS

We thank Christopher P. Filosi (School of Art, Architecture and Design, University of South Australia, Adelaide, Australia), who kindly designed the graphic published as [Figure 1](#).

AUTHOR CONTRIBUTIONS

R. V. Bryant is guarantor of this article. A. S. Day and R. V. Bryant formulated the focus of this review. A. S. Day, J. A. Wood, and E. P. Halmos reviewed the literature and identified areas of dietary management requiring guidance during this pandemic. A. S. Day, E. P. Halmos, and R. V. Bryant wrote the manuscript. All authors reviewed and commented on drafts. All authors reviewed and approved the final version of the manuscript.