

# Guidelines for nutrition support in the elderly

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## Abstract

Nutritional support in the elderly not only co-operates in pharmacological treatment but also very often is a primary therapy for their health. The type of artificial nutrition (AN) to use will depend on the present illness and the previous health record. Due to the fact that enteral feeding (EF) is less expensive and aggressive we should use EF whenever possible, leaving parenteral nutrition (PN) for specific situations where EF should not be used. AN, if properly prescribed, formulated, administered and monitored, is safe as long as qualified personnel are trained in its use. Combined AN (oral, enteral and parenteral) allows a step-by-step improvement that could lead to final oral feeding. Finally, while it is true that age should not be considered in isolation as a contraindication for AN, we should be aware that, in final life stages, oral feeding can be the only satisfaction left for the elderly.

## Keywords

Frail  
Elderly  
Enteral nutrition  
Parenteral nutrition  
Home artificial nutrition  
Oral feeding  
Nutrition support

It is not easy to define nutritional guidelines for the elderly that, being consistent for one person, may be applied to the rest. This is so for three main reasons.

1. The term ‘elderly’ can be applied to people with a wide range of age<sup>1</sup>.
2. Physical and functional fitness may vary in people of the same age. This fact should be taken into account in nutritional interventions. The following clinical situations may be found.
  - 2.1. *Good health.* Nutritional habits will be modified as little as possible. The composition and texture of the diet should be adapted if necessary.
  - 2.2. *Frail health.* The concept refers to the risk of being ill. Nutritional support will be driven to health promotion and primary/secondary prevention. A specific healthy and balanced diet may delay the process of ageing and also avoid the onset of an illness. In this setting it could be necessary to use specific enriched oral supplements in addition to the regular diet.
  - 2.3. *Chronic disease.* This term applies to the elderly with a previous handicapping illness. These people generally present physical and functional deterioration and they will benefit from therapeutic dietary prescriptions as well as from general or elected artificial nutrition (AN).
  - 2.4. *Acute disease.* This term refers to those in good health but who drop into an acute process that may be potentially reversible. Nutritional

support will depend on the type and stage of illness. As in the previous case, AN may be indicated.

3. Present nutritional status in the elderly greatly affects nutritional intervention in different ways. Questions such as ‘How do we feed?’, ‘What type of products do we use?’ and ‘Will we use enteral or intravenous feeding?’ should be answered. We also must decide when to start artificial feeding (AF). A previous well-nourished patient will allow us to be more conservative and the target must be to keep the current health status. Conversely, malnourished patients will need early nutritional support through AN techniques.

## Fundamentals

Due to greater longevity, nowadays the elderly present a greater number of diseases than the young. Eighty-five per cent of old people have one or more chronic diseases<sup>2</sup>; 30% of them may even have three or more. Prevalence of malnutrition is a common issue in these groups and, moreover, the risk of developing secondary malnutrition is higher. It is estimated that 85% of the elderly who live in their own house present at least one disease that could be improved with appropriate nutrition treatment. Both nutritional screening and nutritional intervention have recently been suggested as suitable cost-effective tools in appropriately selected elderly patients.

Although AF may be prescribed for home patients, it is

mainly used for in-patients. These generally present either a chronic or an acute disease. In this setting, when AF is indicated, enteral feeding (EF) through naso-enteric tube is the best choice. We shall only deal with AF in in-patients from now on.

### **Objectives of nutritional support**

Nutritional support has different objectives, depending on the clinical situation. These targets are:

- being the main part of treatment, e.g. in diabetes mellitus therapy;
- improving/preventing the onset of illnesses, e.g. cardiac failure;
- avoiding/managing malnutrition, e.g. stroke sequels; and
- controlling clinical parameters, e.g. serum cholesterol, blood pressure values.

### **Defining terms**

AN is carried out through either enteral nutrition (EN) or parenteral nutrition (PN). By EN we mean commercial products of defined formula administered either orally, through naso-enteric tubes or through ostomies<sup>3</sup>. The feeding tube may be naso-gastric (NSG), in which the distal end is placed in the stomach, or the more appropriate term is naso-enteric tube (SNE) in the case that the distal end may be situated anywhere in the bowel tract.

PN consists of intravenous delivery of nutrients. This can be done either through central veins such as the subclavia (central parenteral nutrition, CPN) or through peripheral veins such as the basilica (peripheral parenteral nutrition, PPN). CPN permits nutritional repletion, whereas PPN does not.

The term 'Total' added to either PN or EN means that nutrition support given solely by this route guarantees nutritional repletion. The word 'Energy' is used instead of 'Calorie' when we calculate requirements and energy balance. For the same reason, the term kcal is replaced by kJ.

Protein molecules differ from carbohydrate and lipids molecules in their nitrogen content. For this reason, when we refer to protein content in AN, we use the term 'nitrogen' (1 g of nitrogen = 6.25 g of protein).

### **Nutrient requirements for the elderly under AN**

#### *Energy*

Use of an easy calculation formula to measure energy expenditure (REE) is strongly recommended in the elderly. For people over 60 years old, the World Health Organization (WHO) recommends the following<sup>2</sup>:

$$\text{Males : } \text{REE} = 8.8W + 1.128H - 1071$$

$$\text{Females : } \text{REE} = 9.2W + 637H - 302$$

where REE is in kcal day<sup>-1</sup>,  $W$  is weight in kg and  $H$  is height in m.

#### *Protein*

Adult RDA should be maintained. At least 0.8 g protein per kg body weight must be provided<sup>2</sup>. The amount of protein that the elderly really receives in relation to their cell mass is higher compared with the adult because cell mass is lost as people get older, being replaced by fat mass<sup>4</sup>. In the case of metabolic stress<sup>5</sup> we must raise the protein content in AN to 1.5 g kg<sup>-1</sup>; it seems that more than 2 g kg<sup>-1</sup> does not improve nitrogen balance and, in addition, the serum urea could increase.

#### *Micronutrients*

The full (100%) micronutrient requirements must be given in the elderly. Some formulations in EN only provide it when at least 2000 kcal is prescribed<sup>2</sup>. However, when elderly people are under caloric restriction, these formulas are not good enough. Under these circumstances one of the following two choices must be selected:

- to supplement AF with additional micronutrients; or
- to use EN that guarantees 100% micronutrients when less energy is given (e.g. 1500 kcal).

#### *Fluids*

The capacity of the kidneys to concentrate urine is limited in the elderly<sup>6</sup>. Volume depletion occurs more frequently than in the adult. This fact, together with their lower energy needs, associated with lower fluid contents in the diet, may develop water depletion states. That is why appropriately monitored fluid balance together with extra water supplements are necessary. If, simultaneously, a low cognition level is present<sup>6</sup>, the above-mentioned advice is mandatory. On the other hand, high and prompt fluid supplies may favour heart failure.


### **Artificial feeding: general indications**

Elderly nutrition implies a dynamic concept. We do not think it means a single type and an isolated route of feeding, for a definite period of time. As we shall see, most of the time it will be possible to use the gastrointestinal tract (GI) through EN, which does not prevent the patient from using limited oral feeding, as this may satisfy him psychologically and socially.

However, EN will not be possible sometimes, or it will not be nutritionally sufficient. In this case, using PN alone or together with EN would be the right course of action.

Finally, certain diseases for the in-patient will require a more aggressive nutritional support such as PN first, then to continue with EN associated with PN for a limited period of time, which will lead, if clinical outcome

**Table 1** Step-by-step strategy in artificial nutrition support

1.	AN indication		Initiate AN
2.	Route of access: selection		
3.	Formula selection in AN		
4.	Infusion techniques		
5.	Infusion devices (pump, etc.)		
6.	Acceptance monitoring		
7.	Patient: education and training		
8.	Hospital discharge: home artificial nutrition (HAN) programme		
9.	Detection of complications/side effects		
10.	Nutritional assessment		
11.	Restoring oral/enteral feeding?		Withdraw AN

permits it, to modified oral feeding before discharge (see Fig. 1).

So, once AF has been settled, a step-by-step strategy concerning selection of the route of access, regained oral feeding, even the training of patient or relatives for home artificial nutrition, should be carried out. Table 1 shows a step-by-step nutritional support strategy.

To facilitate the comprehension of AN indications, we shall deal first with EN and then go on to PN.

### Enteral feeding in the elderly

#### Indications

This is based on three fundamentals: first, the need for AN; second, the possibility of using the GI tract and third, the lack of contraindications to use EN.

Generally speaking, it is required in elderly patients who cannot, do not want to, or should not feed by the oral route but have a competent GI tract, where EN is indicated (see Table 2 for a list of diseases)<sup>3</sup>.

Oral feeding and EN have a GI-stimulating role in themselves, maintaining an intestinal barrier function. The trophic effect of EN on intestinal mucus and the possibility to prevent bacterial translocation should drive us to the use of enteral feeding. Some other advantages in the use of EN are the lower cost and lower frequency of side effects compared with PN. The indications are the following.

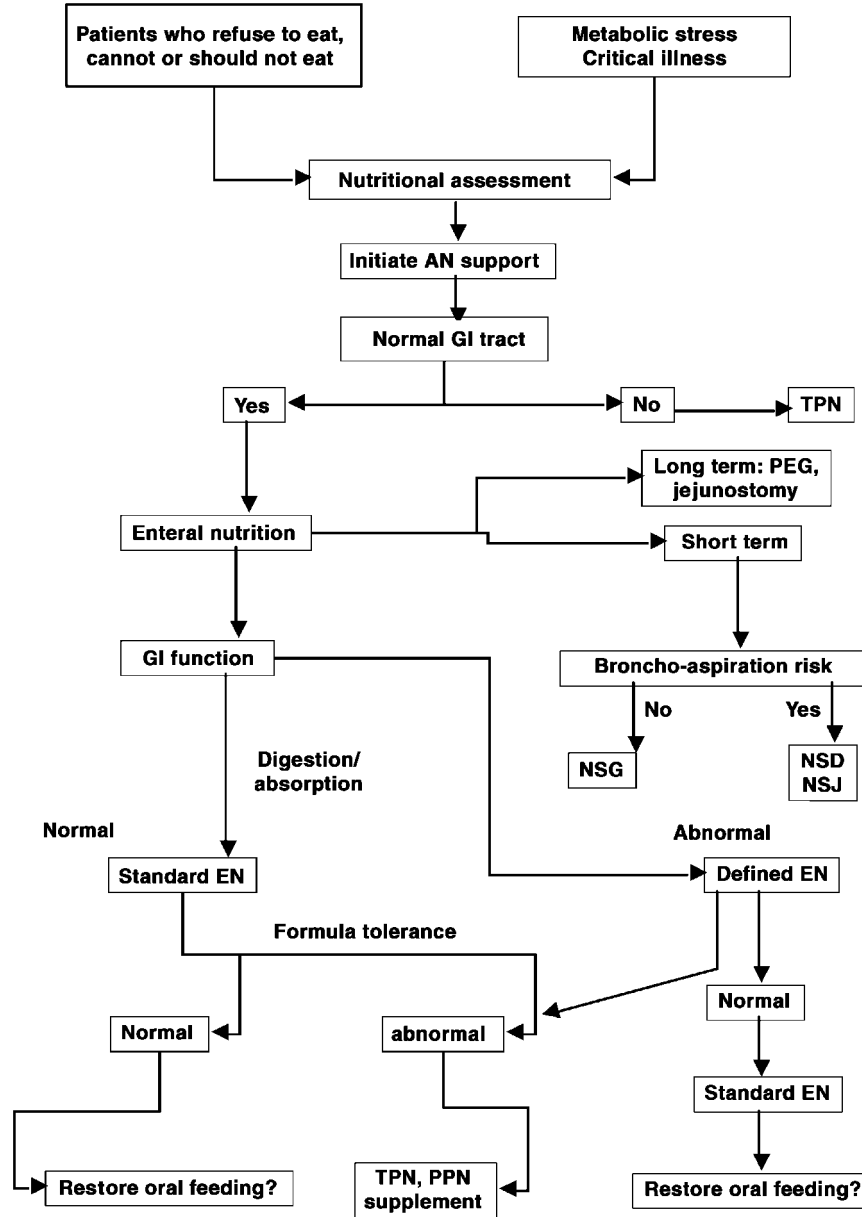
1. EN should be applied to patients who *refuse* to eat. The GI tract is not damaged. It occurs in secondary severe anorexia due to drug intake, major depression or malignancies. Some of the previous situations involve cytokine activities, especially TNF with an intense central anorectic effect.
2. It should also be applied when the patient *cannot* or *should not* eat. In these settings, difficulties in chewing or swallowing can be found. EN can also be prescribed when there is a serious alteration of consciousness, as this might increase the risk of broncho-aspiration when eating. Thirdly, EN should be applied when a GI disease exists that is susceptible to deteriorate after oral diet, or when a narrowing in the GI tract makes the progression of food difficult. In this group, patients with some anatomical or func-

tional limitation in the GI tract, which constrains but does not make EN impossible, are included.

3. Patients feeding orally with a normal GI tract but with insufficient diet to meet nutritional requirements will benefit from EN. Such a situation can be common in acute or chronic diseases that provoke hypermetabolism (an increase in energetic needs) or catabolism (an increase in nitrogen needs).
4. Finally, EN may be given to elderly patients with acute or chronic diseases that require some organ-specific nutritional support. In this scenario, EN may play a role not only in providing nutrients, but also acts as a drug with immunomodulative and anti-inflammatory properties. EN can be also prescribed at the pre- or post-operative early stages, through jejunal EN, etc.

**Table 2** General Indications for enteral nutrition in the elderly (modified from Miján de la Torre<sup>3</sup>)

1.	PATIENTS WHO REFUSE TO EAT (SEVERE ANOREXIA)
2.	PATIENTS WHO CANNOT OR SHOULD NOT EAT Coma, unconsciousness Swallowing disorders (e.g. myasthenia) Tetanus Neck and head tumours Caustic oesophageal gastritis Oncology surgery (oral, head, neck) GI and related tumours Acute, chronic pancreatitis Irritable bowel syndrome Malabsorptive syndromes, diarrhoea Lymphatic diseases (absorption, transport, etc.) Short bowel syndrome GI proximal/distal fistulas Post-radiation enteritis
3.	METABOLIC STRESS Polytrauma Severe burns Acute/chronic sepsis Chemotherapy Radiotherapy Severe hyperthyroidism
4.	OTHER INDICATIONS Renal failure Respiratory failure Heart failure AIDS Early post-op Pre-op Food allergy Organ transplantation



**Fig. 1** Pathway for an appropriate clinical practice in artificial nutrition (modified from Miján de la Torre<sup>3</sup>). AN – artificial nutrition; GI – gastrointestinal; TPN – total parenteral nutrition; PEG – percutaneous endoscopic gastrostomy; NSG, NSD, NSJ – naso-gastric, -duodenal, -jejunal tubes; EN – enteral nutrition; PPN – peripheral parenteral nutrition

The Spanish Government has passed a bill (BOE: OM 6/1998) where regulations to finance EN are specified<sup>7</sup>.

**Contraindications**

EN restrictions depend on anatomic (e.g. mesenteric thrombosis resection), functional (e.g. actinic enteritis) or mechanical (e.g. severe stenosis) limitations<sup>3</sup>. While it is true that, thanks to new EN formula compositions as well as to more functional GI tract access routes, contraindications have been reduced, there still exist some circumstances where PN is an alternative:

- hyperemesis with no pharmacological control;

- acute GI tract bleeding;
- high-output middle GI fistulas;
- onset of severe acute pancreatitis;
- GI obstruction, ileus;
- GI perforation;
- motility or absorptive disturbances make EN impossible; and
- severe haemodynamical instability.

**Formula selection in enteral feeding**

Commercial formulations cover a wide range of specific feeding possibilities: EN in diabetes mellitus, organ failure

(respiratory, renal, liver, etc.), proximal GI absorptive diets, lower volume energetic diets, high-nitrogen diets and so on. We suggest consulting further specific references on the topic, but it is worth noticing the following two recommendations.

1. At the present time, unless there are sound reasons, home- or hospital-made triturate-soft diet delivered through enteral tubes should not be used for several reasons: unknown and changeable composition, a higher viscosity that requires large/wide feeding tubes, possibility of bacterial contamination and difficulty in making and storing it.
2. EN should be as physiological as possible. For this reason, whenever the GI tract remains undamaged (e.g. stroke), we should use fibre-enriched EN. Even when no-fibre EN has been previously prescribed, due to the presence of specific illnesses, we should try to restore fibre EN delivery as soon as possible.

#### ***Where to infuse enteral feeding in the GI tract?***

Oral EN as the only nutrition route for feeding cannot be maintained for a long period of time, as anorexia is usually present in this setting; on other occasions oral EN is not easy to achieve due to the fact that large oral intake of EN volumes is difficult. If this is so, we advise the use of naso-enteric tubes (NET)/ostomies, whose location depends on (see Fig. 1):

- *length of feeding time* – endoscopic percutaneous gastrostomy (PEG) must be considered when long-term EN is needed. If there are no contraindications, we would rather use PEG instead of surgical gastrostomy, as the cost is lower and the frequency of side effects is similar.
- *risk of broncho-aspiration* – the naso-gastric tube (NSG) is appropriate in common situations. NSG allows EN to be emptied more physiologically in the bowel. It also works as an antiseptic intestinal barrier as the pH of gastric acid prevents overgrowth of bacteria. Post-pyloric feeding by means of naso-duodenal/jejunal tubes should be used when facing an aspiration. This route should also be considered in the elderly affected by severe systemic diseases or under opiate treatment, as the stomach is one of the most sensitive intestinal areas to be affected by intestinal ileus.
- *presence and location of GI damage/injury* – if proximal (oesophageal) GI fistulas exist, EN should be distally infused. The same procedure, jejunal EN, should be followed if a severe and acute pancreatitis is present<sup>3</sup>. Finally, in the case of severe proximal GI stenosis that makes endoscopic procedures difficult, and consequently PEG, surgical gastrostomy should be carried out.

#### ***How to infuse enteral feeding in the GI tract?***

An infusion protocol must be followed according to safe and tolerance criteria in patients. Formulations (type and composition of EN) must be suitable to the access routes. To dilute EN in water is not recommended<sup>6</sup>. When an infusion starts, the rate of EN must be increased slowly depending on the tolerance of patients, in order to achieve nutritional adequacy in a period of time ranging from 48 to 72 hours<sup>3</sup>.

At the beginning, EN is usually administered non-stop for 24 hours. This procedure should be followed if there is a risk of broncho-aspiration and also when there are other functional or anatomical abnormalities in the GI tract. However, if the GI tract is normal, EN may be administered by gravity 4 or 5 times a day, with some hour breaks in between. In the same way, EN infusion may be carried out in a cyclical fashion, either by night or day, depending on the patient's job, complementary EN, etc.

The previous EN methods described need a number of infusion devices. EN may be delivered through gravity, volumetric or peristaltic infusing pumps. EN formulas should not be maintained in the containers or bags for a long period of time, not longer than 12 hours, without being totally infused.

#### ***Enteral feeding follow-up in the elderly***

Once the previous steps have been taken, there is a need to set the necessary controls to prevent and treat possible complications. EN complications are less serious than PN, being mostly of mechanical nature (tube obstruction, tube displacement) or digestive (diarrhoea, constipation, abdominal cramps). This fact does not reduce the need to carry out frequent metabolic controls (diuresis, serum glucose and other biochemical parameters), which must be included in every AN protocol, as they help detect early complications. It also should be taken into account the risk of broncho-aspiration in patients with low consciousness. In this case, the practice of an abdominal X-ray to confirm the correct position of enteral tubes will be mandatory.

The patient very often takes a great deal of medication that can affect the absorption, digestion and metabolism of nutrients. Conversely, some drug effects can be minimised or modified by the EN action. Moreover, there might exist an increase in GI side effects due to either drugs or EN when they are administered simultaneously. Handling of these interactions is difficult, as it depends on individual clinical knowledge and the response of each patient to these procedures.

Finally, we should know the effect of nutritional support on the patient. For this reason, a nutritional assessment must be carried out as routine; we recommend doing it once a week. Simultaneously, a clinical assessment to control the patient's ability to reinstate oral feeding should be part of the global therapy procedures.

### Parenteral feeding in the elderly

Elderly patient's PN, both central and peripheral, is less frequent than in adults. PN may supply all types of macro- and micronutrients, guaranteeing GI rest and maintaining an appropriate nutritive status. PN is known for its intravenous nutrient load, bypassing the GI tract and liver filter<sup>8</sup>. This is why complications are more frequent and serious compared with EN. These fall into three groups: mechanical (post-catheter pneumothorax), infectious (catheter sepsis) and metabolic (electrolyte disturbances, glycaemia, serum urea). Although the patient's age should never be a definite factor to rule out PN, it is well known that the following PN-associated complications will increase in this population.

- Hyperglycaemia, uraemia and electrolyte disturbances are more frequent; fluid overload associated with cardiac failure risk is always present; respiratory failure and CO<sub>2</sub> retention are possible; and, due to their depressed immunology response<sup>5</sup>, the presence of a catheter sepsis risk is always prevalent.
- Although prolonged PN is rarely supplied to the elderly, when it is done, it should be borne in mind that both metabolic (mainly bone and liver diseases) and psychological complications will affect the elderly more deeply than the adult.

For all of the reasons mentioned, we should be cautious and prescribe PN only in specific clinical settings:

- when there is no possibility of using the GI tract; and
- when PN is supplied for a limited period of time (pancreatitis, abdominal trauma).

In addition, close PN monitoring and follow-up to detect and treat complications early should be done.

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