GEORGIAN MEDICAL NEWS

ISSN 1512-0112

NO 9 (378) Сентябрь 2026

ТБИЛИСИ - NEW YORK



ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

Monthly Georgia-US joint scientific journal published both in electronic and paper formats of the Agency of Medical Information of the Georgian Association of Business Press. Published since 1994. Distributed in NIS, EU and USA.

GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНИТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman** (**Кириллица**), для текста на грузинском языке следует использовать **AcadNusx.** Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - http://www.spinesurgery.ru/files/publish.pdf и http://www.nlm.nih.gov/bsd/uniform_requirements.html
В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректура авторам не высылается, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or compu-ter-printed on a single side of standard typing paper, with the left margin of **3** centimeters width, and **1.5** spacing between the lines, typeface - **Times New Roman** (**Cyrillic**), print size - **12** (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf
In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

Articles that Fail to Meet the Aforementioned Requirements are not Assigned to be Reviewed.

ავტორთა საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე,დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx.** შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შეღებვის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფჩხილებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

GEORGIAN MEDICAL NEWS
NO 9 (378) 2026

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GEORGIAN MEDICAL NEWS
No 9 (378) 2026

NUTRITIONAL SUPPORT IN SURGICAL PATIENTS. PROTEIN-ENERGY METABOLISM DISORDERS

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Abstract.

Nutritional support plays a key role in the treatment of surgical patients. This review presents current information on the impact of protein-energy malnutrition on surgical outcomes and analyzes modern approaches to nutritional support across the preoperative and postoperative periods. Nutritional therapy methods are considered, including enteral and parenteral nutrition, as well as special immunomodulating formulas, along with their indications and contraindications. It has been shown that proactive nutritional support (especially in patients with malnutrition) helps reduce the incidence of postoperative complications, infections, shortens hospital stays, and improves long-term outcomes. The literature on the significance of nutritional support in enhanced recovery after surgery (ERAS) programs is discussed separately, including in oncological and geriatric patients and in intensive care units. Based on an analysis of 65 sources, it is concluded that early identification of nutritional deficiencies and the timely initiation of enteral or parenteral nutrition are integral components of comprehensive management for surgical patients, contributing to reduced mortality and improved treatment outcomes.

Key words. Nutritional support, parenteral nutrition, enteral nutrition, surgical patients, perioperative period, protein-energy metabolism disorder.

Introduction.

Protein-energy deficiency (malnutrition) is a widespread problem among surgical patients, representing a serious interdisciplinary issue that negatively affects not only treatment outcomes but also the economic indicators of healthcare [1]. Traditionally, prolonged fasting was practiced in the perioperative period; however, modern research has convincingly demonstrated that proactive nutritional support before and after surgery reduces complication rates and shortens hospitalization time [2-4]. Numerous clinical observations indicate that insufficient nutrition is associated with poorer surgical outcomes – increased wound and infectious complications, delayed wound healing, and higher mortality rates [5-8]. According to researchers, signs of malnutrition are found in 15–60% of surgical patients (depending on the cohort and assessment criteria) [7]. An increase in the severity of nutritional deficiency is accompanied by longer hospital stays and higher treatment costs [1]. All of this substantiates the need for active management of nutritional status throughout the entire perioperative period. Given the high prevalence of protein–energy malnutrition among surgical patients and its well-documented association with adverse postoperative outcomes, nutritional support has emerged as a critical component of perioperative and intensive care management. Despite the availability of clinical guidelines and growing evidence supporting early and individualized nutritional interventions, significant variability remains in clinical practice, particularly in critically ill surgical patients. Therefore, this narrative review aims to summarize and critically discuss current evidence on the role of nutritional support in surgical patients with protein–energy malnutrition, with particular emphasis on perioperative management and intensive care, and to highlight its impact on clinical outcomes and postoperative recovery.

To achieve this aim, this review addresses key aspects of nutritional screening and assessment, available modalities of nutritional support, indications and limitations of nutritional therapy, and its role in improving postoperative outcomes within Enhanced Recovery After Surgery (ERAS) protocols.

Materials and Methods.

Study Design:

This narrative review focuses on nutritional support in surgical patients with protein–energy metabolism disorders during the perioperative period. The narrative review approach was selected to provide a comprehensive, clinically oriented synthesis of diverse evidence addressing pathophysiological mechanisms, nutritional strategies, and their impact on outcomes in both perioperative and intensive care settings.

Literature Search Strategy:

A structured literature search was conducted using the following electronic databases: PubMed/MEDLINE, Scopus, and Web of Science. In addition, reference lists of relevant articles and international clinical guidelines were manually screened to identify further pertinent publications. Particular attention was paid to recommendations issued by professional societies involved in clinical nutrition and perioperative care (e.g., ESPEN, ASPEN, ERAS Society). The search included publications published in English and Russian from January 2000 through December 2025. Only studies involving adult surgical patients were considered.

Search Terms and Keywords: The search strategy combined controlled vocabulary terms and free-text keywords related to nutritional support and surgical care. The following keywords and their combinations were used: nutritional support, enteral

nutrition, parenteral nutrition, surgical patients, perioperative period, protein–energy metabolism disorder OR protein–energy malnutrition, critical care OR intensive care unit, Enhanced Recovery After Surgery OR ERAS.

Boolean operators (AND/OR) were applied to refine the search, and database-specific filters were used where appropriate.

Selection Criteria and Data Synthesis: Publications were selected based on their relevance to the objectives of the review, scientific quality, and clinical applicability. The review included randomized controlled trials, observational and cohort studies, systematic and narrative reviews, and international clinical guidelines. Priority was given to studies reporting clinically meaningful outcomes, such as postoperative complications, infectious morbidity, mortality, length of hospital stay, and recovery parameters. Data extraction and synthesis were performed qualitatively. The findings were analyzed and integrated to identify consistent trends, areas of agreement and controversy, and gaps in current knowledge related to nutritional support in surgical and critically ill patients.

Rationale for Narrative Review Approach: A narrative review methodology was considered the most appropriate design for this study due to the heterogeneity of patient populations, surgical procedures, nutritional interventions, and outcome measures reported in the literature. The available evidence spans multiple surgical specialties and clinical settings, including intensive care units, with substantial variation in study design and intervention protocols, limiting the feasibility of a narrowly focused systematic review or meta-analysis.

Furthermore, the primary aim of this review was to integrate current evidence with clinical practice considerations, highlight pathophysiological and organizational aspects of nutritional therapy, and provide a clinically relevant overview applicable to perioperative and intensive care management. The narrative review approach allows for contextual interpretation of findings and supports individualized decision-making in nutritional support strategies.

Results.

Preoperative Nutritional Support:

Screening and patient preparation. An important component of preoperative preparation is the early detection and correction of malnutrition. It is recommended to perform nutritional screening for all incoming surgical patients using standardized scales (NRS-2002, MUST, etc.) [9]. This allows for the timely identification of high-risk individuals who require preoperative nutritional intervention. Clinical experience has shown that severe malnutrition directly worsens the prognosis even in relatively safe procedures. For instance, in cardiac surgery, patients with low serum albumin levels and other signs of malnutrition have a significant decrease in long-term survival after cardiac operations [10-12]. Such data underline the necessity of optimizing a patient's nutrition prior to surgery.

According to current approaches, if severe malnutrition is detected, elective surgery should be postponed, and a course of nutritional support should be conducted over 7–14 days to improve the protein-energy status [13-21]. Criteria for this strategy include >10–15% body weight loss over the past 6 months, BMI <18 kg/m², serum albumin <30 g/L (in the absence of liver failure), and other factors indicating a significant nutritional deficit [21]. Implementing preoperative nutritional therapy (especially in oncology patients) significantly reduces the frequency of postoperative complications and improves tolerance to radical treatment [22-25]. European guidelines on nutrition in cancer patients explicitly state that nutritional support should begin without delay when a risk of malnutrition is present, even before cachexia develops [25]. Several clinical studies in gastrointestinal surgery have confirmed that preoperative nutritional correction (including the use of high-protein specialized formulas) reduces postoperative morbidity and accelerates recovery [26-29]. For example, in patients with gastrointestinal tumors, preoperative intake of immunomodulating formulas containing arginine and omega-3 fatty acids is associated with a lower incidence of infectious complications and pneumonia [30].

Optimizing the feeding regimen before surgery:

In addition to dietary enrichment, reconsidering the preoperative fasting approach is important. Previously, patients were instructed to fast for 8–12 hours before surgery; however, it is now proven that reducing the fasting period improves tolerance to the procedure. International guidelines allow the intake of clear fluids up to 2 hours before anesthesia and solid food up to 6 hours before surgery [10]. This regimen does not increase the risk of aspiration and simultaneously prevents the catabolic effects of prolonged fasting [11]. Moreover, patients are recommended to consume approximately 400 mL of a carbohydrate-containing drink 2–3 hours before anesthesia (referred to as carbohydrate loading), rather than the traditional 'overnight fasting' [10]. This method reduces insulin resistance, supports energy balance during surgery and in the early postoperative period, and ultimately contributes to shorter rehabilitation times [2,3,4,10].

Special patient categories: Nutritional preparation of patients with comorbidities and risk factors requires particular attention. For example, elderly and senile patients often suffer from sarcopenic osteopenia and hidden malnutrition, which is frequently underestimated due to excess weight or concomitant diseases [14]. Targeted preoperative nutritional support in geriatric patients helps reduce postoperative mortality and complication rates, as confirmed by clinical observations [31-46]. Another challenging group is patients with obesity. Despite their excess weight, they may suffer from protein and muscle mass deficiency (sarcopenic obesity), which impairs regenerative capacity and increases the risk of infections [47,48]. These patients also require assessment of their nutritional status and, if necessary, preoperative dietary correction.

Analysis of clinical data indicates that in patients with obstructive jaundice, hemostatic disturbances are closely associated with the duration of the disease and the overall somatic status. Given the high prevalence of malnutrition in this patient population, nutritional support should be considered an essential component of treatment, contributing to the improvement of liver function and the hemostatic system [49-61].

Severe malnutrition is particularly common in oncologic surgical patients. For instance, in esophageal and gastric cancer,

up to 50–70% of patients present with significant weight loss and hypoalbuminemia at the time of surgery, due to the combined effect of tumor intoxication and reduced food intake [15]. Nutritional support is an essential part of preparation for such patients. In preoperative 'prehabilitation' programs, cancer patients are prescribed high-calorie formulas, enteral supplements, and, in some cases, immunonutrition formulas (see enteral feeding section below for details). Modern Enhanced Recovery After Surgery (ERAS) protocols also include measures to optimize nutrition, such as reduced fasting, carbohydrate loading, elimination of routine bowel preparation, and early resumption of postoperative feeding [16]. Thus, key elements at the preoperative stage include screening and correction of malnutrition, an adequate calorie-protein diet in the preceding days, minimization of fasting, and metabolic preparation for surgical stress.

It is worth noting that, despite strong evidence supporting nutritional preparation, its implementation in clinical practice remains suboptimal. According to surveys, many surgeons and anesthesiologists still underestimate the importance of nutrition and do not fully adhere to nutritional support recommendations [17]. A multinational study evaluating actual perioperative nutritional practices revealed significant variability – from active use of enteral formulas to almost complete neglect of nutrition in the postoperative period [18]. This highlights the need for further integration of modern protocols and training of healthcare personnel in nutritional therapy principles.

Postoperative Nutritional Support:

Early postoperative nutritional support is as important as preoperative preparation. Nutritional restoration should begin as early as possible—immediately after the patient's condition stabilizes. If the gastrointestinal tract is functional, it should be used for feeding (the principle of 'if the gut works, use it'). According to the ERAS concept, prolonged fasting in the postoperative period is not recommended; instead, early enteral nutrition promotes wound healing and reduces catabolism [19]. Many studies have confirmed the safety and benefits of initiating enteral nutrition within the first 24 hours after surgery, even after major abdominal procedures [20,45]. Early administration of nutrient formulas via the gastrointestinal tract (through a naso-intestinal tube or stoma) is associated with lower rates of anastomotic leakage, infectious complications, and earlier return of bowel function [19,45,47]. Even after complex surgeries such as esophagectomy, early tube feeding on a special diet helps partially prevent severe weight loss and improves treatment tolerance during the rehabilitation period [31].

Enteral Nutrition:

The primary method of nutritional support after surgery is enteral nutrition (EN)—the delivery of nutrients into the digestive tract (orally or via a tube). EN is physiological, helps maintain intestinal mucosal trophism, prevents bacterial translocation, and is better absorbed by the body [21]. Whenever possible, patients are encouraged to consume fluids and light foods orally as soon as possible. If oral intake is difficult (e.g., after extensive resections of the stomach, esophagus, or intestines), nutrition is administered via a nasogastric or nasojejunal tube, gastrostomy, or enterostomy. Enteral formulas may be complete (containing necessary proteins, fats, carbohydrates, vitamins, and trace elements) or specialized for specific patient groups. The advantages of enteral feeding are clear: it is more physiological, does not require strict solution sterility, is cheaper, and is associated with fewer infectious complications compared to parenteral nutrition [30]. Modern guidelines strongly recommend prioritizing enteral nutrition in all patients with a functioning gastrointestinal tract [21,22].

Parenteral Nutrition:

Parenteral nutrition (PN) is the method of delivering nutrients directly into the bloodstream, bypassing the digestive tract. Total parenteral nutrition is used when enteral feeding is not possible or insufficient to meet the patient's needs. Indications for PN include intestinal obstruction, short bowel syndrome, severe enterocolitis, postoperative intestinal paralysis lasting more than 7 days, high-output gastrointestinal fistulas, pancreatitis with contraindications to enteral feeding, and others. PN is also used as supplemental (partial) nutrition when a patient cannot absorb the required volume enterally. However, PN carries several risks—infectious complications (e.g., catheter-related sepsis), metabolic disturbances (hyperglycemia, electrolyte imbalances), and refeeding syndrome due to rapid administration in severely malnourished patients. Therefore, PN is used strictly according to indications and under careful biochemical monitoring. Whenever minimal enteral nutrition is possible, combined feeding is preferred (partially enteral with intravenous supplementation) [23]. It is crucial not to overfeed the patient via the parenteral route; caloric intake and infusion rate must be calculated individually to prevent hyperglycemia and hepatic fat overload. Despite potential risks, properly conducted PN significantly improves outcomes in patients who would otherwise remain unfed for extended periods.

Immunonutrition:

A systematic evaluation of 15 randomized controlled trials of n-3 polyunsaturated fatty acid nutritional support in gastrointestinal cancer surgery found a lower incidence of postoperative infectious complications (RR 0.66, 95% CI 0.49–0.87) and a shorter hospital stay (mean difference −2.47 days, 95% CI −3.25 to −1.69), with a shorter duration of systemic inflammatory response syndrome [30].

Methods of Nutritional Support: Indications and Contraindications.

Choice of method: enteral vs. parenteral nutrition:

The gold standard of nutritional support for surgical patients is enteral nutrition. It is the most physiological and safest approach, so whenever the gastrointestinal tract is functional, the enteral route is preferred [21,22]. Parenteral nutrition is considered a backup or supplemental method used when enteral feeding is not feasible or fails to meet nutritional needs [23]. Absolute contraindications to enteral feeding include intestinal obstruction, active gastrointestinal bleeding, uncontrolled peritonitis, persistent paralytic ileus, severe intestinal ischemia, or other conditions in which introducing food into the GI tract is dangerous or ineffective. In all other situations, even after complex intestinal surgeries, feeding is initiated enterally as early as possible—in a gentle mode (diluted formulas,

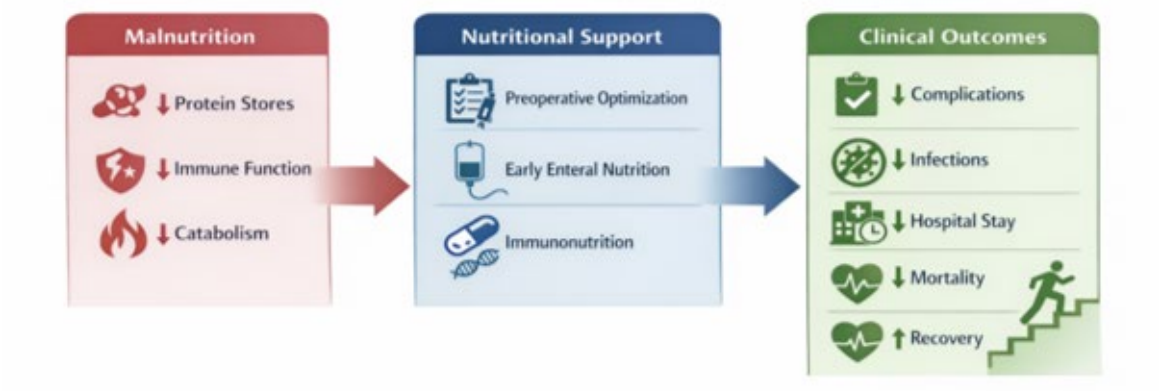


Figure 1. *Impact of Perioperative Nutritional Support on Clinical Outcomes.*

Table 1. *Nutritional Risk Stratification and Management Strategy.*

Risk Level	Nutritional Risk Criteria	Preoperative Strategy	Postoperative Strategy
Low nutritional risk	NRS-2002 <3 [9]	Standard care; minimize fasting	Early oral feeding
Nutritional risk	NRS-2002 ≥3 [9,21]	Assess and individualize nutritional support	Early oral/enteral nutrition when feasible
Severe nutritional impairment	NRS-2002 ≥3 with severe malnutrition features requiring optimization [21]	Consider 7–14 days of preoperative nutritional support when surgery can be safely delayed [21]	Early enteral nutrition; supplemental PN when indicated
Critical illness	ICU admission with sepsis, shock, or organ failure [62]	Individualized nutritional strategy [62]	Early EN when feasible; PN according to indication and tolerance [23,62,63]

Table 2. *Comparative Effectiveness of Nutritional Support Strategies.*

Standard care	Comparator	Comparator	Comparator	Applies according to clinical indication
Early enteral nutrition	Associated with lower postoperative morbidity in selected surgical populations [20,21]	May reduce postoperative complications [20,21]	Evidence supports earlier recovery; magnitude varies across studies [20,21]	Preferred when the gastrointestinal tract is functional
Parenteral nutrition	Benefit when EN is contraindicated or insufficient [23]	Outcome depends on indication, timing, and patient selection [23,63]	No uniform quantitative effect	Supplemental or replacement strategy when indicated
Immunonutrition	RR 0.66 (95% CI 0.49–0.87) for postoperative infectious complications [30]	RR 0.66 (95% CI 0.49–0.87) [30]	Mean difference −2.47 days (95% CI −3.25 to −1.69) [30]	Evidence from 15 RCTs of n-3 PUFA support; effects are population-dependent
ERAS + nutritional support	Reductions reported across individual ERAS studies; magnitude varies [16,36-39]	Generally improved recovery outcomes [16,36-39]	Shorter stay reported in ERAS pathways; no single universal range [16,36-39]	Multicomponent pathway; nutrition should be integrated with other ERAS measures
ERAS + nutritional support	↓ 30–50%	Significant reduction	↓ 2–4 days	Maximum overall benefit

drip administration through a tube) —with gradual volume escalation over several days to the calculated target. Parenteral nutrition is indicated when enteral nutrition is contraindicated or clearly inadequate. For instance, if, within 5–7 days after major surgery, a patient cannot receive more than 50% of their caloric requirement via the enteral route, supplemental parenteral nutrition is recommended [23].

Indications for nutritional therapy: It is generally accepted that all patients with moderate to severe malnutrition should receive nutritional support. Additionally, indications depend on prognosis: if it is anticipated that the patient will be unable to eat for 5–7 days or more, artificial feeding (via tube or vein) must be initiated in advance [21]. Typical indications include: severe malnutrition (NRS-2002 score ≥5, >10% weight loss, BMI <18.5), planned major surgery in debilitated patients (especially oncologic), prolonged intestinal obstruction, high-output fistulas, comatose or critically ill ICU patients, polytrauma, major burns, etc. In elective procedures involving severely malnourished patients, surgery should be postponed to allow for prior nutritional optimization (as noted above) [21]. In emergency surgery, full preoperative correction is often not feasible, so nutritional support is initiated postoperatively as soon as acute disturbances are stabilized.

Contraindications and limitations: Relative contraindications to enteral feeding include intolerance to administered formulas (e.g., severe diarrhea, bloating, gastric aspiration >500 mL/

day). In such cases, the feeding rate or formula composition is adjusted, and prokinetic agents may be used. If the issue persists, parenteral nutrition is initiated. Refeeding syndrome must be considered in patients who have undergone prolonged starvation or are severely cachectic. Rapid carbohydrate administration may lead to dangerous electrolyte shifts (hypophosphatemia, hypokalemia), so feeding should start at a reduced volume (no more than 50% of the target) and be titrated slowly under electrolyte monitoring. Contraindications to parenteral nutrition are relative and include uncontrolled hyperglycemia, severe electrolyte imbalance, and sepsis (relatively, as PN may worsen infection), as well as a functional GI tract (i.e., when enteral feeding is possible, PN is contraindicated due to unnecessary risk). Overall, the question of whether to feed via mouth/tube or intravenously is resolved in favor of the former whenever possible. The parenteral route is used only as a supplement or replacement, with strict indications. This strategy is supported by strong evidence and is reflected in all clinical guidelines [21,22,23].

Impact of Nutritional Support on Treatment Outcomes:

Adequate nutrition is a crucial factor influencing surgical treatment outcomes. A review of the literature shows that providing nutritional support to patients at risk of malnutrition significantly improves outcomes. First and foremost, it reduces the incidence of postoperative complications. A systematic review and meta-analysis of 56 randomized trials demonstrated that perioperative nutritional optimization (including preoperative dietary enrichment and early postoperative feeding) led to an approximate 26% reduction in overall complication risk [4]. Both infectious and non-infectious complications were less frequent in the nutritional support group than in the control group (RR ~0.74) [4]. Notably, wound infections and respiratory complications (pneumonia) decreased by about 29% [4]. Similar results have been reported in other studies [34,35]. For example, a prospective study on the ERAS protocol for colorectal cancer showed that active nutritional management significantly reduced postoperative infections (15% vs. 27% in the standard group) and shortened hospital stays [36]. Enhanced recovery protocols after pancreaticoduodenectomy have shown a 30–40% reduction in complications compared to traditional strategies [37,38]. Overall data confirm that each day of delayed feeding increases the risk of postoperative infections, whereas early nutrition is associated with a more favorable postoperative course [19,45,47].

In a retrospective cohort of patients undergoing minimally invasive esophagectomy, the 5-year overall survival rate was 54% in patients with severe postoperative weight loss (≥17% at 3 months) compared with 67% in those with moderate weight loss (p=0.024) [31].

Interestingly, the benefits of nutritional support extend beyond general surgery. For instance, in trauma-orthopedics, preoperative hypoalbuminemia doubled the risk of infections after joint arthroplasty, whereas correcting protein deficiency reduced wound infections and implant failure rates [5]. In neurosurgery and spinal surgery, early enteral nutrition protocols have been associated with reduced urinary tract infections and pneumonia in bedridden patients after spinal operations [50,51]. In cardiac surgery, individualized nutritional support in intensive care units helped reduce serious complications such as infective endocarditis and mediastinitis, and decreased the need for prolonged mechanical ventilation [42,43,44]. These findings broaden our understanding of nutritional therapy, as it is, in fact, a critical component of comprehensive patient management across diverse surgical disciplines.

At the same time, the effect of nutritional support may vary depending on patient category and interventions used. For relatively healthy patients without evident malnutrition, aggressive nutritional strategies may offer minimal benefit. Some studies have shown no significant reduction in complications with routine immunonutrition for all patients—benefits were observed only in those with baseline nutritional deficits [40]. This suggests that the approach should be personalized, i.e., therapy based on actual needs. On the other hand, avoiding malnutrition and providing early support are always better than attempting to reverse severe, established deficits. Modern strategy thus favors preventive feeding: initiating support before critical homeostasis disturbances arise. This philosophy underpins many ERAS protocols, which view nutrition as a form of therapy, alongside antibiotic prophylaxis, thromboprophylaxis, and other perioperative measures [16,36].

Table 1 presents the stratification of surgical patients according to nutritional risk and outlines corresponding perioperative management strategies. The data emphasize that the intensity and modality of nutritional support should be tailored to the patient's baseline nutritional status. Patients at low risk generally require standard care with early resumption of oral intake, whereas those at moderate and high-risk benefit from targeted preoperative nutritional optimization and early initiation of enteral nutrition in the postoperative period. In critically ill patients, an individualized approach with combined nutritional support is recommended. This risk-adapted strategy contributes to reducing postoperative complications, enhancing recovery, and improving overall clinical outcomes.

Discussion.

Analysis of the current literature convincingly confirms that nutritional support is an integral part of ensuring high-quality surgical care. Preoperative malnutrition is a common condition that significantly worsens treatment outcomes [5,8]. Our understanding of metabolic changes during surgical trauma and critical illness has expanded, and it is now clear that nutritional correction can positively influence clinical outcomes. Implementation of ERAS protocols—which include reduced fasting periods and early nutritional initiation—has been shown to improve short-term outcomes, reduce complication and infection rates, and accelerate recovery [36-39]. Nevertheless, several unresolved issues remain.

First, despite the existence of international and national guidelines, the actual implementation of nutritional support in clinical practice is uneven [17,18]. Many surgeons still focus predominantly on operative technique, underestimating the importance of perioperative nutrition. Continued education programs for physicians, as well as the integration of nutritional protocols into standard inpatient care guidelines, are necessary. Second, further research is needed to optimize the composition

of nutritional formulas for different patient categories. For example, the ideal composition of immunonutritional mixtures remains unclear—debates continue over the appropriateness of high arginine doses in certain conditions, the role of glutamine and omega-3 fatty acids, etc. [52]. Research is also needed on sarcopenic obesity—how to detect and treat these patients, since standard indices (e.g., BMI) may not reflect muscle mass deficits [48].

It is also not that nutritional support is the only measure for optimizing outcomes. Anemia correction, smoking cessation, alcohol withdrawal before surgery, physiotherapy (respiratory training), and psychological support are also important. Together with nutritional therapy, these measures constitute the concept of 'prehabilitation'—preparing the patient for surgery to better tolerate surgical stress [41,52]. As evidence accumulates, it becomes clear that this multidisciplinary approach is more effective than isolated surgical treatment.

A notable area of research is the provision of nutritional support to critically ill patients in intensive care units. Current international ESPEN guidance emphasizes early, individualized nutritional therapy, preferential use of enteral nutrition when feasible, progressive achievement of energy and protein targets, and careful adaptation to gastrointestinal tolerance and the clinical condition [62]. International randomized trials have also shown that the route and amount of nutrition should not be interpreted as a simple 'more is better' strategy. In NUTRIREA-2, early enteral nutrition was compared with early parenteral nutrition in mechanically ventilated adults with shock, while the TARGET trial found that increasing energy delivery with an energy-dense enteral formula did not improve 90-day survival [63,64]. The EAT-ICU trial further evaluated early goal-directed nutrition based on measured requirements versus standard care [65]. Thus, nutritional support in the ICU should be individualized rather than based on a uniform high-calorie approach.

Ultimately, it is essential to highlight the cost-effectiveness of nutritional support. The cost of complete industrial formulas and parenteral solutions is relatively low compared to the costs of treating complications. Preventing even a single case of severe wound infection or anastomotic leakage justifies nutritional therapy expenses for dozens of patients. Studies show that using oral nutritional supplements in undernourished patients may reduce overall treatment costs by shortening hospital stays and decreasing the need for intensive care [1]. Thus, nutritional support is beneficial from a public healthcare system perspective as well.

Table 2 summarizes evidence-based effects of major nutritional support strategies in surgical patients. Quantitative estimates are presented only where they are directly reported in the cited source. For early enteral and parenteral nutrition and ERAS pathways, effects are described qualitatively because the magnitude varies substantially according to patient population, surgical procedure, intervention, and study design.

Figure 1 illustrates the relationship between malnutrition, perioperative nutritional support, and clinical outcomes in surgical patients. Malnutrition is associated with depletion of protein stores, impaired immune function, and increased catabolism, all of which negatively affect postoperative recovery. The implementation of targeted nutritional interventions—including preoperative optimization, early enteral nutrition, and immunonutrition—helps to mitigate these adverse effects. As a result, nutritional support contributes to a reduction in postoperative complications and infections, shortens hospital stay, decreases mortality, and enhances overall recovery.

Limitations.

This narrative review has several limitations. First, the narrative design may be associated with selection bias, as study identification and inclusion were not performed according to a systematic review protocol. Second, a formal assessment of the methodological quality and risk of bias of the included studies was not performed. Third, substantial heterogeneity in patient populations, surgical procedures, nutritional interventions, and reported outcomes limited direct comparison across studies. Finally, although multiple electronic databases and relevant clinical guidelines were reviewed, some potentially relevant publications may not have been identified.

Conclusion.

Nutritional support has firmly established itself as a vital component of perioperative management for surgical patients. This literature review demonstrates that correcting protein-energy deficiency and optimizing nutrition before and after surgery reduce postoperative complications (both infectious and non-infectious), accelerate rehabilitation, and, in some cases, improve long-term outcomes and survival. Key elements include: preoperative screening and identification of malnutrition; if necessary, a course of nutritional preparation before elective surgery; minimization of preoperative fasting duration (including the use of carbohydrate loading); the earliest possible resumption of enteral feeding post-surgery; use of specialized immunomodulating formulas for high-risk groups; and an appropriate combination of enteral and parenteral nutrition when needed.

Enteral nutrition is recognized as the method of choice for the overwhelming majority of patients, while parenteral nutrition is indicated only when gastrointestinal use is not possible. The implementation of these principles (e.g., within ERAS protocols) has led to significant progress in reducing postoperative morbidity and hospital stays. Nevertheless, continued efforts are needed to integrate nutritional support into clinical practice, train medical personnel, and refine protocols. Nutritional therapy must be viewed as an indispensable component of comprehensive surgical care, from the preparation stage to full rehabilitation.

Acknowledgements.

The authors would like to express their sincere gratitude to colleagues and mentors who contributed to the development of this work, as well as to the institutions that provided support and resources for conducting this research.

Author Contributions.

All authors contributed equally to the conception and design of the study, literature search, data analysis, interpretation of findings, and drafting and critical revision of the manuscript. All authors approved the final version of the manuscript.

Funding.

This research received no external funding.

Ethical Approval.

Not applicable. This study is a literature review and does not involve human participants or animal subjects.

Conflict of Interest.

The authors declare no conflict of interest.

REFERENCES

1. Jensen GL. Malnutrition and clinical outcomes in older adults: the economic perspective. J Am Med Dir Assoc. 2015;16:100-104.
2. Di Muzio M, Giannetta N, Figura M, et al. Perioperative nutritional support or perioperative fasting? A narrative review. G Chir. 2019;40:377-380.
3. McClave SA, Taylor BE, Martindale RG, et al. Guidelines for the provision and assessment of nutrition support therapy in the adult critically ill patient. JPEN J Parenter Enteral Nutr. 2016;40:159-211.
4. Zhang B, Najarali Z, Ruo L, et al. Effect of perioperative nutritional supplementation on postoperative outcomes. J Gastrointest Surg. 2019;23:1682-1693.
5. Gu A, Malahias MA, Strigelli V, et al. Preoperative malnutrition and wound complications after total joint arthroplasty: a meta-analysis. J Arthroplasty. 2019;34:1013-1024.
6. Ho JW, Wu AH, Lee MWK, et al. Malnutrition risk predicts surgical outcomes in gastrointestinal operations. Clin Nutr. 2015;34:679-684.
7. Tobert CM, Hamilton-Reeves JM, Norian LA, et al. Emerging impact of malnutrition on surgical patients. J Urol. 2017;198:511-519.
8. Mosquera C, Nicholas J. Koutlas BS NJ, Edwards KC, et al. Impact of malnutrition on gastrointestinal surgical patients. J Surg Res. 2016;205:95-101.
9. Kondrup J, Rasmussen HH, Hamberg O, et al. Nutritional risk screening (NRS 2002): a new method based on an analysis of controlled clinical trials. Clin Nutr. 2003;22:321-336.
10. Ali Abdelhamid Y, Chapman MJ, Deane AM. Peri-operative nutrition. Anaesthesia. 2016;71:9-18.
11. Ljungqvist O, Søreide E. Preoperative fasting. Br J Surg. 2003;90:400-406.
12. Qian F. Malnutrition increases mortality after cardiac surgery. Nutrition. 2020;78:110831.
13. Cheeda N. Nutritional support in cardiac surgery patients. J Card Surg. 2020;35:1318-1324.
14. Siddique N, O'Donoghue M, Casey MC, et al. Malnutrition in the elderly and its effects on bone health - A review. Clin Nutr ESPEN. 2017;21:31-39.
15. Cao J, Xu H, Li W, et al. Nutritional assessment and risk factors associated to malnutrition in patients with esophageal cancer. Curr Probl Cancer. 2021;45:100638.
16. Gustafsson UO, Scott MJ, Hubner M, et al. Guidelines for perioperative care in elective colorectal surgery: Enhanced Recovery After Surgery (ERAS) Society recommendations: 2018. World J Surg. 2019;43:659-695.
17. Sandrucci S, Beets G, Braga M, et al. Perioperative nutrition and enhanced recovery after surgery in gastrointestinal cancer patients. A position paper by the ESSO task force in collaboration with the ERAS society (ERAS coalition). Eur J Surg Oncol. 2018;44:509-514.
18. Williams JD, Wischmeyer PE. Assessment of perioperative nutrition practices and attitudes-A national survey of colorectal and GI surgical oncology programs. Am J Surg. 2017;213:1010-1018.
19. Seo JM, Joshi R, Chaudhary A, et al. A multinational observational study of clinical nutrition practice in patients undergoing major gastrointestinal surgery: The Nutrition Insights Day. Clin Nutr ESPEN. 2021;41:254-260.
20. Herbert G, Perry R, Andersen HK, et al. Early enteral nutrition within 24 hours of lower gastrointestinal surgery versus later commencement for length of hospital stay and postoperative complications. Cochrane Database Syst Rev. 2018;10:CD004080.
21. Weimann A, Braga M, Carli F, et al. ESPEN practical guideline: Clinical nutrition in surgery. Clin Nutr. 2021;40:4745-4761.
22. Weimann A, Braga M, Harsanyi L, et al. ESPEN Guidelines on Enteral Nutrition: Surgery including organ transplantation. Clin Nutr. 2006;25:224-244.
23. Braga M, Ljungqvist O, Soeters P, et al. ESPEN Guidelines on Parenteral Nutrition: surgery. Clin Nutr. 2009;28:378-386.
24. Olotu C. Perioperative care of elderly patients: the PeriAge study protocol. BMJ Open. 2019;9:e031837.
25. Arends J, Bachmann P, Baracos V, et al. ESPEN guidelines on nutrition in cancer patients. Clin Nutr. 2017;36:11-48.
26. Meng Q. Impact of nutritional support in gastric cancer surgery. J Surg Oncol. 2018;117:678-687.
27. Sato T. Immunonutrition reduces complications after gastroenterological surgery. Ann Surg Oncol. 2015;22:S272-S280.
28. Klek S. Perioperative nutrition in gastrointestinal cancer patients. Nutrition. 2017;33:176-182.
29. Aoyama T. Nutrition/inflammation assessment in gastric cancer. Anticancer Res. 2021;41:2121-2130.
30. Ma YJ. Omega-3 PUFA-enriched nutrition in gastrointestinal cancer surgery: a meta-analysis. Nutr Cancer. 2016;68:568-576.
31. Koterazawa Y, Oshikiri T, Takiguchi G, et al. Severe weight loss after esophagectomy and prognosis. BMC Gastroenterol. 2020;20:407.
32. Steenhagen E, Van Vulpen JK, Van Hillegersberg R, et al. Nutrition in peri-operative esophageal cancer management. Expert Rev Gastroenterol Hepatol. 2017;11:663-672.
33. Weijs TJ, Berkelmans GHK, Nieuwenhuijzen GAP, et al. Routes for early enteral nutrition after esophagectomy. World J Surg. 2016;40:1755-1764.
34. Grass F. Peripheral parenteral nutrition versus early oral feeding in gastrointestinal surgery. Clin Nutr. 2018;37:292-298.
35. Jie B. Impact of preoperative nutritional support in abdominal surgery. World J Surg. 2020;44:907-916.
36. Zhao X. Enhanced recovery after surgery pathway in colorectal surgery: a meta-analysis. Medicine (Baltimore). 2016;95:e3497.

37. Ni TG. Enhanced recovery after surgery program in pancreaticoduodenectomy: a meta-analysis. World J Gastroenterol. 2018;24:1666-1678.
38. Soop M. Early oral feeding versus traditional care after major colorectal surgery. Clin Nutr. 2016;35:399-404.
39. Lim S. Enhanced recovery after surgery in liver surgery reduces complications. Ann Hepatobiliary Pancreat Surg. 2020;24:396-404.
40. Howes N, Chalmers A, Ziegler L, et al. Immunonutrition for patients undergoing surgery for head and neck cancer. Cochrane Database Syst Rev. 2018;8:CD010954.
41. Egholm JW, Pedersen B, Møller AM, et al. Perioperative alcohol cessation intervention for postoperative complications. Cochrane Database Syst Rev. 2018;11:CD008343.
42. Stoppe C, Goetzenich A, Whitman G, et al. Role of nutrition support in adult cardiac surgery. Crit Care. 2017;21:131.
43. López-Delgado JC. Nutrition in adult cardiac surgery: a review. J Cardiothorac Vasc Anesth. 2019;33:3143-3162.
44. Zhu M. Enhanced recovery pathway in cardiac surgery. J Anesth Perioper Med. 2018;5:221-227.
45. Herbert G. Early enteral nutrition versus delayed feeding after gastrointestinal surgery. Cochrane Database Syst Rev. 2019;7:CD004080.
46. Schneider SM. Elderly surgical patients: malnutrition and outcomes. Eur Geriatr Med. 2018;9:191-197.
47. Hausel J, Nygren J, Lagerkranser M, et al. A carbohydrate-rich drink reduces preoperative discomfort and postoperative insulin resistance. Br J Surg. 2001;88:1571-1576.
48. Englesbe MJ. Sarcopenic obesity and postoperative risk. Obes Rev. 2019;20:557-568.
49. Schiesser M. The nutritional risk index and complications in gastrointestinal surgery. Br J Surg. 2008;95:733-738.
50. Yeh DD. Multimodal nutritional management in lumbar spine surgery. Spine J. 2021;21:1335-1345.
51. Cui Y. Perioperative nutrition in spine surgery. Asia Pac J Clin Nutr. 2019;28:801-808.
52. He M. Perioperative nutritional risk and malnutrition: a narrative review. Risk Manag Healthc Policy. 2025;18:143-162.
53. Kuznetsov IE. The problem of protein-energy malnutrition in the surgical intensive care unit: a literature review. Intensive Care. 2018.
54. Zolov AV, Mamedov RD. Nutritional support in abdominal surgery. Khirurgiya. 2020;10.
55. Krutikov MA. Nutritional support from the perspective of the Enhanced Recovery After Surgery program. 2018.
56. Fadeev AV, Fadeev VV. Modern approaches to enteral nutrition in intensive care. Vestn Anesteziol. 2018;1.
57. Sokolov DA. Nutritional support of critically ill patients: a review. Klin Med. 2019;97:366-373.
58. Klimov DA. Implementation of clinical recommendations for parenteral nutrition in intensive care units. Intensive Care Herald. 2021;4.
59. Russian Federation Association of Anaesthesiologists and Reanimatologists. Clinical recommendations on nutritional support in intensive care. Moscow; 2017.
60. Ministry of Health of the Russian Federation. Standard for organization of nutritional support in intensive care units. Moscow; 2017.
61. Orazgalieva MT, Aimagambetov MZh, Abdrakhmanov ST, et al. Method for prevention of coagulopathic bleeding during surgery for mechanical jaundice. Georgian Med News. 2024;357-12:108-114.
62. Singer P, Reintam Blaser A, Berger MM, et al. ESPEN practical and partially revised guideline: Clinical nutrition in the intensive care unit. Clin Nutr. 2023;42:1671-1689.
63. Reignier J, Boisramé-Helms J, Brisard L, et al. Enteral versus parenteral early nutrition in ventilated adults with shock: a randomised, controlled, multicentre, open-label, parallel-group study (NUTRIREA-2). Lancet. 2018;391:133-143.
64. Chapman M, Peake SL, Bellomo R, et al. Energy-Dense versus Routine Enteral Nutrition in the Critically Ill. N Engl J Med. 2018;379:1823-1834.
65. Allingstrup MJ, Kondrup J, Wiis J, et al. Early goal-directed nutrition versus standard of care in adult intensive care patients: the single-centre, randomised, outcome assessor-blinded EAT-ICU trial. Intensive Care Med. 2017;43:1637-1647.

Аннотация.

Нутритивная поддержка играет ключевую роль в лечении хирургических больных. В обзоре представлена актуальная информация о влиянии белково-энергетической недостаточности на результаты хирургического лечения и анализируются современные подходы к нутритивной поддержке на разных этапах – в предоперационном и послеоперационном периодах. Рассматриваются методы нутритивной терапии, включая энтеральное и парентеральное питание, специальные иммуномодулирующие смеси, а также показания и противопоказания к их применению. Показано, что проактивная нутритивная поддержка (особенно у пациентов с мальнутрицией) позволяет снизить частоту послеоперационных осложнений, инфекций, сократить продолжительность госпитализации и улучшить отдаленные результаты лечения. Отдельно обсуждаются данные литературы о значимости нутритивной поддержки в программах ускоренного восстановления (ERAS), в том числе у пациентов онкологического и геронтологического профиля, а также в реанимационных отделениях. На основании анализа 65 источника сделан вывод, что раннее выявление нутритивной недостаточности и своевременное начало энтерального или парентерального питания являются неотъемлемой частью комплексного ведения хирургических больных, способствуя снижению летальности и улучшению исходов лечения.

Ключевые слова: Нутритивная поддержка, панетеральное питание, энтеральное питание, хирургические пациенты, периоперационный период, нарушение белково энергетического обмена

ანოტაცია.

ნუტრიციული მხარდაჭერა მნიშვნელოვან როლს ასრულებს ქირურგიული პაციენტების მკურნალობაში. მიმოხილვაში წარმოდგენილია თანამედროვე ინფორმაცია ცილოვან-ენერგეტიკული დეფიციტის გავლენის შესახებ ქირურგიული მკურნალობის შედეგებზე და გაანალიზებულია ნუტრიციული მხარდაჭერის თანამედროვე მიდგომები სხვადასხვა ეტაპზე — პრეოპერაციულ და პოსტოპერაციულ

პერიოდში. განხილულია ნუტრიციული თერაპიის მეთოდები,მათშორისენტერალურიდაპარენტერალური კვება, სპეციალური იმუნომოდულაციური ნარევები, აგრეთვე მათი გამოყენების ჩვენებები და უკუჩვენებები. ნაჩვენებია, რომ პროაქტიული ნუტრიციული მხარდაჭერა (განსაკუთრებით მალნუტრიციით მქონე პაციენტებში) ამცირებს პოსტოპერაციული გართულებებისა და ინფექციების სიხშირეს, ამოკლებს ჰოსპიტალიზაციის ხანგრძლივობას და აუმჯობესებს შორეულ შედეგებს. ცალკე განიხილება ლიტერატურის მონაცემები ნუტრიციული მხარდაჭერის მნიშვნელობის შესახებ სწრაფი რეაბილიტაციის პროგრამებში (ERAS), მათ შორის ონკოლოგიურ და გერონტოლოგიურ პაციენტებში, აგრეთვე რეანიმაციულ განყოფილებებში. 65 წყაროს ანალიზის საფუძველზე გაკეთებულია დასკვნა, რომ ნუტრიციული დეფიციტის ადრეული გამოვლენა და ენტერალური ან პარენტერალური კვების დროული დაწყება წარმოადგენს ქირურგიული პაციენტების კომპლექსური მართვის განუყოფელ ნაწილს, რაც ხელს უწყობს ლეტალობის შემცირებას და მკურნალობის შედეგების გაუმჯობესებას.

საკვანძო სიტყვები: ნუტრიციული მხარდაჭერა, პარენტერალური კვება, ენტერალური კვება, ქირურგიული პაციენტები, პერიოპერაციული პერიოდი, ცილოვან-ენერგეტიკული ცვლის დარღვევა.