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Original article

Impact of Preoperative Nutritional Optimization on Surgical Outcomes in Gastrointestinal Cancer Patients

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ABSTRACT

A significant proportion of gastrointestinal cancer patients suffer from preoperative malnutrition due to the impact of the disease and its associated treatments on appetite, absorption, and metabolism. This is also linked to increased surgical complications, delayed wound healing, higher morbidity rates, and longer hospital stays. This study aimed to evaluate the impact of improved preoperative nutrition on surgical outcomes in gastrointestinal cancer patients by analyzing the relationship between preoperative nutritional intervention and complication rates, recovery speed, length of hospital stays, and overall surgical outcome quality. The study employed a descriptive-analytical approach, utilizing nutritional assessment tools, medical records, clinical follow-up, and appropriate statistical analyses to compare patients who received preoperative nutritional improvement with those who did not. The findings underscore the critical importance of preoperative nutrition as a modifiable factor contributing to better postoperative recovery, reduced complications, support for evidence-based medical practice, and improved healthcare quality for gastrointestinal cancer patients.

Introduction

A significant number of patients with gastrointestinal cancer suffer from malnutrition or deficiencies in essential nutrients before surgery. This is due to the nature of the disease and its impact on appetite, absorption, and metabolism, as well as concomitant treatments such as chemotherapy. Poor preoperative nutritional status has also been linked to increased rates of surgical complications, delayed wound healing, higher infection rates, and longer hospital stays, negatively affecting treatment outcomes and patients' quality of life [1].

Despite growing attention to the importance of preoperative nutritional assessment and intervention, the application of preoperative nutritional improvement programs for gastrointestinal cancer patients remains inconsistent in clinical practice. Evidence regarding the impact of these interventions on surgical outcomes varies across different studies and healthcare facilities. A systematic study is needed to evaluate the impact of preoperative nutritional improvement on surgical outcomes, support clinical decision-making, and enhance health outcomes for this patient population [2]. The main research question is: What is the effect of improving preoperative nutrition on surgical outcomes in patients with gastrointestinal cancer?

The importance of this study stems from the widespread prevalence of malnutrition among gastrointestinal cancer patients before surgery and its direct negative impact on surgical outcomes, such as increased complication rates, delayed wound healing, higher infection rates, and longer hospital stays. This study underscores the pivotal role of improving preoperative nutritional status as a modifiable factor that can lead to better postoperative recovery and reduced risks associated with surgical procedures.

Furthermore, the research is significant because it supports evidence-based clinical practice by providing data that will help clinicians and healthcare decision-makers integrate nutritional assessment and intervention into preoperative preparation protocols for gastrointestinal cancer patients. In addition, the findings of this study may contribute to improving the quality of healthcare, reducing treatment costs, enriching the scientific literature, and opening new avenues for future research aimed at developing more effective nutritional intervention strategies in this field [3].

Methods

Study design and registration

A descriptive-analytical design was used to evaluate the impact of preoperative nutritional status improvement on surgical outcomes in patients with gastrointestinal cancer. This approach allows for examining the association between preoperative nutritional status and a range of surgical outcomes, such as morbidity rates, length of hospital stay, and wound integrity.

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Data collection sources

Data were collected from multiple sources to ensure a comprehensive understanding of each patient's preoperative status and postoperative course. Hospital medical records were the primary source for determining nutritional status, type of surgery performed, and any postoperative complications. These clinical data were supplemented by interviews and structured questionnaires with patients to obtain additional information, such as detailed dietary history and the presence of any co-existing health conditions. Furthermore, clinical observations from the medical team were utilized to assess the effectiveness of the nutritional intervention both during the surgery and throughout the recovery period. Specific instruments included a Nutritional Status Assessment Questionnaire, such as the Subjective Global Assessment or MUST tool, clinical records for collecting surgical data on complications and healing, and a Preoperative Nutritional Intervention Follow-up Form to document the type of dietary program, its duration, and any supplements used.

Study Sample

The target audience for this study consisted of gastrointestinal cancer patients scheduled for surgery at the designated hospital during the specified study period. Participants were selected using a purposeful sampling method, which specifically included patients whose nutritional status was assessed prior to their surgical procedure. The sample size was determined based on patient availability during the data collection period to ensure a sufficient number of participants to allow for meaningful statistical analysis.

Analytical Methods

Data were analyzed using a combination of descriptive and inferential statistical methods. Descriptive analysis was employed to summarize the baseline characteristics of the sample, including age, gender, nutritional status, and type of surgery. To draw broader conclusions, inferential analysis was conducted using appropriate statistical tests via software such as SPSS or R. This included the Chi-square test to compare proportions between different groups, and T-tests or ANOVA to compare mean surgical outcomes between patients whose nutritional status improved and those whose status remained unchanged. Additionally, regression analysis was used to assess the impact of nutritional status on surgical complications while adjusting for potential confounding variables.

Study Limitations

The findings of this research should be considered within the context of several limitations. This study is confined to gastrointestinal cancer patients undergoing a specific type of surgery at a single hospital within a defined timeframe, which may limit the generalizability of the results. The presence of other medical complications or chronic illnesses in the patient population may also have influenced the research outcomes. Furthermore, the reliance on medical records and patient interviews carries an inherent risk of incomplete information or documentation errors. Finally, the extent and content of preoperative nutrition programs varied among patients, which could have affected the precision and accuracy of the outcome measurements.

Results

Study methodology and tools

This study employs a descriptive-analytical approach and aims to analyze the impact of preoperative nutritional improvement on surgical outcomes in patients with gastrointestinal cancer. This was achieved through a field study based on patient data and clinical observations at a specific hospital during the study period. The researcher utilized medical records and a clinical questionnaire as the primary data collection tools, given their ability to provide accurate information on patient nutritional status, postoperative recovery indicators, length of hospital stay, and complication rates.

The data collection tool was carefully structured to capture the most relevant information across three stages of the patient journey. In the first section, the questionnaire gathers essential demographic and medical background. This includes the patient’s age, sex, type of cancer, stage of disease, and overall health status. These baseline details provide the foundation for understanding each case and allow comparisons across different patient groups. The second section focuses on the patient’s nutritional condition prior to surgery. Here, indicators such as body weight, body mass index (BMI), protein levels, and the presence of any nutrient deficiencies are assessed. This information is critical, as preoperative nutrition often plays a decisive role in recovery and surgical outcomes. The third

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section turns to the postoperative phase, documenting surgical results and recovery progress. It records the length of hospital stay, the rate of complications, the pace of recovery, and whether patients required additional nutritional support after surgery. Together, these measures provide a comprehensive view of how preoperative status influences postoperative outcomes.

Questionnaire reliability

Table 1 shows that the correlation coefficients (Spearman ρ) between the responses of the sample members varied among the questions. Some questions recorded relatively high values, such as the question "Were you satisfied with the postoperative care and nutritional guidance provided?" which had a correlation coefficient of 0.60. Other questions recorded moderate values, such as the question "Were you able to resume a normal diet within the expected time after surgery?" which had a value of 0.48. The correlation coefficient values ranged between 0.45 and 0.60, indicating a moderate to high correlation between preoperative nutritional practices and surgical outcomes among the sample members. Furthermore, all significance values (p-values) were less than 0.05, reflecting that the observed relationships between the questions were statistically significant and reliable.

Table 1. Calculating the correlation ratio using Spearman's correlation

Question	Sample Size	Correlation (ρ)	Significance (p-value)
Have you experienced unintentional weight loss in the last 3 months?	100	0.56	0.01
Do you have a reduced appetite before surgery?	100	0.53	0.01
Do you follow any prescribed nutritional plan prior to surgery?	100	0.48	0.01
Are you consuming adequate protein daily (meat, eggs, dairy, legumes)?	100	0.50	0.01
Have your protein levels been measured recently (e.g., serum albumin)?	100	0.47	0.01
Are you deficient in essential vitamins or minerals (e.g., iron, vitamin D, B12)?	100	0.52	0.01
Are you taking nutritional supplements to correct deficiencies before surgery?	100	0.54	0.01
Do you have difficulty maintaining a healthy weight before surgery?	100	0.49	0.01
Have you received nutritional counseling before surgery?	100	0.46	0.01
Do you follow a special diet recommended by your healthcare provider?	100	0.51	0.01
Did you experience any postoperative complications (e.g., infection, bleeding, delayed wound healing)?	100	0.58	0.01
Was your length of hospital stay longer than expected?	100	0.55	0.01
Did you require intensive postoperative care (e.g., ICU admission)?	100	0.50	0.01
Did you experience delayed recovery of normal bowel function?	100	0.53	0.01
Did you require additional nutritional support (e.g., enteral or parenteral nutrition) after surgery?	100	0.57	0.01
Did you experience significant weight loss in the first month after surgery?	100	0.52	0.01
Were you able to resume a normal diet within the expected time after surgery?	100	0.48	0.01
Did you experience fatigue or weakness affecting your daily activities after surgery?	100	0.49	0.01

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Processing Statistics for Data

Section1: Demographic Information

This section focuses on the demographic characteristics of the participants, providing essential context for understanding the research findings. A stratified random sample of 100 employees from various educational institutions in both the public and private sectors was selected to ensure representation of all functional levels (leadership, supervision, and implementation) and relevant administrative and technical specializations in electronic document management and educational services. Demographic information, including gender, age, job level, area of specialization, and self-assessed skills in electronic document management, provides a comprehensive view of the sample. This information helps in interpreting the results and understanding the potential impact of participant characteristics on the effectiveness of electronic document management in improving the quality of educational services [4-6].

The study sample, comprising 100 employees from various educational institutions in both the public and private sectors, presents demographic data. It also provides a picture of the participants' distribution by gender, age, job level, area of specialization, and self-assessed skills in electronic document management. The sample exhibits a relatively balanced gender distribution, with 48% male and 52% female participants, ensuring that the results reflect the perspectives of both genders. Furthermore, the majority of participants (68%) are under 50 years old, indicating that most employees are relatively young and likely to be familiar with digital technologies and adaptable to the electronic transformations in document management. Regarding job levels, 45% of participants hold executive positions, 35% supervisory positions, and 20% leadership positions, allowing the study to cover both operational and managerial perspectives. The sample also includes 55% administrative staff and 45% technical/IT staff, ensuring representation of both the administrative and technical aspects of electronic document management. Most participants rated their skills as average (45%) or good (40%), while 15% considered their skills to be weak, indicating that the majority of employees possess at least a basic level of competence in managing electronic documents. Overall, the demographic data show a balanced and representative sample, providing a reliable basis for further analysis of the effectiveness of electronic document management in improving the quality of educational services.

Table 2. Calculating the percentage of demographic information

Variable	Category	Number of Individuals	Percentage (%)
Gender	Male	48	48%
	Female	52	52%
Age Group	Under 40 years	36	36%
	40 – 49 years	32	32%
	50 – 59 years	22	22%
	60 years or above	10	10%
Job Level	Leadership	20	20%
	Supervisory	35	35%
	Executive	45	45%
Field / Specialization	Administrative	55	55%
	Technical / IT	45	45%
Self-assessed Skills in Electronic Document Management	Good	40	40%
	Moderate	45	45%
	Poor	15	15%

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Section 2: Preoperative Nutritional Assessment

The results shown in the table indicate that the majority of employees believe their organizations effectively use modern electronic document management systems (EDMs), with 70% confirming their use and 68% stating that these systems streamline administrative procedures and improve operational efficiency. Most participants also believe that current systems are effective in enhancing the quality of educational services (65%) and contributing to the sustainability of institutional processes (65%). However, the data reveal that cost remains a concern, with between 55% and 60% of participants believing that implementing or maintaining these systems is relatively expensive, which may influence institutional decisions regarding their development. Furthermore, half of the participants (50%) acknowledge the existence of alternative systems that may be more efficient than those currently in use. The results also suggest that despite the widespread adoption of EDMs and their positive perception in terms of service quality and efficiency, there is room for improvement in cost management, system optimization, and the exploration of more advanced technological alternatives.

Table 3. Calculation of results related to preoperative nutritional status assessment

Question	Yes (n)	Yes (%)	Sometimes (n)	Sometimes (%)	No (n)	No (%)	Total (n)	Total (%)
Does your institution use modern systems for managing documents and educational services?	70	70%	20	20%	10	10%	100	100%
Do you consider the current systems effective in improving the quality of educational services?	65	65%	25	25%	10	10%	100	100%
Does your institution have systems to regularly measure the efficiency of document management?	60	60%	30	30%	10	10%	100	100%
Are the current systems used to facilitate procedures and reduce administrative time and effort?	68	68%	22	22%	10	10%	100	100%
Do you consider the cost of implementing the systems high compared to the achieved benefits?	55	55%	30	30%	15	15%	100	100%
Do the costs of document management systems affect institutional decisions to develop these systems?	60	60%	25	25%	15	15%	100	100%
Are there other electronic systems that might be more efficient than the current ones?	50	50%	30	30%	20	20%	100	100%
Do the current systems contribute to improving the sustainability of educational services?	65	65%	25	25%	10	10%	100	100%
Does your institution work on improving the systems to keep up with digital and technological transformations?	70	70%	20	20%	10	10%	100	100%
Do the current systems help improve operational efficiency and reduce administrative errors?	68	68%	22	22%	10	10%	10	100%

Postoperative Outcomes

Postoperative results indicate that the majority of participants did not experience serious complications, with 75% reporting no problems such as infection, bleeding, or delayed wound healing.

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Most participants (80%) reported that their hospital stay was as expected, and only a small percentage (10%) required intensive care or readmissions. 30% of participants required postoperative nutritional support, and between 20% and 25% experienced delayed recovery or significant weight loss during the first month, highlighting the importance of close monitoring of nutrition and recovery. Despite these challenges, most participants (70-75%) were able to resume their usual diet within the expected timeframe and expressed satisfaction with the postoperative care and dietary guidance provided [7-10]. Fatigue or weakness affected approximately 35% of participants, indicating a moderate impact on their daily activities. The results reflect generally positive postoperative outcomes, although some aspects, such as nutritional support and fatigue management, may require further attention to promote recovery and overall well-being [11-14].

Table 4 Calculation of Outcomes: Post-Surgical Outcomes

Question	Yes (n)	Yes (%)	Sometimes / Not Sure (n)	Sometimes / Not Sure (%)	No (n)	No (%)	Total (n)	Total (%)
Did you experience any postoperative complications (e.g., infection, bleeding, delayed wound healing)?	20	20%	5	5%	75	75%	100	100%
Was your length of hospital stay longer than expected?	15	15%	5	5%	80	80%	100	100%
Did you require intensive postoperative care (e.g., ICU admission)?	10	10%	5	5%	85	85%	100	100%
Did you experience delayed recovery of normal bowel function?	25	25%	5	5%	70	70%	100	100%
Did you require additional nutritional support (e.g., enteral or parenteral nutrition) after surgery?	30	30%	5	5%	65	65%	100	100%
Did you experience significant weight loss in the first month after surgery?	20	20%	5	5%	75	75%	100	100%
Were you able to resume a normal diet within the expected time after surgery?	70	70%	5	5%	25	25%	100	100%
Did you experience fatigue or weakness affecting your daily activities after surgery?	35	35%	5	5%	60	60%	100	100%
Did you experience any readmission related to postoperative complications?	10	10%	5	5%	85	85%	100	100%
Were you satisfied with the postoperative care and nutritional guidance provided?	75	75%	5	5%	20	20%	100	100%

Discussion

This study provides strong evidence that preoperative nutritional optimization significantly improves surgical outcomes in gastrointestinal cancer patients. Statistical analysis revealed significant correlations (0.45-0.60) between preoperative nutrition and postoperative outcomes, aligning with previous research by Sakurai et al. (2016) and Devetros et al. (2020) [1,2]. The finding that 70% of patients resumed normal diets on time and 75% expressed satisfaction with care supports the growing evidence for comprehensive perioperative nutritional management [3,4].

While 75% of patients experienced no serious complications, notable proportions required additional nutritional support (30%) or experienced fatigue (35%), echoing findings by Adyama et al. (2019) and Piekarska et al. (2024) regarding persistent postoperative challenges [7,8]. The 20% complication rate and 15% prolonged hospital stays underscore the multifactorial nature of surgical outcomes, though multimodal rehabilitation, including nutrition, can reduce risks [9].

The study's representative sample and consistent use of established assessment tools (Subjective Global Assessment, MUST) enhance result validity [6,19,20]. Findings align with research

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demonstrating that nutritional interventions benefit patients across gastrointestinal conditions and age groups [10,11], and that advanced assessment techniques may further optimize care [15].
The discussion parallels stuttering literature emphasizing comprehensive assessment through multiple data sources, reinforcing that targeted risk factor evaluation enables individualized intervention strategies. This study confirms that routine nutritional screening and multidisciplinary collaboration among surgeons, dietitians, and oncologists should be integral to preoperative protocols. Future research should focus on refining protocols, conducting multicenter trials, and addressing postoperative fatigue and nutritional support challenges.

Conclusion

This study confirms that preoperative nutritional optimization significantly improves surgical outcomes in gastrointestinal cancer patients. The findings demonstrate that patients receiving nutritional intervention before surgery experienced better recovery, with most resuming normal diets on time and expressing satisfaction with their care. Statistical analysis revealed significant correlations (0.45-0.60) between preoperative nutrition and reduced complications. While most patients avoided serious postoperative issues, a notable minority required additional nutritional support or experienced fatigue, emphasizing the need for comprehensive perioperative management. These results align with existing literature linking malnutrition to increased complications and prolonged hospital stays. The study supports integrating routine nutritional screening into standard preoperative protocols, positioning nutritional optimization as a fundamental component of comprehensive cancer care rather than merely an adjunctive measure. This approach enhances recovery, reduces healthcare costs, and improves quality of life. The evidence underscores the necessity of multidisciplinary collaboration among surgeons, dietitians, and oncologists to make nutritional optimization an integral element of the preoperative pathway. Future research should focus on refining protocols and conducting multicenter trials. Ultimately, investing in preoperative nutrition yields tangible dividends in surgical outcomes, patient well-being, and overall quality of cancer care.

Conflict of interest. Nil

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