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ESPEN GUIDELINES

ESPEN Guidelines on Enteral Nutrition: Wasting in HIV and other chronic infectious diseases ☆

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Summary Undernutrition (wasting) is still frequent in patients infected with the human immunodeficiency virus (HIV), despite recent decreases in the prevalence of undernutrition in western countries (as opposed to developing countries) due to the use of highly active antiretroviral treatment. Undernutrition has been shown to have a negative prognostic effect independently of immunodeficiency and viral load.

These guidelines are intended to give evidence-based recommendations for the use of enteral nutrition (EN) by means of oral nutritional supplements (ONS) and tube feeding (TF) in HIV-infected patients. They were developed by an interdisciplinary expert group in accordance with officially accepted standards and is based on all relevant publications since 1985.

Nutritional therapy is indicated when significant weight loss (>5% in 3 months) or a significant loss of body cell mass (>5% in 3 months) has occurred, and should be

Abbreviations: EN, enteral nutrition. This is used as a general term to include both ONS and tube feeding. When either of these modalities is being discussed separately this is specified in the text. Normal food: normal diet of an individual as offered by the catering system of a hospital including special diets e.g. gluten-free, lactose free, etc. diets; ONS, oral nutritional supplements; TF, tube feeding; AIDS, acquired immunodeficiency syndrome; HAART, highly active antiretroviral treatment; HIV, human immunodeficiency virus

☆For further information on methodology see Schütz et al.[71] For further information on definition of terms see Lochs et al.[72]

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considered when the body mass index (BMI) is $<18.5\,kg/m^2$. If normal food intake including nutritional counselling and optimal use of ONS cannot achieve an adequate nutrient intake, TF with standard formulae is indicated. Due to conflicting results from studies investigating the impact of immune-modulating formulae, these are not generally recommended. The results obtained in HIV patients may be extrapolated to other chronic infectious diseases, in the absence of available data.

The full version of this article is available at www.espen.org.

Summary of statements: HIV

Subject	Recommendations	Grade [71]	Number
Indications	Nutritional therapy is indicated when significant weight loss ($>5\%$ in 3 months) or a significant loss of body cell mass (BCM) ($>5\%$ in 3 months) has occurred.	B	2.1
	Nutritional therapy should be considered when the BMI is $<18.5\,kg/m^2$.	C	2.1
	Diarrhoea and/or malabsorption are no contraindication to EN, because:		
	• Diarrhoea does not prevent a positive effect of oral nutritional supplements or TF on nutritional status.	A	2.4
	• Enteral and parenteral nutrition (PN) have similar effects in such patients.	A	2.4
	• Enteral nutrition has a positive impact on stool frequency and consistency.	A	2.4
Application	The combination of normal food and enteral nutrition is appropriate in many cases and should be attempted.	C	3.6
	If oral intake is possible, nutritional intervention should be implemented according the following scheme. • nutritional counselling • oral nutritional supplements • tube feeding (TF) • PN Each of the steps should be tried for 4–8 weeks before the next step is initiated.	C	2.2
	Nutritional counselling with oral nutritional supplements, or counselling alone, are equally effective at the beginning of nutritional support and/or for preserving nutritional status.	B	2.2
	In settings where qualified nutritional counselling cannot be provided, oral nutritional supplements may be indicated in addition to normal food but this should be limited in time.	C	2.2
	Protein intake should achieve 1.2 g/kg bw/day in stable phases of the disease while it may be increased to 1.5 g/kg bw/day during acute illness. Energy requirements are no different from other patient groups.	B	3.2

	In patients with dysphagia, or if oral nutritional supplements are not effective: If normal food intake and optimal use of oral nutritional supplements cannot achieve sufficient energy supply, TF is indicated.	C	2.3
	Drug treatment and enteral nutrition complement each other.	C	2.5
Route	Use antibiotic prophylaxis during implantation of percutaneous endoscopic gastrostomy (PEG).	A	3.4
Type of formula	Use standard formulae.	B	3.1
	In patients with diarrhoea and severe undernutrition MCT containing formulae are advantageous.	A	3.1
	Immune modulating formulae are not recommended.		3.1

Grade: Grade of recommendation; Number: refers to statement number within the text.

Summary of statements: Other Chronic Infectious Diseases

Subject	Recommendations	Grade [71]	Number
Indication	Nutritional support should be given to patients with undernutrition resulting from infectious diseases, based on generic indication and procedures.	C	4
Type of formula	Prefer oral nutritional supplements.	B	4
Outcome	Nutritional support has been shown to increase weight gain during treatment of pulmonary tuberculosis.		4

Grade: Grade of recommendation; Number: refers to statement number within the text.

Introduction

Nutritional intervention in chronic infections has been studied mainly in patients infected with the human immunodeficiency virus (HIV). There are few, if any data from other chronic infections, such as tuberculosis. These guidelines will therefore concentrate mainly on HIV infection.

1. Interrelations of disease, nutritional status and prognosis

1.1. What is the impact of HIV infection on nutritional status and metabolism?

Weight loss may occur at all stages of HIV disease. Seroconversion often manifests as severe systemic disease with weight loss followed by spontaneous recovery. Weight loss occurs in about one-third of patients in the asymptomatic latent phase and is invariable in the symptomatic and end stage phases of the disease.

Comment: The HIV Wasting Syndrome is defined as weight loss ($>10\%$) with fever and/or diarrhoea of unknown origin,[1] although some wasting may occur in the absence of these symptoms. Rapid wasting is usually a manifestation of opportunistic infection or malignancy in late AIDS with advanced immunodeficiency.[2–4] Changes in weight more subtle than the 10% weight loss specified in the centre for disease classification and prevention (CDC) definition[1] may also have an adverse impact on health.

The introduction of highly active antiretroviral treatment (HAART) in 1996 has decreased the incidence of wasting,[12] and it is now seen mostly in patients who have never been treated or where treatment has failed due to drug intolerance or

resistance. The Wasting Syndrome must be distinguished from lipodystrophy, which is a frequent complication of antiretroviral treatment, and is manifest as fat redistribution with loss of subcutaneous fat, increase in intra-abdominal fat, buffalo hump or breast hypertrophy.[5] Body weight may increase or decrease depending on the relation between subcutaneous lipoatrophy and intra-abdominal lipohypertrophy. HAART-associated lipodystrophy normalises the resting energy expenditure (REE), but has only minor effects on lipolysis as a result of concomitant sympathetic stimulation of adipose tissue.[6] The HAART-induced changes in metabolism seem to be permanent, as discontinuation of HAART has no influence on the degree of lipodystrophy.[7]

Medical treatment of lipodystrophy seems not to be effective[8] but avoiding antiretroviral drugs with strong metabolic adverse effects may prevent or partially reverse lipodystrophy[9–11] (Ib).

In case of weight loss despite sufficient HAART special consideration has to be given to[12]:

- depression,
- anorexia,
- self-neglect (e.g. drug abusers),
- dry mouth, lack of saliva caused by medication (e.g. antiviral therapy).

1.2. Which specific diagnostic procedures are recommended in HIV-infected patients with weight loss?

In addition to standard nutritional assessment the following points should be considered:

- ***Search for an opportunistic infection or other complications of disease or therapy.***
- ***Determine testosterone concentration (B).***[13]
- ***Determine LH/FSH, thyroid function (C).***
- ***Look for signs of lipodystrophy (loss of subcutaneous fat, triceps skinfold thickness, waist/hip ratio).***
- ***Exclude treatment-induced diabetes mellitus.***[14]
- ***If nausea/vomiting: is this an adverse drug reaction?***
- ***Exclude malassimilation/malabsorption.***
- ***Is there a lack of saliva production?***
- ***If abdominal pain or dysphagia: suspect candida oesophagitis, and perform upper GI endoscopy or therapeutic trial with fluconazole.***
- ***Start nutritional support while awaiting results of the diagnostic tests.***

Comment: Distinguish between predominant muscle mass depletion (wasting) and peripheral fat loss (lipoatrophy) by changes in body shape and muscular function. Wasting and lipoatrophy may be combined in patients failing on long-term antiretroviral treatment.

1.3. Does nutritional status influence prognosis (survival)?

The prognosis of advanced HIV infection is influenced by undernutrition. Decreased nutritional status in HIV-infected patients is associated with an increased mortality, independently of immunodeficiency and viral load.

Comment: Undernutrition correlates with increased mortality [4,15–17] (IIb) despite recent decreases in the prevalence of undernutrition and wasting in western countries (as opposed to developing countries) due to the use of HAART.[18,19] It remains to be seen whether HAART will change the way that undernutrition presents in this condition.

Nutritional status in HIV is best reflected by muscle mass representing the structural protein pool. Untreated HIV infection is characterised by early loss of structural protein, loss of lean body mass (LBM), and more precisely by loss of BCM[16] which cannot be measured directly in routine clinical care. Indirect measures of BCM are based on regression equations that are insufficiently well validated.[20,21] The phase angle from bioelectrical impedance analysis (BIA) is a measure of capacitive resistivity of cell walls and of the ratio between extra- and intracellular water, which together with the estimate of BCM derived from it are independent prognostic markers in HIV infection [15,22] (IIb), [16] (III).

Loss of muscle and visceral mass may be masked by an increase in extracellular fluid and/or fat mass, which may explain why body weight, body mass index and history of weight loss have not been shown to predict prognosis reliably.

Decreased serum levels of albumin and transferrin are also adverse prognostic markers [16] (III), although this may relate to their value as surrogate markers of an acute phase response.

2. Aims of nutritional support

Nutritional intervention aims to:

- improve nutritional status,
- decrease functional impairment from undernutrition (muscular fatigue, bedridden state, work incapacity),
- improve tolerance to antiretroviral treatment,

- alleviate gastrointestinal symptoms of HIV illness (nausea, diarrhoea, bloating),
- improve quality of life.

2.1. What are the indications for nutritional counselling or EN in HIV?

Nutritional therapy is indicated when significant weight loss (>5% in 3 months) or a significant loss of BCM (>5% in 3 months) has occurred (B). In addition, nutritional therapy should be considered when the BMI is $<18.5\,kg/m^2$ (C).

Comment: Institution of nutritional support should be preceded by a search for a potential reason for undernutrition. General rules about the indications for nutritional support are valid in HIV infection.

There is a lack of controlled intervention trials supporting the use of TF over normal food. Some open randomised trials compare different types of nutritional support. Choice of the mode of nutritional support is therefore based on expert opinion only.

All randomised controlled trials of EN in HIV-infected patients have been conducted in populations with normal or only mildly impaired nutritional status.[23–28] Positive outcome of nutritional intervention in patients with advanced AIDS wasting has been described in several non-controlled observation trials [27,29–34] (III). PEG is feasible in HIV patients and should be considered as an option [5,3,30–32,34,35] (III). A small controlled trial in two groups of eight moderately malnourished HIV-infected patients demonstrated a decrease in protein oxidation in patients receiving ONS, compared to patients receiving nutritional counselling alone [25] (IIb). These limited data are compatible with a decrease in protein catabolism as shown for PN in advanced AIDS [36] (IIb).

Only one small multicentre prospective controlled trial of total parenteral nutrition (TPN) versus nutritional counselling was conducted in severely immunocompromised and malnourished patients ($N = 31$) with severe digestive disease, but free of opportunistic infections. The results were an increase of 7 kg in LBM in 2 months of treatment in the treated group with an increase in survival and quality of life, while at the same time the control group continued to lose weight [37,38] (Ib) TPN should be used only in patients who are not able to feed enterally. Ethical considerations have rightly prevented the conduct of large powerful controlled studies of nutritional intervention which include an untreated control group in severely malnourished patients with AIDS, as most experts agreed on the need to give nutritional support in the presence of significant malnutrition. This has led to a lack of unequivocal evidence for its efficacy.

2.2. How should nutritional support be initiated in HIV-infected patients without dysphagia?

If oral intake is possible, nutritional intervention should be implemented according the following scheme (C). Each of the steps should be tried for 4–8 weeks before the next step is initiated:

- ***nutritional counselling,***
- ***ONS,***
- ***TF,***
- ***PN.***

Nutritional counselling with ONS, or counselling alone, are equally efficient at the beginning of nutritional support and/or for preserving nutritional status (B). In settings where qualified nutritional counselling cannot be provided, ONS may be indicated in addition to normal food but this should be limited in time (C).

Comment: In a Chilean crossover study, supplementation with a whole protein formulae was more effective in malnourished, symptomatic HIV-infected patients than normal food alone over a 45-day period with regard to weight gain and LBM [39] (IIa). Nutritional counselling with and without ONS were compared in two controlled trials the with following results [40,41] (Ib). Body weight, LBM and BCM were increased in both intervention groups to the same extent. There was marginally greater energy intake in patients receiving ONS. A recent Cochrane review highlights the role of nutritional counselling and ONS in the management of illness-related undernutrition including a small population of HIV positive and mainly HIV negative patients. These results suggest ONS may be more effective than nutritional counselling, or provide an additional benefit in enhancing short-term weight gain.[42,43]

In addition, in asymptomatic HIV-infected patients no difference in nutritional or immunological parameters was observed between a control group with nutritional counselling alone ($n = 19$) compared to a group with additional standard ONS ($n = 26$), and a group with an immune-modulating ONS ($n = 31$). Study participants were followed for 1 year. The immune-modulating formula was enhanced with arginine, glutamine, omega-3 fatty acids, and antioxidative vitamins [44] (Ib).

ONS have not been formally tested in the absence of nutritional counselling, since, if nutritional counselling is available, it would be considered

unethical. If such counselling is unavailable it is appropriate to give ONS without it.

ONS may increase the total energy intake for two to six weeks, however, later on increases are minimal [26,27,29–31,33,34] (III), [40] (Ib). Patients should be advised to use ONS between meals, to avoid interfering with oral intake at meal times. No data are available regarding the optimal duration of the nutritional counselling or ONS before escalating to more invasive nutritional strategies. This has to be decided individually according to the clinical situation.

2.3. How should nutritional support be initiated in HIV-infected patients with dysphagia, or if ONS are not effective?

If normal food intake and optimal use of ONS cannot achieve sufficient energy supply, TF is indicated (C).

Comment: Comparison of actual oral intake with estimated needs should be part of the evaluation. When weight gain is not achieved despite meeting nutritional targets there should be a re-evaluation of the adequacy of those targets, before resorting to TF. Clinical studies of TF have been conducted in patients where oral interventions (i.e., nutritional counselling and ONS) had failed or in those unable to swallow food.[29–32,34] All studies have documented some weight gain, but those that have measured body composition have shown gain in fat rather than muscle mass. Participants in such studies were mostly bedridden and inactive, which may have contributed to the failure to regain lean mass since, in the absence of physical activity, nutritional support alone is unlikely to restore muscle. Similarly, during episodes of rapid weight loss, physical activity is reduced in HIV-infected patients, as demonstrated by the doubly labelled water method.[45]

No controlled studies comparing normal food and EN in patients with AIDS wasting have been published.

2.4. Is EN indicated in patients with diarrhoea and/or malabsorption?

Yes, EN is indicated in patients with diarrhoea for the following reasons:

- ***Diarrhoea does not prevent a positive effect of ONS or TF on nutritional status (A).***
- ***Enteral and PN have similar effects in such patients (A).***
- ***EN has a positive impact on stool frequency and consistency (A).***

Comment: Abnormalities of intestinal absorption have been demonstrated in patients with HIV wasting and in patients without wasting. The functional significance of such abnormalities varies between individuals and the impact of such findings on the outcome of nutritional intervention is unclear. Functional tests of absorption should be initiated individually.

In patients with diarrhoea and severe malabsorption, a controlled trial over three months of peptide based ONS versus PN showed similar efficacy, but PN was more expensive[46] (Ib). Patients on PN achieved higher energy intake and gained more weight but this was almost entirely due to gain in fat mass. The effect on LBM is impaired by opportunistic infection[17] and enhanced by physical exercise. Those receiving EN had better quality of life and greater physical activity.

2.5. What is the role of anabolic drug treatment in HIV associated undernutrition?

Drug treatment and EN may complement each other (C).

HIV positive patients with testosterone deficiency should receive testosterone substitution to restore muscle mass (A). Moderate gain in body weight and fat free mass can be achieved by recombinant human growth hormone (rhGH) at high cost (A).

Comment: Randomised placebo controlled trials in patients with wasting and low testosterone concentration showed positive effects of testosterone substitution on fat free mass, muscle mass and quality of life [24,48] (Ib).

Likewise, women with HIV wasting have low testosterone [49] (IIb). A pilot intervention trial in hypogonadal women showed some positive effects of testosterone substitution of 150 μg/day like increase in muscle mass strength [50] (IV), but no significant weight gain or muscle mass gain could be observed [51] (IIA). It is currently not licensed for use in HIV wasting in Europe.

In a recent meta-analysis eight trials of testosterone therapy met the inclusion criteria and 417 randomised patients were included [52] (Ia). Only six trials used LBM, fat free mass, or BCM as outcome measures. All eight trials included total body weight as an outcome measure, the meta-analysis of which showed a difference of 1.04 kg (−0.01–12.10) between testosterone group and placebo group by random effect and 0.63 kg (−0.01–1.28) for fixed effect models. Overall, the incidence of adverse effects was similar in both groups. Testosterone therapy was shown in this review to increase LBM more than placebo. These

studies, however, were limited by small numbers and heterogeneity of the population, which potentially introduced bias into the methods and results. Testosterone therapy may be considered in patients with HIV wasting syndrome to reverse muscle loss, but there is a concern about the adverse metabolic effects of long-term testosterone administration and long-term follow-up for these patients is needed.

An rhGH and anabolic steroids may increase fat free mass and muscle mass [53,54] (Ib), [55] (IIb). In patients on HAART who had lost >10% of weight, rhGH in two different doses led to 1.5 and 2.2 kg weight gain compared to placebo. This consisted mainly of increased LBM whilst body fat mass was lost. Health-related quality-of-life indices improved with rhGH [48] (Ia). This confirms the results of earlier trials conducted before the advent of HAART.[53] As rhGH is much more expensive than HAART, other treatment options should be exhausted before using rhGH, particularly in health care settings where drug budgets are limited (III).

In a placebo controlled trial treatment with the anabolic steroid oxymetholone (100 mg/day) resulted in an increase in body weight, muscle mass, and functional parameters, but the effect was limited by a significant dose-dependent liver toxicity in ~30% of the patients [54] (Ib). Appetite may be increased by treatment with high doses of megestrol acetate and this is associated with weight gain, although, in men, the weight gained consist almost entirely of fat mass.[56,57] Whilst cannabinoids may improve perceived appetite, they do not impact weight to the same extent[58] (Ib). The use of these drugs is limited by high cost and adverse reactions.

Thalidomide may reduce proinflammatory, catabolic cytokines like TNF-α. In a double blind, placebo-controlled trial in undernourished HIV-infected patients, thalidomide was associated with a significant mean weight gain after 8 weeks of study treatment (2.2 kg (100 mg talidomide/day) versus 1.5 kg (200 mg thalidomide/day) versus 0.9 kg (placebo) but changes in fat free mass were no different to placebo [59] (Ib). In the experimental group a modest increase in HIV load was recognised, consistent with the results of previous studies of Thalidomide in HIV infection, although this occurred very rapidly and may, at least in part, have been related to fluid accumulation. In addition, approximately 30% of the patients discontinued treatment due to adverse reactions.

Note that almost all controlled studies were conducted in patients before the introduction of HAART. Therefore, the efficacy of anabolic drug treatment in populations with access to modern drugs needs to be reassessed in future studies.

3. Practical application of EN

3.1. What type of enteral formulae should be used?

Generally, no advantage for any specific formula has been shown. Standard formulae should therefore be used (B), although in patients with diarrhea and severe undernutrition, MCT containing formulae are advantageous (A).

Conflicting results have been obtained from studies investigating the impact of immune-modulating formulae. They are not therefore recommended.

Comment: Oral nutrition enriched with arginine (14 g/day), glutamine (14 g/day) and β-hydroxy-β-methylbutyrate (3 g/day) led to more gain in muscle mass and was associated with decreased HIV viral load in a placebo-controlled randomised trial [60] (Ib). Both treated and control groups gained weight. The additional caloric intake was 200 kcal/day in both groups but because the placebo was not isonitrogenous, protein intake was only increased in the treated group.

Another randomised, placebo-controlled trial investigated the effect of ONS (660 kcal/day), with or without added arginine (7.4 g/day) and ω-3 fatty acids (1.7 g/day).[26] No advantage of the arginine/ω-3 fatty acid supplement was demonstrated; both groups achieving weight gain (Ib). The same type of supplement was studied in a cross-over blinded trial and achieved higher weight gain than placebo [27] (IIa).

In asymptomatic HIV patients, ONS enriched with oligopeptides and other proteins (19%) and carbohydrates (65%) but depleted of fat (16%) led to greater weight gain and were associated with reduced hospitalisation.[24] However, the results of this study are doubtful because the two interventions were not comparable in energy and nutrient content. Again, such data were obtained before the introduction of HAART and are therefore not easily applicable to current patient populations.

An ONS enhanced with arginine, glutamine, omega-3 fatty acids, and antioxidative vitamins was investigated in asymptomatic HIV-infected patients on HAART. The findings of this study suggest that one year of supplementation with standard and immune-modulating ONS have neither therapeutic nor differential effects [44] (Ib).

In patients with HIV wasting and chronic diarrhoea, two types of nutritionally complete ONS containing either LCT or MCT as fat were associated with an improvement in stool frequency and consistency, whereas the MCT based supplement was superior to the LCT based supplement [47] (Ib).

3.2. What is an adequate energy and protein intake in HIV?

The target for protein intake should be 1.2 g/kg bw/day in stable phases of the disease while it may be increased to 1.5 g/kg bw/day during acute illness (B). Energy requirements are no different from other patient groups.

Comment: There is no evidence that the energy requirement of HIV sufferers is any different from other patients groups. Studies of total energy expenditure have not demonstrated hypermetabolism.[45] Such studies, however, were not designed to evaluate the requirements for energy intake, although they did demonstrate the importance of adequate energy intake. According to a World Health Organization (WHO) working group an intake above 10% of expected energy requirement should be recommended during weight recovery.

During the recovery phase after opportunistic infections, hypermetabolism is common and energy requirements may be increased by 20–30% in order to provide substrates for weight regain. Similarly, the anabolic phase after initiation of HAART is likely to increase energy requirements.

Studies of nitrogen balance using stable isotopes have demonstrated positive nitrogen balance in symptomatic HIV patients with a protein intake between 1.2 and 1.8 g/day [36] (IIa). No controlled trials have addressed this question. Likewise, dose response has not been studied systematically.

3.3. Have specific complications of enteral nutrition been observed in HIV positive patients?

Local infections, with or without limited peritonitis, have been observed in HIV patients with PEG feeding more often than in other populations.

Comment: Two investigations have demonstrated higher rates of local infection at the exit site of PEG in HIV positive patients, mostly in those with advanced immunodeficiency. However, severe complications were not found more frequently than in control populations [35,61] (IIb). Antibiotic prophylaxis was given to all patients in these studies.

3.4. Is antibiotic prophylaxis recommended during implantation of percutaneous endoscopic gastrostomy (PEG) in HIV-infected patients?

As in all patients, antibiotic prophylaxis is recommended (A).

Comment: Sepsis or other severe infectious complications are rare after implantation of PEG. A single dose of a broad-spectrum antibiotic covering anaerobes reduced the rate of peristomal infection in HIV negative populations [62,63] (Ib). In the absence of specific controlled trials in HIV-infected patients, these data can be applied to HIV positive patients where such complications are expected more frequently.

All published studies on PEG feeding in HIV-infected patients have used antibiotic prophylaxis [30,35] (IV).

3.5. When is EN contraindicated in HIV-infected patients?

General contraindications for EN apply to HIV-infected patients, no additional considerations must be taken into account.

3.6. Should EN be combined with normal food intake?

The combination of normal food and EN is appropriate in many cases and should be attempted (C).

Comment: ONS may increase total energy intake by about 20% for limited periods. They should be prescribed, where available, as part of a structured nutritional counselling process [25,33,40,41] (IIb–III). The effect should be evaluated after 2–3 months. Long-term nasoduodenal, nasogastric and percutaneous TF are only rarely indicated in patients who can be maintained on HAART. If oral intake during the day is insufficient due to causes that cannot be influenced (e.g. lack of saliva, neurological causes) then nocturnal TF may be used to increase nutrient intake. Particularly at home this is a very comfortable way of combining oral (social!) feeding with an optimised intake.

4. Can findings from HIV wasting be extrapolated to or from findings in other infectious diseases?

Nutritional support has been shown to increase weight gain during treatment of pulmonary tuberculosis. Nutritional intervention has not been studied sufficiently in most other infectious diseases. However, nutritional support should be given to patients with undernutrition resulting from such diseases, based on generic

indications and procedures (C). For nutritional support, ONS are preferred (B).

Comment: Pulmonary tuberculosis is the classical wasting disease. Weight loss is almost invariably seen at diagnosis in resource poor settings.[64] In industrialised countries, between 30%[65] and 80% of patients are undernourished at diagnosis of pulmonary tuberculosis.[66] Moderate to severe undernutrition is associated with an increased risk of death within the first four weeks of antituberculous treatment.[67] Antimicrobial treatment allows weight gain in most cases but this may be delayed.[68] Furthermore, weight gain without nutritional intervention consists almost entirely of fat mass [69] (IIb).

ONS (600–900 kcal/day) were superior to nutritional counselling alone with regard to gains in weight, fat free mass and muscle strength in patients with pulmonary tuberculosis who had lost weight [70] (Ib).

Many centres provide nutritional support to patients treated for multi-drug resistant tuberculosis. This is clinically appropriate as it may reduce the impact of longstanding disease and toxic second-line treatment, as well as improving adherence to treatment.

There are virtually no data on the impact of nutritional support in other chronic infections associated with wasting, such as visceral leishmaniasis or brucellosis.[2]

Acute infections only provide an indication for EN if recovery from a catabolic state cannot be expected within days, e.g. in the absence of effective antimicrobial treatment, if normal food intake cannot be established over 7 days or longer, or if the patient is already undernourished because of other underlying disease.

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