

Practical guidance for daily use

Nutritional management for adults in healthcare facilities



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Malnutrition is a major public health problem. It includes both overnutrition (obesity) as well as under-nutrition, but here the focus is on under-nutrition and nutritional risk.

In Europe, 33 million people are estimated to be malnourished or at risk of malnutrition. About 1 in 4 hospital patients and even more than 1 in 3 residents in nursing homes are malnourished or at risk of malnutrition.

Even when identified, malnutrition is not always appropriately treated. Often less than 50% of patients identified as malnourished receive nutritional intervention.

There are numerous negative consequences of malnutrition. People with malnutrition consult their general practitioners more frequently, go to hospital more often and for longer, and have higher complication and mortality rates and a poorer quality of life. In addition, malnutrition leads to increased resource use and costs in both, hospitals and nursing homes.

Early detection of malnutrition or nutritional risk and appropriate management is the crucial key to fight against malnutrition. Nutritional screening and assessment of patients at admission to hospital or nursing home,

adequate follow up with nutritional support and regular monitoring are the milestones to tackle malnutrition and to stop the vicious circle.

This practice-oriented booklet is especially developed for healthcare professionals who are looking for a practical guidance for nutritional management in adults.

The content of this booklet is based on international and evidencebased guidelines, actual recommendations of international societies and institutions, scientific knowlegde and practical experiences.

The booklet is separated in 7 chapters. The first four chapters contain detailed information about the "4 steps against malnutrition – screening, assessment, nutrition therapy and monitoring" with helpful descriptions and all necessary calculation tools. Chapters 5, 6 and 7 provide practice relevant information about the usage of Oral Nutritional Supplements (ONS), tube feeding and parenteral nutrition.

Let's fight against malnutrition!

We wish you lots of success, your gnp team



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The gnp pathway:

4 steps to improve the nutritional status of your patient



The gnp pathway:

4 steps to improve the nutritional status of your patient



gnp – good nutrition practice:

Designed to help you and your patients!



The philosophy of gnp is to make nutritional management as quick and easy as possible to improve the nutritional status of your patient!



gnp – practice-oriented toolkit

- Extensive set of materials based on actual scientific knowledge and practical experiences
- Validated by experienced healthcare professionals in the daily practice



gnp – improves the nutritional status of your patients

- The unique gnp pathway with only 4 steps as a practical guidance
- Highly relevant and validated tools to identify patients at risk of malnutrition or already malnourished patients
- · The results of screening and assessment lead directly into an individual nutrition therapy plan



It's worth it

gnp - quick and easy to use

- Simple, guick and reliable
- Screening a patient in less than 3 5 minutes
- Easy to use materials developed for the daily practice

gnp – it's worth it

- Early recognition and intervention improves outcome
- Supports therapy success and quality of life
- Reduces hospital stay and prevent future hospital readmissions
- Prevent future costs and healthcare constraints
- Helps to improve hospital quality management

at the right time.

nutrition.

gnp – good nutrition practice is a vital part of your patient management and includes nutritional screening, assessement of the causes of malnutrition, nutritional intervention and monitoring. gnp helps to improve nutritional status and outcome of your patient by ensuring that patients receive the appropriate nutrition,

The unique gnp program is specifically designed to support health care professionals in the early detection and adequate nutritional management of patients who are malnourished or at risk of mal-

gnp is an extensive set of materials developed by experienced practitioners and clinical experts based on current scientific knowledge. It is developed for the daily practice and guick and easy to use: screening, for example takes less than 5 minutes and requires no special training.

The philosophy of gnp is to make nutritional management as easy as possible with the overall aim to improve the nutritional status of the patient!





Screening

Screening is the first step and essential for a successful nutritional management to detect those at risk of or with nutritional problems. Screening should be performed within 24 hours of admission so that nutrition therapy can be defined and started quickly.

Nutritional screening should be done with a validated screening tool and followed up by appropriate action.

NRS 2002 - part of the gnp program - is the most validated screening tool for the clinic, based on 128 studies and recommended by "ESPEN - Guidelines for Nutrition Screening 2002".¹

It is a rapid and simple procedure, which can be done routinely by any healthcare professional in less than 5 minutes.

> Screening needs to take place within **24 hours** of admission

Source:

1 Kondrup J et al. Nutritional risk screening (NRS 2002): a new method based on an analysis of controlled clinical trials. Clin Nutr. 2003 Jun;22(3):321-36.

Step1 🏟

11

Step1 Screening

The first part of NRS 2002 is the initial screening: If at least one question is answered with "YES", the degree of risk of nutrition deficiency must be appraised. This is done by the final screening considering a survey of nutritional status, severity of disease and age.

The highest scores of the respective part determined in the final screening needs to be summed up to a(n) (age adjusted) total score. The result of screening leads directly to individual patient related actions.

Initial Screening

If the answer is "Yes" to at least If the answer is "No" to all questions. one question, the "Final Screening" the patient needs to be re-screened needs to be performed at weekly intervals.

	needs to be performed.	at weekiy i
Is the Body Mass Index (BMI) < 20.5 kg/m ² ?	YES	NC
Has weight loss occurred during the last 3 months?	YES	NC
Has food intake declined over the last week?	YES	NC
Is a major illness involved?	YES	NC

Final Screening

Impaired nutritional status		Score	Score	Severit	y of disease
– Normal nutritional status		0	0	Low	
 Weight loss > 5% in 3 months or Food intake 50–75% of normal requirements in preceeding week 		1 mild	1 mild	e.g. hip fr in particu tions: cirr haemodi	acture, chronic disease, ular with acute complica- hosis, COPD, chronic alysis, diabetes, cancer
 Weight loss > 5% in 2 months or BMI 18.5-20.5 + impaired general con Food intake 25-50% of normal requirements in preceeding week 	dition <u>or</u>	2 moder- ate	2 moder- ate	e.g. majo stroke, s haemato	or abdominal surgery, evere pneumonia, ologic malignancy
 Weight loss > 5% in 1 month (> 15% i BMI < 18,5 + impaired general conditional requires Food intake 0-25% of normal requires preceeding week 	n 3 months) <u>or</u> on <u>or</u> ements in	3 severe	3 severe	e.g. intensive care patients (APACHE > 10), head injury, bone marrow transplantation	
	Score	-	F	Score =	
		lfag	je ≥ 70 yea	ars + 1 = [Age adjusted total score
Evaluation and actions					
O points = low risk Repeat screening weekly. If an operation is planned: Consider preoperative nutrition therapy.	O 1-2 points Patient nee Repeat scree If an operat Consider pr therapy.	s = modera ds nutrition eening week ion is plann eoperative	te risk a support. kly. jed: nutrition	□ĝ	≥ 3 points = high risk Patient needs nutrition support.
Patient related actions					Please
Weekly re-screening	Contact nutriti	ion suppoi	rt team		If another screening tool
🗙 Assessment	Start a nutriti	onal care	plan		e.g. MUST oder SGA is alread
Food & Fluid protocol	Start directly v (e.g. ONS)	vith nutrit	ion thera	ру	with gnp Step 2: Assessment.

Step 1 Screening | Calculation of BMI

The following calculation tools are designed to help you to complete the screening (Step 1) as quick and easy as possible.

BMI Chart for adults

Calculation of Body Mass Index (BMI = kg/m^2)



Source: adapted from WHO 1995, WHO 2000, WHO 2001

(e.g. ONS)

Estimation of body height by measurement of knee height

To be used, if usual measurement of body height is not possible (e.g. in bedridden patients)



Estimation of BMI in patients with amputation by correction of body weight





Example 1: Amputation of one leg Current body weight (BW) = 65 kg Leg = 16 % of height Weight = 65 kg x 100 : (100-16) Corrected weight = 77.4 kg

Men: 71.85 + (1.88 x knee height in cm)

Measurement of knee height

quick and easy performance.

Calculation of body height

Patients from 60 to 90 years¹²

Patients from 18 to 60 years³:

The knee height is measured in cm along the outside

of the left leg in lying or sitting position of the patient

(please see figure on the left). For this purpose, the leg

is bent by 90° at the knee joint. The knee height is the

direct line from the sole of the foot at the heel to the upper edge of the kneecap. Ask your Fresenius Kabi

contact person for the gnp knee height calculator for a

Men: 64.19 - (0.04 x age) + (2.02 x knee height in cm) Women: 84,88 - (0,24 x age) + (1.83 x knee height in cm)

Women: 70.25 + (1.87 x knee height in cm) - (0.06 x age)

Example 2: Amputation of both arms Current body weight (BW) = 60 kgBoth arms = $2 \times 5\%$ of height Weight = $60 \text{ kg} \times 100 : (100 - 2 \times 5)$ Corrected weight = 66.7 kg

Correction formulas for estimating the BMI of amputees

BW = Body weight [kg], BH = Body height [m]

Amputation of	%	BMI-Calculation	A
foot	1.5	(BW:0.985) : (BH) ²	b
"below-the-knee"	5.9	(BW:0.941) : (BH) ²	b
leg	16.0	(BW:0.84) : (BH) ²	b
hand	0.7	(BW:0.993) : (BH) ²	b
"below-the-elbow"	2.3	(BW:0.977) : (BH) ²	b
arm	5.0	(BW:0.995) : (BH) ²	b

mputation of	%	BMI-Calculation
oth feet	3.0	(BW:0.97) : (BH) ²
oth "below-the-knee"	11.8	(BW:0.882) : (BH) ²
oth legs	32.0	(BW:0.68) : (BH) ²
oth hands	1.4	(BW:0.986) : (BH) ²
oth "below-the-elbow"	4.6	(BW:0.954) : (BH) ²
oth arms	10.0	(BW:0.9) : (BH) ²

Example 1: Amputation of one leg

Current body weight (BW): 65 kg Body height = 1.75 m BMI = (65 : 0.84) : 1.75² = 77.4 : (1.75 x 1.75) **BMI = 25.3 kg/m**²

Example	2: Amputation	of both arms
~		

Current body weight (BW): 60 kg Body height = 1.75 m BMI = (60 : 0.9) : 1.75² = 66.7 : (1.75 x 1.75) BMI = 21.8 kg/m²

Calculation of weight loss in %



Sources:

1 Chumlea WC, Roche AF, Assessment of the nutritional status of healthy and handicapped adults. In: Lohman TG, Roche AF, Martorell R. Anthropometric standardization reference manual. 1988 Champaign Illinois: Human Kinetics Books. S. 115 - 119

2 AKE. Recommendations for enteral and parenteral nutrition in adults. AKE, 2008/2010; Wien

3 Chumlea WC, Guo SS, Steinbaugh ML. Prediction of stature from knee height for black and white adults and children with application to mobility-impaired or handicapped persons. J Am Diet Assoc 1994; 94:1385-8, 1391.



Assessment

Assessment is the second step of an efficient nutritional management. It is a detailed, more specific and in-depth evaluation of the causes of malnutrition and the risk factors for nutrition and fluid deficiency.

Step 2 The assessment should be performed by a nutritional expert (e.g. a dietician, a clinician interested in nutrition, or a nutrition

The completion of the assessment allows patient-tailored interventions contributing to a better outcome of the patient.

nurse specialist) or by a nutritional support team.

What are the causes and risk factors of malnutrition?

Risk factors of malnutrition and patient related actions

Assessement is a detailed examination of the risk factors and causes of malnutrition considering, e.g. underlying diseases and possible side-effects. It includes the evaluation or measurement of general risk factors of malnutrition, social and psycho-social risk factors, nutrition related risk factors, and, where appropriate, laboratory investigations (e.g. blood parameters).

The following table gives you an overview about risk factors of malnutrition and respective examples of patient related actions for a successful patient-tailored intervention.

Dis rela	ease and treatment ated risk factors	Patient related actions
X	Nausea/vomiting	e.g. check for medication, check of underlying gastrointestinal disorders, ask for aversions against food, consider antiemetics and prokinetic drugs
X	Taste and smell disorder	e.g. improve taste with additional flavours and/or herbs, ask for favourite dishes and dislikes
	Poor appetite	e.g. ask for favourite dishes, provide small and several meals during the day
	Chewing and/or swallowing problems	e.g. check for the right position of the patient, adaption of the consistency of the food (e.g. to thicken food), refer for swallow therapy
	Dryness of the mouth	 e.g. check and improve mouth care, ensure necessary dental treatment, give foods with a high water content, try the provision of peppermint tea to stimulate salivary flow
	Dehydration	e.g. evaluate fluid requirement and intake, ensure sufficient fluid intake (e.g. by daily fluid protocol)
	Pain	e.g. define actions to reduce pain, consider analgesics
	Mucositis with ulcerations	• e.g. careful oral hygiene, treatment of ulceration, glutamine supplementation
	Gastrointestinal dysfunc- tion/impairment	e.g. treatment of disease, according to cause, consider peptide-based and/or MCT-containing formula
X	Diarrhoea	e.g. check for food intolerances and gastrointestinal disorder, check for side effects of medication and consider change of drug
	Constipation	e.g. check fluid intake (e.g. by fluid protocol), consider fibre-containing feeds
	Dementia/cognitive decline	e.g. adequate feeding assisstance to increase food intake
	Impaired functional abilty	e.g. adequate feeding assisstance, refer to occupational therapy, try feeding aids
	Chronic disease	e.g. treatment of underlying disease, consider the increase of energy and protein intake
	Acute disease	• e.g. adequate treatment of disease
X	Acute infections	e.g. adequate treatment of infection
	Fever	e.g. ensure sufficient fluid intake (e.g. by daily fluid protocol), antifebrile actions
	Increased needs	e.g. define a nutrition therapy high in energy and protein according to patients requirements (~ Step 3)
	Dialysis	• e.g. consider special diet
	Special medication	e.g. check medication for side effects and consider drug adaptation
	Others:	•
Soc risk	ial and psycho-social factors	Patient related actions
X	Anxiety/depression	e.g. implement psychotherapeutic care
	Social isolation	e.g. patient feeding assistance, continous invitation to eat (in company, if possible)
	Others:	•
Nut	trition related risk factors	Patient related actions
X	Food allergies/intolerances	e.g. provide alternative foods/diets
	Special forms of nutrition (e.g. vegetarian, vegan)	• e.g. ask for favourite dishes and provide alternative foods
	Restrictive diets	• e.g. stop restrictive diet and weight reducing during disease
	Social/cultural requirements	e.g. ask for traditional foods and cultural restrictions and consider
	and habits	the provision of feasable alternatives, ask for favorite dishes
	Others:	•

Blood parameters

Laboratory testing of different blood parameters may be useful to assess the patients nutrition status, to monitor substrate utilisation and control nutrition therapy adequacy, or to quantify inflammation and disease severity.

In patients nutritionally at risk, blood parameters should be controlled routinely. However, the feasibility to measure specific laboratory parameters strongly depends on the clinical setting you work in. Furthermore, it is important to interpret laboratory parameters taken adequately: e.g. serum albumin is more likely to be a measure of disease severity than of malnutrition per se and therefore it is often not included in the standard monitoring. In this context the following chapter only gives you a selection of blood parameters which might be helpful.

Nutrition experts for example, recommend to measure hemoglobin, sodium, potassium, creatinine, blood urea nitrogen, magnesium, calcium, phosphate and blood sugar, at least once a week and more regularly in acutely ill patients. In severely malnourished patients it may be necessary to measure potassium, magnesium and phosphate daily for the first 3 days or until stable, and then 2x weekly to monitor utilisation and detect refeeding syndrome as early as possible.

In patients on parenteral nutrition also the measurement of alkaline phosphatase, bilirubin and alanine aminotransferase (ALT) might be appropriate.

Further parameters often measured in clinical routine are described in detail below:

Blood parameter	Normal range ¹	Half life ¹
Albumin (g/dl)	3.5 - 5.0	18-20 days
Transferrin (mg/dl)	200-350	8-10 days
Pre-albumin (mg/dl)	20-40	2-3 days

Albumin*

A tracking parameter for long-term interventions; direct negative correlation with mortality and rate of complications; also low in liver function disorders, postaggression metabolism, proteinuric nephropathy, protein-losing enteropathy.

Transferrin

A tracking parameter for short-term interventions; no clear correlation with outcome; also low in anaemia, liver diseases and certain antibiotic therapies. Transferrin may be a better and more sensitive reflection of nutritional status compared to albumin.

Pre-albumin*

A tracking parameter for short-term monitoring of nutritional interventions.

*Both albumin and pre-albumin have been shown to be poor markers of nutritional status and should be interpreted with caution.¹



Sources:

1 Lee JL et al. Serum Albumin and Prealbumin in Calorically Restricted, Nondiseased Individuals A Systematic Review. Am J Med. 2015 Sep;128(9):1023.e1-22

Assessment of food and fluid intake

The food intake of many patients deteriorates during treatment or during a stay in a hospital or nursing home. The best way to identify patients at risk of malnutrition is to record their intake of foods and fluids - from admission to discharge.

The Food & Fluid protocol is the basis to determine the optimal nutrition therapy plan of the patient. It is part of the Assessment (Step 2) as a 3 day review of food intake and part of a regularly documentation of the nutritional status during Monitoring (Step 3) to be used for daily monitoring.

Food protocol - Is your patient eating enough?

The food protocol helps to record the intake of a patient, indicating the proportion of a meal that has been eaten (100%, 75%, 50%, 25%, 0%; corresponding to 4, 3, 2, 1, 0 quarters of a plate). The Food protocol helps to document and to control the food intake of the patient to be able to define the nutrition therapy plan (Step 3) by calculating the needed nutritional supplementation.



*average energy content of provided menus during hospital stay (Breakfast, lunch, dinner and snacks) as given by the kitchen ** estimation of daily protein intake (high = H, medium = M, low = L); to be surveyed if possible.

Fluid protocol - Is your patient drinking enough?

The fluid protocol helps to record the daily fluid intake of a patient, indicating the amount of fluid which is consumed over the whole day per os, food, ONS, tube feeding and/ or parenteral nutrition. The Fluid protocol helps to document and to control the fluid intake of the patient to be able to define the nutrition therapy plan (Step 3) by calculating the needed fluid substitution of the patient.



* Based on total energy intake (p. 20). ** Please find the water content on the product label





Nutrition Therapy

The overall aim of the nutrition therapy is usually to stabilise or to increase the weight of the patient and to improve their nutritional status.

For this purpose, the following steps are necessary to be defined:

> • Define the nutritional goals • Define the individual nutritional requirements

- Define nutritional support and imple-ment the nutritional therapy plan
- Define the route(s) of nutrition

Step 3 **Nutrition Therapy**



Calculation of energy requirements in kcal

BEE = Basal Energy Expenditure': Rule-of-thumb	Patients > 60 years and/or BMI > 25: 20 kcal/kg BW/day Patients < 60 years and/or BMI < 25: 25 kcal/kg BW/day							
Stress factor ¹ :	Postoperative (no complications)	1.0						
(to correct calculated energy requirement for hypermetabolism)	Long bone fracture	1.15 - 1.30						
	Cancer	1.10 - 1.30						
	Peritonitis/sepsis	1.20-1.30						
	Severe infection/multiple trauma	1.20-1.30						
	Burns	1.20 - 2.0						
Activity factor ² :	Immobile patients: Patient with low activity:	1.2 1.5						
	Patient with moderate activity:	1.75						

Total² energy requirements (kcal/day) = BEE x stress (or activity) factor^{1*}

* Total energy requirements equal the BEE multiplied by stress or activity factors.

Calculation of Protein requirements in g



Please note: Protein recommendations in clinical nutrition range from 1-1.5 g protein/kg BW. In some special conditions e.g. in patients with chronic wounds, burns and cancer an increase up to 2 g protein/kg BW is recommended.

Weight [kg]	40	43	45	48	50	53	55	58	60	63	65	68	70	73	75	78	80	83	85	88	90	93	95	98	100
0.8 g/kg KG	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80
1.0 g/kg KG	40	43	45	48	50	53	55	58	60	63	65	68	70	73	75	78	80	83	85	88	90	93	95	98	100
1.1 g/kg KG	44	47	50	52	55	58	61	63	66	69	72	74	77	80	83	85	88	91	94	96	99	102	105	107	110
1.2 g/kg KG	48	51	54	57	60	63	66	69	72	75	78	81	84	87	90	93	96	99	102	105	108	112	114	117	120
1.4 g/kg KG	56	60	63	67	70	74	77	81	84	88	91	95	98	102	105	109	112	116	119	123	126	130	133	137	140
1.5 g/kg KG	60	64	68	71	75	79	83	86	90	95	98	102	105	110	113	117	120	125	128	132	135	140	143	147	150
1.8 g/kg KG	72	77	81	86	90	95	99	104	108	113	117	122	126	131	135	140	144	149	153	158	162	167	171	177	180
2.0 g/kg KG	80	86	90	96	100	106	110	116	120	126	130	136	140	146	150	156	160	166	170	176	180	186	190	196	200

Healthy adults	0.8 g/kg BW ³	Elderly patients (> 65 years) with stress ¹ ,
Metabolically stable patients	1.0-1.5 g/kg BW1	patients with liver cirrhosis, alcoholic fatty
Intensive care patients	1.2-1.5 g/kg BW1	liver heptatitis⁵, peritoneal dialysis ⁶
Cancer patients	(at least 1.0) 1.2 - 2.0 g/kg BW ⁴	1.2 - 1.5 g/kg BW

Calculation of fluid requirements in ml

Weight [kg]	40	42.5	45	47.5	50	52.5	55	57.5	60	62,5	65	67.5	70
Fluid requirements [ml]	1800	1840	1875	1915	1950	1990	2025	2060	2100	2140	2175	2220	2250
Weight [kg]	72.5	75	77.5	80	82.5	85	87.5	90	92.5	95	97.5	100	103.5
Fluid requirements [m]]	2290	2325	2365	2400	2440	2475	2515	2550	2590	2625	2665	2700	2750

Increased fluid requirement: during fever 2-2.5 ml/kg body weight/day per 1°C above 37°C, vomiti							
	= FLUID REQUIREMENT in ml						
	+ 15 ml/kg (for the 21 st – x kg of body weight)						
	+ 50 ml/kg (for the 11 th – 20 th kg of body weight)						
	100 ml/kg (for the 1 st – 10 th kg of body weight)						
Calculation basis:9	to be calculated by the 100/50/15 formula.9						

diarrhoea, severe burns, heavy sweating, drainage, fistulas or similar diseases.⁹

Restricted fluid supply: during oedemas (cardiac, hepatogenic, renal pathogenesis), ascites, terminal kidney failure (with oliguria, anuria), dialysis treatment.9

Sources: 1 AKE Recommondations for Enteral and Parenteral Nutrition in Adults; Version 2008 - 2010, 2 deducted from: Human energy requirements: Energy Requirement of Adults. Report of a Joint FAO/WHO/UNU Expert Consultation, Food and Agriculture Organization of the United Nations, 2004, Retrieved 2009-10-15. 3 EFSA: Scientific Opinion on Dietary Reference Values for Protein, EFSA Journal 2012; 10(2): 2557(66pp), 4 Arends J, Bodoky G, Bozzelti F et al., ESPEN Guidelines on Enteral Nutrition: Nov - Surgical Oncology. Clin Nutr 2006; 25: 245-59, 5 Planth M, Cabre E, Riggio O, et al., ESPEN Guidelines on Enteral Nutrition: Liver Disease. Clin Nutr 2006; 25: 285-94, 6 Cano N, Fiaccadosi E, Tesinky P et al., ESPEN Guidelines on Enteral Please note: Always perform early nutrition therapy and the therapy of the causes of malnutrition in parallel.

Nutrition: Adult Renel Failure. Clin Nutr 2006; 25: 295 - 310, 7 DACH - German Nutrition Society (DGE), Austrian Nutrition Society (ÖGE), Swiss Society for Nutrition Research (SGE), Swiss Nutrition Association (SVE): Reference Values for Nutrient Intake. Frankfurt/Main, Umschau Braus, 2000. 8 Bozetti F, Basics in Clinical Nutrition: Nutritional support in cancer. e-SPEN, the European e-Journal of Clinical Nutrition and Metabolism 5 (2010) e148-e152, 9 Chidester J. Spangler A. Fluid intake in the institutionalized elderly. J Am Diet ASSOC 1997: 97:23 – 9.



Please note: The recommendations for supplementation should be based on nutrition intake and assessment.

Calculation of fluid substitution

FLUID SUBSTITUTION = Fluid requirement - total fluid intake*

- Cral fluid intake in ml
 - + Water content of food (0.33 ml/kcal) in ml
 - + Water content of ONS and/or tube feed in ml
 - + Water content of parenteral nutrition in ml
 - = TOTAL FLUID INTAKE in ml

Calculation of fluid substitution in patients eating normal food







Source:

adapted from National Collaborating Centre for Acute Care, February 2006. Nutrition support in adults Oral nutrition support, enteral tube feeding and parenteral nutrition. National Collaborating Centre for Acute Care, London. Available from www.rcseng. ac.uk



Monitoring

Monitoring is an integral part of the nutritional management process to document and control the effectiveness of the nutrition therapy of the patient. The nutritional therapy and status of the patient should be monitored by defined measurements and observations, such as recording of dietary intake, body weight and function and, where appropriate, laboratory parameters (e.g. blood parameters). This may lead to adaptations of the nutrition therapy plan during the natural history of the patient's condition.

Documentation and control of the effectiveness of nutrition therapy
Adaptation of the nutrition therapy plan if necessary

Monitoring

Step 4

Monitoring/Follow-up

Monitoring and follow-up of food intake should take place at least once a week to guarantee an effective nutrition therapy. The documentation of weight development can help to give an additional orientation about the development of the nutritional status of the patient.

	Energy requirements: 2050 kc	cal/d Pr	otein requir	ements:	95 g/d	
	Please find calculation tools to calculate requirements on p. 24 - 25					
				Monitoring	J	
		1	2	3	4	5
	Date/Signature	28.10.12 Sth	4.11.12 Sth			
	Energy intake via normal diet, kcal	1400	1400			
	Energy intake via ONS, kcal	300	600			
٨b.	Energy intake via tube, kcal	-	-			
Ener	Energy intake parenteral nutrition, kcal	-	-			
	Total energy intake, kcal	1700	2000			
	% of requirements (Intake/requirement x 100)	83%	98%			
	Protein intake via normal diet, g	60	60			
	Protein intake via ONS, g	20	40			
ein	Protein intake via tube, g	-	-			
Prot	Protein intake parenteral nutrition, g	-	-			
	Total protein intake, g	80	100			
	% of requirements (Intake/requirements x 100)	84%	105%			
	Nutrition Therapy: 0 = no changes 1 = following changes	¹ 600 kcal ONS = 2 bottles	⁰ 600 kcal ONS = 2 bottles			

Please note: Also consider the measurement of blood parameters (step 2: Assessment)

Monitoring - weight development

24.10.12 58.0 0	281012 57.5 -0.5	4.11.12 58.5 + 1.0		_	
58.0 0	57.5 -0.5 	58.5 + 1.0			
•	-0.5	+ 1.0			
				1	
			4		
		×			
×	×				
•	*	× ×			





Oral Nutritional Supplements

Oral Nutritional Supplements (ONS) are an integral part of the overall patient management strategy and an effective solution to tackling malnutrition in a wide variety of patient groups. There is extensive and robust evidence that ONS lead to improvements in nutritional intake, clinical, functional and economic outcomes amongst patients who are able to consume food, but not enough to meet their nutritional requirements.

Current evidence suggests that patients' overall compliance to ONS is good (~78%) and helpful in improving total energy intakes.¹

The tailor-made product range of Fresenius Kabi offers ONS such as standard ONS (e.g. Fresubin Protein Energy DRINK), texture-modified products (e.g. Fresubin Crème) as well as ONS for special indications (e.g. Diben DRINK, Supportan DRINK) to meet the nutritional needs of the patients.

> ONS – an effective and non-invasive solution to tackle malnutrition

Source:

1 Hubbard GP, Elia M, Holdoway A, Stratton RJ: Compliance to oral nutritional supplements and its association with increased total energy intake: results from a systematic review (abstract). Proceedings of the Nutrition Society 2012, 70:E292.

1. Which is the right ONS?

Choose an ONS that can fulfill the calorie and protein gap between the patient's requirements and their current intake. Remember to consider the patient's preferences when selecting an ONS in terms of flavours, textures and serving sizes. Oral Nutritional Supplements can be categorised as standard and disease-specific products adapted to the patient's needs. ONS include sip feeds (sweet and savoury), products with a modified texture and powder products.

2. What time is the best time for ONS?

In most cases, ONS should not replace normal meals and snacks, therefore patients should be encouraged to eat regular meals as usual and take ONS in addition. The timing of ONS is important to minimise the impact on appetite at meal times. In general, the best time for sip feeds is after meals, particularly in the evening. Remember to consider the patient's daily routine and preferences when deciding the best time to take supplements.

3. How to improve compliance of ONS?

- ✓ Serve ONS cold or warm according to the patient's preferences
- ✓ Offer variety by e.g. providing different flavours
- ✓ Find out patient's favourite flavour with samples before prescribing
- ✓ Serve ONS at medication rounds or in good company
- ✓ Offer ONS with non-acidic fresh fruits (e.g. banana, strawberries)
- Heat chocolate and cappuccino flavours (up to max. 70 °C) and try adding whipped cream
- \checkmark Offer ONS with vanilla flavour together with fruit salad
- ✓ In case the patient perceives ONS with vanilla, chocolate and cappuccino flavour as too sweet, add instant coffee
- Enrich normal food with ONS neutral flavour (e.g. in mashed potatoes, creamed rice, semolina pudding, porridge, pudding).
- ✓ Prepare delicious meals with ONS of different flavours, e.g. with recipes on pages 37 - 39
- \checkmark Train all health care professionals in nutritional management regulary

4. How to store ONS?

Detailed information is given on a products label. Generally, unopened sip feeds can be stored at room temperature. Opened sip feeds kept at room temperature should be consumed within 8 hours; refrigerated they can be consumed over 24 hours. Fresubin a la carte Tomato cream soup



Ingredients

1 sachet	Calshake Neutral
200 ml	tomato juice
40 ml	cream (30% fat)
15 g	onion (diced)
20 g	bacon
1/2	garlic clove
1 table-	
spoon	olive oil
	stock
	salt, pepper, suga
	strips of basil

Nutritional information per serving:





Preparation

Put Calshake Neutral, tomato juice and cream in a shaker and shake well. Gently fry onions, bacon and garlic in olive oil, deglaze with some stock. Add the mixed Calshake Neutral and heat up for a short time.

Season to taste with salt, pepper and sugar. Garnish the soup with cream and strips of basil.



Savoury

level Y 

Waffles with morello cherries in a fruits of the forest sauce





Sweet	
level Y	■■□⊏ 1 75 min

ONS



Ingredients

5 ml	Fresubin Energy DRINK
	Iropical ruito

	ii opical Fi uits	
10 a	cocoput flakos	

- 60 g cream (30% fat)
- 40 g whole egg (1 small egg)
- 10 g honey (1 teaspoon)

Nutritional information per serving:

Fat50.0 a Carbohydrate 22.0 g Fibre....5.9 g

Alternative products: Fresubin® Protein Energy DRINK



Preparation

Bring two-thirds of the coconut flakes to the boil with the cream, leave to cool slightly. Mix the Fresubin Energy DRINK Tropical Fruits with the egg and the honey.

Grease a heat-resistant ramekin with butter and sprinkle with the rest of the coconut flakes. Pour the mixture into the ramekin. Leave to thicken in boiling water for about one hour.

Once it has cooled down. turn out the crème and decorate.

TIP: Substitute

1 tablespoon of cream with 1 tablespoon of white rum* and decorate the crème with slices of pineapple and whipped cream.

*Check with your doctor or pharmacist before consuming alcohol

Ingredients

Waffles 200 ml Fresubin 2 kcal DRINK Vanilla

3 eggs 125 g soft butter 100 g sugar 100 ml full-fat milk (3.5% fat) 250 g flour 20 g baking powder 1 teaspoon lemon (juice) salt. cinnamon Fruits of the forest sauce morello cherries (350 g) 1 jar 200 ml Fresubin 2 kcal DRINK

Fruits of the forest 3 tablespoons sugar

Nutritional information per serving:

Energy 886 kcal Fat4.0 g Carbohydrate 122.0 g Fibre....2.5 g

Alternative products: Fresubin® Energy/Fibre DRINK Fresubin® Protein Energy DRINK

Preparation

Separate eggs. Beat egg yolks, soft butter and sugar until fluffy. Add Fresubin 2 kcal DRINK Vanilla, milk, lemon juice, a pinch of salt and cinnamon. Sieve the flour and baking powder and stir in gradually. Fold whipped egg whites into the mixture.

Add morello cherries (without juice) and sugar to Fresubin 2 kcal DRINK Fruits of the forest. Add juice as desired.

Bake waffles in a waffle maker. Sprinkle icing sugar over the baked waffles and add the cherry sauce.

TIP: Substitute Fresubin 2 kcal DRINK Vanilla with Fresubin 2 kcal DRINK Cappuccino.





Tube Feeding

Tube feeding is indicated for those patients with a functional or partially functional gastrointestinal tract who are unable or unwilling to eat sufficient quantities of conventional foods or oral nutritional supplements to meet their nutritional requirements or for whom oral intake is contraindicated, for example, patients who are unconscious or have an unsafe swallow¹

Tube feeding is indicated for the nutritional therapy of patients with a range of indications. Tube feeding can increase or ensure appropriate nutritional support in case of insufficient oral food intake. For example, tube feeding is indicated in patients undergoing major head and neck cancer surgery, gastrointestinal surgery for cancer or patients with severe trauma.^{2,3}

Fresenius Kabi offers a broad range of tube feed products such as standard tube feeds (e.g. Fresubin Energy) as well as tube feeds for specific indications (e.g. Diben for diabetic patients or Supportan for oncology patients) to meet the special nutritional needs of these patients.

> Tube feeding is indicated for patients with an inadequate oral intake.

Sources:

- 1 Stratton R.J. Flia M. Who benefits from nutritional support: what is the evidence Fur. J. Gastroenterol Henatol. 2007 May:19(5):353-8 Review
- 2 Arends J et al; ESPEN (European Society for Parenteral and Enteral Nutrition). ESPEN Guidelines on Enteral Nutrition: Non-surgical oncology. Clin Nutr. 2006 Apr; 25(2):245-59.
- 3 Volkert D et al; ESPEN (European Society for Parenteral and Enteral Nutrition). ESPEN Guidelines on Enteral Nutrition: Geriatrics. Clin Nutr. 2006 Apr; 25(2):330-60.

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How to select the best enteral feeding route¹



Need for long-term nutrition perceptible

PEG = Percutaneous endoscopically controlled gastronomy PEJ = Percutaneous endoscopic jejunostomy *or oral tube if patient is unconscious

- JETPEG = Jejunal tube through PEG
- = Fine-needle catheter jejunostomy FKJ

· organs located between (e.g. liver, colon)

· local tumour infiltration at the needle

Contraindications to enteral nutrition

Contraindications to gastrostomy placement¹

- severe coagulation disorders (INR > 1.5, Quick < 50 %, PPT > 50 s, thrombocytes < 50,000/mm³)
- advanced peritoneal carcinosis
- severe ascites
- anorexia nervosa
- greatly limited life expectancy

Absolute contraindications for enteral nutrition³

- acute abdomen
- acute gastrointestinal bleeding
- mechanical ileus
- intestinal obstruction

intestinal perforation

• peritonitis

biopsy site

severe psychoses

severe dementia²

- abdominal compartment syndrome
- persistent attacks of diarrhoea
- intestinal ischemia

Sources

1 Löser C, Aschl G, Hebuterne X et al. ESPEN guidelines on artificial enteral nutrition-percutaneous endoscopic gastrostomy (PEG). Clin Nutr 2005; 24:848-61

2 Volkert D, Chourdakis M, Faxen-Irving G: ESPEN guidelines on nutrition in dementia. Clin Nutr. 2015 34(6):1052-73 3 AKE. Recommendations for enteral and parenteral nutrition in adults. AKE, 2008/2010; Wien

How should enteral nutrition be started?

For patients with normal digestive capacity and normal caloric tube feeding (1 kcal/ml) e.g. Fresubin[®] original fibre

Stage	ml/d (amount)	ml/h (pump)	kcal/d	Duration hours
1*	500	25	500	20
2*	1000	50	1000	20
3*	1500	75	1500	20
4*	2000	100	2000	20
5*	2000	125	2000	16

* Steps 1 – 3 may need 2 days each in sensitive patients, e.g. intensive-care patients, patients with restricted digestive capacity; for patients who are not nutritionally restricted, faster buildup may be possible.

- Increase the supply rate according to individual tolerance.
- The fluid substitution during the nutrition buildup should be sufficient to cover the requirement.
- If the tube is positioned in the stomach, a nutrition pause of 4-6 hours per 24 h is recommended.
- The nutrition should preferably be supplied by feeding pump.
- During administration, make sure that the upper body is raised (angle of at least 30°).
- Check emptying of the stomach, especially for postoperative, neurological and diabetic patients.

Possible causes and corrections in case of diarrhoea

Causes of diarrhoea	► Corrections
Too rapid advancement of feeding	 Introduce slowly (e.g. with 20 ml/h) and increase rate depending on patient's tolerance
Too rapid application	Reduce and control rate of application; don't give more than 150 ml/h
Medication	Check medication and if possible, change to another drug
Maldigestion/malabsorption	 According to cause, choose a peptide-based feed and/or MCT-containing formula
Wrong definition of diarrhoea	▶ Diarrhoea: more than 3 thin stools/d with a weight of more than 200 g/d

Basic rules for drug application in tube feeding

Basic rules for drug application	
Give drugs always one by one	
Never mix drugs with tube feed	
Prefer liquid drugs	
Crush solid drugs immediately before application	
Dilute syrups and drugs with high osmolarity	
Fluck to be a with 20 reliance before and often draw providentian	

Flush tubes with 20 ml water before and after drug application

For further specific information on enteral nutrition and products, please ask your Fresenius Kabi contact person.



Parenteral Nutrition

Parenteral nutrition (PN) is defined as the supply of defined nutrients administered intravenously. PN becomes necessary when it is not possible for the body to metabolize sufficient nutrients via the enteral route and to utilize these nutrients in an adequate way.

Therefore, the function or dysfunction of the gastrointestinal tract must be assessed to decide if nutrients should be administered enterally, parenterally or by both routes combined.

> Parenteral nutrition – the means of choice in case of insufficient or not possible enteral feeding.

Contraindications for parenteral nutrition therapy

Contraindications for clinical nutrition¹

- Acute phase
- Hypoxia $pO_2 < 50 \text{ mmHg}$
- Shock
- Severe acidosis pH < 7.2; pCO₂ > 75 mmHg
- Serum lactate > 3 mmol/l
- Ethical aspects



Monitoring of parenteral nutrition in the clinic

Parameter ¹ > 4 -	6 times/day	1 x per day	1 x per week	2 x per week	1 x per month
Blood glucose	acute phase	stable phase	long-term nutrition		
K+, PO ₄ ³⁻	acute phase	stable phase	long-term nutrition		
Blood gas, lactate	acute phase	stable phase	long-term nutrition		
Na⁺, Cl⁻		acute phase	stable phase		long-term nutrition
Ca ²⁺ , Mg ²⁺		acute phase	stable phase		long-term nutrition
Triglycerides		acute phase	stable phase		long-term nutrition
Creatinine, serum urea		acute phase	stable phase		long-term nutrition
Urine (glucose, protein, acetone, urea, creatinine osmolarity, Na⁺, K⁺, Cŀ)		acute phase		stable phase	long-term nutrition
Blood count				acute phase	long-term nutrition
Coagulation			acute phase		long-term nutrition
Liver enzymes, NH ₃ , bilirubin, CHE			stable phase	acute phase	long-term nutrition
Lipase, amylase			acute phase	acute phase	long-term nutrition
Total protein, albumin, transferrin, prealbumin			acute phase		stable phase/ long-term nutrition
Trace elements Fe ²⁺ , Zn ²⁺ , Cu ²⁺ , Se ²⁺					long-term nutrition
Vitamins					long-term nutrition

Awareness

Reflux control

Stool frequency/stool consistency

In cachectic patients or after lengthy fasting,

intervals (danger of a refeeding syndrome)

monitor potassium and phosphate at short time

Clinical monitoring – at least daily

- Amount supplied parenterally/enterally: energy, protein, fluid
- Supply rate parenterally/enterally
- Target/actual comparison (how many of the planned supplies were actually administered)
- Skin turgor/oedema
- Source:

1 AKE. Recommendations for enteral and parenteral nutrition in adults. AKE, 2008/2010; Wier



Technique of parenteral nutrition

Routes of access

Duration of parenteral nutrition expected to be max. 7-10 days:1

- Peripheral access when osmolarity of the infusion solution is up to 850* mosmol/l²
- Central venous access when osmolarity of the infusion solution > 850 mosmol/l²

Duration of parenteral nutrition expected to be > 7-10 days.¹

Central venous access

Duration of parenteral nutrition expected to be > 3 weeks:

- Broviac-Hickman® catheter or port
- * in the absence of lipids, a limit of 800 mosm/l including any electrolytes that may be added is to be complied with¹

Infusion technique

- Continuous infusion for 24 hours
- Cyclic infusion, e.g. for 16 hours, 8-hour pause

Inject or mix products only if their compatibility has been checked. If necessary, ensure light protection. For further notices and information, please consult the respective device information or information for use of the respective medical device manufacturer.

Please note:

 Cyclic infusion is recommended for parenteral nutrition at home³

To reduce the risk of infection, avoid drawing blood from central venous catheters.

Build-up of nutrition

Beainning of nutrition: 12-14 hours after an acute event, otherwise immediately

50% of the target supply 1st day 2nd day 75% of the target supply 3rd day 100% of the target supply

Comply with gradually increasing and maximum infusion rate.

For further specific information on parenteral nutrition and products, please ask your Fresenius Kabi contact person.

Sources:

- 1 Jauch KW, Schregel W, Stanga Z et al. Leitlinie parenterale Ernährung DGEM: Technik und Probleme der Zugänge in der parenteralen Ernährung. Aktuel Ernaehr Med 2007; 32, Suppl. 1:41-53
- 2 Pittirutti M, Hamilton H, Biffi R et al. ESPEN Guidelines on Parenteral Nutrition: Central venous catheters. Clin Nutr 2009; 28:365-77
- 3 Staun M, Pironi L, Bozzetti F et al. ESPEN Guidelines on Parenteral Nutrition: Home parenteral nutrition (HPN) in adult patients. Clin Nutr 2009; 28:467-79

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Notes