

**NUTRITIONAL SUPPORT AND REHYDRATION THERAPY FOR  
ADULT PATIENTS IN NEED OF PALLIATIVE MEDICAL CARE**

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## INTRODUCTION

In all cultures, sharing food has a deep social value. In addition, feeding the hungry and giving drink to the thirsty are matters of great moral weight in our society. The cancellation of these measures can cause feelings of guilt in both the family and the medical staff. Unlike other medical procedures, nutrition and hydration have symbolic significance in our culture.

The role of nutritional support and hydration in palliative care is not clearly defined for various reasons (medical, family, religious, social) and is therefore a topic of ongoing debate. Although some studies have shown the benefit of nutritional utilisation of both parenteral nutrition (PN) and hydration, other studies show that there are more complications that indicate them in palliative patients.

Due to the lack of consensus in the existing literature, nutritional support provided by different methods remains a part of treatment regimens that should be considered when assessing the patient.

The aim of the work is to analyse the methods of nutritional support and rehydration therapy for adult patients in need of palliative care and propose their optimisation

Objectives of the work:

- to bring theoretical basis of the object of research;
- to present a study of methods of support for adult patients in palliative care;
- to propose the development of solutions to optimise the support of adult patients in palliative care.

Object of work - nutritional support and rehydration therapy for adult patients.

Subject of the work - methods of nutritional support and rehydration therapy for adult patients in need of palliative care.

The work consists of the introduction, 3 chapters, conclusion and list of used sources.

# **1 THEORETICAL FOUNDATIONS OF THE RESEARCH OBJECT**

## **1.1. Introduction to the concept of palliative care**

Palliative care is a comprehensive approach to caring for patients with severe chronic diseases or incurable conditions, aimed at alleviating their suffering and improving their quality of life. Palliative care includes not only the treatment of physical symptoms (pain, nausea, fatigue, etc.), but also psychological, social and spiritual support. Addressing suffering involves taking care of issues beyond physical symptoms. Palliative care uses a team approach to support patients and their caregivers. This includes addressing practical needs and providing bereavement counselling. It offers a support system to help patients live as actively as possible until death.

Palliative care is explicitly recognized under the human right to health. It should be provided through person-centered and integrated health services that pay special attention to the specific needs and preferences of individuals.

Palliative care is required for a wide range of diseases. The majority of adults in need of palliative care have chronic diseases such as cardiovascular diseases (38.5%), cancer (34%), chronic respiratory diseases (10.3%), AIDS (5.7%) and diabetes (4.6%) [18]. Many other conditions may require palliative care, including kidney failure, chronic liver disease, multiple sclerosis, Parkinson's disease, rheumatoid arthritis, neurological disease, dementia, congenital anomalies and drug-resistant tuberculosis.

Pain and difficulty in breathing are two of the most frequent and serious symptoms experienced by patients in need of palliative care. For example, 80% of patients with AIDS or cancer, and 67% of patients with cardiovascular disease or chronic obstructive pulmonary disease will experience moderate to severe pain at the end of their lives [6]. Opioids are essential for managing pain.

Opioids can also alleviate other common distressing physical symptoms including breathlessness. Controlling such symptoms at an early stage is an ethical duty to relieve suffering and to respect a person's dignity.

Each year an estimated 56.8 million people are in need of palliative care, most of whom live in low- and middle-income countries. For children, 98% of those needing palliative care live in low- and middle-income countries with almost half of them living in Africa [4].

Worldwide, a number of significant barriers must be overcome to address the unmet need for palliative care:

- national health policies and systems often do not include palliative care at all;
- training on palliative care for health professionals is often limited or non-existent; and
- population access to opioid pain relief is inadequate and fails to meet international conventions on access to essential medicines.

According to a WHO survey relating to noncommunicable diseases conducted among 194 Member States in 2019: funding for palliative care was available in 68% of countries and only 40% of countries reported that the services reached at least half of patients in need [5].

The International Narcotics Control Board found that in 2018, 79 per cent of the world's population, mainly people in low- and middle-income countries, consumed only 13 per cent of the total amount of morphine used for the management of pain and suffering, or 1 per cent of the 388 tons of morphine manufactured worldwide. Although that was an improvement over 2014, when 80 per cent of the world's population consumed only 9.5 per cent of the morphine used for the management of pain and suffering, the disparity in the consumption of narcotic drugs for palliative care between low- and middle-income countries and high-income countries continues to be a matter of concern [7].

Other barriers to palliative care include:

- lack of awareness among policy-makers, health professionals and the public about what palliative care is, and the benefits it can offer patients and health systems;
- cultural and social barriers, such as beliefs about death and dying;

- misconceptions about palliative care, such as that it is only for patients with cancer, or for the last weeks of life; and
- misconceptions that improving access to opioid analgesia will lead to increased substance abuse.

National health systems are responsible for including palliative care in the continuum of care for people with chronic and life-threatening conditions, linking it to prevention, early detection and treatment programmes. This includes, as a minimum, the following components:

- health system policies that integrate palliative care services into the structure and financing of national health-care systems at all levels of care;
- policies for strengthening and expanding human resources, including training of existing health professionals, embedding palliative care into the core curricula of all new health professionals, as well as educating volunteers and the public; and
- a medicines policy which ensures the availability of essential medicines for managing symptoms, in particular opioid analgesics for the relief of pain and respiratory distress.

Palliative care is most effective when considered early in the course of the illness. Early palliative care not only improves quality of life for patients but also reduces unnecessary hospitalizations and use of health-care services [12].

Palliative care needs to be provided in accordance with the principles of universal health coverage. All people, irrespective of income, disease type or age, should have access to a nationally- determined set of basic health services, including palliative care. Financial and social protection systems need to take into account the human right to palliative care for poor and marginalized population groups.

As part of multidisciplinary teams, the nursing workforce should be trained in palliative care skills, especially those who work with patients with serious illness.

Specialist palliative care is one component of palliative care service delivery. But a sustainable, quality and accessible palliative care system needs to be integrated

into primary health care, community and home-based care, as well as supporting care providers such as family and community volunteers. Providing palliative care should be considered an ethical duty for health professionals.

Palliative care medicines, including those for pain relief, are included in WHO Essential Medicines List and the WHO Essential Medicines List for Children [20]. Palliative care is recognized in key global mandates and strategies on universal health coverage, noncommunicable diseases, and people-centred and integrated health services. WHO Guidelines for the pharmacological and radiotherapeutic management of cancer pain in adults and adolescents were released in 2019 (3).

In 2014, the first ever global resolution on palliative care, World Health Assembly resolution WHA67.19, called upon WHO and Member States to improve access to palliative care as a core component of health systems, with an emphasis on primary health care and community/home-based care. WHO's work to strengthen palliative care focuses on the following areas:

- integrating palliative care into all relevant global disease control and health system plans;
- assessing the development of palliative care services;
- developing guidelines and tools on integrated palliative care across disease groups and levels of care, addressing ethical issues related to the provision of comprehensive palliative care;
- supporting Member States in improving access to palliative care medicines through improved national regulations and delivery systems;
- a special focus on palliative care for people living with HIV, including development of guidelines;
- promoting increased access to palliative care for children (in collaboration with UNICEF);
- monitoring global palliative care access and evaluating progress made in palliative care programmes;
- developing indicators for evaluating palliative care services;

- encouraging adequate resources for palliative care programs and research, especially in resource-limited countries; and
- building evidence of models of palliative care that are effective in low- and middle-income settings [13].

## **1.2. The importance of nutritional support and rehydration therapy for adult patients in palliative care**

Palliative care is an approach which aims to increase the quality of life of patients by detecting and treating the symptoms of the patients, who were diagnosed with any life-threatening disease, associated with the disease process in the early period (1). The purpose of palliative care units is to enable terminal period patients to spend their remaining lives more comfortably (2,3). In these patients, adequate and balanced nutrition is one of the basic needs to maintain vital functions. Adequate and balanced nutrition, which is quite effective in protecting health, preventing and treating diseases, can increase the quality of life and sense of well-being, and help alleviate the disturbing symptoms that occur at the end of life (4–6).

Adequate nutrition is important not only to fulfill physiological needs, but also due to its psychological, spiritual, social and cultural benefits for patients and caregivers. Addressing these beneficial aspects of nutrition is of great importance in the palliative environment (5). However, as patients who require palliative care have different diseases, various conditions and prognoses, it is difficult for patients to have a balanced diet due to the negative effects of the disease and treatments (7,8). Some symptoms such as pain, nausea, wounds on the oral mucosa, diarrhea and vomiting while eating may cause impaired nutrition of patients receiving palliative care, and consequently, malnutrition may develop in these patients (8). Malnutrition, which is a significant problem particularly for palliative care units, negatively affects the course of the disease by causing loss of body mass, further decrease of the immune system and insufficiency of organ- system functions, may extend the length of hospital stay, decrease the quality of life and increase the risk of death (8– 10).

The risk of developing malnutrition differs depending on the diagnosis, treatment method, age and gender of the patient (8). Specifically, with the progression of the disease, patients are generally malnourished, and it is asserted that 20% of the patients die from the effects of malnutrition rather than the disease itself (4). Therefore, the risk of malnutrition should be identified early in the patient group in the palliative care unit, and early nutritional support should be initiated by providing patients and families with adequate nutritional training and counseling especially in the early period for ideal patient management (3).

The findings of a study reveal that the malnutrition experienced by palliative care patients cannot be limited to only the physical aspect. Malnutrition affects not only the bodies of the patients but also their psychological and social well-being (11). However, there is a lack of literature with respect to this aspect of malnutrition in this patient population (1,7,12). Furthermore, nutritional status, which is very important for palliative care patients, is perceived as a burden of care by healthcare professionals and is usually ignored.

A person's nutrition and hydration needs and preferences will likely change throughout the palliative phase. In the earlier stage of palliative care, nutrition and hydration supports can help to boost tissue repair and general wellbeing, and prevent infection.<sup>4</sup> For those experiencing rapid deterioration in the last weeks and days of life, it is common to experience physical difficulties with eating and drinking and reduced desire and need for food.

Common challenges include:

- malnutrition or dehydration
- wasting syndrome (cachexia) with marked weight and muscle loss (often a sign of advanced cancer, heart failure or advanced chronic obstructive pulmonary disease) (COPD)
- swallowing problems (dysphagia) which affect the ability to safely swallow food, fluids and/or medication
- a physical obstruction prevents eating or drinking
- discomfort or pain is exacerbated by eating or drinking

- weakness or fatigue makes it difficult to receive oral nutrition
- loss of desire to eat or drink.

Dignity of risk is a person's right to make their own decisions about their care and services, including making choices that involve some risks. A person may choose not to eat and drink or to be artificially fed or hydrated. That is their right and it should be respected. Equally, they may choose to continue to eat and drink in a particular way, despite associated risks. This should also be supported, following discussions with the person about the potential risks to them [13].

Regular assessment during the palliative phase is essential for an individualised, person-centred approach that is responsive to changing care goals and nutrition and hydration needs and preferences. Reassessment when the person is imminently dying is critical to enable responsiveness to specific end of life circumstances.

A nutrition and hydration assessment should form part of a broader assessment of the person's care needs goals and preferences. The Palliative Care Standards<sup>7</sup> identify comprehensive assessment and a corresponding care plan as foundational to supporting better experiences and outcomes. Likewise, the Aged Care Quality Standards require aged care providers to undertake ongoing assessment and planning with consumers to identify and address their current needs, goals and preferences [14].

### **1.3. Basic principles and methods of nutritional support and rehydration therapy in palliative medicine**

Unlike other medical procedures, eating and drinking have symbolic meaning in our culture. Providing food and drink is an important human act based on respect for life and concern for other people.

The role of nutritional and hydration support within palliative care is not clearly defined for various reasons (medical, family, religious, social); therefore it is a subject of constant debate. Although some studies have demonstrated benefits

from the use of nutritional support, both through parental nutrition (NP) and hydration (particularly improved survival in patients with a persistent vegetative state); Some other studies show that when given to patients with some palliative diseases, more serious complications occur [15].

Due to the lack of consensus in the literature, nutritional support provided by various methods continues to be part of management regimens that should be considered when assessing the patient.

The goal of this approach is to restore the satisfaction that food gives the patient, while not forgetting the importance of helping the family and the patient himself to achieve adequate adaptation to the pathological process. If necessary, supportive nutritional support can also be provided in an attempt only to correct the deficiencies found; however, it must be emphasized that this is not a curative treatment.

There are various methods for assessing a patient's nutrition. It is extremely important to consider that weight loss of more than 10% in cancer patients is a criterion of malnutrition, which also has prognostic significance [19].

Given that many patients attending the palliative care service have some form of cancer, we will look at some of the key factors in oncological nutrition assessment (Table 1).

Table 1- Methods for conducting nutritional assessments

	Options	Characteristics
Anthropometry	Weight, height, BMI (body mass index), triceps skinfold measurement	Taking into account footwear and clothing, as well as the presence of edema, ascites or large tumors
Plasma protein concentration	Albumen	Very useful for assessing chronic malnutrition, <2.5 g/dL increases risk of complications
	Transferrin	Greater utility during follow-up
	Prealbumin	Increased sensitivity for assessing acute dietary changes

### Oral feeding

This is the first route worth considering. The symptoms presented by the patient must be taken into account to make appropriate recommendations (Table 2).

Table 2 - Symptoms, general and pharmacological measures [22]

Symptoms	General measures	Pharmacological measures
Constipation	<p>Start your diet with dry foods.                      Avoid whole milk products and acidic fruit juices. Fractionated nutrition.                      Low-fat dishes Do not mix cold and hot foods.                      Stay seated after eating. Cold food is odorless and pleasant to look at.                      Increased activity                      Increased fluid intake                      Fiber-rich foods</p>	<p>Phenothiazines: chlorpromazine, levomepromazine.                      Butyrophenones: haloperidol.                      Metoclopramide.                      5HT<sub>3</sub> receptor antagonists: ondansetron. Corticosteroids: dexamethasone.                      Laxatives                      Bolus formers: methylcellulose.                      Peristalsis activators: senosides A and B, bisacodyl, sodium picosulfate.                      Lubricants and emollients: docusate, mineral oils.                      Osmotics: lactulose, magnesium salts, polyethylene glycol.</p>
Previously saturation	<p>Feeding small meals Frequent meals                      Low fat content, no indigestible fiber.</p>	<p>Metoclopramide, antacids, ranitidine.</p>
Diarrhea	<p>A diet consisting of clear liquids and simple carbohydrates. Avoid dairy products.</p>	<p>Loperamide, octreotide                      dexamethasone, cholestyramine</p>
Xerostomia	<p>Reintroduce proteins and then fats gradually after the problem resolves.                      Make solutions with one liter of water, one Table spoon of baking soda and another salt with mint water.                      Moisturize your lips                      Encourage consumption of soft foods. Drink very cold water or crushed ice, avoid dry foods and opt for liquid foods.</p>	<p>Pilocarpine, artificial saliva (methylcellulose).</p>
Anorexia	<p>Using salivary stimulants (chewing gum, pineapple pieces)                      Create a pleasant atmosphere                      Eats little and often depending on what he likes                      Serve food in small plates                      Have a flexible schedule</p>	<p>Steroids of the first option (methylprednisolone, prednisolone, dexamethasone), meggestrol acetate. As a second option, thalidomide, melatonin, dronabinol.</p>

Some of the most important points to comment on include:

a) Explain the advantages and disadvantages of this treatment: It is important to comment in detail on these points to family members, as well as the need to receive adequate training in the handling of the devices being placed in order to begin treatment either enterally or parenterally. Some examples:

i. Benefits: Increased survival of patients with persistent vegetative state, improved nutritional status of patients with advanced cancer who will receive intensive radiation therapy.

ii. Disadvantages: increased amount of ascites fluid, increased frequency of cystic duct insertion, increased oedema and bronchial secretions after initiation of hydration.

b) Explain complications associated with device placement and use: increased risk of central venous catheter (CVC)-related infections, thrombophlebitis, renutrition syndrome (explained later).

Nutritional support is the administration of enteral or parenteral nutrients designed for patients who require them to maintain or restore nutritional status. When starting nutritional support, contraindications should be taken into account (Fig. 1).

Indications	Survival rate is more than 3 months.	Survival less than 3 months.	Contraindications
	Age over 50 Insufficient consumption. Severe nutritional disorder. Patient's wishes.	PSS greater than 2 Age up to 50 years	

Figure 1 Indications and contraindications for nutritional support [13]

### Enteral nutrition

Once it is determined that the patient is a candidate for this type of nutrition, the most appropriate route of access is selected. There are 3 ways to access:

- Oral route.
- Nasoenteric route (short-term):
  - ✓ Nasogastric.
  - ✓ Nasoduodenal.

- Ostomies (long-term):

✓ Gastrostomy.

✓ Jejunostomy.

There are 2 types of nutrient delivery routes: enteral, short-term and long-term.

The 3 common methods of tube feeding are bolus feeding, intermittent drip feeding, and continuous drip feeding (Table 3). The choice of the method to be used should be based on the function of the patient's pathology, its tolerance, the expected duration of treatment, without forgetting the available resources.

Table 3 - Methods of introducing food through a tube [4]

Bolus Syringe 50-60 ml	Gravity dropper	Continuous drip
Stable patients with a functional stomach Easy for home management Do not exceed >20 ml/min. Regular intake schedules. Clean the probe with 30 ml of solution.	Better tolerance For 24 hours or 12 to 16 hours continuously with night rest. Change infusion lines every 48 to 72 hours. Not in patients at risk of pulmonary aspiration.	Very precise infusion Large volumes can be injected For duodenal administration or hyperosmolar mixtures. Higher cost

There are different types of enteral formulas:

- Supplement: Serves to maintain proper nutritional status. They are intended to supplement the oral diet in those patients for whom normal food intake is not sufficient.

- Complete Formula: These formulas can be administered by tube or orally as they contain sufficient essential and non-essential nutrients to meet the patient's overall nutritional needs and maintain adequate nutritional status.

- Polymer formulas: are formulas in which nitrogen comes only from proteins, for use in patients with normal or nearly normal gastrointestinal function, for which they are used in patients with good digestive and absorptive capacity.

– Normoproteins: 15% of total calories from proteins.

– Hyperprotein: More than 20% of the total calories in the diet come from protein.

- Oligomeric Formulas: To make them easier to absorb, nutrients are pre-digested, resulting in increased osmolarity. They are used when the patient's digestive and absorption capacity is reduced.

Complications of enteral feeding can be minimized by proper tube use and appropriate formula administration (Table 4).

Table 4 - Complications of enteral nutrition [21]

Mechanics	Probe clogged with crushed medication Incorrect placement
Infectious	Mucositis Bacterial contamination of the mixture Aspiration pneumonia
Gastrointestinal	Diarrhea Malabsorption Bloating Constipation
Metabolic	Hyperglycemia Hyponatremia Hypokalemia

Feeding tubes require monitoring to ensure proper placement and prevent complications such as skin/mucous membrane damage or infection.

- The probe site should be constantly checked for irritation, ulceration, necrosis or skin damage.

- Keep the area where the sensor is located clean using warm or salt water.

- Make sure we expect proper care from the person administering the formula.

- Introduce the mixture to the patient at an angle of 30°-45°, keeping it in this position for up to half an hour to avoid bronchoaspiration.

- After introducing the mixture, rinse the probe with 50 ml of water.

- Do not use homemade formulas.

- Take the mixture at room temperature, if it is found in the refrigerator, you could suggest Mary to take a bath.

- Opened packaging that has not been completely used should be stored in the refrigerator for no more than 24 hours.

- Properly label the indicated package with the date and time of opening.

## Parenteral nutrition.

Total parenteral nutrition (TPN) is the administration of nutrients directly into the bloodstream intravenously, providing a nutritional alternative when the digestive tube needs rest or is not functioning as compared to oral or enteral nutrition.

The administration of food is determined by various factors, such as: the patient's condition, the composition of the solution, energy requirements and duration (Table 5).

Table 5- Method of administration and indications for parenteral nutrition

[23]

Access	Indications	Advantages	Flaws
Peripheral path	Short-term NPT NPT with low osmolarity (up to 900 mOsm and glucose concentration up to 12.5%)	Easy access. Budget <risk of complications	Mild extravasation with phlebitis and tissue infiltration. No hypertonic solutions
Peripheral on-board central venous catheter	Interim short-term NPT (< 4 weeks)	Access to the central vein by peripheral venipuncture. Lower risk of infection compared to classic venous catheters. Installation with minor complications	Experienced medical staff to accommodate them. Wait to administer them until peripheral pathways are lost due to puncture. Easy Obstacle
Percutaneous central venous catheter	NPT Interim Short-Term Action	Catheters with one or three lamps, allowing the simultaneous administration of several solutions. They stand at the foot of the bed	Their insertion into the internal jugular vein, subclavian or femoral, increases the risk of placement and the rate of infection
Tunneled venous catheter with subcutaneous reservoir	Long-term or permanent NPT (more than 4 weeks)	Ideal for home NPT. Reduced risk of thrombosis and infection	Introduction to the operating room. Precise heparinization to maintain

NPT: total parenteral nutrition

There are short- and long-term NIPs, with the former lasting 7 to 10 days, recommended for adults, and the latter, over 3 weeks, recommended for children and adolescents (Table 6).

If you are dealing with CVC, you must take appropriate precautions; it is recommended:

- Clean the catheter exit area with chlorhexidine 2%; Regular application of antibiotic creams to the catheter outlet is not recommended.
- The catheter outlet should be covered with a transparent, sterile, semi-permeable adhesive material; it should be changed regularly every 7 days.
- Remove the device if infection is suspected and reposition it using the metal guide; If infection of the catheter is confirmed, it should be removed and replaced.
- In the case of catheters with an open external lumen, heparin is recommended. First you need to give saline solution, and then heparin.

#### Hydration.

Hydration can be provided by the same routes as NPT, but is preferably administered subcutaneously<sup>17-20</sup>.

Subcutaneous hydration provides the benefits of allowing the patient more freedom for most of the day, the ability to have family members operate in the home, and not having to rely on an infusion pump; this allows for different types of fluid administration:

- 1) 500 ml every hour 2 or 3 times a day.
- 2) Night infusion (80 ml/h).
- 3) Infusion continues at a rate of 40–60 ml/hour.

It is worth emphasizing that this medium only allows the introduction of saline solutions and electrolytes.

Some benefits have been reported for the use of hypodermolysis in certain cases, such as when patients report dehydration, malaise, asthenia, confusion, hallucinations and renal failure, as well as delirium and evidence of opioid intoxication [24].

There are many complications associated with the use of nutritional support, they depend on the method of administration of nutritional support and are largely related to the timing of use; we will comment on the most frequent and important<sup>21</sup>.

Thrombophlebitis is one of the most significant complications limiting peripheral DPT. The incidence of this complication depends on the osmolarity, pH and rate of infusion of the solution. The risk of thrombophlebitis has been found to be lower if the catheter is located on the back of the hand compared to the wrist or arm [25].

Infection is the most common complication associated with long-term NP. If a catheter infection is suspected, cultures of peripheral blood (from two different puncture sites) and from each catheter lumen should be taken simultaneously, the device should be immediately removed and the tip should be examined microbiologically<sup>22</sup>.

If necessary, antibiotic treatment can be started after the results have been obtained and the sensitivity of the culture to antibiotics has been determined. In some cases, such as subclinical infection (no local signs of infection and sTable patients), treatment with antibiotics alone may be indicated without CVC removal.

If the results of both cultures are positive, and also if the peripheral blood culture is negative, but the CVC culture is positive, it is necessary to discontinue it and begin antibiotic therapy; this is especially true for patients with prosthetic heart valves and infection with *Staphylococcus aureus* or *Candida* spp.

Refeeding syndrome is a series of biochemical and metabolic changes that occur in severely malnourished patients who are started on any type of nutritional support (oral, enteral or parenteral).

Symptoms arise due to 2 processes:

1) Changes in serum electrolytes alter membrane potential (hypokalemia, hypomagnesemia, hypophosphatemia).

2) Metabolic consequences are associated with an imbalance between water and glucose, as well as with the deficiency of certain vitamins.

Clinical manifestations include nausea, vomiting, lethargy, arrhythmias, delirium, coma, and in some cases death due to heart failure and respiratory failure.

Treatment is based on prevention and early detection of this syndrome so that the necessary electrolyte correction can be made.

Here are the ethical aspects of nutritional support for terminally ill patients.

Loss of appetite is often a cause of concern. Family members are concerned that “the patient is not eating enough,” and the patient may also be concerned. Fears, myths and misunderstandings can often be addressed by providing misinformation, but the following points should be taken into account<sup>23</sup>:

- Liquid is not the same as food.
- Dehydration does not mean suffering.
- Forcing a dying patient only tires the patient.
- Eating cannot reverse the underlying process.
- Loss of interest in food is an almost fatal natural phenomenon.
- The body takes only what it needs.
- Decreasing food intake does not shorten life, it is simply a sign that the body can no longer process food.

However, there is controversy regarding the initiation and maintenance of nutritional support in patients with palliative illness. Two main ethical aspects are taken into account: the first concerns the balance of the advantages and disadvantages of nutritional support and the wishes of the patient. Another concerns the assignment of resources, including money, personnel and equipment. Although no patient should be denied nutritional support on resource-based grounds, rational use of increasingly limited resources must take place in the decision-making process<sup>24,25</sup>.

From a legal perspective, almost no court has supported the view that nutritional support is a medical intervention that can be accepted or refused by a competent patient or subrogee (subject to clear and convincing evidence that the subject wishes to withhold treatment). In some countries, nutritional support and hydration are considered issues that should be decided upon or reconsidered during the pending probate or subrogation process.

In conclusion, the patient has the right to request this medical intervention; the family and patient should be provided with all available information about the benefits and risks of starting nutritional support; It should also be emphasized that

most studies do not demonstrate a clear benefit in patients who initiate such treatment, although there are some exceptions; If a decision is made to provide nutritional support, they will be required to sign an informed consent containing the information provided and such treatment will continue.

During the assessment of discontinuation of nutritional support, the patient may be confronted with various ideas that may complicate the process, such as the fear of actual dehydration or the feeling of hunger.

It is important to inform the family about the changes that occur in these patients, especially in the last days of life; Patients are typically no longer hungry or thirsty, and some symptoms that can be attributed to the maintenance or withdrawal of nutritional support (eg, dry mouth, confusion, delirium, decreased alertness, fatigue) may be part of the death process.

Many of these symptoms have been shown not to be relieved by initiation of hydration and NP, which also has the disadvantage of being considered an invasive treatment and in turn can be adequately controlled with general measures. It has also been found that dehydration can induce an endogenous analgesic effect due to ketoacidosis and endorphin accumulation, and also helps reduce the feeling of choking with less coughing and less pulmonary secretions.

The most important thing is to know that the subject must be the final arbiter of benefits and difficulties. It is advisable to inform patients of the importance of informing family members of their desire to continue treatment and, in particular, to continue or discontinue nutritional support and hydration, so that in the event that they are no longer able to make such decisions, their family can do so with confidence and without feeling guilt.

## 2 STUDY OF METHODS OF SUPPORT FOR ADULT PATIENTS IN PALLIATIVE CARE

### 2.1 Analyzing existing methods of nutritional support and rehydration therapy

Nutritional screening and assessment are necessary to determine an individual's nutritional status and potential need for supportive care [1–4]. Malnutrition is a deficiency, excess, or imbalance in a person's intake of energy or nutrients; in this article, malnutrition is defined as a condition associated with insufficient nutrition. Table 1 presents selected tools for screening and identifying individuals at risk of malnutrition [5] There is insufficient evidence to support the use of one tool over another; therefore, clinicians should select an instrument depending on the patient and treatment setting.

If screening determines that a patient is at higher risk of malnutrition, family physicians should work with a registered dietitian who uses the Nutrition Care Process framework for assessment [6]. This includes assessing anthropometric measurements; biochemical data, medical tests and procedures; history of food and nutrition; nutrition-oriented physical data; and medical history.

Table 6- Selected tools for screening and identifying adults at risk of malnutrition

Tool	Website
Community setting	
Malnutrition Universal Screening Tool	<a href="https://www.bapen.org.uk/screening-and-must/must-calculator">https://www.bapen.org.uk/screening-and-must/must-calculator</a>
Inpatient setting/hospitalized patients	
Malnutrition Screening Tool	<a href="https://abbottnutrition.com/tools-for-patient-care/rd-toolkit">https://abbottnutrition.com/tools-for-patient-care/rd-toolkit</a>
Nutritional Risk Screening 2002	<a href="https://www.mdcalc.com/nutrition-risk-screening-2002-nrs-2002">https://www.mdcalc.com/nutrition-risk-screening-2002-nrs-2002</a>
Short Nutritional Assessment Questionnaire	<a href="https://www.fightmalnutrition.eu/toolkits/hospital-screening">https://www.fightmalnutrition.eu/toolkits/hospital-screening</a>
Older adults	
Mini Nutritional Assessment–Short Form	<a href="https://www.mna-elderly.com/mna-forms">https://www.mna-elderly.com/mna-forms</a>
Modified Mini Nutritional Assessment–Short Form	
Note: Superscript letters refer to the following components included in the screening tool: a =	

recent weight loss; b = appetite; c = body mass index; d = disease severity.  
Information from reference 5.

To determine whether patients are meeting energy needs, clinicians may use body weight, height, and age, as well as additional energy requirements required for activity and metabolic requirements for specific medical problems.<sup>7-9</sup> The average adult requires 25 to 30 kcal per day. kg. body weight and 1 to 2 g of protein per kg of body weight, but family physicians should use a predictive formula such as the Mifflin-St. George equation and consult with a registered dietitian when possible.

Universal indications for nutritional support are controversial due to the lack of high-quality studies with patient-centered outcomes. [11] A Cochrane review of low-quality studies found no evidence of reduced mortality or increased harm from nutritional support. [12] However, there is stronger evidence of effectiveness diet maintenance therapy for certain diseases of the gastrointestinal tract. A Cochrane review found that early EN support after lower gastrointestinal surgery reduced length of hospital stay but did not affect other outcomes; therefore, clinicians should consider starting EN within 24 hours of lower GI surgery. [13] For non-severe acute pancreatitis, clinicians should initiate early oral nutrition and use EN if supportive care is needed. [14,15] In addition to these conditions, clinicians should consider nutrition assessment to decide if nutrition support is needed.

Patients may benefit from nutritional support if they are malnourished, at risk of malnutrition, or are receiving nutrition but cannot meet estimated nutritional requirements orally for more than five days [4]

However, before starting therapy, family physicians must determine treatment goals, prognosis, and overall quality of life. Figure 1 presents an algorithm to help determine the feasibility and potential route of administration of nutritional support [16]

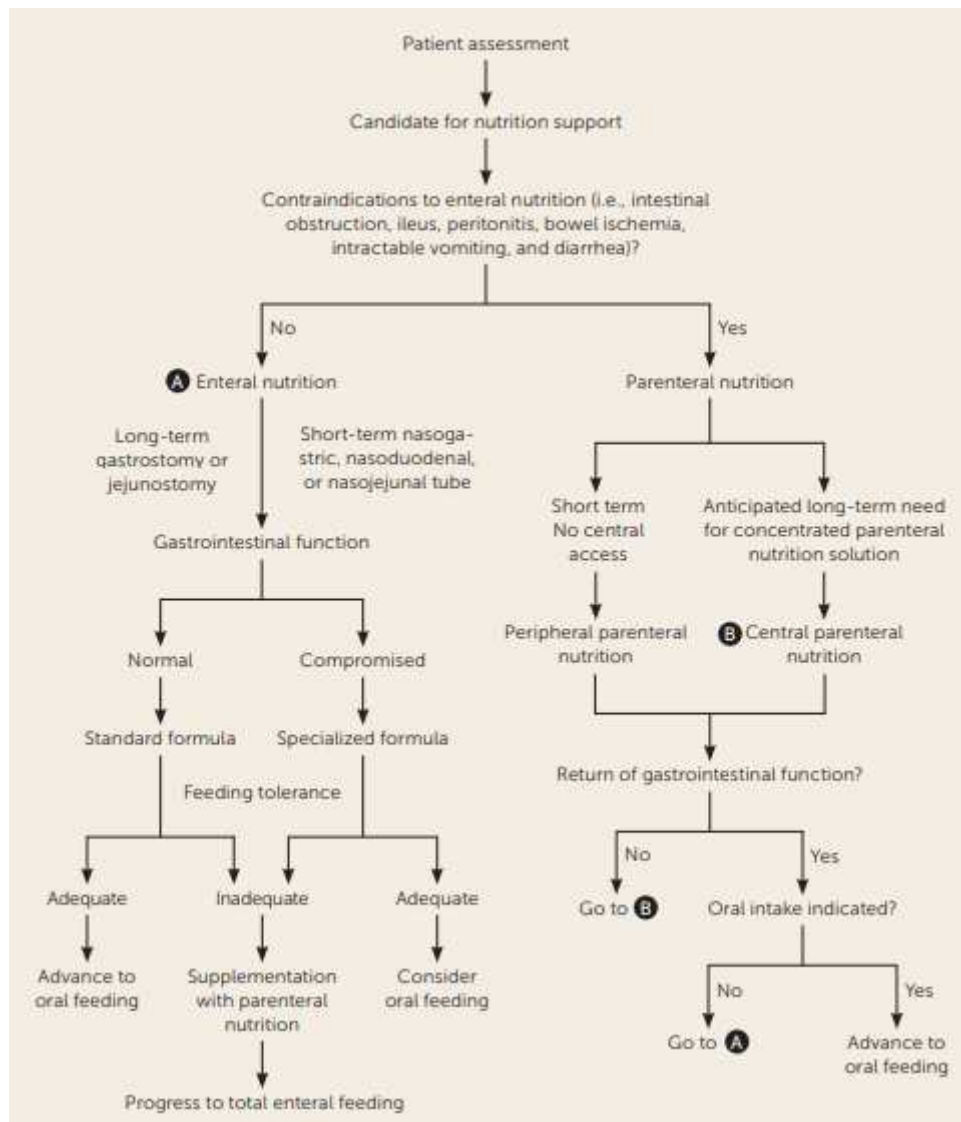


Figure 1- Algorithm for providing nutritional support

Source: Rolfesa SR, Pinny K, Whitney E. Understanding Normal and Clinical Nutrition, 12th ed. Cengage Learning, Inc.; 2020:604.

Research supports the use of EN over PN if the person's gastrointestinal system is functioning, as EN generally has fewer side effects and may have better outcomes.[1,4,12] Studies comparing EN and PN in critically ill patients have shown no difference in 90-day mortality; however, EN has been associated with fewer respiratory infections and shorter hospital stays, and it is more cost-effective [4,17–19]. Hospitals that use a nutrition support team to regulate PN use may have lower rates of inappropriate PN use [20]

EN support can be provided to patients with a functional gastrointestinal tract who are unable to consume sufficient food and fluid to meet expected nutritional needs due to GI dysfunction.

## **2.2. To evaluate the effectiveness of different approaches to nutritional support and rehydration therapy in palliative care**

EN support formulas can be divided into several categories: polymeric or intact formulas contain whole sources of macronutrients and are suitable for medically stable patients with a functioning gastrointestinal tract [24] Partially hydrolyzed, semi-elemental or elemental formulas contain pre-digested, free amino acids or their combination. These formulas are suitable for patients with malabsorption, pancreatic disease, or recent gastrointestinal surgery [1,24]

Some formulas differ in the content of macro- and microelements. A systematic review supported the use of high-carbohydrate, high-protein, low-fat formulas in patients with burns greater than 10% of the total body area to reduce the incidence of pneumonia [25]. Tube feeding through a blender is a puree, a mixture of natural foods, and can be used for the patient with an intact, functioning gastrointestinal tract who may require long-term EN support. Modular products that contain only one nutrient (i.e., protein, carbohydrate, or lipid) may be added (as a bolus) to help meet the patient's perceived needs if they cannot be met by the EN support formula alone. Figure 2 shows an approach to selecting appropriate EN formulas depending on the patient's needs [26]

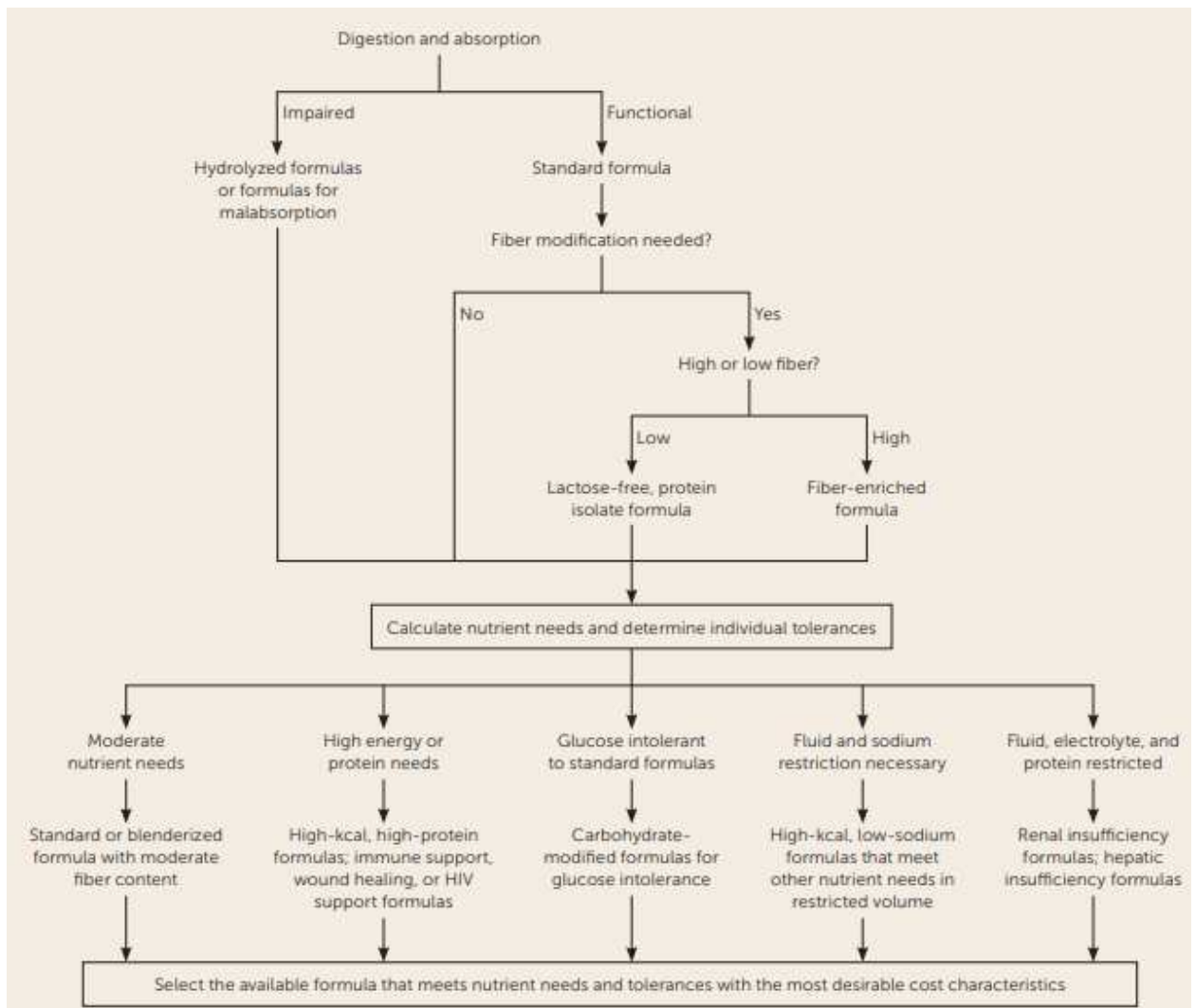


Figure 2- Algorithm for selecting an enteral nutrition formula.

Source: Rolfesa SR, Pinny K, Whitney E. Understanding Normal and Clinical Nutrition, 12th ed. Cengage Learning, Inc.; 2020:604.

Maintenance PN therapy can be provided through central or peripheral venous access. PN support provided through a central venous access is called total or central PN. PN support provided peripherally is called peripheral PN. Peripheral PN support can be used in patients without fluid restriction and with an expected duration of therapy of seven to 10 days. [1] Providing nutrition through peripheral venous access is limited because drugs with an osmolarity greater than 900 mOsm/L are poorly tolerated peripherally. Therefore, central or full PN support is usually required to provide higher osmolarity drugs.

PN support is available as a general three-in-one nutritional supplement solution or, more commonly, as a two-in-one mixture consisting of dextrose and amino acids, with fat emulsions administered as a separate solution [1] Many medications are incompatible with PN support solutions. PPs (eg, acyclovir, ceftriaxone) and should not be administered simultaneously.

Dextrose, a carbohydrate containing 3.4 kcal per gram, is available in concentrations ranging from 2.5% to 70%. The energy provided by carbohydrates to support PN typically accounts for 70% to 85% of total daily nonprotein energy. To reduce the incidence of hyperglycemia, the amount of carbohydrate provided to adults should be 5 to 7 mg per kg per minute in non-critically ill patients and 4 mg per kg per minute or less in those who are critically ill. 1. 2 To reduce the risk of thrombophlebitis when administering peripheral PN support, the concentration of carbohydrates should not exceed 10%.

PN contains amino acids instead of intact proteins and is available in concentrations ranging from 3% to 20%.

Table 7- Estimating Nutritional Needs of Adults

Males	
$RMR = 9.99 \times \text{weight (kg)} + 6.25 \times \text{height (cm)} - 4.92 \times \text{age} + 5$	
Females	
$RMR = 9.99 \times \text{weight (kg)} + 6.25 \times \text{height (cm)} - 4.92 \times \text{age} - 161$	
Estimating protein needs	
Condition	Protein in g (based on body weight in kg)
Healthy adult	0.8
Adults > 65 years	1.0
Bariatric	1.0 to 1.5 (ideal body weight)
Chronic kidney disease (for hemodialysis or peritoneal dialysis)	1.2 to 1.5
Chronic kidney disease (nondialysis)	0.6 to 0.75
Critical illness	1.2 to 2.0
Heart failure	1.12 to 1.37
Hepatic disease	1.0 to 1.2 (dry weight) 1.2 to 1.5 (dry weight malnourished)
Hepatitis or cirrhosis without encephalopathy	0.8 to 1.0
Obesity	2.0 (ideal body weight for obese classes 1 and 2) 2.5 (ideal body weight for obese classes 3 and 4)
Pressure injury	1.2 to 1.5
Respiratory disease	1.2 to 1.6 (maintenance)

	1.6 to 2.0 (for repletion) 2.0 (ideal body weight for BMI of 30 to 40 kg per m <sup>2</sup> ) 2.5 (ideal body weight for BMI > 40 kg per m <sup>2</sup> )
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Table 8- Methods of Monitoring Nutrition Support Therapy

Enteral nutrition		Parenteral nutrition	
Parameter	Frequency	Parameter	Frequency
<b>Anthropometrics</b>			
Body weight	Daily; 2 times per week when sTable	Body weight	Daily; 2 to 3 times per week when sTable
<b>Biochemical</b>			
Calcium, magnesium, phosphorus	Daily; weekly when sTable	Calcium, magnesium, phosphorus	2 to 3 times per week; weekly when sTable
Electrolytes, blood urea nitrogen, creatinine	Daily; 2 to 3 times per week when sTable	Electrolytes, blood urea nitrogen, creatinine	Daily; 1 to 2 times per week when sTable
Glucose	Patients with diabetes mellitus: every 6 hours; individualized frequency once sTable Patients without diabetes: daily; weekly when sTable	Glucose	3 times per day until consistently < 200 mg per dL (11.10 mmol per L)
Nitrogen balance	Weekly, if appropriate	Liver function tests	2 to 3 times per week; weekly when sTable
		Triglycerides	Weekly
		Complete blood count with differential	Weekly
		Prothrombin time, partial thromboplastin time	Weekly
		Prealbumin or transferrin	Weekly
		Nitrogen balance	As needed
<b>Clinical</b>			
Gastric residuals	Every 4 to 6 hours when feeding into stomach	Vital signs: blood pressure, respirations, pulse	Daily; 3 times per week when sTable
Intake and output	Daily	Intake and output	Daily
Stool output and consistency	Daily	Bowel function	As needed
		Indirect calorimetry	As needed
<b>Nutrition-focused physical examination</b>			
Abdominal examination if soft, firm, or distant	Daily	Hydration or fluid status: physical assessment of skin turgor, presence of edema, temperature; oral cavity for color, texture, moisture, or dryness	Daily; 3 times per week when sTable

Signs or symptoms of dehydration	Daily		
Signs or symptoms of edema	Daily		

Various commercial amino acid solutions vary in the amount of essential and non-essential amino acids and are suitable for certain conditions, such as liver failure.<sup>1</sup> Excess protein in PN support increases the metabolic load on the kidneys; therefore, renal function should be monitored [27]

Lipids in PN maintenance therapy contain lipid emulsions for intravenous administration and are most often in the form of long-chain triglycerides; they can be part of general solutions of nutritional supplements or administered separately. Intravenous fat emulsions are available in concentrations of 10%, 20%, and 30%, providing 1.1, 2.0, and 2.9–3.0 kcal per mL, respectively. Intravenous fat emulsions are necessary to prevent essential fatty acid deficiency. Smoflipid is a US Food and Drug Administration-approved alternative fat emulsion for intravenous administration that contains fish oil, olive oil, and medium chain triglycerides in addition to long chain triglycerides. Smoflipid has the potential to improve anti-inflammatory responses and reduce liver disease associated with PN.<sup>28</sup> To avoid suppression of the immune system, the formulation should not contain more than 30% energy from fat [1]

Mineral and vitamin requirements for PN differ significantly from reference dietary intakes due to differences in enteral absorption and bioavailability compared with direct intravenous administration. [1] Multivitamin solutions with or without vitamin K are available for patients who are concomitantly taking warfarin (Coumadin ). Standard trace element solutions contain chromium, copper, manganese, zinc and selenium. Copper and manganese should be administered conservatively in patients with hepatic impairment.[1,2,29] Patients with increased small intestinal losses may require supplemental zinc.[1,2,29] Formulations generally do not include iron due to stability issues .

### 2.3. Exploring the problems and complexities encountered in implementing nutritional support and rehydration therapy in palliative care

Patients receiving EN or PN support require close monitoring (Table 9) [1]. For those receiving EN support, family physicians should monitor food and feeding tolerance (eg, vomiting, changes in bowel habits, bloating, gastric residues) and complications associated with enteral tube feeding (eg, nasal erosion, infection, migration, leakage). Family physicians should monitor patients receiving PN support for enteral administration, tolerability, and complications of parenteral administration (eg, thrombophlebitis, infections). Any patient receiving dietary maintenance therapy should be monitored for clinical signs of dehydration or volume overload, weight overload, and biochemical abnormalities. Biochemical evaluation should include a baseline complete metabolic panel, complete blood count, triglycerides, magnesium, and phosphorus. For patients receiving EN support, family physicians should monitor laboratory values as needed based on the individual's clinical situation.

Table 9- Complications of Nutrition Support Therapy

Complication	Factors to monitor
Enteral	
Gastrointestinal	
Abdominal retention	Excessive gas
Constipation	Decreased stool frequency
Diarrhea	Increased stool frequency or liquid consistency
Nausea or vomiting	Elevated gastric residuals
Infectious	
Contamination	Equipment (eg, tube cleanliness) Formula (eg, expiration dates) Site cleanliness
Mechanical	
Breakdown of tube site	Leakage from ostomy
Tube displacement or migration	Coiled or displaced tubes
Tube obstruction	Medication obstruction Tube diameter
Metabolic	
Edema or dehydration	Inadequate or excessive fluid intake, body weight
Hyperor hypoglycemia	Serum glucose
Refeeding syndrome	Electrolytes (hypokalemia, hypomagnesemia, hypophosphatemia)
Parenteral	
Biliary disease Bone disease	Complete metabolic panel, magnesium, phosphorus,

Electrolyte imbalances Hepatic disease Hyperglycemia Hypoglycemia Refeeding syndrome	triglycerides, and vitamin D Hyperlipidemia Rebound
Hemodynamic instability	Vital signs
Infectious	Catheter cleanliness
Mechanical	Central venous access site and line
Thrombosis	Central venous line

For patients receiving PN support, family physicians should monitor laboratories daily until the condition stabilizes, and then at least weekly. Glucose levels should be monitored as needed to achieve adequate glycemic control. In patients receiving long-term dietary maintenance therapy, family physicians should periodically measure the levels of iron, ferritin, zinc, copper, folic acid, vitamin B12, vitamin D and vitamin K.

Complications can occur with any form of maintenance diet. Table 9 shows the most common complications. Complications associated with EN support include metabolic, gastrointestinal, mechanical, and infectious. [1,2] PN support may have metabolic and non-metabolic complications. Metabolic complications include glucose abnormalities or liver dysfunction, which physicians can reduce by monitoring and adjusting the composition and rate of infusion [1,2] Non-metabolic complications include infectious or mechanical problems, which can be reduced with proper catheter care [1, 2, 30]

Another potential complication is refeeding syndrome, which is a dangerous condition leading to a variety of electrolyte imbalances [1, 2, 29]. Refeeding syndrome can occur during aggressive use of nutritional support in patients suffering from malnutrition [1, 2, 31 ] It is more common in PP. is supported, but can also occur with EN support. For refeeding syndromes (eg, malnutrition, alcoholism, electrolyte disturbances, anabolism), nutritional support should begin at one-third to one-quarter of nutritional requirements and gradually increase over five to seven days.

### 3 DEVELOPING SOLUTIONS TO OPTIMISE SUPPORT FOR ADULT PATIENTS IN PALLIATIVE CARE

#### 3.1. Development of recommendations for optimizing nutritional support and rehydration therapy

EN and PN support are specialized life-sustaining medical procedures that may cause discomfort and significant risks. There is no concrete evidence that tube feeding benefits patients with dementia [32] Nutritional support therapy is no different from other life-sustaining treatments for medico-legal problems [33] Family physicians should be involved in shared decision-making with patients and persons affected by them. caregivers when they make a decision. - determining when to start and stop diet maintenance therapy.

Recommendations for optimizing nutritional support and rehydration therapy are given in the summary table below [11].

Table 10- Nutrition support therapy

Clinical recommendation	Evidence rating	Comments
Physicians should work with a registered dietitian nutritionist who uses the Nutrition Care Process framework to assess the need for nutrition support therapy in patients at risk of malnutrition	C	Guidelines recommended using a standard process for assessing nutritional risk.
Consider initiating EN feedings within 24 hours of gastrointestinal surgery.	B	A systematic review of low-quality studies showed a decreased length of hospital stay, but no effect on other outcomes.
In no severe acute pancreatitis, initiate early oral feeding. If nutrition support therapy is needed, use EN over total PN.	A	A systematic review showed no harms of early feeding and a reduced length of stay; a systematic review showed that in patients needing nutrition support, EN significantly decreased morbidity and mortality compared with total PN.
Use EN over PN in patients with a functioning gastrointestinal tract.	B	A systematic review of low-quality studies showed that EN may have fewer serious adverse events than PN.
In critically ill patients who need nutrition support therapy, use EN instead of PN or a combination of the two.	A	A large randomized controlled trial and a systematic review of low-quality studies comparing EN and PN in critically ill patients showed no difference in 90-day mortality. However, using EN may result in fewer respiratory infections and shorter hospital stays, and it is more cost-effective.

Consider using high-carbohydrate, high-protein, low-fat EN in patients with burns on more than 10% of their total body surface area.	B	A systematic review of low-quality studies showed that using a high-carbohydrate, high-protein, low-fat EN formula may result in a lower incidence of pneumonia compared with use of a low-carbohydrate, high-protein, high-fat diet.
In patients with dementia, avoid tube feeding.	C	A nonsystematic review found no evidence that tube feeding improved outcomes.
Note: EN = enteral nutrition; PN = parenteral nutrition. A = consistent, good-quality patient-oriented evidence; B = inconsistent or limited-quality patient-oriented evidence; C = consensus, disease-oriented evidence, usual practice, expert opinion, or case series.		

compiled by the author on the basis of [10-15]

Any critically ill patient who is not expected to be able to take oral nutrition for  $\geq 5$  days with significant comorbidity.

Any patient who has taken or has received oral medications that are insufficient to meet current nutritional needs. (i.e.  $< 50\%$  of estimated calorie requirement for  $> 5$  days)

### **3.2. Practical recommendations for improving the quality of life of patients through nutritional support and rehydration therapy**

Despite recent advancements in medical care, malnutrition continues to be a significant and prevalent issue in developed nations. Patients receiving palliative care are particularly susceptible to the negative effects of malnutrition, including longer hospital stays, increased likelihood of falls, higher healthcare utilization, reduced physical function, diminished quality of life, and heightened risks of severe complications and mortality. Research indicates that 57.4% of palliative care patients suffer from malnutrition, with an additional 27.8% at risk of developing malnutrition. Notably, nutritional assessment revealed that 89.43% of these patients were malnourished. Furthermore, a clear correlation between diet and malnutrition was established, showing a higher risk of malnutrition among those reliant on oral nutrition compared to the TPN group. Conversely, individuals receiving parenteral nutrition were more likely to experience malnutrition than those following an oral diet (tabl. 11) [16].

Table 11 - Distribution of nutrition according to descriptive characteristics of patients (N=123) [16]

Descriptive characteristics	Normal nutrition N=4		Risk of malnutrition N=9		Malnutrition N=110		Test statistics	
	N	%	N	%	N	%	$\chi^2$	P
Floor							2.07	0.34
Female	1	1.7	6	10.0	53	88.3		
Male	3	4.8	3	4.8	57	90.5		
Family status							0.62	1.00
Married	4	3.4	9	7.6	105	89.0		
Lonely	0	0.0	0	0.0	5	100.0		
Educational level							7.82	0.39
Illiterate	1	1.6	5	7.8	58	90.6		
Literate	0	0.0	1	5.0	19	95.0		
Elementary education	3	10.3	3	10.3	23	79.3		
high school	0	0.0	0	0.0	8	100.0		
Undergraduate/Graduate	0	0.0	0	0.0	2	100.0		
Diagnosis of diseases							7.22	0.72
Cancer	3	6.1	5	10.2	41	83.7		
Heart failure	1	7.1	1	7.1	12	85.7		
Diabetes	0	0.0	1	14.3	6	85.7		
Cerebrovascular	0	0.0	0	0.0	18	100.0		
Alzheimer's	0	0.0	1	4.0	24	96.0		
Other	0	0.0	1	10.0	9	90.0		
Duration of the disease							1.28	1.00
Less than a year	1	2.4	3	7.1	38	90.5		
1-5 years	2	3.9	4	7.8	45	88.2		
6-10 years	1	6.7	1	6.7	13	86.7		
11 years and older	0	0.0	1	6.7	14	93.3		
Income status							3.01	0.50
Poor	0	0.0	2	6.3	thirty	93.8		
Moderate	4	4.7	6	7.0	76	88.4		
Fine	0	0.0	1	20.0	4	80.0		
Type of feeding							13.81	0.04
Oral	3	5.4	9 <sup>A</sup>	16.1	44 <sup>a</sup>	78.6		
P.E.G.	0	0.0	0 <sup>ab</sup>	0.0	16 <sup>ab</sup>	100.0		
NG	0	0.0	0 <sup>ab</sup>	0.0	9 <sup>ab</sup>	100.0		
TPN	1	2.4	0 <sup>b</sup>	0.0	41 <sup>b</sup>	97.6		
	$\chi$	SD	$\chi$	SD	$\chi$	SD	F	p
Age	62.75	19.31	68.22	11.57	72.51	14.14	1,247	0.291

Superscripts a, b indicate differences between groups in the same column;  $\chi^2$ : Chi-square, F: Anova, PEG: Percutaneous Endoscopic Gastronomy, NG: Nasogastric Catheter, TPN: Total Parenteral Nutrition.

Malnutrition arises as a result of reduced food consumption, heightened nutrient demands, or hindered capacity to utilize or absorb nutrients. A literature

review revealed that the prevalence of malnutrition rises with advancing age, and approximately 60% of older adults in the community experience nutritional deficits. Analysis showed no statistically significant variance in nutritional status concerning age, gender, education level, marital status, income, or disease duration based on the MNA scale. However, malnutrition levels were more pronounced among elderly patients (tabl. 12) [18].

Table12- Impact of malnutrition on patient characteristics according to MNA percentage (N=123) [18]

Descriptive characteristics	Median value	25. Percentage value	75. Percentage value	Test statistics	
Floor				g=0.877	p=0.381
Female	5.50	2.50	9.25		
Male	4.50	2.12	7.00		
Family status				g=0.032	p=0.974
Married	5.50	2.50	8.00		
Lonely	4.50	2.62	9.37		
Educational level			H=2.348		p=0.672
Illiterate	5.50	2.00	8.00		
Literate	4.50	3.00	6.50		
Elementary education	7.50	0.50	11.00		
high school	3.50	1.50	5.25		
Undergraduate/Graduate	4.50	3.50	5.50		
Diagnosis of diseases			H=18.540		p=0.002
Cancer	4.75ab	1.00	7.50		
Heart failure	4.50ab	4.00	10.00		
Diabetes	1.00b	0.00	5.50		
Cerebrovascular	4.00ab	3.87	6.375		
Alzheimer's	6.50a	1.25	10.00		
Other	6.40ab	4.00	7.00		
Duration of the disease			H=5.087		p=0.166
Less than a year	6.00	4.00	8.00		
1-5 years	3.50	1.00	9.12		
6-10 years	7.00	1.12	9.75		
11 years and older	4.50	0.50	7.37		
Income status			H=4.077		p=0.130
Poor	6.25	3.75	8.25		
Moderate	4.50	1.00	8.00		
Fine	8.00	4.50	13.37		
Type of feeding			H=31.295		p<0.001
Oral	7.25a	5.50	12.00		
PEG	1.00b	0.00	4.50		
NG	3.00b	0.50	5.87		
TPN	4.00b	1.00	6.00		

<sup>a, b</sup>: Superscripts show differences between groups in the same column. PEG: Percutaneous endoscopic gastronomy. NG: Nasogastric catheter. TPN: Total Parenteral Nutrition

In a separate investigation carried out on individuals receiving palliative care in our nation, it was observed that the prevalence of malnutrition was higher among patients aged 90 and above; however, there was no statistically significant correlation between age and nutritional status [31]. A study focusing on elderly cancer patients revealed that those with low MNA (Mini Nutritional Assessment) scores exhibited a reduced life expectancy [34]. Consequently, it is imperative to exercise greater caution regarding malnutrition, particularly among the elderly and cohorts of patients necessitating palliative care.

Malnutrition is a prevailing issue among the majority of patients with late-stage cancer [11]. Within this patient demographic, malnutrition is attributed to an inflammatory process leading to anorexia and subsequent substantial weight loss [32]. It is established that anorexia, weight reduction, and muscle mass depletion, collectively known as cancer cachexia, are evident in 80% of individuals with advanced cancer [11].

Cancer patients often experience overweight in addition to their diagnosis, and malnutrition is prevalent among this patient population. Previous research has highlighted the elevated risk and prevalence of malnutrition in cancer patients. A study [20] compared the nutritional status of palliative care patients, revealing that cancer patients exhibited higher rates of malnutrition compared to the other group. A statistically significant difference was observed between disease diagnosis and malnutrition levels.

Malnutrition, prevalent among individuals with cancer, significantly affects both quality of life and survival rates. A comprehensive investigation into the factors influencing malnutrition in cancer patients revealed that tumor location and disease stage play a crucial role in its development [19]. Hence, early nutritional assessment is vital for monitoring cancer progression. Maintaining a well-rounded and consistent dietary regimen is essential for individuals battling cancer, given the nature of the disease and treatment modalities. Consequently, nurses ought to establish and adhere to oncology-specific dietary plans for patients, working closely with dietitians [23].

Malnutrition in hospitalized patients has significant medical and economic consequences. It results in weakness, sensitivity, and/or dependence, exacerbates the patient's condition, increases morbidity, prolongs hospital stays, and diminishes quality of life. Moreover, it is associated with a poorer prognosis for underlying diseases and heightened mortality risk. Timely detection allows for prompt intervention, better outcomes, and enhanced quality of life. Therefore, nutritional screening is essential to pinpoint causal factors. Regular assessment of nutritional status using suitable tools is crucial during treatment. Nurses play a vital role in identifying changes in patients' conditions and addressing symptoms impacting their nutrition [1].

Healthcare professionals need to identify the potential for malnutrition at an early stage in palliative care patients and commence nutritional assistance promptly. They should offer comprehensive nutrition education and guidance to patients and their families, particularly at the outset, to optimize patient care. Establishing clear communication among patients, caregivers, and healthcare providers is crucial in addressing individual nutritional requirements, enhancing the likelihood of resolving nutritional issues, and ultimately enhancing quality of life [3].

### **3.3. Implementation of the proposed solutions in the practice of palliative care and evaluation of their effectiveness**

When managing patients in intensive care units, it is very difficult to isolate any one factor in the overall care of the patient. This can be easily demonstrated with nutritional support. When considering nutritional support for a critically ill patient, considerations must be given to timing, route of administration, formula selection, and monitoring. Thus, the data also demonstrated that prevention of stress gastritis partially overlaps with management of nutritional support and should be considered together. Over the past 4 years, evidence-based medicine has demonstrated the critical importance of intensive glucose/insulin management and improved outcomes. This is an obvious nutritional support and glucose management must be done together. There are basic principles for providing surgical care to patients with

serious conditions, as well as some very important exceptions. These issues will be considered.

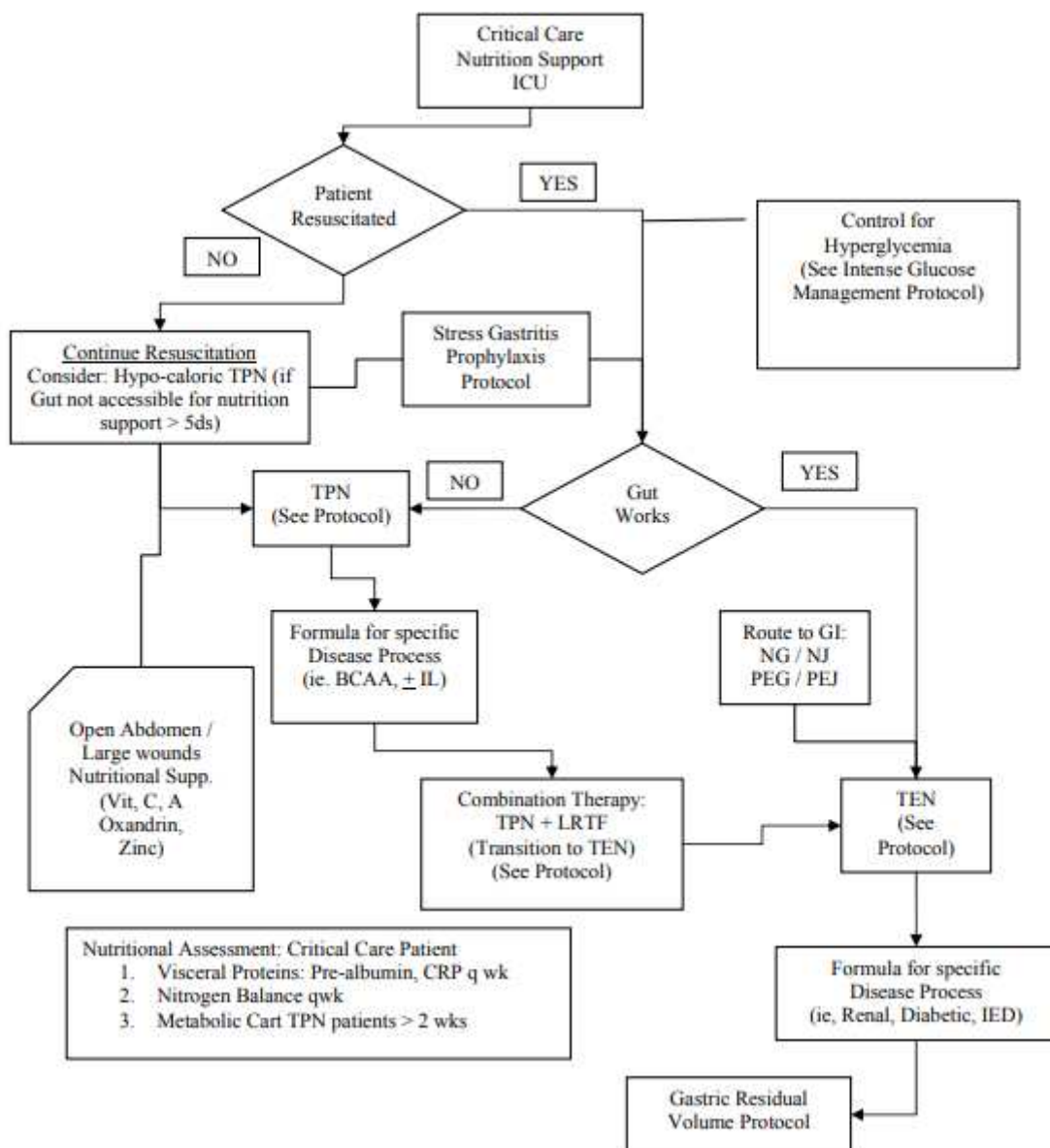


Figure 3- Flow diagram

Based on the proposed algorithm, the following recommendations can be offered.

Anabolic steroids (oxandrolone) are recommended for use in the following cases:

- Total thickness of burns exceeds 15% body surface area (TBSA).
- There is clinical or expected loss of muscle mass, supplemented by approximately 20% of the body surface area of the burn wound.

- The recommended dose is 10 mg twice daily orally for at least 30 days.
- The use of anabolic steroids is contraindicated in patients with liver disease.

The Open Belly Protocol includes the use of nutritional supplements in the following cases:

- For extensive burns or wounds affecting more than 20% of the body surface area.
- Vitamin C at a dose of 500 mg per day orally for 10 days, then intravenously (not recommended in the presence of renal failure).
- Zinc sulfate at a dose of 220 mg per day orally for 10 days, then intravenously (not recommended in the presence of renal failure).
- Vitamin A at a dose of 10,000 IU per day orally for 10 days, then discontinue use (not recommended in the presence of liver failure).
- In cases of ongoing critical illness, vitamin levels should be checked before starting another course of nutritional supplements.

Critically ill patients are at risk of gastrointestinal bleeding, primarily due to gastric or duodenal ulcers. The cause is thought to be increased stomach acidity and a decreased gastric mucosal barrier. The longer the stomach pH remains below 4, the higher the risk of hemorrhage. The following patients are at risk:

- critical illness (sepsis, burn, trauma, including nerve injury) requiring > 48 hours of mechanical ventilation
- coagulopathy
- previous history of gastrointestinal bleeding
- organ dysfunction (renal, liver, cardiac)
- hypotension/shock.

Up to 20% of patients may develop clinical gastrointestinal bleeding and, if surgery is required, the mortality rate may approach 70%.

Objective: To standardize the prevention and treatment of gastrointestinal bleeding.

Indications: High risk patients (Prophylaxis required)

- Mechanical ventilation > 48 hours
- Coagulopathy
- History of previous gastrointestinal bleeding
- Damage to the central nervous system (SAH/CVA - hemorrhagic or ischemic)

- SCI – steroid protocol required
- Sepsis with or without organ dysfunction
- Vasopressor / Inotropic prescription

Other patients at moderate risk:

- Chronic use of NSAIDs or aspirin
- High doses of long-acting steroids
- Stay in the intensive care unit > 10 days

Protocol: Administration of gastric nutrition reduces, but does not eliminate, the risk of gastrointestinal bleeding. Any patient predicted to be mechanically ventilated for >48 hours and who has no contraindications to gastric enteral feedings is recommended to begin nasogastric feedings within 72 hours of admission with a nasoenteral tube in place.

Let's assume a high-risk patient is identified:

- Patients with gastric access (OGT/NGT) start taking sucralfate 1 g every 6 hours.

- If there is no access to the stomach; initiate famotidine 20 mg IV every 12 hours (adjust dose and interval if Ccr < 50 mg/dL) UNLESS patient is taking a PPI for documented outpatient GERD. If so, start taking lansoprazole (Prevacid) or esomeprazole (Nexium).

- Patient on ESRD; add famotidine to TPN for 24 hours (40 mg).

A patient who develops significant gastrointestinal bleeding receives prophylaxis:

- Check stomach pH every 8 hours.
- If pH < 4 for more than 16 hours, then; start a continuous infusion of famotidine (40 mg famotidine in 250 mL NSS, rate 1.7 mg/hour) after 20 mg IV

bolus

- If pH remains < 4, begin intravenous pantoprazole (Protonix); 40 mg IV every 12 hours

- Check stomach pH every 8 hours.

- then pH < 6 for > 16 hours;

- Pantoprazole 80 mg intravenously, then 8 mg/hour

Moderate risk patient:

- Think about prevention

Patients at low risk or tolerating oral diet/total gastric enteral nutrition:

- do not carry out prophylaxis or stop prophylaxis.

Patients with blunt and penetrating abdominal wounds should receive enteral nutrition if possible due to the lower incidence of septic complications compared with patients receiving parenteral nutrition.

B. Level II

Patients with severe head injuries should preferentially receive early enteral nutrition as outcomes are similar compared to patients receiving parenteral nutrition. If early enteral nutrition is not possible or is not tolerated, parenteral nutrition should be started.

C. Level III

1. In severely injured patients, parenteral nutrition should be started on day 7 if enteral nutrition has failed.

2. Patients who do not tolerate at least 50% of target enteral nutrition by day 7 postinjury should begin parenteral nutrition but should be weaned when >50% of enteral nutrition is tolerated.

Early and delayed enteral nutrition:

Level I

In severe trauma patients with blunt/penetrating trauma, starting enteral nutrition within 24 hours of admission does not appear to have an outcome advantage compared with 72 hours after admission.

B. Level II

1. In burn patients, intragastric nutrition should be started as soon as possible after admission, since delayed enteral nutrition (>18 hours) leads to a high incidence of gastroparesis and the need for intravenous nutrition.

2. Patients with severe head injury who cannot tolerate gastric feedings within 48 hours of injury should be placed on postpyloric feedings, ideally beyond the ligament of Treitz if possible and safe for the patient.

#### C. Level III

1. Patients who are not fully resuscitated should not be given direct enteric nutrition due to the risk of gastrointestinal intolerance and possible intestinal necrosis.

2. In patients undergoing laparotomy for blunt or penetrating abdominal wounds, direct access to the small intestine (via a nasojejunal tube, gastrojejunal tube, or jejunostomy) should be achieved and enteral nutrition should be initiated as soon as possible after resuscitation from shock.

Place of enteral support: gastric or jejunal.

#### A. Level I

No recommendations.

#### B. Level II

In critically ill patients, early gastric feeding is possible, and the clinical outcome is equivalent to that of patients receiving duodenal feeding. For this reason, and because the stomach can be accessed more quickly and easily than the duodenum, an initial attempt at gastric feeding seems warranted.

#### C. Level III

Patients at high risk for pulmonary aspiration due to gastric retention or gastroesophageal reflux should receive enteral nutrition into the jejunum.

Assessment of energy and substrate needs by a traumatologist

#### A. 1st level

There appears to be no benefit to the routine use of calorimetry to determine the caloric needs of burn patients.

#### B. Level II

1. For patients with moderate to severe trauma (ISS 25–30), energy requirements are estimated at 25–30 total kcal/kg/day or 120% to 140% of predicted BEE (according to the Harris-Benedict equation).

2. There does not appear to be a consistent relationship between ISS and measured resting energy expenditure (MREE) in trauma patients.

3. In patients with severe traumatic brain injury (GCS score <8), energy needs can be met by replacing 140% MREE (~30 kcal/kg/day) in nonpharmacologically paralyzed patients and 100% MREE (~25 kcal/day) in paralyzed patients.

4. During the first 2 weeks after spinal cord injury, nutritional support should be provided at a level of 20-22 kcal/kg/day (55-90% of Harris's predicted BEE).

Benedict's equation) for paraplegics and 22-24 total kcal/kg/day (80% to 90% of the predicted BEE from the Harris-Benedict equation) for quadriplegics.

5. For patients with burns greater than 20–30% TBSA, initial caloric needs can be estimated using several available formulas.

6. The Curreri formula ( $25 \text{ kcal/kg} + 40 \text{ kcal/TBSA burn}$ ) overestimates the burn patient's caloric needs (as estimated by calorimetry) by 25–50%.

7. The Harris-Benedict formula underestimates the caloric needs of a burn patient (as estimated by calorimetry) by 25–50%.

8. In patients with burns greater than 50% TBSA, adding parenteral nutrition to enteral nutrition to achieve Curreri's predicted caloric requirements is associated with higher mortality and impaired T-cell function.

9. Caloric requirements for major burns fluctuate during the hospital period but appear to follow a biphasic course, with energy expenditure decreasing as the burn wound closes. Thus, direct measurement of energy expenditure by calorimetry once or twice a week may be useful in adjusting caloric support throughout the course of hospitalization.

10. Intraoperative enteral nutrition for burn patients is safe and effective, resulting in fewer interruptions to enteral nutrition and, therefore, greater success in achieving calorie and protein goals.

11. Most trauma patients need 1.25 grams of protein per kg of body weight per day.

12. For patients with severe burns, up to 2 grams of protein per kg of body weight per day is sufficient.

13. In the burn patient, energy in the form of carbohydrates can be provided at rates up to 5 mg/kg/min (~25 kcal/kg/day); exceeding this limit may predispose patients to metabolic complications associated with overeating. In trauma patients without burns, even this rate of carbohydrate delivery may be excessive.

14. Intravenous lipid and fat intake should be carefully monitored and maintained at <30 percent of total calories. Zero or minimal fat administration to burned or injured patients during the acute phase of injury may minimize susceptibility to infection and reduce length of hospital stay.

15. Requirements for proteins, fats and carbohydrates do not appear to vary significantly depending on the route of administration (enteral or parenteral).

16. Fat or carbohydrate requirements do not appear to vary greatly depending on the type of injury, i.e. burn or traumatic injury.

### C. Level III

1. Providing excess calories to trauma patients can cause hyperglycemia, excess CO<sub>2</sub> production, fluid/electrolyte disturbances, lipogenesis, and hepatic steatosis.

2. The energy needs of patients with TBSA burns less than 20–30% are similar to those of patients without skin burns.

3. Protein requirements in burn patients and in patients with severe central nervous system damage may be significantly higher than expected and reach 2.2 g/kg body weight per day. However, the ability to achieve positive nitrogen balance in a given patient varies depending on the phase of injury. Providing large protein loads to elderly patients or people with impaired liver, kidney, or lung function may result in adverse effects.

## Standard and Extended Nutritional Support

### A. Level I

No recommendations

B. Level II

No recommendations

C. Level III

1. Use of enteral formulations supplemented with “adequate” doses of arginine and glutamine appears to reduce length of hospital stay and septic morbidity in severely injured patients (ISS >20, ATI >25). The exact doses and duration of arginine and glutamine treatment required to achieve this effect have not yet been determined.

It is unclear whether additional benefit would be obtained from continued supplementation of omega-3 fatty acids, nucleotides, and micronutrients.

2. No recommendations can be made at this time regarding the role of intensified enteral medications in patients with severe burns.

Monitoring Nutritional Support in Trauma Patients

A. Level I

1. No recommendations

B. Level II

1. In patients with head trauma, serum prealbumin levels correlate well with nitrogen balance. Albumin and transferrin levels do not correlate well with nitrogen balance. Retinol binding protein also correlates well with nitrogen balance, but lags behind prealbumin.

2. In patients with multiple injuries, serum prealbumin levels correlate well with nitrogen balance. Albumin levels do not correlate well with nitrogen balance.

3. In burn patients, there are insufficient data to make any recommendations regarding the correlation between serum prealbumin, retinol-binding protein, or transferrin levels and nitrogen balance. However, serum levels of these proteins should be interpreted with caution because they are influenced not only by nutritional status but also by other factors (age, burn wound size, day post-burn, and nitrogen intake). Albumin levels do not correlate well with nitrogen balance.

4. Calculation of nitrogen balance in burn patients may be inaccurate due to the impossibility of accounting for nitrogen losses through the burn wound.

5. When calculating the nitrogen balance in burn patients, using urine urea nitrogen instead of total urine nitrogen may lead to an overestimation of the nitrogen balance.

### C. Level III

1. Nitrogen balance is the gold standard for monitoring the correct nutritional prescription for a trauma patient.

2. Serial determination of serum levels of acute phase reactants (C-reactive protein, fibrinogen, alpha-1-glycoprotein, etc.), as well as their constituent proteins (prealbumin, retinol-binding protein, transferrin) can increase the value of the latter as a nutrient monitoring tool.

## CONCLUSION

Healthcare regulations require that patients be provided with sufficient nutrition and fluids to maintain life, maintain good health, and prevent the risk of malnutrition and dehydration during healthcare delivery. Research shows that a significant proportion of patients cared for in community settings suffer from malnutrition, which is associated with poorer clinical outcomes and increased costs of recovery from illness and surgery. Dehydration due to fluid loss is also associated with increased mortality, morbidity, and disability among older adults, who are more at risk for dehydration due to fluid loss. Patients admitted to hospitals from nursing homes often suffer from dehydration.

The Care Quality Commission notes the need to assess patients' nutritional needs and provide appropriate nutrition, including when supplements and/or parenteral nutrition are prescribed. However, patients' preferences, as well as their religious and cultural background, must be taken into account when providing food and beverages. For older adults living at home, it is important to monitor fluid intake to ensure optimal hydration and prevent dehydration. The policy does not apply to corporate food and beverage functions included in the RDASH food and beverage plan.

In patients, particularly in the terminal stages of life, there is a common observation of insufficient dietary intake and consequent weight loss, causing distress to both the patients and their families. Despite this, the implications of malnutrition are often overlooked, leading to malnutrition not being definitively diagnosed. Furthermore, medical records rarely document malnutrition, and its adverse effects are typically not adequately addressed. This disregard is primarily due to healthcare professionals' lack of training in clinical nutrition and a general insensitivity among hospital staff towards malnutrition issues. Additionally, there seems to be a scarcity of nursing research dedicated to the nutritional challenges faced by palliative care patients. It is advised to develop models and undertake essential research in this area. Screening assessments should be utilized to determine

and regularly reassess the nutritional requirements of patients under palliative care, with nutritional support tailored to individual needs based on the findings.

All patients receiving IHC (assisted hydration) should be re-evaluated regularly for continuation, modification or discontinuation of appropriate treatment. The goals of reassessment are (a) to ensure that the IHC meets the patient's hydration needs (i.e. that the patient is not under- or over-hydrated), (b) to ensure that the IHC is well tolerated, (c) to ensure that the IHC remains acceptable to the patient, and (d) to ensure that the IHC remains appropriate/compliant with the 'treatment goals'.

Patients on long-term IHC, and especially patients with ongoing gastrointestinal fluid loss (e.g. vomiting, diarrhea, high fluid output stomas, small bowel fistulas) require regular biochemical monitoring to determine fluid and electrolyte replenishment.

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