# Early Oral Feeding and Postoperative Dietary Supplement after Surgery

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**Abstract**

Protein-energy malnutrition is a common problem in hospital patients. Studies have reported that 40% of surgical and medical patients are malnourished on admission to the hospital. Most patients experienced nutritional depletion during their hospital admission, which was more severe in those patients who were already depleted at the time of their admission. The consequences of pre-operative malnutrition were first recognized in the 1930s. It was observed that a direct relationship between preoperative weight loss and operative mortality rate, independent of factors such as age, impaired cardiorespiratory function, and type of surgery. The importance of nutritional depletion as a major determinant of the development of postoperative complications has subsequently been confirmed the absence of a standardized definition of nutritional depletion has led to surrogate markers of nutritional status being utilized. Albumin, muscle function tests, immunological status and weight loss are used as these show correlation with postoperative morbidity and mortality. Traditional restrictions on oral intake after surgery are not based on scientific evidence. Several historical issues such as postoperative nausea, vomiting and ileus plus fears of anastomotic dehiscence has led to the practice of restrictive postoperative oral nutrition (nil per mouth). In addition to early oral feeding, dietary supplementation can provide added benefits in terms of reduction in fatigue, weight loss and overall morbidity in patients who are normal swell as malnourished. The combination of specific nutrients such as arginine, Nucleotides, 3 fatty acids and glutamine (i.e., immune nutrition) has been shown to improve nutritional, immunological and inflammatory parameters. A recent systematic review has shown that in elective surgical patients, immune nutrition can lead to a significantly lower.



**Key Words:** Early Oral Feeding, Postoperative Dietary Supplement

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## Introduction

Protein-energy malnutrition is a common problem in hospital patients. Studies have reported that 40% of surgical and medical patients are malnourished on admission to the hospital. The majority of patients experienced nutritional depletion during their hospital admission, which was more severe in those patients who were already depleted at the time of their admission. The consequences of pre-operative malnutrition were first recognized in the 1930s a direct relationship between preoperative weight loss and operative mortality rate, independent of factors such as age, impaired cardiorespiratory function and type of surgery. The importance of nutritional depletion as a major determinant of the development of postoperative complications has subsequently been confirmed The absence of a standardised definition of nutritional depletion has led to surrogate markers of nutritional status being utilized. **(1).**

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Nutritional depletion is associated with changes in body composition, tissue wasting and impaired organ function which lead to impaired immune and muscle function. Thus, depleted patients are at risk of infectious complications and cardiorespiratory impairment. Patients who undergo colorectal surgery are at risk of nutritional depletion from inadequate nutritional intake; both preoperatively and postoperatively, the stress of surgery and the subsequent increase in metabolic rate **(2).**

More recently, ensuring adequate nutritional intake has been a major focus of perioperative care and research has focused on the methods of delivering nutritional support, their comparative clinical benefits and minimizing the metabolic changes associated with surgical trauma **(3).**

Nutritional support leads to improved nutritional status and clinical outcome in patients. Studies of postoperative nutritional support have demonstrated reduced morbidity and reduced length of hospital stay. There is also evidence that artificial nutritional support in malnourished patients is cost-effective by reducing the costs associated with length of stay and morbidity and improved quality of life. It is important, however, to consider the most clinically appropriate and beneficial means of delivering nutritional support to surgical patients **(4).**

**The consequences of malnutrition**

Malnutrition disturbs cellular and organ function resulting in impaired cardiac and respiratory muscle function, atrophy of smooth muscle in the gastrointestinal tract, impaired immune function and impaired healing of wounds and anastomosis. These changes not only impair recovery after surgery but are associated with complications (wound infections, pressure sores) and increasing health care costs (prolonged hospital stays, recurrent hospital admissions and primary care visits) **(5).**

The causes of malnutrition are multifactorial and may be related to low socioeconomic status or a specific disease process. The poor nutritional status of surgical patients can result from decreased oral intake due to pain, fasting or gastrointestinal pathology. Other causes include malabsorption or increased nutritional requirements in response to surgical insult, trauma or sepsis **(6).**

**Nutritional requirements in health**

The principal components of a normal diet are energy (carbohydrate and lipid), nitrogen, trace elements, minerals and vitamins. A healthy adult requires approximately 20-25 kcal per kilogram body weight per day. Metabolic stress associated with sepsis, trauma or surgery increases energy requirements to 35-40 kcal per kg per day. Vitamins function as coenzymes, cofactors in wound healing and antioxidants, and minerals and trace elements are required for metabolic processes and normal cellular function. It is imperative that each of these components is provided for patients requiring artificial nutritional support and this is best managed using a multidisciplinary approach with a dedicated dietitian and nutrition support team **(7).**

**Delivery of nutritional support**

The usual approach to estimating a patient's nutritional requirement is to estimate the energy requirements using the basal metabolic rate ( BMR) equation which takes into account individual's age, sex and weight and then adjusts for stress and activity levels. A similar equation is used for protein requirements which are based on weight with adjustments made for sepsis and stress. A suggested nutritional prescription would be 25-35kcal/kg/day of energy, 0.8-1.5g protein/kg/day, 30-35ml fluid/kg and adequate electrolytes, minerals and trace elements. Allowances for extra losses from fistulas or extra intake from intravenous drugs must be tailored for individual patients **(8).**



Nutritional support can be administered in a variety of ways including dietary supplements, enteral tube feeding or parenteral feeding. Each mode of delivery has its benefits and limitations, and a dietician and nutritional support team must be involved in aiding the clinician **(2)**

**Oral nutritional supplements**

Oral supplements should be given to patients who are unable to meet their daily nutritional requirements from hospital meals alone.

They are liquid supplements containing protein, fat and carbohydrate and micronutrients. They are easy to administer, cheap, free from complications and more palatable for patients as they are available in a variety of flavours. Studies have shown that oral supplements increase weight gain in malnourished patients, reduce mortality and postoperative complications. Ameta-analysis of 18 randomized controlled trials in gastrointestinal surgical patients (undergoing gastrectomy, hemicolectomy, cholecystectomy, bowel resection and pancreatoduodenectomy) showed oral supplements significantly reduced postoperative complications such as wound and respiratory infections, ileus and wound dehiscence. There were concerns that oral supplements may suppress appetite in patients not keen to eat. However, studies suggest that liquid supplements tend not to suppress appetite or food intake and are an effective treatment for patients with poor appetite **(9).**

**Parenteral nutrition**

Parenteral feeding was instituted in the 1960 when clinicians realised malnutrition was associated with increased morbidity and mortality in hospitalised patients. This resulted in the development of total parenteral nutrition (TPN) and the philosophy that if nutrition was good, more would be better. Many studies appeared in the literature emphasising the success of hyperalimentation but over time reality showed that not only did TPN not cure disease, but it was associated with certain complications. Over the last 20 years, the role of TPN has remained a hot topic of debate, and in some institutions is regarded with less enthusiasm than the more "physiological" enteral nutrition **(10).**

Parenteral nutrition should be used for patients who have a non-functioning gastrointestinal tract perhaps as a result of short bowel syndrome or high output intestinal fistulas in which enteral nutrition is contraindicated. Parenteral nutrition may be given either through a peripheral cannula or a central venous line **(11).**

**Complications of total parenteral nutrition**

Complications related to the insertion site of the central venous line in the form of; failure of insertion, pneumothorax, arterial puncture, haemothorax, malposition catheter-related sepsis, venous thrombosis, and line occlusion**.**

Complications related to feeding in the form of; electrolyte and fluid imbalance hypo or hyperglycemia, cholestatic jaundice, gall stones and osteoporosis on long-term parenteral nutrition **(12).**

**Enteral versus parenteral nutrition**

Current opinion suggests that enteral nutritional support is superior to parenteral nutrition for the following reasons: it is less expensive, safer, more "physiological", promotes gastrointestinal tract function and maintains mucosal barrier function, prevents bacterial translocation and improves outcome. Most authorities would continue to recommend that "if the gut works, use it" but over the last decade there have been many studies in the literature seeking to confirm or disprove the above reasons **(13).**

Enteral nutrition is cheaper than parenteral nutrition and a review by **Lipman, (14)** supports this although new economic analyses would be of value. Enteral feeding can be provided safely and effectively but it can fail to achieve the necessary calories from side effects such as bloating, diarrhoea or high nasogastric aspirates. There are numerous potential complications from enteral tube feeding, especially with the increasing popularity of invasive methods of tube placements. There are case reports in the literature warning that although relatively safe, enteral feeding does carry significant morbidity. The complications of parenteral nutrition, from mechanical difficulties with insertion of a central venous catheter line, and sepsis to the metabolic complicationsof hyperglycemia and electrolyte imbalances are well documented. It is a common perception that TPN leads to mucosal atrophy leading to bacterial translocation. This is certainly the case in animal studies, but the evidence is less clear when applied to humans **(15).**

**MacFie and colleagues, (16)** have shown that bacterial translocation does occur in surgical patients and is associated with increased rates of sepsis, although a study by **Sedman et al., (17)** suggested no increase in bacterial translocation with TPN There seems to be no evidence in the literature to date that parenteral nutrition promotes bacterial translocation or that enteral nutrition prevents it in humans.Some authors suggest that the presumed higher rates of sepsis associated with parenteral nutrition may be due to the increased energy intake received, the associated hyperglycemia or complications of the delivery system **(18).**



Traditional restrictions on oral intake after surgery are not based on scientific evidence. Several historical issues such aspostoperative nausea, vomiting and ileus plus fears of anastomotic dehiscence has led to the practice of restrictive postoperative oral nutrition (nil per mouth) **(19).** Within 24 hours after surgery, muscle protein catabolism begins with the intestine, followed by the skeletal muscle being the main site for protein catabolism. However, controlled studies have shown that this catabolic response to surgery can be diminished by nutritional support **(20).** A recent review has concluded that there is no need to delay oral feeding after GI surgery, with a positive trend toward reduced complications with early feeding. Individual studies have shown that early feeding may decrease postoperative infections, length of hospital stay, muscle loss and fatigue. It decreases intestinal mucosal permeability and leads to a positive nitrogen balance. Experimental and clinicalstudieshaveshown increased wound healing and anastomotic strength in the intestines and somatic tissues with early feeding. These reduced rates of postoperative complications are independent of preoperative nutritional status **(21).**

In addition to early oral feeding, dietary supplementation can provide added benefits in terms of reduction in fatigue, weight loss andoverall morbidity in patient's whoare normalaswell as malnourished. The combination of specific nutrients such as arginine**,** Nucleotides, 3 fatty acids and glutamine (i.e., immunonutrition) has been shown to improve nutritional, immunological and inflammatory parameters. A recent systematic review has shown that in elective surgical patients, immunonutrition can lead to a significantly lower

Incidence of infectious complications and reduced length of hospital stay. Once established the rate of feeding can be adjusted according to the intestine's reduced capability and using techniques that reduce ileuses such as thoracic epidural analgesia, restricted intravenous fluid therapy and avoidance of opioids. Early oral feeding with or without supplementation is safe and may be associated with major benefits and should be routinely practised, although conclusive findings about exact beneficial effects are still awaited **(22)**

One of the main goals for enhanced recovery after surgery protocols is to have the patient back on oral intake as fast as possible, this being a key function necessary for discharge. To have the patient eat normally again necessitates two major goals to be met. The patient must tolerate the intake of food and the patient must be metabolically receptive to the nutrient given to make good use of them. To have the patient tolerate normal food involves gut motility and appetite. Behind these functions lies also fluid balance and neural regulation of the gastrointestinal tract **(23).**

As soon as the patient is lucid after the operation, he can be offered to drink clear fluids. After a couple of hours or so, intake of normal food can be allowed, and the patient should also take two cups of nutritional supplements the same afternoon/evening of surgery. Preferably, eating and taking supplements can be done after getting out of bed after the operation, since this is the most normal way to eat or drink **(23).**

The day after surgery, the intravenous infusion should be disconnected in the morning. The patient should be served a normal breakfast and from then on the hospital meals. On top of this, they should be ordered two supplements with a total of at least 400 kcal a day. They should be instructed to drink as much as they want to, but at least 1,000 mL/day. Nursing staff should take notes on food and fluid intake daily and report any problems occurring **(23).**

In case of ileus or even vomiting, the intake should be stopped for a couple of hours and then resumed with fluids initially. If they work, the patient can start to eat again. If there is a suspicion of gastric retention, a nasogastric tube can be used to empty the contents. Once this is done, the tube should be removed and the patient starts to resume drinking within a couple of hours. The tube should not primarily stay in. Keeping a nasogastric tube in should be reserved for patients with an established ileus and as short a period as possible **(Table 1) (23).**

**Table (1):** Actions to take to minimize metabolic stress in ERAS protocols ***(23).***

| When | Which patient | Action |
|---|---|---|
| **Outpatient clinic** | The undernourished patient<br><br>The patient who is slowly losing weight | Oral supplements (if the gut is working)<br>Dietary advice<br>If not eating properly combine enteral and parenteral nutrition<br>Oral supplements and dietary ad |
| **Day before surgery** | Elective colon resections<br>All | Avoid bowel cleansing<br>Eat normal hospital food |
| **Before operation** | All allowed to drink<br>All | Carbohydrate treatment 2 h bef anaesthesia<br>Thoracic epidural activated |
| **Postoperatively day of surgery** | All | As soon as the patient is lucid: propose clear fluids<br>400 mL oral supplement<br>Offer dinner |
| **Day after surgery** | All | Disconnect i.v. infusion in the morning after the operation<br>Breakfast, lunch and dinner offe<br>2 × 200 mL oral supplements<br>Free intake of fluids<br>Secure good pain control |



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