



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 implement the nutritional therapy plan
- Define the route(s) of nutrition

Step 3 

Define the nutritional goals

Different nutrition goals are possible e.g.:

- Stabilisation of body weight
- Increase of body weight

Target weight: **63** (= + **5** kg)
Target BMI: **>20.5** (e.g. > 20.5 kg/m²)

Example:

Age: 55 years Current weight: 58 kg
Sex: male Height: 1.75 m
Disease: Cancer Current BMI: 18.9
➔ **Target weight increase: 5 kg**
➔ **Target BMI: >20.5**

Define the nutritional requirements with calculation tools below

Energy requirements: **2050** kcal/d

Protein requirements: **95** g/d

Fluid requirements: **2200** g/d

Example:
Energy: 25 kcal/63 kg BW x
Stress factor: 1.3
Protein: 1.5 g protein/63 kg BW

Calculation of energy requirements in kcal

$$\text{Total}^2 \text{ energy requirements (kcal/day)} = \text{BEE} \times \text{stress (or activity) factor}^*$$

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 factor¹:

(to correct calculated energy requirement for hypermetabolism)

Postoperative (no complications)	1.0
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 factor²:

Immobile patients:	1.2
Patient with low activity:	1.5
Patient with moderate activity:	1.75

* 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 BW³

Metabolically stable patients

1.0-1.5 g/kg BW¹

Intensive care patients

1.2-1.5 g/kg BW¹

Cancer patients

(at least 1.0) 1.2-2.0 g/kg BW⁴

Elderly patients (> 65 years) with stress¹, patients with liver cirrhosis, alcoholic fatty liver hepatitis⁵, peritoneal dialysis⁶

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 [ml]	2290	2325	2365	2400	2440	2475	2515	2550	2590	2625	2665	2700	2750

Calculation basis:⁹

to be calculated by the 100/50/15 formula:⁹

$$\begin{aligned} & 100 \text{ ml/kg (for the 1}^{\text{st}} - 10^{\text{th}} \text{ kg of body weight)} \\ & + 50 \text{ ml/kg (for the 11}^{\text{th}} - 20^{\text{th}} \text{ kg of body weight)} \\ & + 15 \text{ ml/kg (for the 21}^{\text{st}} - x \text{ kg of body weight)} \\ & = \text{FLUID REQUIREMENT in ml} \end{aligned}$$

➤ **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.⁹

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

Please note: Always perform early nutrition therapy and the therapy of the causes of malnutrition in parallel.

Sources: 1 AKE Recommendations 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, Bozzetti 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 Nutrition: Adult Renal 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 Bozzetti 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.

Define the nutritional support

Energy requirements: 2050 kcal/d	Protein requirements: 95 g/d	Fluid requirements: 2200 ml/d
– Energy intake: 1500 kcal/d	– Protein intake: 80 g/d	– Fluid intake: 1800 ml/d
= Energy substitution: 550 kcal/d	= Protein substitution: 15 g/d	= Fluid substitution: 400 ml/d

$$\text{Intake} : \text{requirements} \times 100 = \% \text{ of requirements}$$



Example for Energy:

$$1500 \text{ kcal} : 2050 \text{ kcal} \times 100 = 73\%$$

Intake versus requirement	Supplementation	Energy Gap	Examples of appropriate supplementation
<input type="checkbox"/> 100% of requirements	No supplementation necessary	0%	–
<input type="checkbox"/> 75–100% of requirements	Energy and protein rich food and consider oral nutritional supplements	< 25%	100–400 kcal Energy/protein rich food and/or 1 x Oral nutritional supplement (• 200 ml à 2 kcal/ml = 400 kcal)
<input checked="" type="checkbox"/> 50–75% of requirements	Oral nutritional supplements	25%	500 kcal 2 x Oral nutritional supplements (• 200 ml à 1.0 kcal/ml + 200 ml à 1.5 kcal/ml = 500 kcal)
<input type="checkbox"/> 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 and/or tube feeding (• 400 ml à 2.0 kcal/ml + 200 ml à 1.0 kcal/ml = 1000 kcal) or 1 x tube feeding (• 1000 ml à 1.0 kcal/ml = 1000 kcal)
<input type="checkbox"/> < 25% of requirements	For < 21–28 days: nasogastric tube feeding, for > 21–28 days: tube feeding via PEG	> 75%	1500 kcal 2 x Tube feeding (• 1000 ml à 1.5 kcal/ml = 1500 kcal)

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

Calculation of fluid substitution

$$\text{FLUID SUBSTITUTION} = \text{Fluid requirement} - \text{total fluid intake*}$$

*Calculation basis:

Oral 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

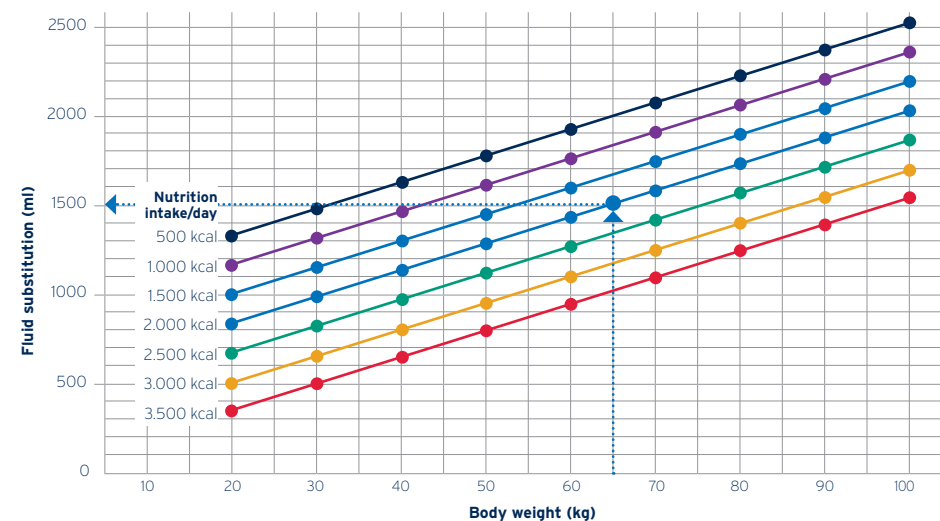
Calculation of fluid substitution in patients eating normal food



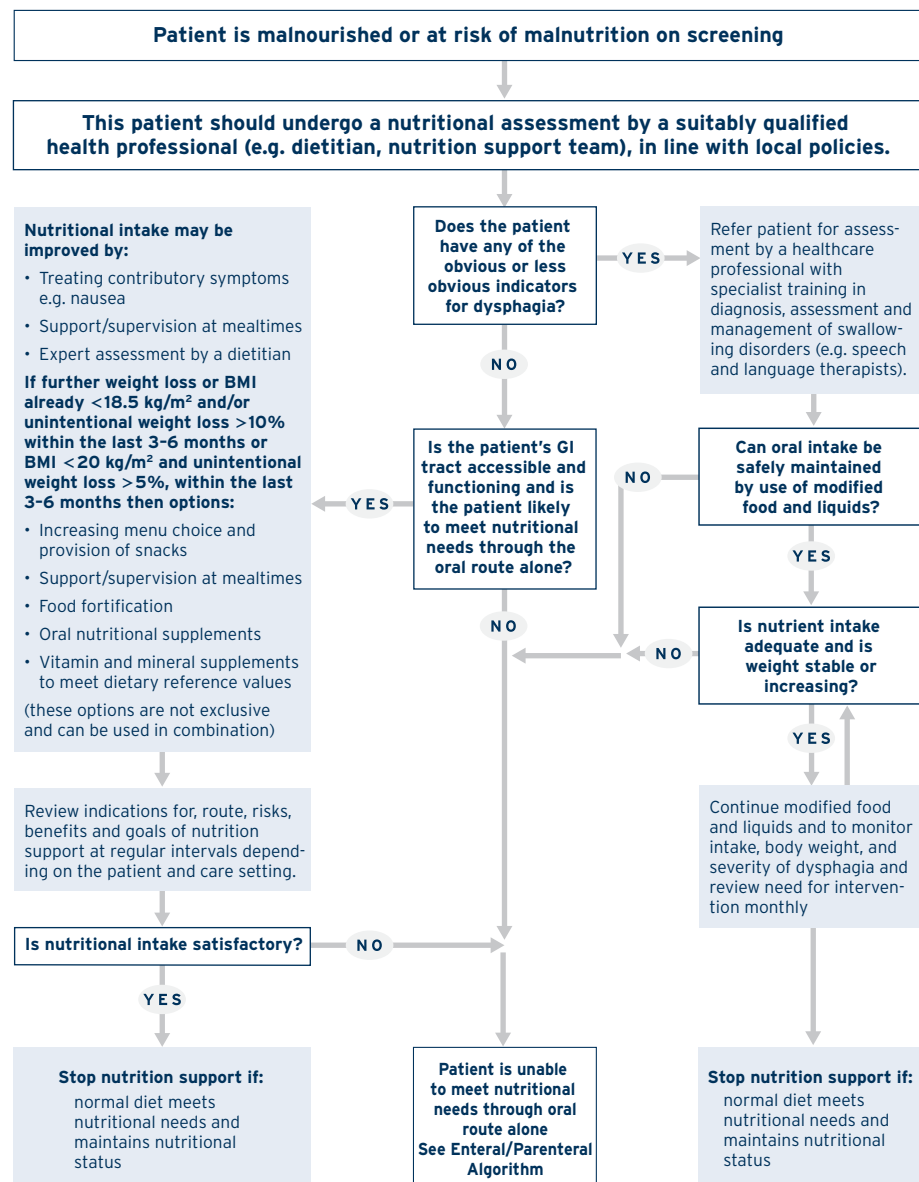
Examples:

A patient (65 kg BW):

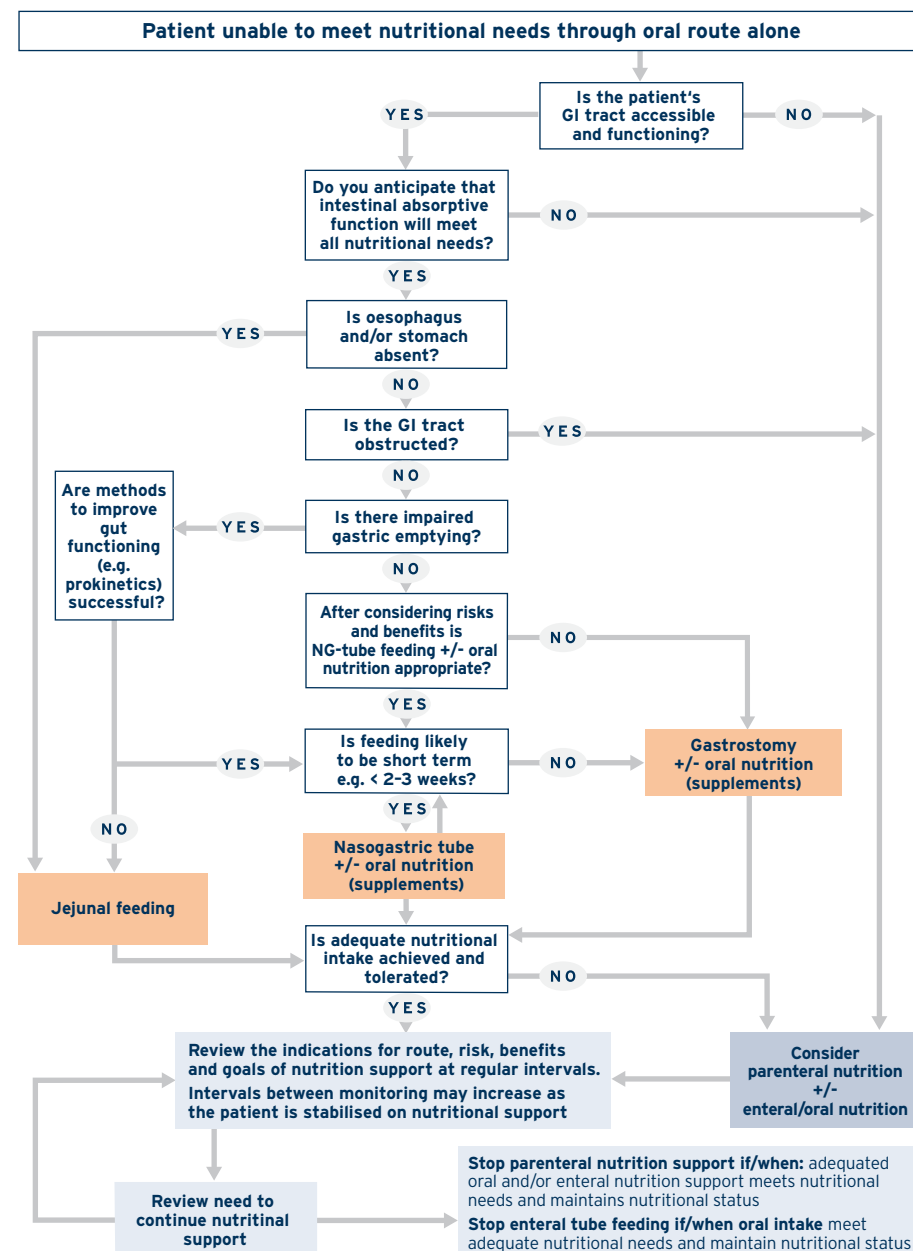
– eating 2,000 calories, needs 1,500 ml fluids in addition.



Oral Algorithm



Enteral/Parenteral Algorithm



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