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## Post operative clinical nutrition

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### Abstract

Clinical Nutrition for Surgical Patients begins with a thorough review of the basics of medical nutrition therapy for surgical patients, including nutritional assessment, the role of surgical diets, and the indications and contraindications for specialized nutrition support. Early oral feeding is the preferred mode of nutrition for surgical patients. Avoidance of any nutritional therapy bears the risk of underfeeding during the postoperative course after major surgery. Considering that malnutrition and underfeeding are risk factors for postoperative complications, early enteral feeding is especially relevant for any surgical patient at nutritional risk, especially for those undergoing upper gastrointestinal surgery. The focus of this guideline is to cover nutritional aspects of the Enhanced Re-recovery After Surgery (ERAS) concept and the special nutritional needs of patients undergoing major surgery, e.g. for cancer, and of those developing severe complications despite best perioperative care.

**Keywords:** Post operative clinical nutrition, surgical patients

### 1. Introduction

Post Operative Clinical Nutrition is nutrition of patients health care it incorporates primarily the scientific fields of nutrition to the patients undergone with surgery. It aims to keep healthy energy balance in patients, as well as providing sufficient amounts of other nutrients such as proteins, vitamins and minerals. Patients undergoing surgery may face metabolic and physiological changes challenges that may compromise nutritional status. Post operative nausea, vomiting, pain, and anorexia may tax those undergoing even minor surgeries, whereas catabolism, Infection and wound healing may be additional hurdles for patients after major operations.

From a metabolic and nutritional point of view, the key aspects of perioperative care include:

- Integration of nutrition into the overall management of the patient
- Avoidance of long periods of preoperative fasting
- Re-establishment of oral feeding as early as possible after surgery
- Start of nutritional therapy early, as soon as a nutritional risk becomes apparent
- Metabolic control e.g. of blood glucose
- Reduction of factors which exacerbate stress-related catabolism or impair gastrointestinal function
- Minimized time on paralytic agents for ventilator management in the postoperative period
- Early mobilisation to facilitate protein synthesis and muscle function

#### Important abbreviations and terms

BM	biomedical endpoints
EN	enteral nutrition (enteral tube feeding)
ERAS	enhanced recovery after surgery
ESPEN	European Society for Clinical Nutrition and Metabolism
HE	health care economy endpoint
IE	integration of classical and patient-reported endpoints
ONS	oral nutritional supplements
PN	parenteral nutrition
QL	quality of life
TF	tube feeding

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Normal food/normal nutrition normal diet as offered by the catering system of a hospital including special diets  
 Perioperative nutrition period starting prior to surgery from hospital admission until discharge after surgery

### 1.1 Preliminary remarks and Principles of nutritional care

Nutritional therapy may provide the energy for optimal healing and recovery, but in the immediate postoperative phase may only minimally counteract muscle catabolism, or not at all. To restore peripheral protein mass the body needs to deal with the surgical trauma and possible infection adequately. Nutritional support/intake and physical exercise are prerequisites to rebuild peripheral protein mass/body cell mass.

Severely compromised patients should receive perioperative nutritional therapy of longer duration or when acute intervention is required, surgery should be limited or minimally invasive interventional techniques should be preferred to relieve infection/ischaemia.

In order to optimize the mildly malnourished patient short-term (7e10 days) nutritional conditioning has to be considered. In severely malnourished patients longer periods of nutritional conditioning are necessary and this should be combined with resistance exercise. In the truly infected patient immediately dealing with the focus of sepsis ("source control") should have priority and no major surgery should be performed (risky anastomoses, extensive dissections etc.). Definitive surgery should be performed at a later stage when sepsis has been treated adequately.

### 1.2 Nutrition therapy

Nutrition therapy. Synonym: nutritional support is defined  
 As Nutrition therapy is the provision of nutrition or nutrients either orally (regular diet, therapeutic diet, e.g. fortified food, oral nutritional supplements) or via enteral nutrition (EN) or parenteral nutrition (PN) to prevent or treat malnutrition. "Medical nutrition therapy is a term that encompasses oral nutritional supplements, enteral tube feeding (enteral nutrition) and parenteral nutrition" [27]. Enteral and parenteral nutrition have traditionally been called artificial nutritional support. Nutrition therapies are individualized and targeted nutrition care measures using diet or medical nutrition therapy. Dietary advice or nutritional counselling can be part of a nutrition therapy.

In the surgical patient, the indications for nutritional therapy are prevention and treatment of catabolism and malnutrition. This affects mainly the perioperative maintenance of nutritional state in order to prevent postoperative complications [29]. Therapy should start as a nutritional risk becomes apparent. Criteria for the success of the "therapeutic" indication are the so-called "outcome" parameters of mortality, morbidity, and length of hospital stay, while taking into consideration economic implications. The improvement of nutritional status and functional recovery including quality of life are most important nutritional goals in the late postoperative period.

Nutrition therapy may be indicated even in patients without obvious disease-related malnutrition, if it is anticipated that the patient will be unable to eat or cannot maintain appropriate oral intake for a longer period perioperatively. In these situations, nutrition therapy may be initiated without delay. Altogether, it is strongly recommended not to wait until severe disease-related malnutrition has developed, but to start nutrition therapy early, as soon as a nutritional risk becomes apparent.

Nutritional care protocols for the surgical patient must include a detailed nutritional and medical history that includes body composition assessment a nutrition intervention plan an amendment of the intervention plan, where appropriate clear and accurate documentation assessment of nutritional and clinical outcome resistance exercise whenever possible

### 1.3 Preoperative nutritional care

#### 1.3.1 Nutritional "disease-related malnutrition"

Assessment before surgery means risk assessment according to pathophysiology [32]. Severe undernutrition has long been known to be detrimental to outcome [33e, 36]. Malnutrition is generally considered to be associated with starving and lack of food. Its presence in the Western world with an increasing percentage of obese people is frequently neither realized nor well understood. Disease Related Malnutrition (DRM) is more subtle than suggested by the World Health Organization (WHO) definition of undernutrition with a body mass index (BMI) < 18.5 kg/m<sup>2</sup> (WHO) [28, 37]. Disease related weight loss in patients who are overweight is not necessarily associated with a low BMI.

According to the prospective data from a multicentre trial, most patients at risk will be found in hospital in the departments of surgery, geriatrics, and intensive care medicine. The univariate analysis revealed significant impact for the hospital complication rate: severity of the disease, age >70 years, surgery and cancer.

### 1.4 Evidence of nutritional therapy

There is evidence that malnutrition is associated with worse outcome, and it is evident that major surgical stress and trauma will induce catabolism. The extent of catabolism is clearly related to the magnitude of surgical stress but also to the outcome. In complex medical conditions like the perioperative patient undergoing major surgery, the geriatric patient or in the critically ill the outcome will be clearly related to multiple associated factors. Regarding a nutritional intervention an existing effect may be too weak to show significant impact in a prospective controlled randomized study with a feasible number of patients to be included, even in a multicenter setting. However, the combination of the nutritional intervention with some other therapeutic items as a "treatment bundle" like in the many programme may show significant benefit [72].

## 2. Methodology

### 2.1 Aim of the guideline

The guideline is a basic framework of evidence and expert opinion aggregated in a structured consensus process. The idea is to cover nutritional aspects, that is aimed at most patients undergoing surgery and covers their nutritional needs, and also the special nutritional needs of patients at risk that is based on the traditional principles of metabolic and nutritional care.

Therefore, this guideline focuses on the issue of nutritional support therapy in patients at risk being unable to cover appropriately by oral intake their energy requirements for a longer period of time. The working group attempted to summarize the evidence from a metabolic point of view and to give recommendations for surgical patients at nutritional risk those undergoing major surgery, e.g. for cancer those developing severe complications despite best perioperative care

**2.2 Methodology of guideline development**

This is the update of the Guideline for Enteral Nutrition: the Guideline for Parenteral Nutrition: Surgery from 2015. The guideline was developed in accordance with official standards of the Guideline International Network (GIN) and based on all relevant publications since 1980 e in the update since 2006 (the German DGEM Guideline had included the period 2006e 2012.

**2.3 Search strategy**

The Embase, PubMed and Cochrane Library databases were searched for studies and systematic reviews published between 2010 and 2015 using a broad filter with the key words “enteral nutrition AND surgery” and “parenteral nutrition AND surgery” (Table 1). Further key words were “immunonutrition” and “bar-iatric surgery AND nutrition” (see Table 1). Only articles published in English and German, and studies in humans were considered.

**Table 1:** Criteria for systematic search for literature e databases and keywords.

Publication date	From 01.01.2010 to 17.05.2015
Language	English, German
Databases	Medline, EMBASE, Pubmed, Cochrane
Filter	“human”
Publication type	Original publications, practice guidelines, recommendations, meta-analyses, systematic reviews, randomized controlled trials, observational studies
Default keywords	Enteral nutrition AND surgery, parenteral nutrition AND surgery, Nutrition AND elective surgery, Nutritional risk
	Enteral nutrition AND surgery
	Parenteral nutrition AND surgery
	Perioperative nutrition
	Perioperative nutritional support
	Preoperative nutrition
	Postoperative nutrition
Optional keywords	Bariatric surgery AND nutrition
	Transplantation AND nutrition
	Oral nutritional supplements AND surgery
	Sip feeding AND surgery
	Immunonutrition AND surgery
	Pharmaconutrition AND surgery
	Glutamine AND surgery
	Arginine AND surgery
	Fish oil AND surgery
	Omega-3-fatty acids AND surgery
	Probiotics AND surgery
	Prebiotics AND surgery
	Tube feeding AND surgery
	Fine-needle-catheter jejunostomy
	Feeding jejunostomy
	Jejunostomy

**3. Basic questions**

**3.1 Is preoperative fasting necessary?**

**Recommendation 1**

Preoperative fasting from midnight is unnecessary in most patients. Patients undergoing surgery, who are considered to have no specific risk of aspiration, shall drink clear fluids until two hours before anaesthesia. Solids shall be allowed until six hours before anaesthesia (BM, IE, QL).

**Commentary**

There is no evidence that patients given clear fluids up to two hours before elective operations are at any greater risk of aspiration or regurgitation than those fasted for the traditional 12 h or longer, since clear fluids empties the stomach within 60e90 min.

**3.2 Is preoperative metabolic preparation of the elective patient using carbohydrate treatment useful?**

**Recommendation 2**

In order to reduce perioperative discomfort including anxiety oral preoperative carbohydrate treatment (instead of overnight fasting) the night before and two hours before surgery should be administered (B) (QL). To impact postoperative insulin resistance and hospital length of stay, preoperative carbohydrates can be considered in patients un-dergoing major surgery (0)

**3.3 Is postoperative interruption of oral nutritional intake generally necessary after surgery?**

**Recommendation 3**

In general, oral nutritional intake shall be continued after surgery without interruption (BM, IE). Grade of recommendation A e strong consensus (90% agreement)

**Recommendation 4**

It is recommended to adapt oral intake according to individual tolerance and to the type of surgery carried out with special caution to elderly patients. Grade of recommendation GPP e strong consensus (100% agreement)

**Recommendation 5**

Oral intake, including clear liquids, shall be initiated within hours after surgery in most patients. Grade of recommendation A e strong consensus (100% agreement)

**4. Indication for nutritional therapy**

**4.1 When is nutritional assessment and therapy indicated in the surgical patient?**

**Recommendation 6**

It is recommended to assess the nutritional status before and after major surgery. Grade of recommendation GPP e strong consensus (100% agreement)

**Recommendation 7**

Perioperative nutritional therapy is indicated in patients with malnutrition and those at nutritional risk. Perioperative nutritional therapy should also be initiated, if it is anticipated that the patient will be unable to eat for more than five days perioperatively. It is also indicated in patients expected to have low oral intake and who cannot maintain above 50% of recommended intake for more than seven days.

**4.2 When are preoperative oral nutritional supplements and enteral nutrition indicated?**

**Recommendation 8**

When patients do not meet their energy needs from normal food it is recommended to encourage these patients to take oral nutritional supplements during the preoperative period unrelated to their nutritional status Grade of recommendation GPP e consensus (86% agreement)

### Recommendation 9

Preoperatively, oral nutritional supplements shall be given to all malnourished cancer and high-risk patients undergoing major abdominal surgery (BM, HE). A special group of high-risk patients are the elderly people with sarcopenia.

Grade of recommendation A e strong consensus (97% agreement).

### 4.3 When is preoperative parenteral nutrition indicated?

#### Recommendation 10

Preoperative PN shall be administered only in patients with malnutrition or severe nutritional risk where energy requirement cannot be adequately met by EN (A) (BM). A period of 7e14 days is recommended (0)

### 5. Postoperative nutrition

#### 5.1 Which patients benefit from early postoperative tube feeding?

#### Recommendation 11

Early tube feeding (within 24 h) shall be initiated in patients in whom early oral nutrition cannot be started, and in whom oral intake will be inadequate (<50%) for more than 7 days. Special risk groups are:

patients undergoing major head and neck or gastrointestinal surgery for cancer (A) (BM) patients with severe trauma including brain injury (A) (BM) patients with obvious malnutrition at the time of surgery.

### Nutritional supplements for post operative patients

S. No.	Nutritional supplements commonly used for surgery patients
1.	T. B.Complex
2.	T. Calcium
3.	T. Vitamin C
4.	T. Multivitamin

### 6. Conclusion

These guidelines are based on currently best-available evidence and it must be emphasised that in certain areas the evidence is not strong. Inevitably, new evidence in the future will lead to strengthening or modification of the guidelines

### Appendix A. Supplementary data

Supplementary data related to this article can be found at [http:// dx.doi.org/10.1016/j.clnu.2017.02.013](http://dx.doi.org/10.1016/j.clnu.2017.02.013).

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