

Early Enteral Nutrition In Postoperative Of Gastrointestinal Surgery: A Review

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Abstract

Background: The surgical patient is often at risk of malnutrition, especially when he is affected by gastrointestinal pathology. When such risk is confirmed its common to intervene with an additional nutritional support. Whenever possible, the enteric route should be privileged, once it is the most physiological, it maintains the structural and functional integrity of the intestinal barrier and it helps to stimulate the secretion of intestinal hormones, preventing the atrophy of the intestinal mucosa.

Objective: To access the benefits and the safety of early enteral nutrition in the postoperative of gastrointestinal surgery.

Method: Review of the literature that used the PICO methodology to compile the research question. The research was performed in CINAHL *Complete*, Cochrane Central Register of Controlled Trials; Cochrane Database of Systematic Reviews and Pubmed databases to identify studies published between 2015 and 2019. Nine randomized clinical trials and six systematic reviews were selected. **Results:** Most of the articles included in this review point to the benefits of early enteral in people undergoing gastrointestinal surgery, namely the rapid recovery of intestinal function and reduction in hospital stay, which in turn reduces hospital costs. Only two articles considered this nutritional approach not viable/safe due to the increase in postoperative complications in its participants.

Conclusion: This review reveals that early enteral nutrition is a beneficial and safe intervention in the postoperative of gastrointestinal surgery. However, due to some limitations of the studies analyzed and given the wide range of scenarios and surgical interventions, further studies are suggested.

Keywords: Nursing care; Surgical patient; Postoperative; Gastrointestinal surgery; Enteral nutrition.

Introduction

The hospital environment, and the surgical one in particular, promotes malnutrition to appear, since the anxiety/stress caused by surgery leads to a hypermetabolic state, in which there is a considerable increase in the consumption of proteins and of energy [1]. That said, the surgical patient is considered a risk patient because, depending on the pathology, he may be in a state of nutritional deficiency, especially if that pathology is gastrointestinal and affects the digestion and absorption of nutrients, and that dysfunction, based on a hypermetabolic state, can potentiate malnutrition [2]. Malnutrition, in the postoperative context, has several consequences and is associated with a considerable increase in morbidity and risk of death [2].

Thus, it becomes extremely important to intervene with an additional nutritional support, once it is confirmed that the person cannot maintain adequate nutrition [3]. This nutritional support can be performed through the administration, individually or in combination, of special nutrition directly in the gastrointestinal tract (oral or tube supplementation) and through the supply of nutrients intravenously [4].

However, this review refers only to the use of early enteral nutrition in the postoperative period of gastrointestinal surgery, in the sense of assessing whether it

is a safe approach and if it contributes to the improvement of the patient's nutritional state, accelerating his recovery process.

The objective of the study is to access the benefits and the safety of early enteral nutrition in the postoperative of gastrointestinal surgery.

Methods

The interest in the methodology of literature reviews has been increasing, since these methods allow a practice based on scientific evidence designed to solve complex problems, thus bringing important contributions to the field of nursing [5,6]. A literature review corresponds to a research article that uses predefined methods to identify all relevant published and unpublished documents that answer the defined research question. In addition, it evaluates the quality of these articles, extracts the data and synthesizes the results [5].

Reviews of the literature can take on different aspects depending on the degree of systematization and function they are intended for [6], being the present review an integrative literature review, since it is intended to carry out a comprehensive study on the subject under study and the inclusion of studies of different methodologies is envisaged. The integrative literature review uses the broadest type of research review methods, allowing the

combination of primary and secondary studies, combining data from theoretical and empirical literature, to better understand a phenomenon [6]. In this way, it contributes to decision-making and promotes the incorporation of evidence found in daily professional action, opening new paths for the improvement of clinical practice [5].

In this integrative literature review, the authors sought to respect all the fundamental steps recommended, namely: Identification of the theme and selection of the hypothesis or research question; Establishment of criteria for inclusion and exclusion of studies/sampling or literature search; Definition of information to be extracted from selected studies/categorization of studies; Evaluation of included studies; Interpretation of results; Presentation of the knowledge synthesis [6].

To formulate the research question, the PICO mnemonic was used: (P) Population, (I) Intervention; (C) Comparison, and (O) Outcome. The following question was asked to answer the outlined objective that served as the guiding principle for this literature review: Is early enteral nutrition (intervention) a beneficial and safe intervention that contributes to the improvement of the nutritional status (outcome) of the surgical patient in postoperative of gastrointestinal surgery (Population)?

The research strategy included a search for studies published in French, English, Spanish, and Portuguese carried out by the three authors, independently, to identify studies published in the last five years, between January 2015 and December 2019, in CINAHL Complete, Cochrane Central Register of Controlled Trials; Cochrane Database of Systematic Reviews and Pubmed databases. The search included the descriptors "Early enteral nutrition", "Early enteral feeding", "Early nutrition", "Surgical patient", "Surgical patients", "Operative patient", "Postoperative", "Gastrointestinal" and "Gastrointestinal surgery". The descriptors were connected with the Boolean operators "AND" and "OR" in the following arrangement: "Early enteral nutrition" OR "Early enteral feeding" OR "Early nutrition" AND "Surgical patient" OR "Surgical patients" OR "Operative patient" OR "Postoperative" AND "Gastrointestinal" OR "Gastrointestinal surgery".

The privileged studies focused in studies that aimed at the objective outlined to answer the research question, and whose publication date was between January 2015 and December 2019. Regarding the exclusion criteria, the authors excluded studies that did not identify with the thematic under study and whose publication date was before 2015.

The initial survey identified 845 results and 34 duplications. The evaluation of the remaining results, carried out by three authors, proceeded in two phases, namely: the phase of selecting the studies to be analyzed after reading the titles and the abstracts, which allowed the identification of 32 studies, and the phase of full reading of all studies, after which, once the inclusion criteria and analysis of the levels of evidence and methodological quality were applied, 15 studies were selected (Figure 1).

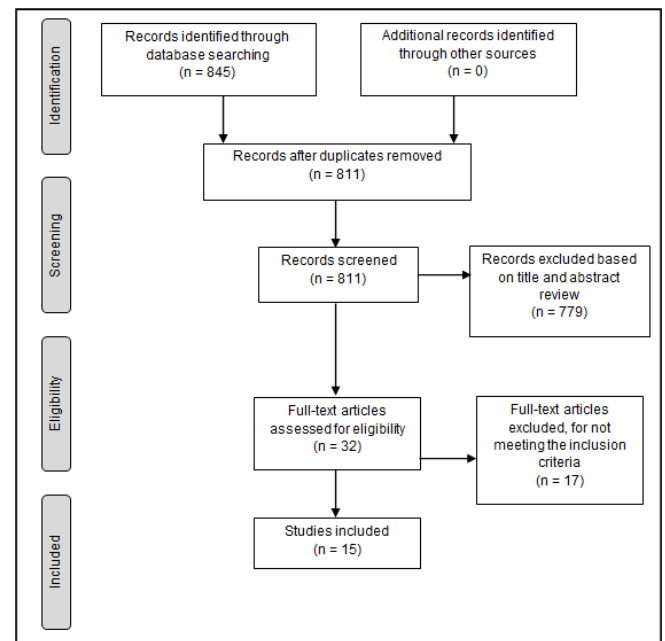


Figure 1 – PRISMA diagram to the presentation of the search method.

The levels of evidence from the studies selected for this review were evaluated based on the levels of evidence from The Joanna Briggs Institute [7]. The methodological quality was analyzed using the Critical Appraisal Skills Program for systematic reviews of the literature and for randomized controlled trials, which allows the classification of studies at two levels: level A for studies with good methodological quality and reduced bias; level B for studies with satisfactory methodological quality, but with increased bias potential. The levels of evidence and the methodological quality are presented in Table 1.

Table 1: Classification of the articles by levels of evidence and methodological quality

Title	Level of Evidence	Methodological Quality
Early initiation of oral feeding following upper gastrointestinal tumor surgery: a randomized controlled trial	1.c – Randomized Controlled Trial.	Level A
The postoperative clinical outcomes and safety of early enteral nutrition in operated gastric cancer patients	1.c – Randomized Controlled Trial.	Level A
Impact of early postoperative enteral nutrition on clinical outcomes in patients with gastric cancer	1.c – Randomized Controlled Trial.	Level A
Early Enteral Versus Total Parenteral Nutrition in Patients Undergoing Pancreaticoduodenectomy: A Randomized Multicenter Controlled Trial	1.c – Randomized Controlled Trial.	Level A
Comparison of multi-modal early oral nutrition for the tolerance of oral nutrition with conventional care after major abdominal surgery: a prospective, randomized, single-blind trial	1.c – Randomized Controlled Trial.	Level A
Early Oral Feeding Following McKeown Minimally Invasive Esophagectomy: An Open-label, Randomized, Controlled, Noninferiority Trial	1.c – Randomized Controlled Trial.	Level B
Efficacy of Early Enteral Immunonutrition on Immune Function and Clinical Outcome for Postoperative Patients With Gastrointestinal Cancer	1.c – Randomized Controlled Trial.	Level B
Effect of early oral feeding on length of	1.c – Randomized	Level A

hospital stay following gastrectomy for gastric cancer: a Japanese multicenter, randomized controlled trial	Controlled Trial.	
Effects of Early Initiation of Solid Versus Liquid Diet after Endoscopic Submucosal Dissection on Quality of Life and Postoperative Outcomes: A Prospective Pilot Randomized Controlled Trial	1.c – Randomized Controlled Trial.	Level A
Early Oral Feeding as Compared with Traditional Timing of Oral Feeding After Upper Gastrointestinal Surgery - A Systematic Review and Meta-analysis	1.b - Systematic review of RCTs and other study designs.	Level A
Optimal postoperative nutrition support for patients with gastrointestinal malignancy: A systematic review and meta-analysis	1.a – Systematic review of Randomized Controlled Trials (RCTs).	Level A
Impact of Early Enteral Nutrition on Nutritional and Immunological Outcomes of Gastric Cancer Patients Undergoing Gastrectomy: A Systematic Review and Meta-Analysis	1.b – Systematic review of RCTs and other study designs.	Level B
Effects of early postoperative enteral nutrition versus usual care on serum albumin, prealbumin, transferrin, time to first flatus and postoperative hospital stay for patients with colorectal cancer: A systematic review and meta-analysis	1.b - Systematic review of RCTs and other study designs.	Level B
Early enteral nutrition within 24 hours of lower gastrointestinal surgery versus later commencement for length of hospital stay and postoperative complications	1.a - Systematic review of Randomized Controlled Trials (RCTs).	Level A
The effect of diets delivered into the gastrointestinal tract on gut motility after colorectal surgery- A systematic review and meta-analysis of randomised controlled trials	1.a - Systematic review of Randomized Controlled Trials (RCTs).	Level A

Results

It was decided to present the results obtained by analyzing the studies included in this review in table format (Table 2) in order to facilitate and simplify their reading and interpretation.

Discussion

Although there are some differences in the articles selected for this review, namely concerning gastrointestinal pathologies, surgeries performed and the nutritional approach adopted, in all studies the authors pointed to the objective of evaluating the efficacy and safety of early enteral nutrition. After analyzing and interpreting the results, it became evident that the majority of authors identified numerous benefits with this nutritional strategy.

In the study by Mahmoodzadeh, Shoar, Sirati and Khorgami [8], the authors focused on determining the length of hospital stay between the group of late oral feeding and the group of early oral feeding and concluded that this parameter was lower in the group of early oral feeding (6 days, while in the other group it was 8) and rehospitalization occurred less frequently. The postoperative results were also compared, having shown more favorable values in the group of early oral feeding, particularly, shorter duration of intravenous serum administration, a shorter time to flatus, better tolerance to the soft diet and less need for gastric tube reinsertion. In addition, this group had a lower prevalence of postoperative adverse events, that is, nausea and vomiting.

The results of the study by Herbert, Perry and Anderson [9] are in line with the results of this study, since they point to a reduction in the length of hospital stay in the early feeding group. There was no clear difference between the two groups with regard to postoperative complications and mortality. This study reinforces the evidence that early feeding reduces postoperative permanence. Likewise, in the study by Willcutts, Chung, Erenberg et al. [10], the authors concluded that there were no differences between the late oral feeding group and the early oral feeding group regarding the risk of anastomotic leak, the need for nasogastric tube reinsertion, reoperation, mortality and readmission. Hospital stay and the risk of pneumonia were lower in the group of early oral feeding.

In the study by Sun, Li, Li, et al. [11], the authors found that allowing the consumption of liquids and solids in a slow and careful manner, immediately after McKeown's minimally invasive esophagectomy, is not an inferior strategy to the standard regimen of restricting oral intake with posterior enteral feeding, in terms of cardiac, respiratory and gastrointestinal complications, and in terms of adverse events associated with the surgical site. Therefore, it does not appear to be justifiable to restrict oral intake to avoid dehiscence of anastomosis and pneumonia. Early oral feeding has also improved recovery of intestinal function and reduced postoperative length of stay. In addition, the results indicate that early suspension of parenteral nutrition after the fourth postoperative day is feasible and safe.

The study by Li, Liu, Guo et al. [12] demonstrated that the incidence of fever and its duration, the recovery time of intestinal function and the length of stay in the postoperative period was relatively shorter in the group that received early enteral nutrition for 7 days and allowed to verify that there were no significant differences regarding anastomotic leak, postoperative ileus and regurgitation between the two groups. Regarding the immunological parameters evaluated, it was found that the activity of multiple immune cells was lower in all patients on the first day after surgery, when compared to preoperative levels. However, on the seventh postoperative day, the levels were similar to the preoperative levels in the group of early enteral nutrition, while in the group of parenteral nutrition they remained at lower levels. Regarding the nutritional status, the levels of serum albumin and prealbumin decreased on the first postoperative day, improving on the seventh day in the group of early enteral nutrition. Therefore, the results demonstrate that the recovery of intestinal function, immune function and nutritional status of patients who received early enteral nutrition were superior to those who received parenteral nutrition. In the study by Li, Liu, Guo et al. [13] in which enteral nutrition in water during the initial postoperative period was compared with the use of a nasoenteral feeding tube and intravenous infusion, it was found that enteral nutrition contributes to the improvement of nutritional status, as well as immune function, in addition to contribute to the reduction of

postoperative fever, anal exhaust time, hospitalization time and hospital costs.

In the study by Luo, Wang, Zhang et al. [14], participants in the group that received early enteral immunonutrition showed less weight loss, less time to first defecation and shorter hospital stay, and the serum level of albumin and prealbumin, as well as immune function, at eighth postoperative day were significantly higher. It was also found that after the administration of early enteral immunonutrition, the general condition of the participants improved, with a longer complication-free survival. It should be noted that the authors did not identify

differences in hospital cost, major short-term postoperative complications and hemoglobin. Additionally, Nikniaz, Somi, Nagashi and Nikniaz [15] also show that early enteral nutrition is superior to parenteral nutrition since the participants had a faster postoperative recovery of serum levels of albumin and prealbumin and it was found an increase in the level of immune cells. Early enteral nutrition facilitated the synthesis of important proteins, which consequently resulted in less hospital stay. This effect can be attributed to the effective maintenance of the intestinal mucosa barrier function, reduction of endotoxin and bacterial translocation, and reduction of postoperative

Table 2 – Synopsis of the analyzed studies

Authors (Date)	Title	Research Population/Sample	Interventions Phenomena of Interest	Results/ Authors' conclusions	Limitations
Mahmoodzad et al. (2015).	Early initiation of oral feeding following upper gastrointestinal tumor surgery: a randomized controlled trial.	109 patients with esophageal or gastric tumor submitted to surgical resection.	Patients were randomly divided into two groups: one group received early oral feeding on the first postoperative day (n=54), while the other group remained nil by mouth until the return of bowel sounds-late oral feeding - late oral feeding group (n=55).	The early initiation of oral feeding after surgical resection of esophageal and gastric tumors is safe, without additional complications. It is also associated with more favorable hospital outcomes and an early return to gastrointestinal function and hospital discharge.	The simultaneous comparison of patients with esophageal cancer and gastric tumor is a source of heterogeneity, although the tumor sites and types of surgery were similar between the two groups. Postoperative quality of life should have been assessed. In addition to comparing the different postoperative nutritional regimens, a long-term follow-up of patients should have been carried out.
Li et al. (2015a).	The postoperative clinical outcomes and safety of early enteral nutrition in operated gastric cancer patients.	400 patients with gastric cancer, undergoing radical gastrectomy of any extend with D2 nodal dissection.	Patients were randomly divided in two groups: Control group (n=200): parenteral nutrition in the postoperative period, lasting 7 days; Experimental group (n=200): early enteral nutrition, lasting 7 days. All patients had a nasoenteral draining tube for 3-4 days postoperatively.	The benefits of early enteral nutrition in the postoperative period were greater than the benefits of parenteral nutrition, in terms of recovery of intestinal function, immune function and nutritional status. Early enteral nutrition is a safe and effective practice, as it allows complete recovery of the patient without increasing the occurrence of complications.	
Li et al (2015b).	Impact of early postoperative enteral nutrition on clinical outcomes in patients with gastric cancer.	300 patients undergoing open radical gastrectomy.	Patients were randomly divided in two groups: Control group (n=150): conventional perioperative treatment, consisting of a nasoenteral feeding tube and postoperative intravenous infusion. Experimental group (n=150): enteral nutrition in water during the early postoperative period.	Early postoperative enteral nutrition improves the nutritional status as well as the immune function of patients with gastric cancer. In addition, it reduces the duration of postoperative fever, anal exhaust time and length of postoperative hospital stay. Hospital costs were significantly lower in the experimental group, since the recovery of gastrointestinal function after surgery was faster.	
Perinel et al. (2016).	Early Enteral Versus Total Parenteral Nutrition in Patients Undergoing Pancreaticoduodenectomy: A Randomized Multicenter Controlled Trial (Nutri-DPC)	204 patients undergoing pancreaticoduodenectomy.	Patients were divided into two groups: Group of early enteral nutrition by nasojejunal tube (n=103); Group of total parenteral nutrition (n=101).	Early enteral nutrition by nasojejunal tube has been associated with increased overall postoperative complications rate in patients undergoing pancreaticoduodenectomy. The frequency and the severity of postoperative pancreatic fistula increased significantly after this nutritional approach.	Participants were not randomized according to their nutritional state and the study did not include a group of immune-enriched enteral nutrition. The outcomes of early oral feeding with routine use of artificial nutrition should have been compared and analyzed.

Sun et al. (2017).	Comparison of multi-modal early oral nutrition for the tolerance of oral nutrition with conventional care after major abdominal surgery: a prospective, randomized, single-blind trial.	107 patients undergoing major abdominal surgery.	Patients were randomly divided into two groups: Multimodal early oral nutrition group (n=53), which included: chewing sugar-free gum 3 times per day; appetite stimulation; water intake upon waking and juice 6 hours after surgery; oral administration of enteral nutrition suspension 12 hours after surgery; Group with conventional care (n=54), which included: drinking water after surgery, according to the patients' wishes; intake of enteral nutrition suspension in a gradual manner until normal requirements are achieved. Both treatments lasted 8 days.	Multimodal early oral nutrition was superior to conventional care in terms of improving gastrointestinal function and tolerance to oral nutrition during the first week after surgery, reducing the length of stay in the hospital and improving the cost-effectiveness ratio.	The markers of recovery of gastrointestinal function (time to first defecation, time to flatus and recovery time of bowel sounds) are subjective, which might cause inaccurate assessment. It was not possible to evaluate whether the multimodal protocol was more effective than early oral nutrition or chewing gum alone. The cost of the multimodal program did not include all components, so the results and the evaluation of intangible costs (such as pain and suffering due to illness), most likely, were influenced. In addition, the economic parameters may differ from country to country, depending on the type of health care system and insurance reimbursement systems.
Sun et al. (2018).	Early Oral Feeding Following McKeown Minimally Invasive Esophagectomy: An Open-label, Randomized, Controlled, Noninferiority Trial	280 patients who underwent McKeown's minimally invasive esophagectomy for esophageal cancer.	Patients were randomly allocated to two groups: Oral feeding group on the first postoperative day (n=140); Late oral feeding group (through a nasogastric tube, which was removed on the seventh postoperative day, in which they started the same diet as the other group (n=140). In this last group, parenteral nutrition was also used, from the first postoperative day to the third.	Early oral feeding, after McKeown's minimally invasive esophagectomy, is a safe and viable strategy. Compared to late oral feeding, the early enteral nutrition group achieved faster recovery of intestinal function and improved short-term quality of life.	The viability of early oral feeding has not been investigated in patients undergoing other surgical procedures, such as open surgery, and with different anastomotic methods. The selected patients were relatively young, with few comorbidities and a low percentage of neoadjuvant therapy.
Luo et al. (2018).	Efficacy of Early Enteral Immunonutrition on Immune Function and Clinical Outcome for Postoperative Patients with Gastrointestinal Cancer.	78 patients with gastrointestinal cancer undergoing surgery.	Patients were randomly divided into two groups: Parenteral nutrition group (n=44); Early enteral immunonutrition group (n=34).	Early enteral immunonutrition is safe and well tolerated. It is even superior to parenteral nutrition because it not only improves the nutritional level in the early postoperative period but also decreases the duration of hospitalization. In addition, it can increase immune function, lessen the inflammatory cytokine serum level and prolong progression-free survival, increasing the patient's quality of life.	The efficacy of the novel approach in patients with European Organisation for Research and Treatment of Cancer QLQ-C30 / QLQ-CR38 (an appropriate measure of postoperative quality of life especially for cancer patients) has not been proved. Overall postoperative survival and longer follow-up of complications-free survival were not analyzed.
Shimizu et al. (2018).	Effect of early oral feeding on length of hospital stay following gastrectomy for gastric cancer: a Japanese multicenter, randomized controlled trial.	263 patients who underwent distal gastrectomy or total gastrectomy for gastric cancer.	The participants were first distributed according to the surgical intervention to which they were subjected and within each intervention they were subsequently randomly divided into two groups: Control group (n=132) with conventional postoperative; Intervention group (n=131) with early oral feeding.	Early oral feeding in patients with distal gastrectomy did not shorten the length of postoperative stay and was associated with a higher incidence of postoperative complications, so this strategy is not recommended. On the other hand, early oral feeding seems to be a potential strategy for reducing postoperative permanence in patients with total gastrectomy.	The study did not attain the established target sample size in the total gastrectomy group, making it difficult to conclude if early oral feeding can be implemented safely for all those patients. Perioperative care (drain management, nutrition, pain control) was not unified among the participating institutions.

Miyakawa et al. (2019).	Effects of Early Initiation of Solid Versus Liquid Diet after Endoscopic Submucosal Dissection on Quality of Life and Postoperative Outcomes: A Prospective Pilot Randomized Controlled Trial.	100 patients submitted to endoscopic submucosal dissection for gastric neoplasms.	Patients were randomly divided into two groups: Solid diet group (n=50), which started with rice porridge; Liquid diet group (n=50) which started on liquid diet, with gradual transition to solid food.	Early resumption of a solid diet after endoscopic submucosal dissection is feasible. The consumption of solid foods improves the quality of life and can accelerate wound healing in patients with gastric neoplasms. Conventional use of liquid diets may not be necessary if hemostasis is confirmed after endoscopic submucosal dissection.	The definition of feasibility is ambiguous. The basic nutritional assessment used was inadequate. The study design included a second-look endoscopy, a practice not routinely recommended.
Willcutts et al. (2016).	Early Oral Feeding as Compared with Traditional Timing of Oral Feeding After Upper Gastrointestinal Surgery: A Systematic Review and Meta-analysis.	15 studies (n=2112): 8 randomized controlled trials, 6 Observational prospective cohort studies with historical controls, 1 Retrospective cohort study.	Compare the effects of early oral feeding to traditional (or late) timing of oral feeding after upper gastrointestinal surgery on clinical outcomes. Cointerventions sometimes included other forms of nutritional support, such as tube feeding or parenteral nutrition.	Delaying oral feeding after upper gastrointestinal surgery does not seem to be protective when compared with allowing early postoperative oral feeding in adults in the postoperative period. Early postoperative feeding is also associated with shorter hospital length of stay.	Inherent clinical heterogeneity: combination of studies with different types of upper gastrointestinal surgery; methodological heterogeneity: while 80% of the studies started oral feeding early on the first postoperative day, there was a large variation in when the traditional (or late) fed group started oral feeding. The composition of initial diet and the diet advancement regimen varied. Four studies provided supplementary nutritional support, which may compromise the results. The risk of bias was high in one of the studies. The studies were conducted in different countries, where standard surgical practice likely varies.
Yan et al. (2017).	Optimal postoperative nutrition support for patients with gastrointestinal malignancy: A systematic review and meta-analysis.	30 Randomized Controlled Trials (n=3854).	Compare the clinical outcomes of parenteral nutrition with standard enteral nutrition and immuno-enhanced nutrition in patients with gastrointestinal tumors undergoing surgery.	Enteral nutrition and immuno-enhanced nutrition may not decrease the incidence of mortality in patients with gastrointestinal cancer after surgery, but it may decrease the morbidity of life-threatening complications, including respiratory tract infections, wounds infections and anastomotic leakage. Parenteral nutrition should be restricted to patients with severe intolerance to enteral nutrition.	No assessment was performed in terms of the impact on immunological function and metabolomics due to lack of data and sample size. Some studies had a poor quality, which induced a prominent heterogeneity in terms of certain outcome measurements.
Nikniaz et al. (2017).	Impact of Early Enteral Nutrition on Nutritional and Immunological Outcomes of Gastric Cancer Patients Undergoing Gastrectomy: A Systematic Review and Meta-Analysis.	7 Randomized Controlled Trials and other study designs (n=835).	To evaluate the impact of early enteral nutrition on postoperative nutritional and immunological outcomes of gastric cancer patients, by comparing early enteral nutrition and parenteral nutrition.	Early administration of enteral nutrition is more effective in improving postsurgical nutritional status and for the immune index in patients with gastric cancer. In addition, the length of stay in the hospital in the enteral group was significantly less than the parenteral group.	Publication bias could not be completely excluded. Not all trials included in the review appear to be methodologically sound. Inclusion of some studies with poorly representative samples. Unclear or inadequate blinding and allocation concealment.
Yang et al. (2018).	Effects of early postoperative enteral nutrition versus usual care on serum albumin, prealbumin, transferrin, time to first flatus and postoperative hospital stay for patients with colorectal cancer: A systematic review and meta-analysis.	26 studies (n=2307): 15 randomized controlled trials and 11 studies with other research designs.	To estimate the effect of early enteral nutrition for postoperative Colorectal cancer. The chosen articles contain one or more of the following outcome measures: serum albumin, prealbumin, transferrin, time to first flatus and postoperative hospital stay.	Compared with traditional nutritional intervention, early enteral nutrition, after colorectal resection, appears to be safe and effective in promoting recovery. This is associated with better nutritional status, faster recovery of gastrointestinal motility and shorter postoperative hospital stay.	Nine studies did not report the randomization method. There was no description of dropouts or withdrawals in the included studies. Heterogeneous studies. As the methods of intervention for early enteral nutrition included both oral and tube feeding, it was not possible to elucidate the advantages and disadvantages of different forms of feeding.

Herbert et al. (2019).	Early enteral nutrition within 24 hours of lower gastrointestinal surgery versus later commencement for length of hospital stay and postoperative complications.	17 Randomized Controlled Trials (n=1437).	Evaluate whether the early commencement of postoperative enteral nutrition (within 24 hours), oral intake and any kind of tube feeding (gastric, duodenal or jejunal), compared with traditional management (delayed nutritional supply) is associated with a shorter length of hospital stay, fewer complications, mortality and adverse events in patients undergoing lower gastrointestinal surgery.	Early feeding reduces postoperative permanence, which is clinically and economically important.	Inconclusive results for postoperative complications, mortality, adverse events and quality of life. The studies used different feeding routes and different amounts of energy, making the best approach to be considered in clinical practice barely noticeable. Substantial heterogeneity and poor quality evidence.
Hogan et al. (2019).	The effect of diets delivered into the gastrointestinal tract on gut motility after colorectal surgery- A systematic review and meta-analysis of randomized controlled trials.	10 Randomized Controlled Trials (n=1237).	Determine the effectiveness of diets into the gastrointestinal tract on gut motility, following colorectal surgery. The interventions included the comparison between: Early feeding versus traditional postoperative fasting; Solids versus progression of fluids to solids; Complete Nutrition versus Hypocaloric Nutrition; Coffee and diet versus water and diet; Enteral nutrition and diet versus parenteral nutrition and diet.	Any form of early postoperative diet will likely stimulate gut motility, resulting in an earlier return of bowel function and a shorter length of hospital stay.	Low quality and small number of studies included within this review. This means that there was insufficient evidence to confirm that one intervention was superior to another. Low overall quality of evidence for each outcome. Possibility of publication bias, as essays in other languages are not included. Heterogeneity of studies.

intestinal stress. The study by Yang, Wei, Huo et al. [16] found that early enteral nutrition after colorectal surgery has been associated with an improvement in the level of serum albumin and prealbumin, in the recovery of gastrointestinal function and in the postoperative hospital stay compared to the traditional nutrition method, especially in patients with colon cancer.

The study by Sun, Li, Liu et al. [17] suggests that the mechanisms of the multimodal protocol seem to improve the recovery of gastrointestinal function, since the visual stimulation used can trigger the initial phase of the brain and the phase of the mouth and stomach and promote the recovery of inhibition of the splanchnic nerve of the motor activity due to surgery. In addition, the early supply of oral nutrition can decrease inflammation and consequently decrease the duration of the postoperative ileus. After analyzing the results obtained, the authors concluded that this approach increased the success rate of oral nutrition during the first week after surgery and decreased hospital stay, as well as hospital costs. The study by Miyakawa, Kodera, Sakuma et al. [18] concluded that participants in the liquid diet group had a greater loss of appetite, constipation and had a greater perception that they were experiencing a food restriction during hospitalization. Regarding the rate of ulcer healing by post-endoscopic submucosal dissection, there was a tendency to improve healing in the solid diet group, even though late hemorrhage was observed in one of the participants in this

group. Regarding the length of stay, this was the same for both groups.

The study by Yan, Zhou, Lan et al. [19] certified that, compared to parenteral nutrition, standard enteral nutrition contributes to a lower incidence of postoperative complications, including respiratory tract infection, wound infections and anastomotic leak. In addition, it has reduced the length of hospital stay. Subsequently, a comparison was made between immuno-enhanced enteral nutrition and standard enteral nutrition, the result showing that the addition of immunological elements could further improve the prognosis. There was also a decrease in the general incidences of infectious and non-infectious complications.

In the study by Hogan, Steffens, Rangan et al. [20], when comparing early feeding with traditional postoperative fasting, it was observed that the first contributes to reducing the time to first flatus and the length of hospital stay. When comparing the early introduction of solids with the progression of fluids to solids, it was found that intestinal motility, hospital stay and mortality were similar between the two groups. However, solids seem to decrease nausea on the first day after surgery. They also compared Complete Nutrition with Hypocaloric Nutrition, having verified that neither one nor the other influences the time to first flatus. As for coffee and diet, compared to water and diet, there was a reduction in the time to first flatus. Enteral nutrition and diet versus parenteral nutrition and diet did not differ in terms of length of stay. Thus, the authors

concluded that any early postoperative diet is more beneficial for intestinal motility than keeping the patient fasted orally. In turn, the study by Perinel, Mariette, Dousset et al. [21], contradicts the results of some previous studies, regarding the comparison between enteral nutrition and parenteral nutrition, since the authors concluded that early enteral nutrition by nasojejunal tube was associated with an increase in postoperative complications, namely higher frequency of postoperative pancreatic fistula. In addition, they reported that there was no significant impact on length of stay and mortality in 30 days. It was also found that the participants in the parenteral nutrition group started oral feeding earlier.

In the study by Shimizu, Oki, Tanizawa et al. [22], the average postoperative hospital stay in the control group, which received conventional postoperative management, was 10 days for participants who underwent distal gastrectomy and 12 days for participants who underwent total gastrectomy. In the experimental group, the mean length of hospital stay in the postoperative period was 10 days for participants who underwent distal gastrectomy and total gastrectomy. In addition to this parameter, it was also observed that severe pain seemed to be associated with lower consumption of oral energy. However, the authors confirmed a higher incidence of postoperative complications in the experimental groups, which led them to not recommend this strategy.

Conclusion

The vast majority of scientific evidence found suggests that enteral nutrition is a safe and effective therapy, which has numerous benefits for patients undergoing gastrointestinal surgery. The most obvious benefits are the rapid improvement in intestinal function and the reduction in hospital stay, which in turn reduces hospital costs. However, this intervention also contributes to the improvement of nutritional state, immune function and a better quality of life.

In addition, the frequency with which adverse events/postoperative complications are reported is quite low and this did not appear to influence the mortality rate, which invalidates the fact that it is a safe intervention that can be instituted early.

Some interesting discoveries were also investigated, such as: The mechanisms of the multimodal protocol seem to improve the recovery of gastrointestinal function, since the visual stimulation used (observe food in media programs, see other people eating, perceive the color and flavor of favorite foods, drink small amounts of juice fruit, chewing a gum and early delivery of oral nutrition) can increase the success rate of oral nutrition during the first week after surgery and significantly decrease the length of hospital stay, as well as the cost of treatment; Immuno-enhanced enteral nutrition is an excellent support strategy that promotes the optimization of results from the early use of enteral nutrition; Any form of early postoperative diet will likely stimulate bowel motility, resulting in an earlier return to bowel function and shorter hospital stay.

However, although the evidence supports the early implementation of this nutritional strategy in the respective population, the authors of the selected articles are unanimous in considering that more studies are needed to corroborate their results.

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