FRESENIUS KABI
caring for life

Practical guidance for daily use

Nutritional management for adults in healthcare facilities

gnp good nutrition practice by Fresenius Kabi

Nursing Home

Foreword

Malnutrition is a major public health problem. It includes both over-nutrition (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.[1] About 1 in 4 hospital patients and even more than 1 in 3 residents in nursing homes are malnourished or at risk of malnutrition.[2,3]

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

Depression, cognitive or functional impairment, and swallowing difficulty are often associated with malnutrition.[4] Medication can reduce appetite and the ability to taste. If untreated, malnutrition particularly in the elderly, will start a cascade of events leading to deterioration of body function, reduced quality of life and increased mortality rates.[5] In addition, malnutrition leads to increased resource use and healthcare costs.[6]

Early detection of malnutrition or nutritional risk and appropriate management is the crucial key to fight against malnutrition. Nutritional screening and assessment of residents 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 nursing home residents.

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

The booklet is devided in 8 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 – 8 provide practice relevant information about the usage of Oral Nutritional Supplements including management of patients with swallowing disorders, tube feeding and parenteral nutrition.

Let's fight against malnutrition!

We wish you lots of success,
your gnp team

Sources: 1 Kondrup J et al. (2003): ESPEN guidelines for nutrition screening 2002; Clin Nutr. 22(4):415-421. **2** Lohrmann C et al. (2013). www.pflegewissenschaft.medunigraz.at/forschung/pflegequalitaetserhebung/. Medizinische Universität Graz, Institut für Pflegewissenschaft. **3** Meijers J et al. (2009): Malnutrition in Dutch health care; Nutrition 25:512–519. **4** Bell CL et al. (2015): Malnutrition in the nursing home; Curr Opin Clin Nutr Metab Care 18:17-23. **5** National Collaborating Centre for acute care (2006): Nutrition support for adults. www.nice.org.uk/guidance/cg32/ **6** Meijers J et al. (2012): Estimating the costs associated with malnutrition in Dutch nursing homes. Clin Nutr. 31(1):65-68.

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Content

Introduction 2
The gnp pathway: 4 Steps against malnutrition 7

Step 1 – Screening 11
Screening 12
Calculation of BMI 13
Estimation of body height by measurement of knee height 14
Estimation of BMI in residents with amputation 14
Calculation of weight loss in % 15

Step 2 – Assessment 17
Risk factors of malnutrition and resident-related action 18
Assessment of nutritional intake 19
– Food protocol 19
– Fluid protocol 20
Calculation of fluid substitution 21

Step 3 – Nutrition therapy 23
Nutritional goals 24
Calculation of energy requirements in kcal 24
Calculation of protein requirements in g 25
Calculation of fluid requirements in ml 25
Nutritional support 26
Implementation of the Food & Fluid protocol 26
Nutrition therapy plan 27
Calculation of fluid substitution 27
Oral algorithm 28
Enteral/Parenteral algorithm 29

Step 4 – Monitoring / Follow-up 31
Monitoring / Follow-up 32
Food intake 32
Weight development 33

Swallowing disorders 35
How to prepare the resident and surroundings before meals? 36
How to facilitate safe swallowing? 36
What is a suitable food? 36

Oral nutritional supplements (ONS) – practical aspects 39
Which ONS is the right one? 40
Which is the right time for ONS? 40
How to improve compliance of ONS? 40
How to store ONS? 40
Recipes 41

Tube Feeding 45
Choice of the right enteral application route 46
Contraindications for enteral feeding 46
How should enteral nutrition be started? 47
Possible causes and corrections in case of diarrhoea 47
Basic rules for drug application via tube feeding 47

Parenteral Nutrition 49
Contraindications 50
Monitoring 50
Technique 51

The gnp pathway:

4 steps to improve the nutritional status of your resident

4 steps against malnutrition

Step 1

Screening
should take place within 24 hours of admission

Malnutrition – High Risk

Increased Risk of Malnutrition

Normal condition – No Risk

Step 2

Assessment

- Causes of malnutrition
- Assessment of the nutritional intake, e.g. by Food & Fluid protocol

Step 3

Nutrition therapy

- Define the nutritional goals
- Define the individual nutritional requirements
- Define the route(s) of nutrition
- Define nutritional support and implement the nutritional therapy plan

Therapy of the causes of malnutrition

Step 4

Monitoring / Follow-up

- Documentation and control of the effectiveness of the nutrition therapy e.g. by Food & Fluid protocol
- Adaptation of the nutrition therapy plan if necessary

Re-screening

every 1–3 months (at no risk)

once permonth (at increased risk

gnp – good nutrition practice:

Designed to help you and your residents!

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

Simple, practice-oriented and reliable!

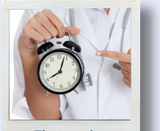
gnp – practice-oriented toolkit

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

Good nutritional status

gnp – improves the nutritional status of your patients

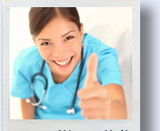
- The unique gnp pathway with only 4 steps as a practical guidance
- Highly relevant and validated tools to identify residents at risk of malnutrition or already malnourished residents
- The results of screening and assessment lead directly into an individual nutrition therapy plan



Time-saving

gnp – quick and easy to use

- Simple, quick and reliable
- Screening a resident takes less than 5 minutes
- Easy to use materials developed for the daily practice



It's worth it

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 quality management in healthcare facilities

gnp – good nutrition practice is a vital part of your resident 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 resident by ensuring that malnourished residents receive the appropriate nutrition, at the right time.

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

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 quick 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 resident!

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.

MNA® is the best validated screening tool for elderly residents and is among the recommended tools by ESPEN.[1]

Screening is the first part of the gnp concept. It is a rapid and simple procedure, which can be done routinely by any healthcare professional in less than 5 minutes.

Examples are marked in light blue writing.

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.

Step 1 **Screening**

! Re-screening every 1 – 3 months.

Please respond to all questions from the MNA® (Mini Nutritional Assessment Short Form) by indicating the relevant number in the box.

In case the Body Mass Index (BMI) can't be given, please indicate the calf circumference.

Please sum up all numbers for the final result.

MNA® Nestlé Nutrition Institute

Re-screening every 1 – 3 months.

A	**Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties?**	0 = severe decrease in food intake 1 = moderate decrease in food intake 2 = no decrease in food intake
B	**Weight loss during the last 3 months**	0 = weight loss greater than 3 kg (6.6 lbs) 1 = does not know 2 = weight loss between 1 and 3 kg (2.2 and 6.6 lbs) 3 = no weight loss
C	**Mobility**	0 = bed or chair bound 1 = able to get out of bed / chair but does not go out 2 = goes out
D	**Has suffered psychological stress or acute disease in the past 3 months?**	0 = yes 2 = no
E	**Neuropsychological problems**	0 = severe dementia or depression 1 = mild dementia 2 = no psychological problems
F1	**Body Mass Index (BMI):** ☐ **(weight in kg) / (height in m)²**	0 = BMI less than 19 1 = BMI 19 to less than 21 2 = BMI 21 to less than 23 3 = BMI 23 or greater

If BMI is not available, replace question F1 with question F2. Do not answer question F2 if question F1 is already completed.

F2	**Calf circumference (CC) in cm** See also table on carton and calculation aids for residents with amputation in the gnp practical guidance on p. 14	0 = CC less than 31 3 = CC 31 or greater

Screening score (max. 14 points)

☐ 12 – 14 points = **Normal** nutritional status

☐ 8 – 11 points = **At risk** of malnutrition

☐ 0 – 7 points = **Malnourished**

Sources:
Vellas B, Villars H, Abellan G, et al. Overview of the MNA® - Its History and Challenges. J Nutr Health Aging 2006; 10: 456-465. **Rubenstein LZ**, Harker JO, Salva A, Guigoz Y, Vellas B. Screening for Undernutrition in Geriatric Practice: Developing the Short-Form Mini Nutritional Assessment (MNA-SF). J. Geront 2001; 56A: M366-377. **Guigoz Y**. The Mini-Nutritional Assessment (MNA®) Review of the Literature - What does it tell us? J Nutr Health Aging 2006; 10: 466-487. **Kaiser MJ**, Bauer JM, Ramsch C, et al. Validation of the Mini Nutritional Assessment Short-Form (MNA®-SF): A practical tool for identification of nutritional status. J Nutr Health Aging 2009; 13: 782-788.

Measures referring to resident

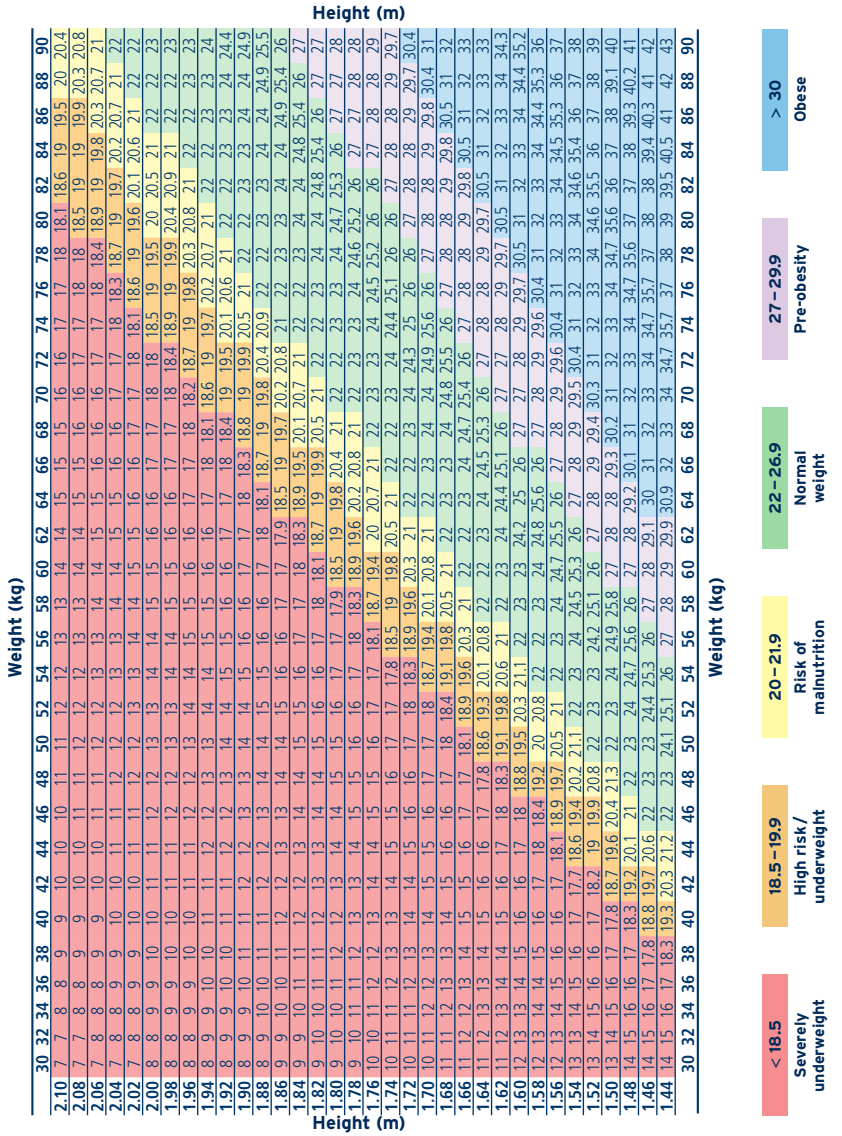
☐ Re-screening every 1 – 3 months
☐ Assessment
☐ Food and fluid protocol
☐ Directly start a nutritional care plan (e. g. ONS)

Comment _____

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.[1-3]

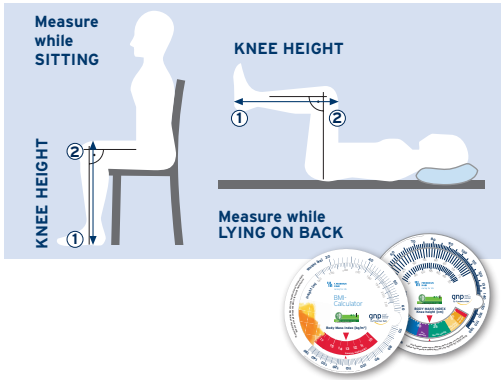
Calculation of Body Mass Index (BMI): Weight in kg / (height in m²)



Sources: 1 Sergi G et al. (2005): An adequate threshold for body mass index to detect underweight condition in elderly persons: The Italian Longitudinal Study on Aging (ILSA). J Gerontol A Biol Sci Med Sci 60 (7): 866-871. **DACH (2002):** Reference values for nutrient intake. German Nutrition society, Austrian Nutrition Society, Swiss Society for Nutrition Research, Swiss Nutrition Association. Frankfurt, Germany. **ESPEN Volkert D et al. (2006):** ESPEN guidelines on enteral nutrition: Geriatrics. Clin Nutr 25 (2): 330-60. **Dutch Malnutrition Steering Group (2011):** Guideline. Screening and treatment of malnutrition. www.fightmalnutrition.eu/

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)



Measurement of knee height

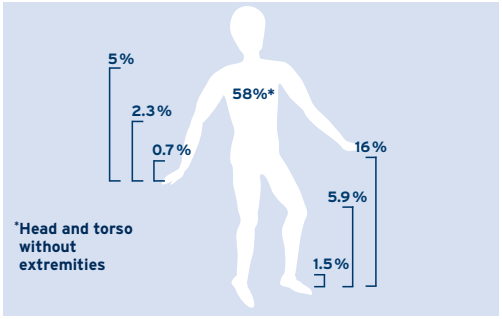
The knee height is measured in cm along the outside of the left leg in lying or sitting position of the resident (please see figure on the left). For this purpose, the leg is bent by 90° at the knee joint. The knee height is the direct line from the sole of the foot at the heel [1] to the upper edge of the kneecap [2]. Ask your Fresenius Kabi contact person for the gnp knee height calculator for a quick and easy performance.

Calculation of body height [1-3]

Residents from 60 to 90 years:
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)

Residents below 60 years:
Men: 71.85 + (1.88 x knee height in cm)
Women: 70.25 + (1.87 x knee height in cm) – (0.06 x age)

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



Example 1: Amputation of one leg
Current body weight (BW) = 63 kg
Leg = 16 % of height
Weight = 63 kg x 100 : (100–16)
Corrected weight = 75 kg

Example 2: Amputation of both arms
Current body weight (BW) = 63 kg
Both arms = 2 x 5% of height
Weight = 63 kg x 100 : (100–2 x 5)
Corrected weight = 70 kg

Correction formulas for estimating the BMI of residents with amputation(s)

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

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

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

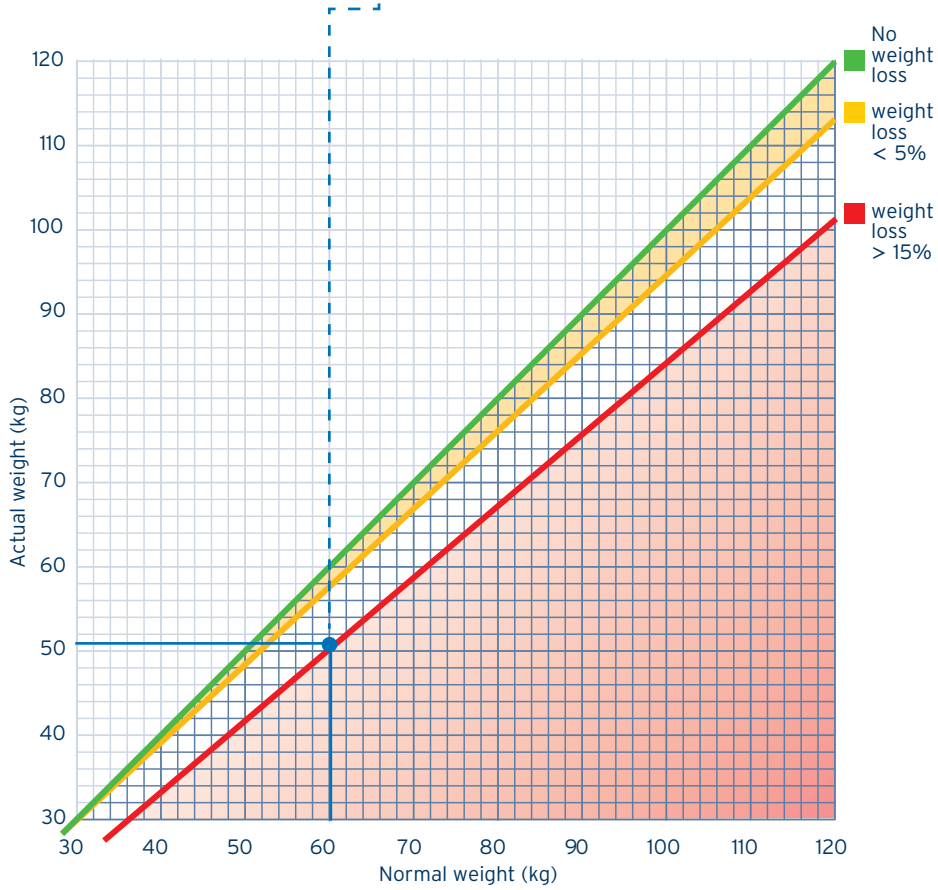
Example 1: Amputation of one leg
Current body weight (BW): 63 kg
Body height = 1.76 m
BMI = (63 : 0.84) : 1.76^2 = 75 : (1.76 x 1.76)
BMI = 24.2 kg/m²

Example 2: Amputation of both arms
Current body weight (BW): 63 kg
Body height = 1.76 m
BMI = (63 : 0.9) : 1.76^2 = 70 : (1.76 x 1.76)
BMI = 22.6 kg/m²

Calculation of weight loss in %

Optional useful parameter in screening procedure.

Normal weight [kg]	Weight loss	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115
Actual weight [kg]	5 %	38	43	47.5	52	57	62	66.5	71	76	81	85.5	90	95	100	104.5	109
	10 %	36	40.5	45	49.5	54	58.5	63	67.5	72	76.5	81	85.5	90	94.5	99	103.5
	15 %	34	38	42.5	47	51	55	59.5	64	68	72	76.5	81	85	89	93.5	98



Sources: 1 Chumlea W et al. (1988): Assessment of the nutritional status of healthy and handicapped adults. In: Lohman TG, Roche AF, Martorell R. Anthropometric standardization reference manual. Champaign Illinois: Human Kinetics Books. S. 115-119 **2** AKE (2008): Recommendations for enteral and parenteral nutrition in adults. Austrian Society of Clinical Nutrition, Vienna **3** Chumlea W et. al. (1994): 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; 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 dietitian, a physician with nutrition expertise, or a nutrition nurse specialist) or by a nutritional support team.

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

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 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 intervention.

PEMU Assessment[1] (adapted)

Examples of possible reasons for a reduced food and/or fluid intake

Physical or cognitive impairment	**Comments**
☐ Cognitive decline	e.g. caused by dementia; doesn't know what to do with the food
☐ Impaired function of arms and hands	e.g. accessibility of meals and beverages; can't hold the cutlery
☐ Bad condition of the mouth	e.g. dry mouth, mucositis
☐ Chewing/dental problems	
☐ Swallowing problems	e.g. chokes easily, coughs a lot while eating/drinking, avoids certain food items
Lack of appetite/refusal of food	**Comments**
☐ Psychological stress (e.g. social isolation)	
☐ Acute disease	
☐ Pain	
☐ Lack of exercise	
☐ Medical side effects	e.g. type, number of different drugs
☐ Taste and smell disorder	
☐ Reduced sensation of thirst	
☐ Desire for a reduced urinary excretion	e.g. fear of incontinence
☐ Cultural/religious/individual habits	
☐ Fear of food intolerance/allergies	
Environmental factors	**Comments**
☐ Sense of discomfort during mealtime	e.g. noises, odors
☐ Inadequate mealtimes	e.g. timing, duration, flexibility
☐ Inappropriate/lack of tools	
☐ Tensed relation to the care attendants	
Food/beverage offer	**Comments**
☐ Dissatisfaction with the offer	e.g. cultural preferences, food choices
☐ Inappropriate consistency	
☐ Non-compliance with prescribed diet/ inappropriate diet suspected	
Other reasons:	**Comments**
☐	
☐	

Examples of possible reasons for an increased need of energy and/or fluids

	Comments
☐ Due to illness	e.g. fever, infections, tumour, decubitus, diarrhoea, constipation
☐ Hyperactivity/restlessness	e.g. constant walking, possibly related to cognitive disease
☐ Heavy sweating	e.g. overheated rooms, inappropriate clothing
Other reasons:	**Comments**
☐	
☐	

Source: 1 DNQP (2009), PEMU. Andruck im Expertenstandard für die Pflege: Ernährungsmanagement, Deutsches Netzwerk für Qualitätssicherung in der Pflege, Osnabrück. www.dnqp.de

Assessment of nutritional intake

The food intake of many residents deteriorates over time or during a stay in a hospital. The best way to identify residents at risk of malnutrition is to record their intake of foods and fluids – from admission onwards.

The Food & Fluid protocol is the basis to determine the optimal nutrition therapy plan of the resident. 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 4).

Food protocol – Is your resident eating enough?

The food protocol helps to record the intake of a resident, 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 resident to be able to define the nutrition therapy plan (Step 3) by calculating the necessary supplementation.

Example: Patient is offered 2000 kcal

☒ **Assessment** (3 days) ☐ **Monitoring** (at least once a week) **Legend:** Normal diet 0 ⊕ 1/4 ⊕ 1/2 ⊕ 3/4 ⊕ 1/1 ⊕

23.9.15 Date	kcal	g protein	Normal diet	Description/type	INI	Supplementation: type and quantity (ONS/tube feeding, parenteral)	INI
Breakfast	200	10	⊗	2 Sandwiches with butter and jam	Ma		
Snack	150	8	⊗	Fruit joghurt	Ma		
Lunch	700	20	⊗	Menu 3	Ma		
Snack	200	12	⊗				
Dinner	250	10	⊗	Ham sandwich		1 bottle ONS	Fa
Night snack	-	-	⊕		Fa		
Total energy intake via food	kcal 1500	g 60	INI Fa				

☐ **Assessment** (3 days) ☐ **Monitoring** (at least once a week) **Legend:** Normal diet 0 ⊕ 1/4 ⊕ 1/2 ⊕ 3/4 ⊕ 1/1 ⊕

23.9.15 Date	kcal	g protein	Normal diet	Description/type	INI	Supplementation: type and quantity (ONS/tube feeding, parenteral)	INI
Breakfast							
Snack							

Fluid protocol – Is your resident drinking enough?

The fluid protocol helps to record the daily fluid intake of a resident, 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 resident to be able to define the nutrition therapy plan (Step 3) by calculating the needed fluid substitution of the resident.*

		Assessment			Monitoring						
		3 days review of fluid intake			1	2	3	4	5	6	7
	Date	23.9.	24.9.	25.9.	24.10.						
150 ml Cup	ml	150	150	150	100						
	ml	150	150	100	150						
	ml	200	250	250	150						
	ml	250	250	250	250						
200 ml Glass/ bowl	ml		50	100	250						
	ml			50	100						
	ml										
	ml										
	ml										
	ml										
Fluid intake via ONS (ml)		750	850	900	1000						
+ Water content of food (0.33 ml/kcal) (ml)		561	660	627	693						
Water content of ONS and/or tube feed* (ml)		312	312	200	234						
+ Water content of parenteral/infusion solution* (ml)		–	–	–	–						
= **Total fluid intake (ml)**		1620	1820	1730	1930						

** Please find the water content on the product label.

Fluid substitution = Fluid requirement – total fluid intake

Fluid substitution (ml)	525	325	415	215						
Initials	Fa	Mü	Mü	Fa						

***Example:** 63 kg resident with a fluid requirement of 2145 ml. (see page 27)

Calculation of fluid substitution

FLUID SUBSTITUTION = Fluid requirement – total fluid intake

***Calculation basis:**
Fluid intake per os 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

Please note: Further details on calculation of fluid substitution are given on page 27.

Nutrition Therapy

The overall aim of the nutrition therapy is to stabilize or to increase the weight of the resident and to improve the nutritional status. For this purpose, the following steps are necessary:

- **Define the nutritional goals**
- **Define the individual nutritional requirements**
- **Define the route(s) of nutrition**
- **Define nutritional support and implement the nutritional therapy plan**

Step 3

Definition of the nutrition goals

Check the body weight always at the same time (e.g. in the morning, sober, after urination), with similar clothing without shoes, and with the same validated scales.

Tools and equations to set the nutrition targets

Weight:	63 kg	**Target weight:**	70 kg		
BMI:	20.3 kg/m²	**Target BMI:**	22.5 kg/m²	(e.g. 22 kg/m²)	
Energy requirements:*	25 kcal x	70 Weight x	1.2 stress (activity) factor =	2100 **kcal/day**	

Example:
Activity factor: 1.2 (Immobile patient)
Body height: 1.76 m
Age: 78 years
Actual weight: 63 kg
BMI: 63 / (1.76 x 1.76) = 20.3 kg/m²

Calculation of energy requirements in kcal [1]

Basal Energy Expenditure = BEE
"Rule-of-thumb"
20 kcal/kg BW/day

In subjects with BMI < 25 and/or age < 60:
25 kcal/kg BW/day

TOTAL energy requirements (kcal/day) = BEE x stress (activity) factor*

"Activity factor" [2]:

Immobile residents[a]:	1.2
Residents with low activity[b]:	1.5
Residents with moderate activity[c]:	1.6
Residents with high activity[d]:	1.6

a mainly lying or sitting
b sitting, sometimes walking or standing
c mainly walking and standing
d constantly walking and standing

"Stress factor" [1]:
(to correct calculated energy requirement for hypermetabolism)

Pressure ulcers/chronic wounds < 50 cm²	1.20 – 1.50
Pressure ulcers/chronic wounds > 50 cm²	1.50 – 1.90
Long bone fracture	1.15 – 1.30
Cancer	1.10 – 1.30
Acute infection	1.20 – 1.30
Reduced kidney function (not on dialysis)	0.60 – 0.80

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

Calculation of Protein requirements in g [2]

Please note: Protein recommendations usually range from 0.8 to 1.5 g/kg body weight.
For residents with diseases and special conditions demands increase; in the case of burns or cancer protein amounts up to 2.0 g/kg body weight are recommended.

Weight [kg]	35	38	40	43	45	48	50	53	55	58	60	63	65	68	70	73	75	78	80	83	85	88	90	93	95
0.8 g/kg KG	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76
1.0 g/kg KG	35	38	40	43	45	48	50	53	55	58	60	63	65	68	70	73	75	78	80	83	85	88	90	93	95
1.1 g/kg KG	39	42	44	47	50	52	55	58	61	63	66	69	72	74	77	80	83	85	88	91	94	96	99	102	105
1.2 g/kg KG	42	45	48	51	54	57	60	63	66	69	72	75	78	81	84	87	90	93	96	99	102	105	108	111	114
1.4 g/kg KG	49	53	56	60	63	67	70	74	77	81	84	88	91	95	98	102	105	109	112	116	119	123	126	130	133
1.5 g/kg KG	53	57	60	64	68	71	75	79	83	86	90	94	98	101	105	109	113	116	120	124	128	131	135	139	143
1.8 g/kg KG	63	68	72	77	81	86	90	95	99	104	108	113	117	122	126	131	135	140	144	149	153	158	162	167	171
2.0 g/kg KG	70	73	80	86	90	96	100	106	110	116	120	126	130	136	140	146	150	156	160	166	170	176	180	186	190

Resident (< 65 years)	0.8 g/kg BW
Resident (> 65 years)	0.8 – 1.2 g/kg BW
Resident (> 65 years) with acute or chronic desease	1.2 – 1.5 g/kg BW

Ask your Fresenius Kabi contact person for the gnp calculator for a quick and easy performance.

Calculation of fluid requirements in ml [4]

Weight [kg]	35	38	40	43	45	48	50	53	55	58	60	63	65
Fluid requirements [ml]	1725	1770	1800	1845	1875	1915	1920	1995	2025	2070	2100	2145	2175
Weight [kg]	**68**	**70**	**73**	**75**	**77.5**	**80**	**83**	**85**	**88**	**90**	**93**	**95**	
Fluid requirements [ml]	2220	2250	2295	2325	2365	2400	2445	2475	2520	2550	2595	2625	

Calculation basis:[9] to be calculated by the 100/50/15 formula.

100 ml/kg (for the 1st – 10th kg of body weight)
\+ 50 ml/kg (for the 11th – 20th kg of body weight)
\+ 15 ml/kg (for the 21st – x kg of body weight)
= **FLUID REQUIREMENT** in ml

Increased fluid requirement: during fever 2 – 2.5 ml/kg body weight/day per 1 °C above 37 °C, vomiting, diarrhoea, severe burns, heavy sweating, drainage, fistulas or similar diseases.

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

Please note:
Start early nutrition therapy and treat the causes of malnutrition in parallel.

Sources: 1 AKE (2008): Recommendations for Enteral and Parenteral Nutrition in Adults. Austrian Society of Clinical Nutrition, Vienna. ESPEN Volkert D et al. (2006): ESPEN guidelines on enteral nutrition: Geriatrics. Clin Nutr 25 (2): 330-60. DGEM Volkert D et al. (2013): Clinical Nutrition in Geriatrics (DGEM guideline). Aktuel Ernahrungsmed, 38(3): e1-e48. EPUAP & NPUAP (2009): Treatment of Pressure Ulcers. National Pressure Ulcer Advisory Panel, Washington DC. **2** Bauer J et al. (2013): Evidence-based recommendations for optimal dietary protein intake in older people: a position paper from the PROT-AGE Study Group. J., et al., J Am Med Dir Assoc 14 (8): 542-559. DACH (2000): Reference values for nutrient intake. German Nutrition society, Austrian Nutrition Society, Swiss Society for Nutrition Research, Swiss Nutrition Association. Frankfurt, Germany. **3** Chidester J and Spangler A (1997): Fluid intake in the institutionalized elderly. J Am Diet Assoc, 97 (1): 23-28. (2013): Aktuel Ernahrungsmed, 38(3): e1-e48.

Define the nutritional support

Energy requirements:	2100 kcal/d	Protein requirements:	84 g/d	Fluid requirements:	2145 ml/d
– Energy intake:*	1500 kcal/d	– Protein intake:*	60 g/d	– Fluid intake:*	1800 ml/d
= Energy substitution:	600 kcal/d	**= Protein substitution:**	24 g/d	**= Fluid substitution:**	350 ml/d

*average intake of the last days

%-calculation of requirement

Energy intake x 100 / requirement = % of requirement
e.g.: 1500 kcal x 100 / 2100 kcal = 71% of requirement

Protein intake x 100 / requirement = % of requirement
e.g.: 60 g x 100 / 84 g = 71% of requirement

Implementation of the Food & Fluid protocol

Energy	Protein	Intake versus requirement	Supplementation	Energy Gap	Examples of appropriate supplementation
☐	☐	100% of requirements	No supplementation necessary	0%	–
☐	☐	75–100% of requirements	Energy and protein rich food and consider oral nutritional supplements	<25%	100–600 kcal **Energy/protein rich food and/or 1 x Oral nutritional supplement** (▸200 ml à 2 kcal/ml = 400 kcal)
☒	☒	50–75% of requirements	Oral nutritional supplements	25%	600 kcal **2 x Oral nutritional supplements** (▸200 ml à 1.0 kcal/ml + 200 ml à 1.5 kcal/ml = 500 kcal)
☐	☐	25–50% of requirements	If possible: oral nutritional supplements, if not: supplementary or complete tube feeding. Consider parenteral nutrition if enteral nutrition is inadequate or impossible.	50%	~1000 kcal **3 x Oral nutritional supplements** (▸2x200 ml à 2.0 kcal/ml + 1x200 ml à 1,0 kcal/ml = 1000 kcal) **or tube feeding** (▸1000 ml à 1.0 kcal/ml = 1000 kcal)
☐	☐	< 25% of requirements	For < 21–28 days: nasogastric tube feeding, for > 21–28 days: tube feeding via PEG. Consider parenteral nutrition if enteral nutrition is inadequate or impossible.	>75%	~1500 kcal **Tube feeding** (▸1000 ml à 1,5 kcal/ml = 1500 kcal)

Source: Dutch Malnutrition Steering Group (2011): Guideline - Screening and treatment of malnutrition. www.fightmalnutrition.eu.

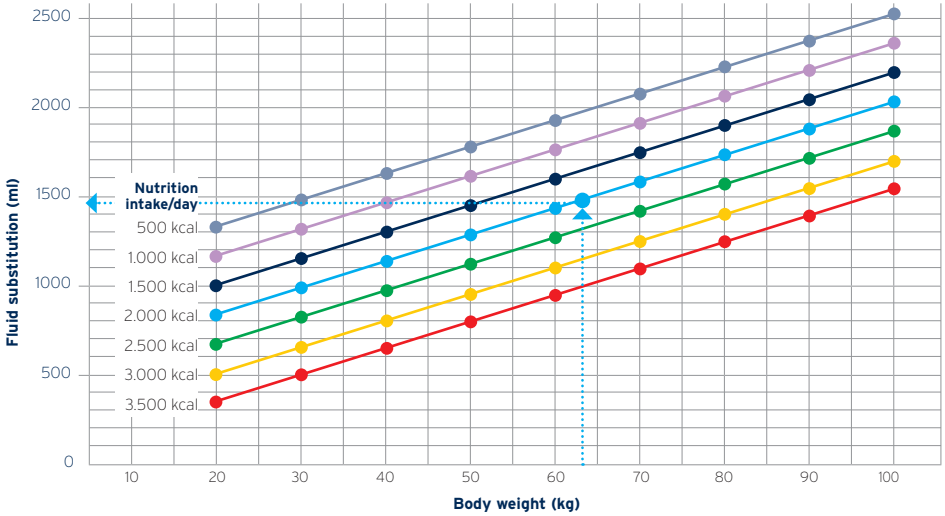
Please note: The recommendations for supplementation should be based on nutrition intake **and** assessment.

Nutrition threapy plan

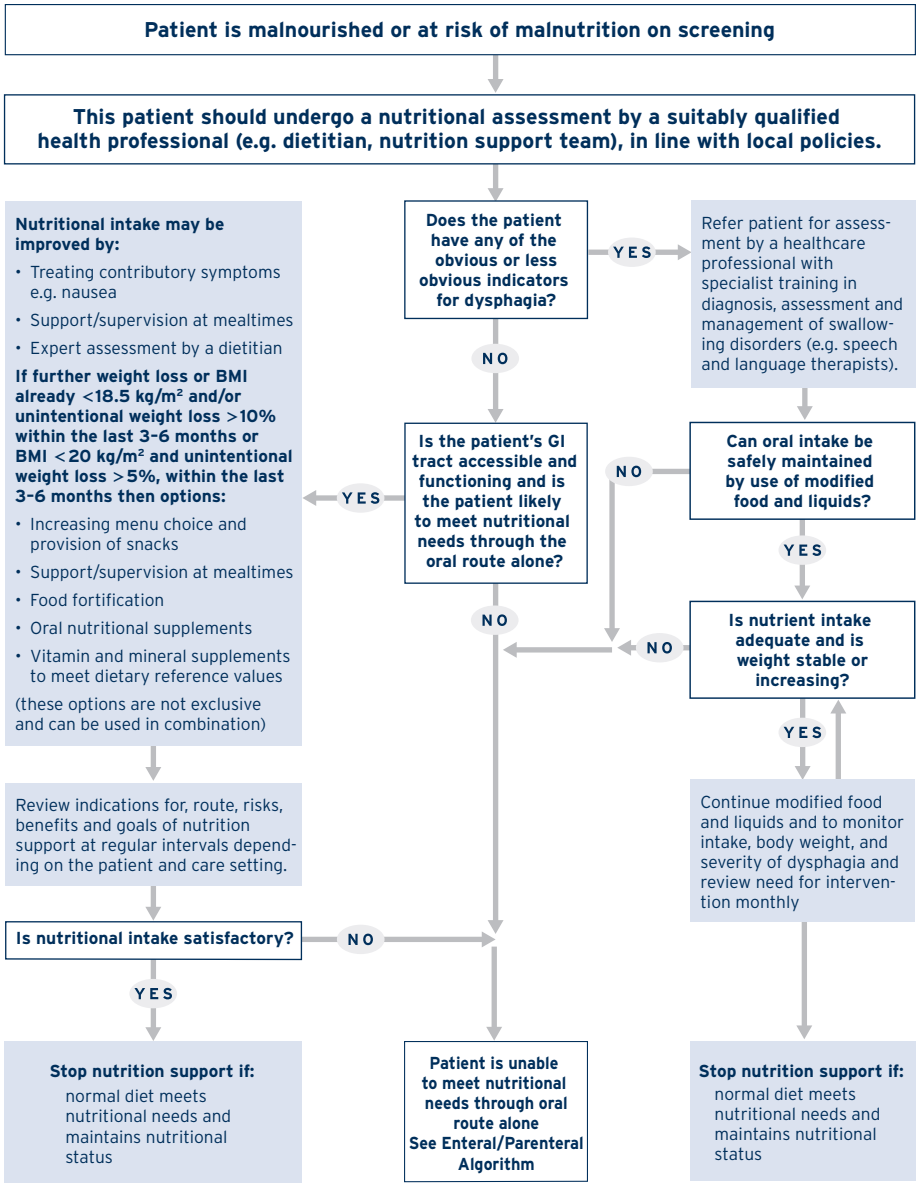
☒ Oral nutritional supplements	☐ Tube feeding	☐ Parenteral nutrition
Fresubin Energy DRINK product name	product name	product name
600 kcal/day 24 g protein/day	kcal/day g protein/day	kcal/day g amino acids/day
400 ml/day	ml/day	ml/day
2 no. of bottles	flow rate (ml/h)	flow rate (ml/h)
	duration (hours)	duration (hours)

Calculation of fluid substitution in residents eating normal food

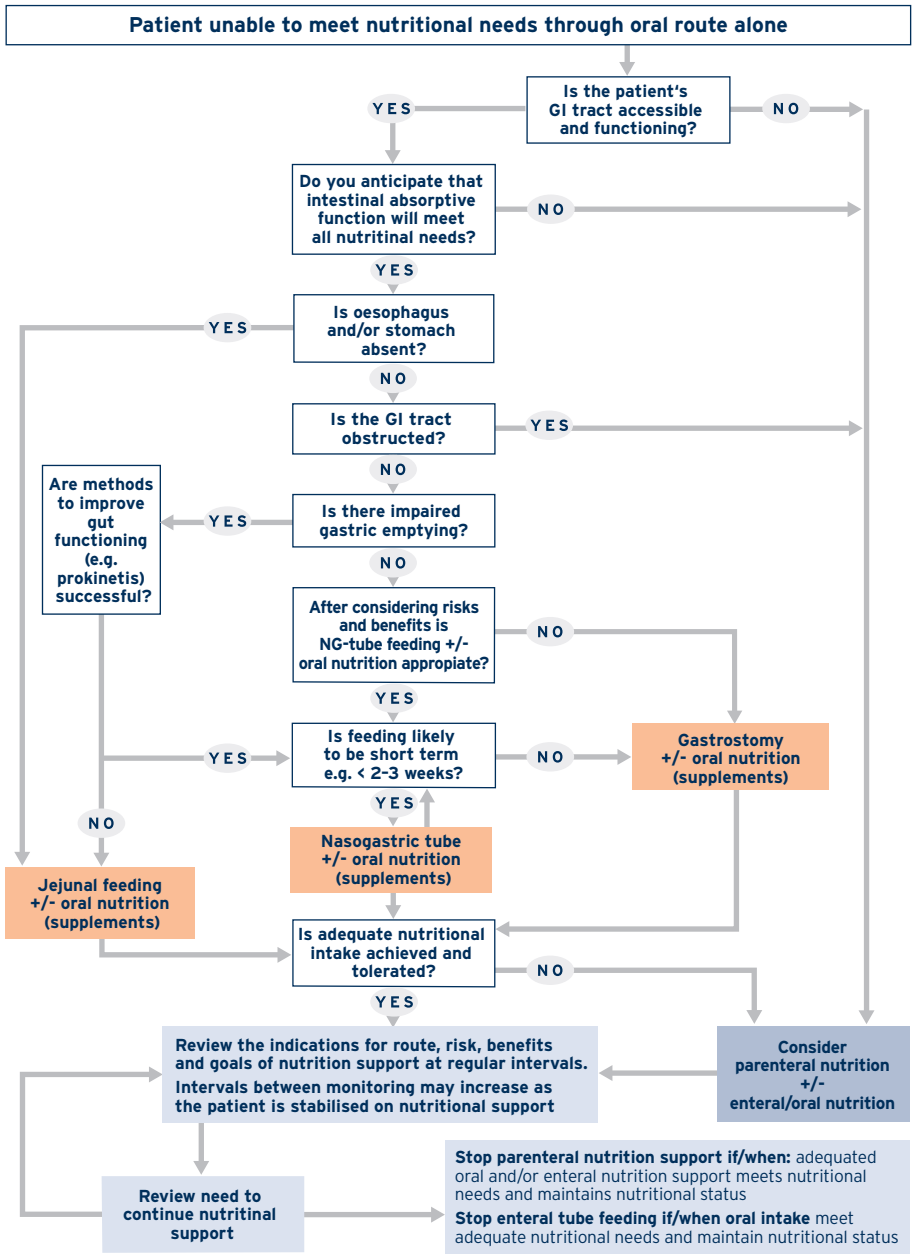
Example:
A resident (63 kg BW):
- eating 2.000 calories
needs approx. 1.500 ml fluids in addition.



Oral algorithm



Enteral / parenteral algorithm



Source: Adapted from National Collaborating Centre for acute care (2006): Nutrition support for adults. www.nice.org.uk/guidance/cg32/

Monitoring

Monitoring is an integral part of the nutritional management process to document and control the effectiveness of the nutrition therapy of the resident. The nutritional therapy and status of the resident 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 resident's condition.

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

Step 4

! Don't forget to check also the daily fluid intake

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 resident.

Energy requirements: 2100 kcal/d **Protein requirements:** 84 g/d

You can find tools to calculate requirements on page 24 - 25

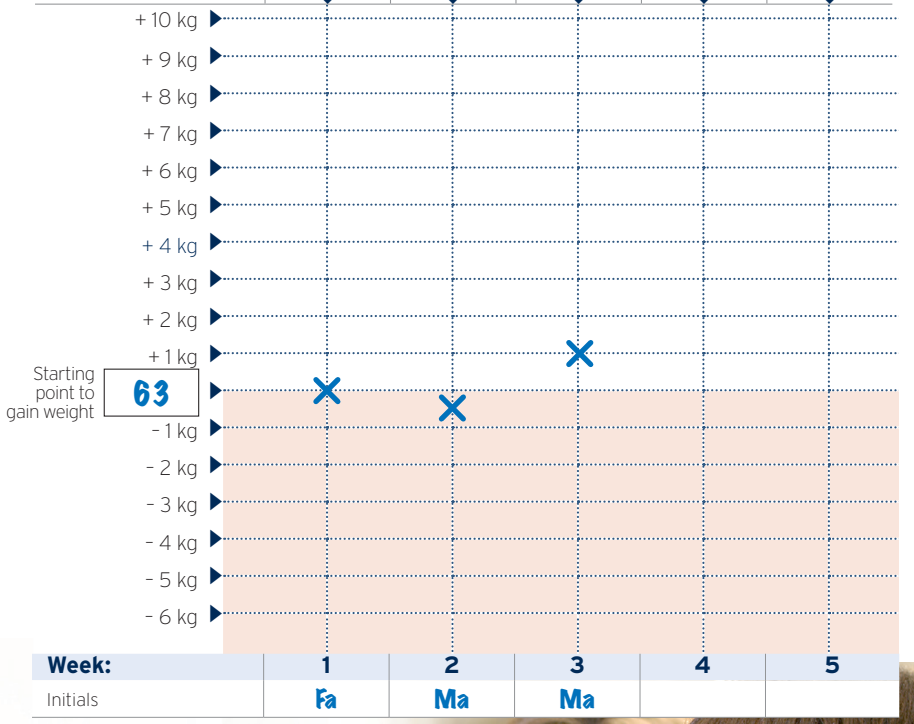
The energy and protein requirements can be found on the nutrition therapy sheet.

Monitoring - food intake (to be completed by nutrition expert)

		Assessment			Monitoring		
		3 days review			1	2	3
	Date	28.09.15	29.09.15	30.09.15	07.10.15		
Energy	Energy intake via normal diet, kcal	1400	1400	1300	1500		
Energy	Energy intake via ONS, kcal	300	600	600	600		
Energy	Energy intake via tube, kcal	-	-	-	-		
Energy	Energy intake parenteral nutrition, kcal	-	-	-	-		
Energy	**Total energy intake, kcal**	1700	2000	1900	2100		
Energy	**% of requirements** (Intake/requirement x 100)	81%	95%	90%	100%		
Protein	Protein intake via normal diet, g	60	60	55	60		
Protein	Protein intake via ONS, g	12	24	24	24		
Protein	Protein intake via tube, g	-	-	-	-		
Protein	Protein intake parenteral nutrition, g	-	-	-	-		
Protein	**Total protein intake, g**	72	84	79	84		
Protein	**% of requirements** (Intake/requirement x 100)	60%	100%	94%	100%		
	Nutrition therapy: yes/no	1600 kcal ONS	1600 kcal ONS	1600 kcal ONS	1600 kcal ONS		
	Initials	Fa	Ma	Ma	Le		

Monitoring - weight development

Week:	1	2	3	4	5
Date	24.09.15	27.09.15	30.09.15		
Weight (kg)	63.0	62.5	63.5		
Weight gain/weight loss (kg)	0	- 0.5	+ 1.0		



Week:	1	2	3	4	5
Initials	Fa	Ma	Ma		

Swallowing disorders

Dysphagia (swallowing disorder) is a growing health concern in our aging population which affects up to 68% of elderly nursing home residents. Besides age related alterations in the swallowing mechanism, which can cause diminished swallowing function, neurological diseases (e.g. stroke), cancers of the head/neck and oesophagus are also frequent causes of dysphagia. Additionally, certain medicines can affect swallowing negatively. These factors arise more frequently in elderly, which puts them at a higher risk for dysphagia.

Impaired swallowing function can have severe health consequences such as malnutrition, dehydration, pneumonia and reduced quality of life. Consequently, a multidisciplinary approach including nutritional management to prevent the development of malnutrition is essential.

Dietary modification to alter the consistency of foods and liquids to improve the safety and ease of oral consumption is a fundamental aspect of dysphagia management. Hence, the use of powder thickeners and ready to use texture-modified oral nutritional supplements (ONS) can support and facilitate the management of dysphagic patients.

- **Promote safe and efficient swallow**
- **Define appetising choices**
- **Identify food to suit individual needs**

1. How to prepare the resident and surroundings before meals?

- ✓ Ensure a good body posture of the resident
- ✓ Seating, straight up at the table
- ✓ Ensuring the back is well supported
- ✓ Shoulders and head slightly inclined forwards, neck stretched
- ✓ Assure resident has well-fitting dentures
- ✓ Switch radio and television off, so resident is not distracted

2. How to facilitate safe swallowing?

- ✓ Promote slow eating, avoid eating in rush or when tired
- ✓ Put small portions on the plate, offer little bites and small sips
- ✓ Consider swallowing techniques (postures and manoeuvres) in consultation with a speech and language therapist
- ✓ Consider eating aids (special drinking cups or eating utensils, use of straw etc.) as recommended by an occupational therapist

3. What is a suitable food?

- ✓ Food with a high nutrient content looking appetising and matching the individual chewing and swallowing ability
- ✓ Avoid food with grains, peel, pips, lumps
- ✓ Avoid foods with mixed consistency
- ✓ Avoid crumbly or hard foods

Fresubin® à la carte

Tomato cream soup

Savoury

level ■■□□

1

15 min

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 tablespoon	olive oil
	stock
	salt, pepper, sugar
	strips of basil

Nutritional information per serving:

Energy	777 kcal
Protein	9.9 g
Fat	52.0 g
Carbohydrate	65.0 g
Fibre	0.6 g

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.

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FRESENIUS KABI
caring for life

Oral Nutritional Supplements

Oral Nutritional Supplements (ONS) are an effective solution to tackling malnutrition in a wide variety of resident groups and should be part of the overall management strategy. There is extensive and robust evidence that ONS lead to improvements in nutritional intake, clinical and functional outcomes amongst residents who are able to consume food, but not enough to meet their nutritional requirements.[1] ONS were also shown to bring essential cost savings in the nursing home and community setting.[2]

Current evidence suggests that residents' overall compliance to ONS is good (~78 %) and helpful in improving total energy intakes.[3]

The extensive 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 residents.

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

Source: 1 MNI (2012). Oral nutritional supplements to tackle malnutrition. www.espen.org/ons-to-tackle-malnutrition
2 Elia M et al. (2015): A systematic review of the cost and cost effectiveness of using standard oral nutritional supplements in community and care home settings. Clin Nutr (epub ahead of print). **3** Hubbard G et al. (2012): A systematic review of compliance to oral nutritional supplements. Clin Nutr. 31(3):293-312

1. Which is the right ONS?

In case of low energy and protein intake choose the ONS highest in energy- and protein content, balanced in micronutrients; for special conditions choose one of the disease-specific ONS varieties. ONS are available in various forms and should be chosen according to the residents' needs. ONS are offered in liquid, creme and powder format. A modified texture is especially useful for residents with dysphagia.

2. What time is the best time for ONS?

The best timing to give ONS depends on the individual preferences and needs of the resident.

3. How to improve compliance of ONS?

- ✓ Serve ONS cold or warm according to the residents preferences
- ✓ Offer variety by e.g. providing different flavours
- ✓ Find out resident's favourite flavour
- ✓ Serve ONS at medication rounds or in good company
- ✓ Offer ONS with not-acid fresh fruits (e.g. banana, strawberries)
- ✓ Heat chocolate and cappuccino flavours (up to max. 70 °C – put some cream on top)
- ✓ Offer ONS with vanilla flavour together with fruit salad
- ✓ In case the resident 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, pudding).
  Feel free to create new recipes. You can use ONS of different flavours for cooking, e.g. see the recipes on pages 37 – 39.
- ✓ Train all health care professionals in nutritional management regulary

4. How to store ONS?

Detailed information are given on a products label.
Generally, unopened sip feeds are stored at room temperature.

Opened sip feeds kept at room temperature should be consumed in max. 8 hours; refrigerated they can be consumed over 24 hours.

Source: 1 Steele CM et al. (1997): Mealtime difficulties in a home for the aged: not just dysphagia. Dysphagia 12(1):43-50.

Fresubin® à la carte

Cauliflower au gratin

Savoury

level ■□□□

1

40 min

Ingredients

1 sachet	Calshake Neutral
1/2	cauliflower
25 g	butter
25 g	wheat flour
240 ml	whole milk (3.5 % fat)
75 g	grated cheese
	salt, pepper

Nutritional information per serving:

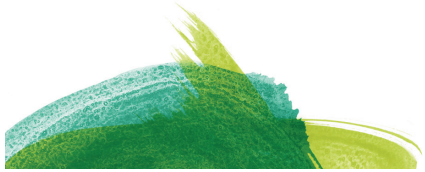
Energy	625 kcal
Protein	20.0 g
Fat	38.0 g
Carbohydrate	50.0 g
Fibre	0.0 g

Alternative products:
Fresubin® Clear Thickener
Fresubin® Protein Powder

Preparation

Mix Calshake Neutral as usual with milk.
Boil cauliflower in salt water. Heat Calshake Neutral, butter and flour in a pot under constant stirring until a uniform thickened consistency is reached. Add cheese and stir till melted. Season with salt and pepper.

Place cauliflower into heat-resistant dish and cover with the cheese sauce. Bake in the oven at approx. 180 °C until the cauliflower is golden brown.



Fresubin® à la carte

Banana nut shake

Drink

level ■□□□

1

3 min

Ingredients

200 ml	Fresubin Protein Energy DRINK Nut
1	ripe banana (100 g)
	juice of 1/2 lemon

Nutritional information per serving:

Energy	393 kcal
Protein	21.1 g
Fat	14.0 g
Carbohydrate	45.0 g
Fibre	2.0 g

Alternative products:
Fresubin® Original DRINK

Preparation
Purée the banana with the lemon juice, add Fresubin Protein Energy DRINK Nut and mix together.

TIP:
Chill the Fresubin Protein Energy DRINK before use.

Fresubin® à la carte

Hot chocolate

Drink

level ■□□□

1

3 min

Ingredients

200 ml	Fresubin Energy DRINK Vanilla or Neutral
3 – 4 tea-spoons	chocolate powder
2 table-spoons	boiling water

Nutritional information per serving:

Energy	382 kcal
Protein	13.1 g
Fat	14.0 g
Carbohydrate	49.0 g
Fibre	0.0 g

Alternative products:
Fresubin® Original DRINK
Fresubin® Energy Fibre DRINK
Fresubin® 2 kcal DRINK
Fresubin® Protein Energy DRINK
Frebini® Energy Fibre DRINK

Preparation
Warm the Fresubin Energy DRINK.

Mix with chocolate powder and boiling water in a mug.

TIP:
To make a mocha drink substitute 1 teaspoon of chocolate powder with 1/2 teaspoon instant coffee.

ONS

Tube Feeding

Tube feeding is indicated for those residents 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, e.g. unconscious or unsafe swallow.[1]

Tube feeding is indicated for the nutritional therapy of residents 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 residents undergoing major head and neck cancer surgery, gastrointestinal surgery for cancer or residents with severe trauma.[2,3]

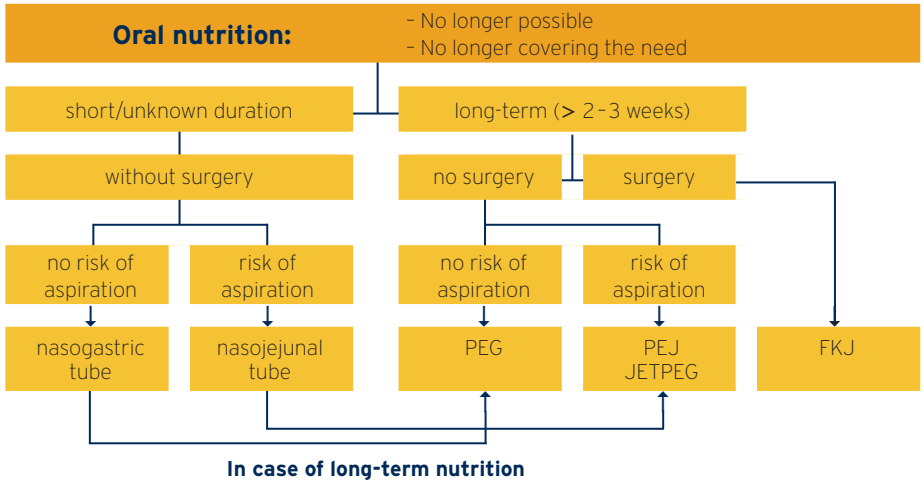
Fresenius Kabi offers a broad range of tube feed products such

as standard tube feeds (e.g. Fresubin Energy) as well as tube feeds for special indications (e.g. Diben, Supportan) to meet the special nutritional needs of the residents.

Tube Feeding – the means of choice in case of insufficient oral food intake.

Sources: 1 Stratton R et al. (2007): Who benefits from nutritional support: what is the evidence Eur J Gatroenterol Hepatol. 19(5): 353-8.
2 ESPEN Arends J et al. (2006): ESPEN Guidelines on Enteral Nutrition: Non-surgical oncology. Clin Nutr. 25(2):245-59.
3 ESPEN Volkert D et al. (2006): ESPEN Guidelines on Enteral Nutrition: Geriatrics. Clin Nutr. 25(2):330-60.

How to select the best enteral feeding route[1]



PEG = Percutaneous endoscopically controlled gastronomy
PEJ = Percutaneous endoscopic jejunostomy
JETPEG = Jejunal tube through PEG
FKJ = Fine-needle catheter jejunostomy

Contraindication of enteral nutrition

Contraindications for PEG + JETPEG[1]

- 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
- organs located between (e.g. liver, colon)
- peritonitis
- severe psychoses
- local tumour infiltration as the needle biopsy site

The placement of a fine-needle jejunostomy catheter or nasojejunal tube is recommended for all residents who have undergone a major abdominal invasive procedure and who are to receive enteral nutrition.

Absolute contraindications for enteral nutrition[(2)]

- acute abdomen
- acute gastrointestinal bleeding
- mechanical ileus
- intestinal obstruction
- intestinal perforation
- abdominal compartment syndrome
- persistent attacs of diarrhoea
- intestinal ischemia

Sources: 1 ESPEN Löser C et al. (2005): ESPEN guidelines on artificial enteral nutrition-percutaneous endoscopic gastrostomy (PEG). Clin Nutr 24(5): 848-61.
2 AKE (2008): Recommendations for enteral and parenteral nutrition in adults. Austrian Society of Clinical Nutrition, Vienna.

How should enteral nutrition be started?

For residents 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 residents, e.g. intensive-care residents, residents with restricted digestive capacity; for residents who are not nutritionally restricted, faster buildup may be possible.

- Increase the supply rate at best only after 24 hours of good 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 30°).
- Check emptying of the stomach, especially for postoperative, neurological and diabetic residents.

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 resident'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 (if permitted) immediately before application
• Dilute syrups and drugs with high osmolarity
• 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.

Fresenius Kabi offers a broad range of parenteral nutrition products to meet the special needs of these patients.

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

Indications and contraindications for parenteral nutrition therapy

Indication for parenteral nutrition[1]

Parenteral nutrition is indicated when the dietary intake is not or insufficiently possible via the oral/enteral route (see also algorithm on page 29).

Contraindications for clinical nutrition[1]

- Acute phase
- Hypoxia
  - pO_2 < 50 mmHg
- Shock
- Severe acidosis
  - pH < 7.2; pCO_2 > 75 mmHg
- Serum lactate > 3 mmol/l
- Ethical aspects

CAUTION:
Vital functions must be stabilized before beginning the nutrition therapy!

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^+, Cl^-)		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

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
- Awareness
- Reflux control
- Stool frequency/stool consistency
- In cachectic residents or after lengthy fasting, monitor potassium and phosphate at short time intervals (danger of a refeeding syndrome)

Source: 1 AKE (2008): Recommendations for enteral and parenteral nutrition in adults. Austrian Society of Clinical Nutrition, Vienna.

Technique of parenteral nutrition

Routes of access[1,2]

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

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

Duration of parenteral nutrition expected to be > 7 – 10 days:

- 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 with

Infusion technique[1,3]

- Continuous infusion for 24 hours
- Cyclic infusion, e.g. for 16 hours, 8-hour pause
- Cyclic infusion is recommended for parenteral nutrition at home

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

Please note:
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.

Build-up of nutrition

Beginning of nutrition:
12 – 14 hours after an acute event, otherwise immediately

1st day 50 % of the target supply

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 DGEM Jauch K et al. (2007): Leitlinie parenterale Ernährung DGEM: Technik und Probleme der Zugänge in der parenteralen Ernährung. Aktuel Ernaehr Med; 32, Suppl. 1: 41-53 **2** ESPEN Pittirutti M et al. (2009): ESPEN Guidelines on Parenteral Nutrition: Central venous catheters. Clin Nutr. 28: 365-77. **3** ESPEN Staun M et al. (2009): ESPEN Guidelines on Parenteral Nutrition: Home parenteral nutrition (HPN) in adult patients. Clin Nutr. 28: 467-79.

Notes

Notes

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