

Optimizing Postoperative Rehabilitation for Patients After Colorectal and Anal Cancer Surgery: The Critical Role of Tailored Nutritional Interventions and Dietitian Collaboration

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Abstract: Advancements in early detection and treatment have significantly enhanced survival rates for colorectal and anal cancer patients, highlighting the need for comprehensive postoperative care. This paper examines the dietitian's critical role in multidisciplinary teams at late complication clinics, emphasizing tailored nutritional interventions for these patients' unique challenges. Dietitians assess individuals to create personalized nutrition plans to alleviate symptoms like diarrhea, constipation, bloating, and flatulence, thus improving quality of life and health outcomes. Dietary strategies, such as the Low FODMAP (fermentable oligosaccharides, disaccharides, monosaccharides and polyols) diet and psyllium supplementation, underline the importance of a patient-centered approach due to variability in patient responses. Effective team communication ensures nutritional care is integrated into the overall treatment plan, advocating a holistic rehabilitation approach. Challenges like patient compliance and the necessity for ongoing support necessitate innovative educational strategies and interventions tailored to individual needs. The paper advocates for more research into evidence-based nutritional interventions, enhancing the dietitian's role in cancer care. It concludes that dietitians are integral to providing holistic care and improving cancer survivors' long-term health and quality of life through personalized nutritional interventions and interdisciplinary collaboration. Future research should aim to refine these interventions, improve healthcare professional education, and boost patient engagement and compliance for better outcomes.

Keywords: Nutritional intervention; Colorectal and anal cancer; Dietary strategies; Interdisciplinary collaboration; FODMAP; Bile acid malabsorption.

Introductions

As survival rates for patients with colorectal and anal cancer continue to increase due to advances in early detection and treatment methods, the need for comprehensive postoperative care and rehabilitation becomes increasingly prominent. Specifically, it is very common to experience bowel dysfunction after treatment for colorectal and anal cancer^[1,2]. A critical component of this rehabilitation process is therefore nutritional intervention, which addresses the unique dietary challenges and sequelae that many patients face after surgery. These challenges can vary significantly and include symptoms such as diarrhea, constipation, bloating, flatulence, lactose intolerance, and bile acid malabsorption^[3-8], all of which can have profound impacts on the patient's quality of life and health^[9].

Within this complex spectrum of postoperative needs, the dietitian emerges as a central figure whose role is to offer tailored nutritional strategies designed to support the patient's symptom relief, promote nutritional well-being, and optimize quality of life

(Fig. 1). Through individualized dietary recommendations and close follow-up, the dietitian works to address and mitigate the nutritional sequelae of cancer treatment, requiring a deep understanding of the mechanisms driving these conditions and an ability to apply evidence-based practice^[4,5,7,8,10-14].

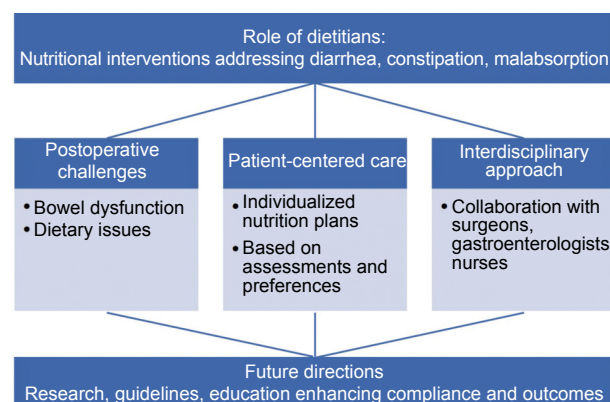


Fig. 1. Key points of involvement of dietitians in postoperative care for patients with late sequelae after treatment for colorectal and anal cancer.

The approach to nutritional intervention in late complication clinics is fundamentally interdisciplinary, integrating knowledge

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from surgery, oncology, gastroenterology, nutritional science, and patient care to offer holistic support to patients^[1]. This article aims to discuss the dietitian's multifaceted role in this context, with a particular focus on the strategies used to meet patients' nutritional needs and the challenges of implementing these in a clinical setting. By doing so, we strive to highlight the importance of nutritional intervention as a central role in the postoperative care of patients treated for colorectal and anal cancer, thereby contributing to an improved understanding and ensure future cooperation across specialties by focusing on how best to support this patient group.

The dietitian's role in the late complication clinic

The dietitian plays a central role in the multidisciplinary treatment of patients in the late complication clinic. Patients are referred to the dietitian by specialist nurses, surgeons, or gastroenterologists^[1]. The dietitian is responsible for assessing and addressing the patient's nutritional problems based on an initial consultation and ongoing follow-ups. The consultations, which often last 45-60 minutes for the initial consultation and shorter for subsequent ones, are offered in person and via telephone, depending on the patient's preferences. This flexibility ensures that the patient receives the necessary support, regardless of their situation or capacity.

In a late complication clinic, the dietitian is an indispensable resource in managing complex nutritional and bowel dysfunction challenges^[10]. Patients often face a range of nutrition-related sequelae that can significantly affect their health and quality of life. The dietitian's role in this context is multifaceted and requires an in-depth understanding of the surgical^[15,16], medical^[16,17], and nutritional aspects of the patient's journey. Other studies have also shown the effects of dietitians' expert knowledge^[3,5,7,10,11,12,13,14].

Primarily, the dietitian works closely with patients to develop individualized nutrition plans that address specific challenges such as diagnosed malabsorption, bowel dysfunction, defecation problems, weight loss or gain, and changes in appetite. These plans are based on a thorough assessment of the patient's nutritional status, dietary habits, and preferences, enabling a tailored approach that respects the patient's individual needs and lifestyle.

The specialized dietary work involves more than simple dietary guidance. It includes education and support to help patients understand the importance of nutrition and, importantly, the impact of diet on the gut thereby the restoration of gut function and long-term healing. This involves teaching patients about how different foods can affect their symptoms and health and offering practical advice to manage challenges such as diarrhea, constipation, fecal incontinence, bloating, and flatulence.

Another crucial aspect of the dietitian's role is to act as a bridge between the patient and the broader clinical team. By communicating the patient's nutritional needs, symptom-relieving nutritional measures, and progress to the rest of the healthcare staff, the dietitian ensures that nutritional care is integrated into the patient's overall treatment plan. This interdisciplinary collaboration is key to offering holistic care that addresses all aspects of the patient's well-being.

In a late complication clinic, the dietitian's expertise is therefore not only crucial for addressing the immediate nutritional challenges but also for ensuring that patients achieve the best

possible gut function thereby optimization of health and quality of life in the long term. Through a combination of tailored nutritional counseling, education, and interdisciplinary collaboration, the dietitian thus plays a central role in the overall team surrounding the patient.

Treatment algorithms

The most common issues where the dietitian plays an active role include diarrhea, constipation, fecal incontinence, bloating, flatulence, lactose intolerance, and bile acid malabsorption. The patient's weight and weight development are monitored throughout the treatment course, and this is considered in connection with dietary guidance.

In the dietary treatment of conditions such as bile acid malabsorption, the treatment can often be advantageously combined with a Low FODMAP diet. The Low FODMAP diet^[18,19] is based on a reduction of fermentable oligosaccharides, disaccharides, monosaccharides, and polyols. Based on local experience, the most significant effect is often achieved by avoiding wheat and rye and their products, but also by excluding onions, garlic, leeks, cauliflower, mushrooms, and legumes, as well as milk and yogurt. Instead of dairy products, lactose-free dairy products can be used. This is colloquially called the "gentle Low FODMAP diet"^[20] and is easier for the patient to manage than a strict Low FODMAP diet.

Diarrhea of unknown cause

Initial Assessment: A thorough dietary history is crucial to identify diet-related triggers. This may involve fatty foods or other known foods that frequently cause diarrhea and stomach pain/bloating. Some patients have come to believe that it is very important to increase their fiber intake and have switched to a diet with a very high fiber content. Official recommendations suggest a fiber intake of 25-35 grams daily. If the intake exceeds this amount, it can affect stool regulation and consistency. In some cases, the amount in the official recommendations may be too high for what the patient can tolerate, thus causing diarrhea. However, experience shows that the use of Psyllium can alleviate diarrhea both in patients with very high and very low fiber intake. This is likely due to the water-soluble fibers in psyllium husks and their ability to absorb and retain water. Thus, fiber intake should be recommended depending on gastrointestinal state and function.

Intervention with a Low FODMAP diet alleviates the diarrhea issue for many patients. Often, a specific treatment plan must be tailored for each patient, as people have different eating habits and gut functions. Therefore, it requires a specialist with in-depth knowledge of the role of diet^[21].

Intervention: Recommendations may include reducing fat intake and implementing a gentle version of the Low FODMAP diet^[20]. Foods can be supplemented with lactose-free milk and yogurt, hard cheeses, gluten-free bread or cereal products, potato, rice, quinoa, carrot, green beans, pumpkin, spinach, tomato, banana, blueberry, cantaloupe-melon, kiwi, lemon, orange, and strawberry.

Follow-up: Evaluation after 2-6 weeks to assess the effect and make necessary adjustments.

Diarrhea due to bile acid malabsorption

Initial Assessment: Assessment of symptoms and previous treatments. The surgical history is significant, as the removal of the terminal ileum and an ileocolic anastomosis is almost mandatory for this diagnosis. The diagnosis is typically made in close collaboration with a gastroenterologist.

Intervention: In the case of bile acid malabsorption, the medical treatment may be combined with a low-fat diet. The fat content in the diet is recommended to be reduced to 20% of energy intake, corresponding to 30-50 grams daily^[6,11-13]. As a specialized dietitian, one knows which foods contain "hidden" fat, such as avocado, and what alternatives patients can use to make food not tasteless and boring. For some, a gentle Low FODMAP diet may reduce symptoms.

Follow-up: Collaboration with a gastroenterologist to adjust treatment based on the patient's response. Medical treatment with colestyramine or colesevelam can be used in conjunction with dietary adjustments, and if the effect is insufficient, treatment with liraglutide may be attempted^[10,22].

Constipation

Initial Assessment: Experience suggests that the initial assessment should primarily evaluate the patient's fiber intake, fluid intake, and level of physical activity, as these areas often relate to constipation problems.

Intervention: Adjustments in the diet to optimize fiber intake and hydration, supplemented with increased physical activity. Based on the dietary history, the meal pattern is adjusted to 3 main meals and 1-3 snacks daily if food intake is 1-2 times daily, along with regulation of fluid intake and exercise. An attempt is made to achieve a fiber intake of 25 grams per day. The use of psyllium husks also has a beneficial effect. Regarding fluid intake, 30-40 mL/kg/day is recommended, but no more than 2-3 L per day. As for exercise, 30 minutes of walking daily or other equivalent physical activity is recommended.

Follow-up: Ongoing assessment and adaptation of diet and treatment strategies are adjusted based on effect.

Bloating and flatulence

Initial Assessment: Identifying foods that contribute to the symptoms, and clarifying underlying constipation.

Intervention: Use of the gentle version of a Low FODMAP diet^[20] or elimination of specific trigger foods, assessed from a thorough dietary history. Additionally, advice such as chewing food thoroughly and avoiding eating too quickly can have a beneficial effect. Excluding certain FODMAPs (polyols) can also have a beneficial effect, especially for chewing gum and foods containing sorbitol, mannitol, or other sweeteners from the sugar alcohol group.

Follow-up: Gradual reintroduction of foods to identify triggers.

Discussion

The implementation of these algorithms requires an individual approach, as patients' reactions to dietary changes can vary significantly. Experience shows that while some patients experience significant improvement in their symptoms, others need further

adjustments or combined medical and dietary intervention. Challenges such as patient compliance and variation in individual dietary preferences underscore the need for a flexible and patient-centered approach.

The discussion on the dietitian's role in the late complication clinic for patients treated for colorectal and anal cancer opens a series of important considerations and insights that highlight the complexity and significance of nutritional intervention in this context^[3,5,7,10,11,12,13,14,17]. As an example, a patient could be seen after bowel resection with diarrhea. Extensive diagnostic work-up found bile acid diarrhea after which medical treatment with colesevelam is given. As the optimal effect is not seen with medical treatment alone, dietary treatment is also initiated via a dietitian. The patient is introduced to a low-fat diet where, for example, high-fat dairy products, cheeses, types of meat, and cold cuts are changed to lean types, and fat-saving cooking methods are chosen. This resulted in a marked decrease in the patient's stool frequency, while the energy content of the diet continued to cover the patient's nutritional needs.

Nutrition is a fundamental pillar in patients' journeys, not only to address the immediate physical challenges but also to support their long-term health and quality of life. This discussion brings forth several key points that require further attention and reflection. Firstly, the varied and often complex nutritional needs of patients underscore the importance of an individualized approach to diet planning and counseling. Dietitians face the challenge of developing nutrition plans that not only meet nutritional deficiencies and symptoms but also consider patients' personal preferences, lifestyle, and social circumstances. This demands a deep understanding of patients' unique situations and a flexible and empathetic approach to counseling.

Moreover, the interdisciplinary nature of the dietitian's work highlights the need for effective communication and collaboration within the broader clinical team. Integrating nutritional care into the patient's overall treatment plan is crucial for ensuring a holistic approach to rehabilitation. This involves dietitians regularly exchanging information and coordinating with other actors in the late complication clinic such as surgeons, gastroenterologists, and nurses to achieve the best patient outcomes. The dietitian's role also provides a broader understanding of functional and medical gastrointestinal diseases for nurses and doctors attached to the late complication clinic.

The challenges of patient compliance and engagement in nutritional interventions also demand attention. While dietitians' counseling and support are critical, patients' willingness and ability to implement and maintain dietary changes are equally important. This raises questions about how best to motivate patients, support behavior changes, and overcome barriers to compliance. Strategies such as patient education, regular follow-up, and the use of behavior change techniques can be effective but require further research and adaptation to individual patient needs.

Finally, the discussion emphasizes the need for ongoing research into nutritional interventions for cancer survivors. While progress has been made in understanding the role of nutrition in cancer rehabilitation, there is still an urgent need for further evidence-based research to optimize dietitian interventions. This includes studies evaluating the effectiveness of specific dietary interventions, developing new approaches to address nutrition-related sequelae, and exploring the long-term impact of nutritional

care on patients' health and quality of life.

In light of these considerations, it is clear that the dietitian's role in late complication clinics is crucial and multifaceted, requiring a combination of professional expertise, creativity, and compassion. By addressing these challenges and seizing opportunities for improvement, dietitians can continue to play a pivotal role in supporting the journey for patients treated for colorectal and anal cancer, thereby contributing to improved patient care and quality of life.

Perspectives

Through individualized nutrition plans, comprehensive patient education, and close interdisciplinary collaboration, dietitians crucially contribute to improving patients' nutritional status, managing nutrition-related sequelae, and ultimately enhancing quality of life. Their work underscores the importance of a holistic approach to patient care, encompassing both the physical and psychological aspects of the journey.

Food choices vary depending on the country of residence. It can be seen that countries like Sweden, the UK, and Spain consume overall fewer amounts of FODMAPs than, for example, Denmark^[10,23-25]. This may be due to the intake of rye bread (a FODMAP) being common in Denmark but not traditionally eaten in other countries. There may also be other foods that are used to a greater or lesser extent depending on locality.

Future perspectives within this field should focus on developing more refined, evidence-based nutritional interventions that can be tailored to the unique needs and circumstances of individual patients. This requires ongoing research to explore new dietary strategies, evaluate their effectiveness, and integrate them into clinical practice. Furthermore, it is crucial to promote education and training of healthcare professionals on the role of nutrition in cancer rehabilitation to ensure a broader implementation of nutritional interventions in the care of cancer survivors.

It is essential to strengthen patients' engagement and compliance through innovative approaches to education and support, considering the growing role of digital media in health information and patient care. By addressing these areas, dietitians and the broader healthcare team can continue to improve care and support for patients treated for colorectal and anal cancer, thereby contributing to setting new standards for rehabilitation and long-term care in this patient group.

Lastly, future research efforts should include ways to prevent post-treatment bowel dysfunction. It is well established that pre-operative radiation therapy plays an important role in the development of bowel dysfunction seen long term after treatment. However, newer treatment approaches with more advanced radiotherapy techniques such as intensity-modulated and image-guided radiotherapy and volumetric modulated arc therapy may result in lower late gastrointestinal toxicity rates^[26]. However, this field is in rapid development, and currently with standard neoadjuvant therapy, up to a third of patients may achieve a complete pathological response^[27], although our current knowledge on the effect on bowel dysfunction as late sequelae is not fully known. Future research efforts to increase survival through more effective neoadjuvant regimens should therefore include focus on late sequelae in these patients.

Conclusion

The dietitian's contribution to managing sequelae in patients treated for colorectal or anal cancer is crucial. By offering tailored nutritional interventions and support, dietitians can play a key role in improving patients' quality of life. Moving forward, there is a need for further research to optimize dietitian interventions and develop evidence-based guidelines specifically aimed at this patient group.

Abbreviations

FODMAP, fermentable oligosaccharides, disaccharides, monosaccharides and polyols.

Declarations of interest

All authors declared that there are no conflicts of interest.

Authors' contributions

LJ: conception, design, interpretation, contribution of details, substantial revision of work; BTO: conception, design, substantial revision of the work; JR: conception, design, planning, data acquisition, interpretation, wrote the manuscript.

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