

Nourishing Surgical Success

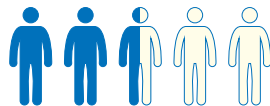
Integrating Nutrition Across the Surgical Journey



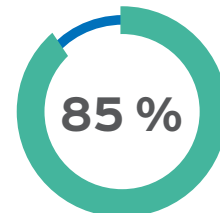
Malnutrition and Surgical Outcomes

Malnutrition is Highly Prevalent in Surgical Settings

Malnutrition affects a significant portion of surgical patients, with estimates suggesting **approximately 40 % - 50 % of patients undergoing surgery have some degree of malnutrition.**¹

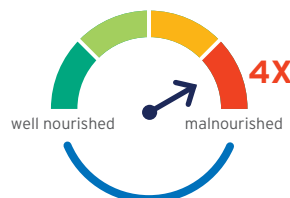


In certain groups, such as hospitalised cancer patients, **the prevalence of malnutrition can reach up to 85 %.**²



A Major Risk Factor for Adverse Outcomes

- Malnutrition is an **independent and important risk factor for adverse postoperative outcomes.**¹
- Patients with malnutrition have **fewer physiological reserves** to withstand the catabolism induced by the **surgical stress response.**³
- Preoperative malnutrition is associated with **significantly higher surgical morbidity and mortality.**¹



Malnourished surgical patients face clinical outcomes that are worse, including a **fourfold increase in the risk of death.**²



Even in overweight patients, disease-related weight loss can still cause loss of muscle mass (sarcopenia) and induce "metabolic risk"⁴

The Burden of Poor Muscle Health

Low muscle mass and quality (sarcopenia) is recognised as an independent predictor of poor surgical outcomes.⁵



Risk of complications



Poor Muscle Health



Overall Mortality

Impact on Healthcare Resources

Malnutrition directly contributes to: ^{1, 2}



Longer hospital
length of stay (LOS)



Higher readmission
rates



Higher hospital
expenditure

Hospital costs for malnourished patients are
30 % - 50 % higher than well-nourished patients. ⁶

Identification is Critical

Identifying malnutrition or the risk of malnutrition is fundamental to optimal perioperative care. ⁷

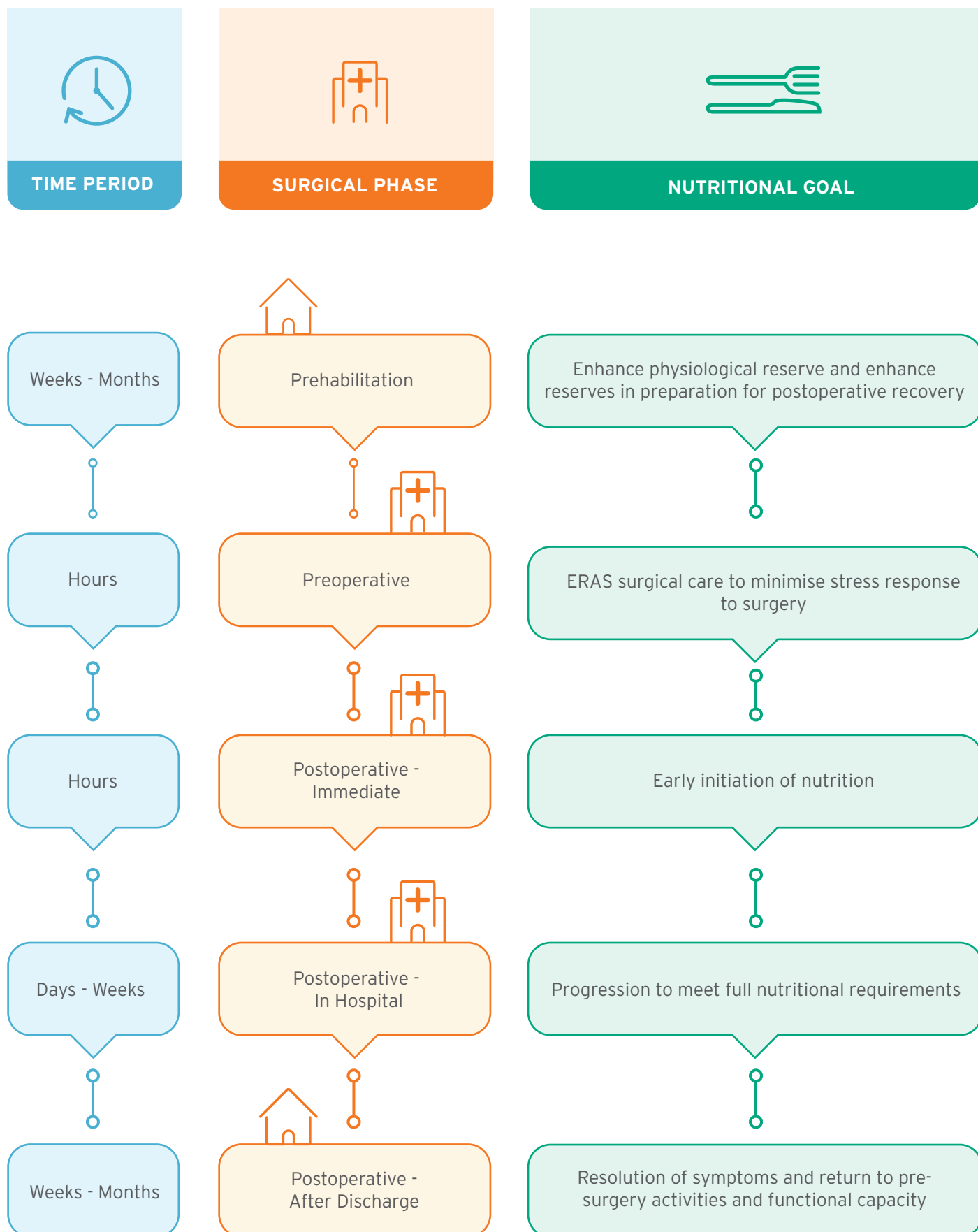
Screening for malnutrition should be performed early, ideally within the first **24 - 48 hours of admission**, or prior to elective surgery at first contact ⁵

Tools validated in the surgical population include **NRS-2002** and **Perioperative Nutrition Screen (PONS)** ^{1, 7}



Optimal nutrition is important for **all patients**,
but it **is critical** for those deemed to be at **nutritional risk**
or **malnourished prior to surgery**. ⁵

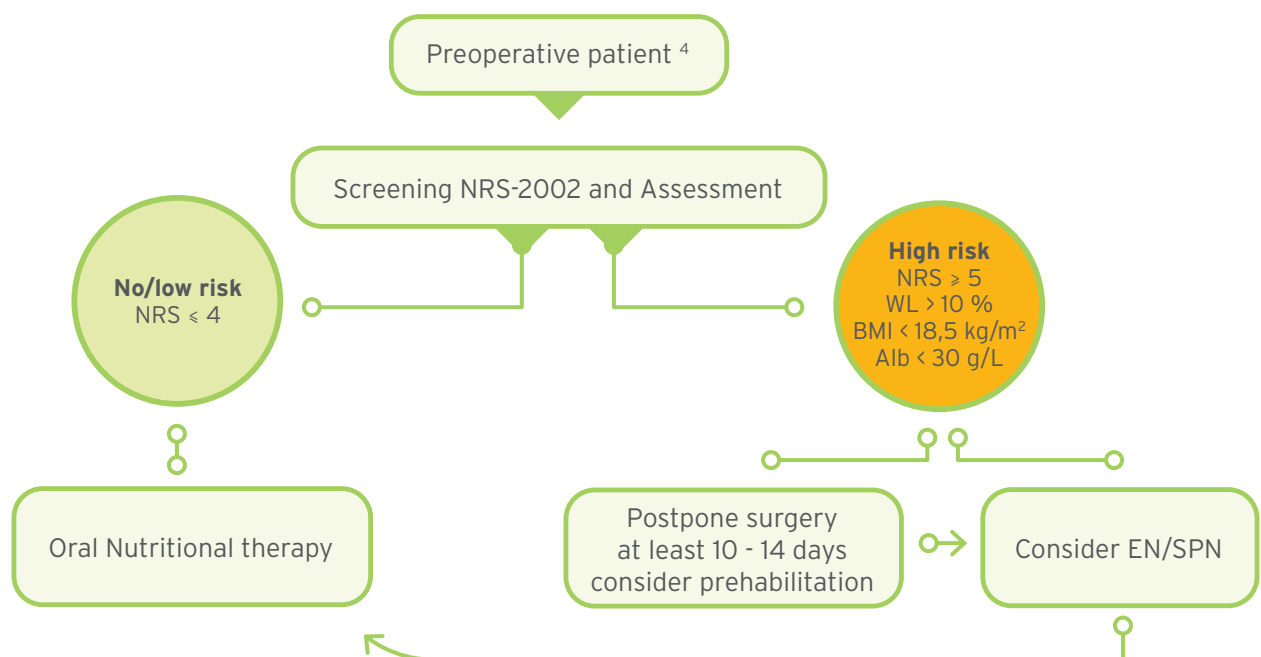
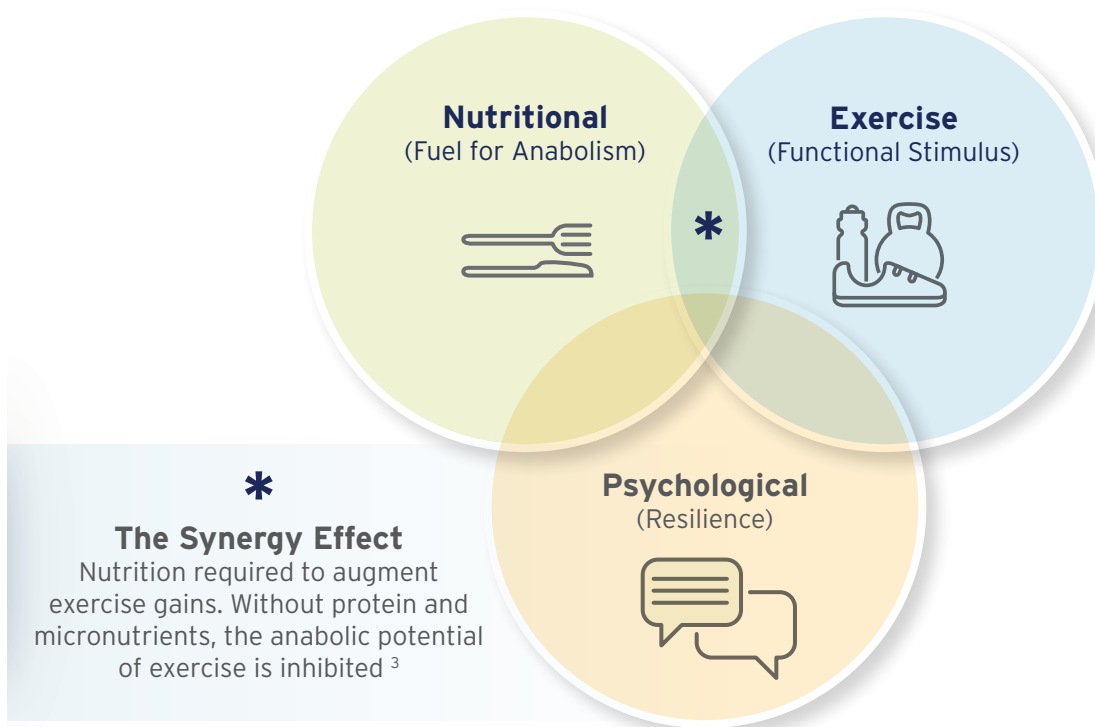
The Surgical Journey ³



Prehabilitation

Definition: Prehabilitation is a process from diagnosis to surgery, consisting multiple interventions, with the **goal** of allowing patients to **withstand surgical stress**, through enhanced functional capacity and physiological reserves that **improves postoperative outcomes** and **facilitates recovery** ⁸

Multi-modal Approach to Prehabilitation ^{3,8}



EN = Enteral Nutrition
SPN = Supplemental Parenteral Nutrition
WL = Weight Loss
NRS = Nutrition Risk Score

Benefits of Prehabilitation

Evidence of Improved Outcomes



Less Complications

- Reduced rate of surgical complications in older patients with abdominal tumours ⁵
- Lower incidence of postoperative pulmonary complications ⁵
- Reduction of infections with standard oral supplements in malnourished or weight-losing patients undergoing gastrointestinal surgery ⁸



Shorter Length of Stay

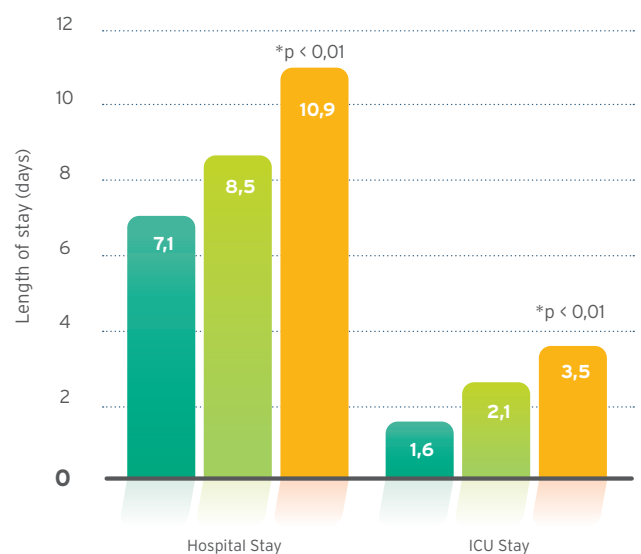
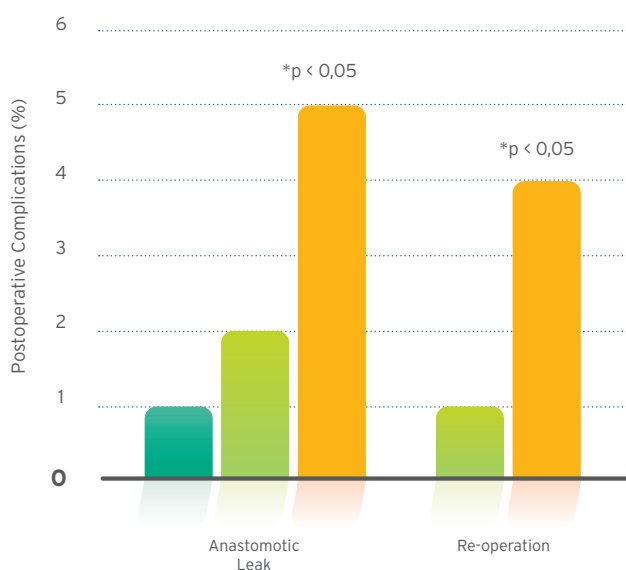
- Reduced the length of hospital stay when combined with exercise ⁹



Other Benefits

- Decreased need for red blood cell transfusions and human albumin administration ²
- Improved serum nutrition markers (albumin, total protein, transferrin, and total lymphocyte count) in cancer patients even without signs of clinical malnutrition ¹
- Increased mitochondrial complex I activity significantly in malnourished patients, with activity returning to normal after 1 month of nutrition support ³
- Improved functional capacity ⁵

The impact of short-term preoperative nutrition on malnourished colorectal surgery patients ²



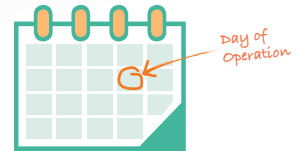
14 Days Supplementation 7 Days Supplementation No Preoperative Supplementation

Preoperative Nutrition Strategies

Before Surgery

Why Fasting Increases Stress ³

- Overnight fasting acts as a physiological stressor
- Exaggerates the body's effort to return to homeostasis
- Amplifies the catabolic response to surgery



Carbohydrate Preloading

Why Carbohydrate Drinks Help

The use of carbohydrate drinks up to 2 hours prior to surgery: ¹

- Reduce insulin resistance by 50 %
- Prevent muscle breakdown
- Decrease preoperative thirst, hunger, and anxiety
- Decrease hospital length of stay
- Improve recovery time
- Improve postoperative function

No
increased risk
of aspiration or
regurgitation ⁴

Carbohydrate loading preoperative including whey protein:

Patients receiving a **carbohydrate** drink **including whey protein**, up to **2,5 hours before surgery**, had no difference in residual gastric volume vs control group. ¹⁰

Gynaecological Tumour Patients receiving a **carbohydrate** and **whey protein** drink:

- No difference in residual gastric volume vs. control ⁹

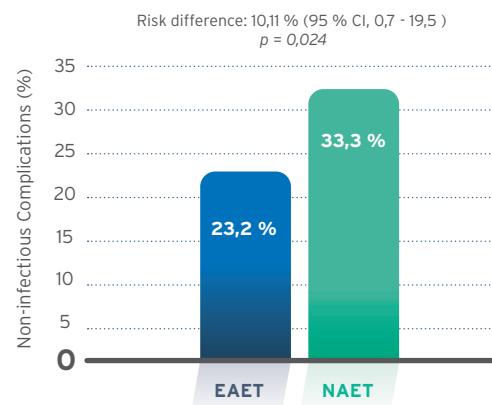
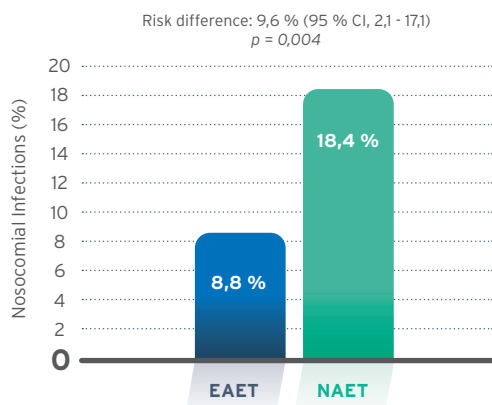
Early Postoperative Nutrition

Most patients can start on oral or enteral feeding within hours following surgery



Reaching Energy Targets

In major abdominal surgery patients, early achievement on energy target had a beneficial effect on various parameters¹¹

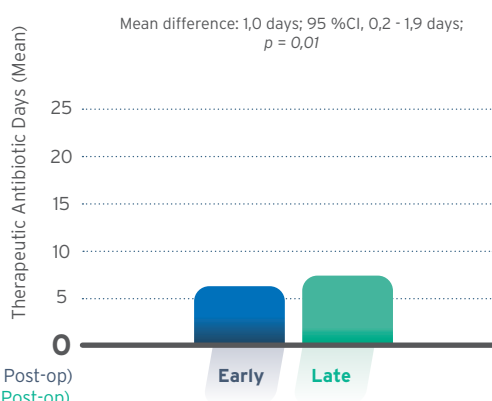
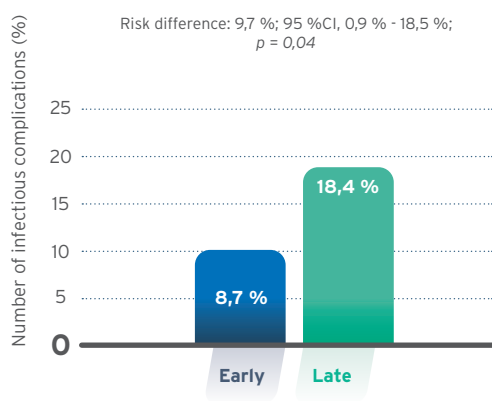


EAET = Early Achievement of Energy Target NAET = Non-achievement of Energy Target

At discharge: Serum albumin, prealbumin and retinol-binding protein were significantly higher in the EAET group than in the NAET group.

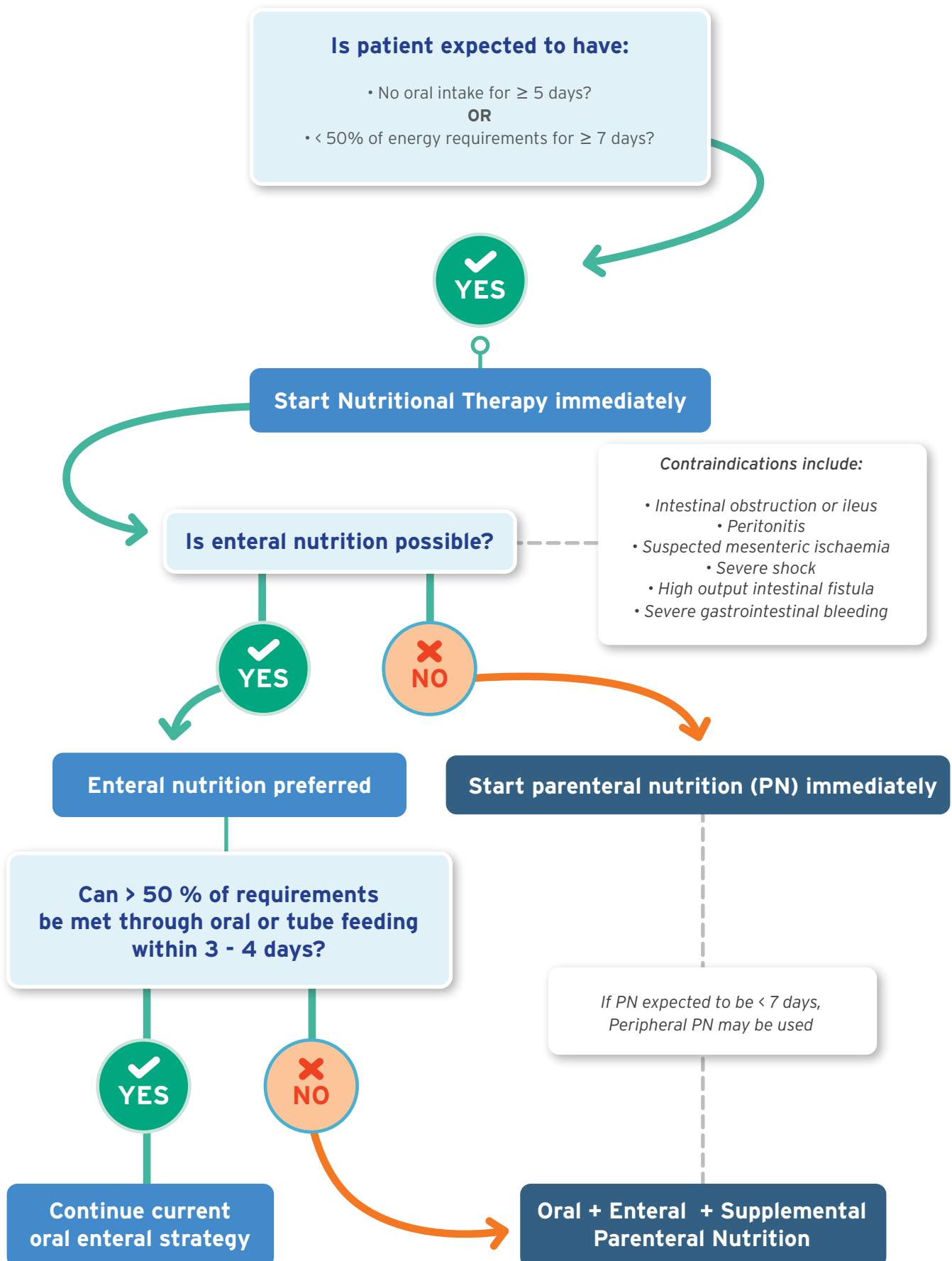
Early Supplemental Parenteral Nutrition (SPN)

Early SPN is a favourable strategy vs late SPN in patients with high nutritional risk and poor enteral tolerance¹²

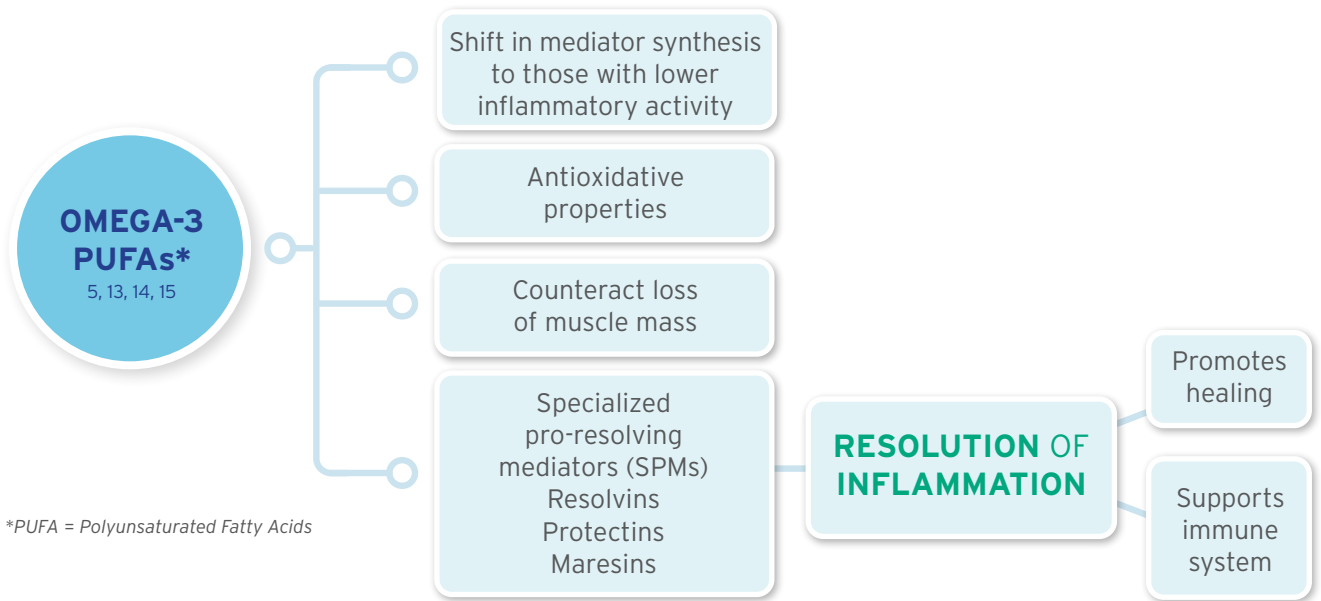


Early SPN (Day 3 Post-op)
Late SPN (Day 8 Post-op)

Which Route to Feed Postoperatively



Omega-3



In **Gastrointestinal Oncology Surgery patients** Omega-3 polyunsaturated fatty acids (PUFA)-rich formulas significantly: ¹⁶



Reduced postoperative
infectious
complications



Decrease length of
hospital stay



Decrease duration of systemic
inflammatory response syndrome
and C-reactive protein levels

Evidence from a network meta-analysis, including surgical patients, show that intravenous lipid emulsions (ILEs) **containing fish oil** are associated with **improved outcomes** ¹⁷

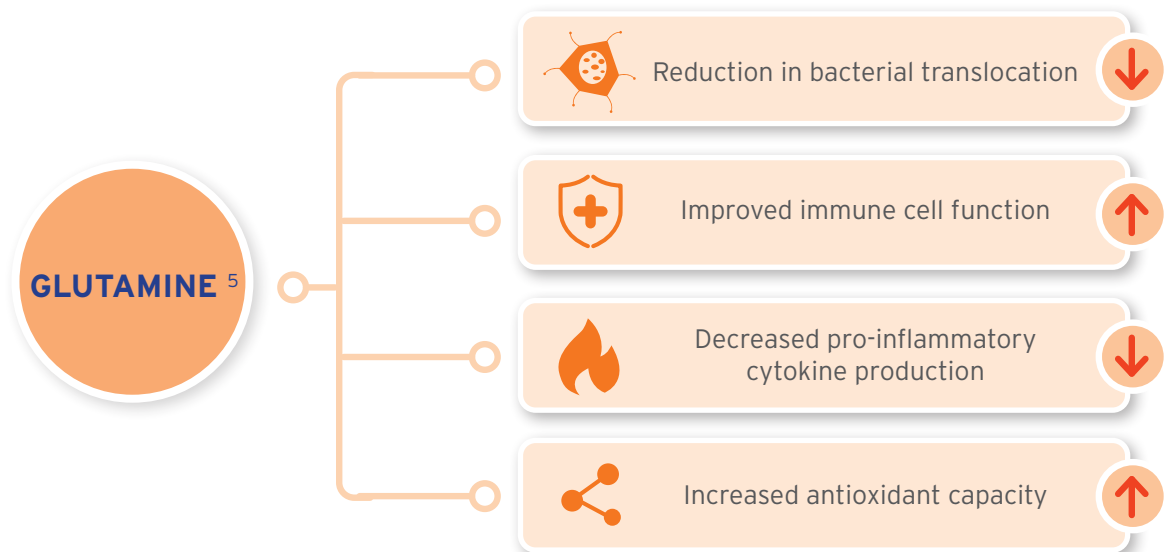
FO = Fish Oil
SO = Soybean Oil
MCT = Medium Chain Triglycerides
OO = Olive Oil
CrI = Credibility Interval

	Risk of Infection
FO vs. SO	-57 % (OR = 0,43 90 % CrI 0,29 to 0,63)*
FO vs. MCT/SO	-41 % (OR = 0,59 90 % CrI 0,43 to 0,82)*
FO vs. OO/SO	-44 % (OR = 0,56 90 % CrI 0,33 to 0,91)*

* Very high credibility of difference between interventions (posterior probability of OR < 1 or MD < 0 greater than 90 %)

Expert Consensus: In surgical (both ICU and hospitalised) patients, the use of lipid emulsions containing fish oil is supported due to clinical advantage and favourable risk-benefit ratio, as well as cost-efficacy. ¹⁵

Glutamine



Plasma glutamine drops following surgery (**16 %**)
and there is a larger decrease in major surgery than minor surgery ¹⁸

In patients with **colorectal cancer** who have undergone radical surgery, glutamine-containing nutrition has been shown to have a positive impact ¹⁹



Humoral immune function indicators including IgA, IgM and IgG and T-cell immune function indicators



Length of hospital stay



Anastomotic leaks

Use of IV glutamine, in major abdominal surgery patients ²⁰

52 %

Reduction
in **risk of
infection**

3 Day

Reduction
in **length
of stay**



Positive effect
in postoperative
nitrogen balance

ESPEN guideline Statements ⁴

PRELOADING BEFORE SURGERY

Recommendation 2: Patients without a particular risk of tracheo-bronchial aspiration shall be allowed to ingest **clear liquids up to two hours** and **solid foods up to six hours before the start of anaesthesia**.

Recommendation 3: Specific **carbohydrate drinks can be given the evening before and up until two hours before** the start of anaesthesia to trigger insulin release.

PREHABILITATION & PREOPERATIVE PERIOD

Recommendation 6: **Nutritional status should be routinely assessed** when major surgery is planned in order to guide perioperative nutritional therapy.

Recommendation 20: Patients with severe **malnutrition and/or high metabolic risk** shall receive **nutritional therapy preoperatively**, even if it postpones surgery. A period of **10 - 14 days** should be considered.

Recommendation 21: **Oral/enteral tube delivery shall be preferred** whenever feasible over parenteral nutrition.

Recommendation 23: Patients who do **not meet their nutritional needs from normal food should be encouraged to take oral nutritional supplements** during the preoperative period, unrelated of their nutritional status.

Recommendation 24: In patients with **malnutrition and/or at high metabolic risk**, an **oral nutritional supplement** shall be administered **before** major abdominal surgery in a quantity that **matches the deficit** of the patient's needs.

Recommendation 26: If clinically indicated, **preoperative enteral nutrition**, including the use of oral nutritional supplements, should be provided **prehospital admission**.

Recommendation 27: Only in those patients with severe **malnutrition and/or at high metabolic risk in whom oral/enteral nutrition is not feasible, preoperative parenteral nutrition** shall be provided. A period of **10 - 14 days** with a minimum of **seven days** can be recommended.



POSTOP PERIOD 1

Recommendation 4: Oral/tube **feeding shall be started as soon as possible within the first few hours after surgery**, in conscious and haemodynamic stable patients as tolerated.

Recommendation 5: The oral diet should be adapted to the type of surgical procedure and individual tolerance. **Tolerance of early oral nutrition shall be assessed** carefully in patients after operations with a high risk for delayed gastric emptying or postoperative ileus.

Recommendation 9: In patients who are **not expected to be able to take oral nutrition for five days or longer** perioperatively, **nutritional therapy should be started immediately** with special regard to malnourished patients.

Nutritional therapy should be started immediately, also in patients who were **unable to have an oral intake of more than 50 %** of the recommended amount of energy for more than seven days.

POSTOP PERIOD 2

Recommendation 10: If **energy and substrate requirements cannot be met** by oral and/or tube feeding alone (< 50 % of energy requirements) within three to four days, **a combination of oral, enteral, and (supplementing) parenteral nutrition** should be given.

Recommendation 11: **Parenteral nutrition** should be started as soon as possible if there is a **contraindication to oral and enteral nutrition** (e.g., intestinal obstruction), especially in severely malnourished patients.

Recommendation 13: If the expected **duration of supplementary PN is below seven days**, nutrition can be delivered parenterally via **peripheral** access.

Recommendation 18: Postoperative parenteral nutrition, **including omega-3 fatty acids**, should be used in patients who cannot receive adequate enteral nutrition and, therefore, require predominantly parenteral or combined enteral/parenteral nutrition.

Recommendation 28: **Enteral nutrition shall be started within 24 h in patients** in whom the **caloric requirements cannot be met orally**, or an oral diet is not yet possible. This applies in particular to patient:

- *In whom oral energy and protein intake is expected to be < 50 % in the next 7 days*
- *After major head and neck surgery and upper gastrointestinal resection for tumour*
- *With severe trauma and/or severe traumatic brain*
- *With malnutrition at the time of surgery*

Recommendation 33: Patients who require nutritional therapy perioperatively should have **regular assessment of nutritional status** during hospitalisation with **continuation post hospital discharge**, including referral for nutritional counseling and oral/tube supplementation as appropriate.

Parenteral Nutrition Products

Intravenous Total Nutrition:

The compounding unit produces and delivers a variety of intravenous PN admixtures to meet patients' macro AND micronutrient requirements with one bag.

SMOFlipid:

A unique lipid emulsion containing Soybean, MCT, Olive and Fish Oil. Providing 15 g Fish Oil per 100 g of lipids



Glutamine:

From Dipeptiven and/or Glamin to provide source of this conditionally essential amino acid.²⁰

Micronutrients:

Water- and fat-soluble vitamins, as well as trace elements, to meet the daily requirements for patients on parenteral nutrition.



Dipeptiven:

An IV glutamine supplement containing 13,46 g IV glutamine per 100 mL

Vitamins & Trace Elements:

With a complete range of micronutrients, which are also included in the compounded bags the patient's daily requirements for trace elements, water soluble and fat soluble vitamins can be met.



Enteral Nutrition Products

A range of specialised tube feed formulas

to provide various options based on patients' specific requirements and tolerance.



A range of standard enteral tube feed formulas

to provide various options based on patients' specific requirements and tolerance.



A range of specialised and standard oral nutritional supplements,

including texture modified options, to provide various options based on patients' needs, oral intake and tolerance.



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[S3] Addaven®. Each 1 ml concentrate contains 5,33 µg chromic chloride hexahydrate; 0,10 mg cupric chloride dihydrate; 0,54 mg ferric chloride hexahydrate; 19,80 µg manganese chloride tetrahydrate; 4,85 µg sodium molybdate dihydrate; 17,3 µg sodium selenite anhydrous; 1,05 mg zinc chloride; 16,6 µg potassium iodide; 0,21 mg sodium fluoride. Reg. No.: 49/24/0996.

[S3] Dipeptiven. Each 1 000 ml concentrate contains 200,0 g N(2)-L-alanyl-L-glutamine (82,0 g L-alanine & 134,6 g L-glutamine). Reg. No.: 33/23/0210.

[S3] Glamin. Each 1 000 ml solution contains 134 g total amino acids (corresponding to 22,4 g total nitrogen). Reg. No.: 31/25.2/0087.

[S3] SMOFlipid® 20 %. Each 1 000 ml emulsion contains 60,0 g soybean oil; 50,0 g olive oil; 30,0 g fish oil; 60,0 g medium chain triglycerides. Reg. No.: 41/25.2/0060.

[S3] Soluvit® Novum. Each 10 ml vial contains 3,2 mg thiamine HCl (as thiamine mononitrate); 3,6 mg riboflavin (as sodium riboflavin phosphate); 40,0 mg nicotinamide; 4,0 mg pyridoxine (as pyridoxine HCl); 15,0 mg pantothenic acid (as sodium pantothenate); 100,0 mg ascorbic acid (as sodium ascorbate); 60,0 µg biotin; 0,4 mg folic acid; 5,0 µg cyanocobalamin. Reg. No.: U/22.1.4/200.

[S3] Vitalipid® Novum Adult. Each 1 ml concentrate contains 99 µg (330 IU) Vitamin A; 0,5 µg (20 IU) Vitamin D2; 0,91 mg (1 IU) Vitamin E; 15 µg Vitamin K1. Reg. No.: Z/22.1/236.

For full prescribing information refer to the latest professional information approved by the South African Health Products Regulatory Authority.