Cos'è la malnutrizione ?

Alterazione dello stato nutrizionale
per carenza o eccesso (o squilibrio) di
calorie, proteine ed altri nutrienti

che ha effetti negativi sull'organismo
e sulla composizione corporea,
sullo stato e sulla funzionalità dei vari organi ed
apparati e sull' evoluzione clinica.

Elia M, 2000

Nelle residenze per anziani

In Europa gli studi più recenti, condotti su ampie popolazioni con metodiche validate, riportano prevalenze di malnutrizione molto variabili (30-97%). La variabilità dipende soprattutto dal setting di cura analizzato (comunità alloggio, residenze sanitarie assistite, residenze assistenziali per anziani autosufficienti), oltre che dalle metodiche utilizzate per la valutazione della malnutrizione[4]. In Italia, uno studio condotto in una RSA nel Lazio ha rilevato una prevalenza di malnutrizione del 36%[5]. La stessa prevalenza è stata riscontrata in uno studio multicentrico che ha valutato 736 degenti in una rete di RSA piemontesi[6].

Cause organiche età-correlate

L'invecchiamento determina alcune modifiche fisiologiche tra cui l'atrofia della mucosa del cavo orale e della lingua con ipogeusia da innalzamento della soglia gustativa (sono necessarie stimolazioni circa 10 volte maggiori rispetto al giovane adulto per ottenere una pari sensibilità gustativa); minor secrezione gastrica e pancreatica e ridotta produzione di enzimi endocellulari (es. lattasi); deficit della digestione e dell'assorbimento dei nutrienti. I difetti di masticazione, da ascriversi all'edentulia, sono frequentemente riscontrabili e spesso si associano ad erronee abitudini dietetiche ed igieniche e a condizioni socio-economiche deficitarie. L'anoressia fisiologica dell'anziano è legata ad un aumento dei livelli di colecistochinina e ad un ritardato svuotamento gastrico.

MALNUTRIZIONE

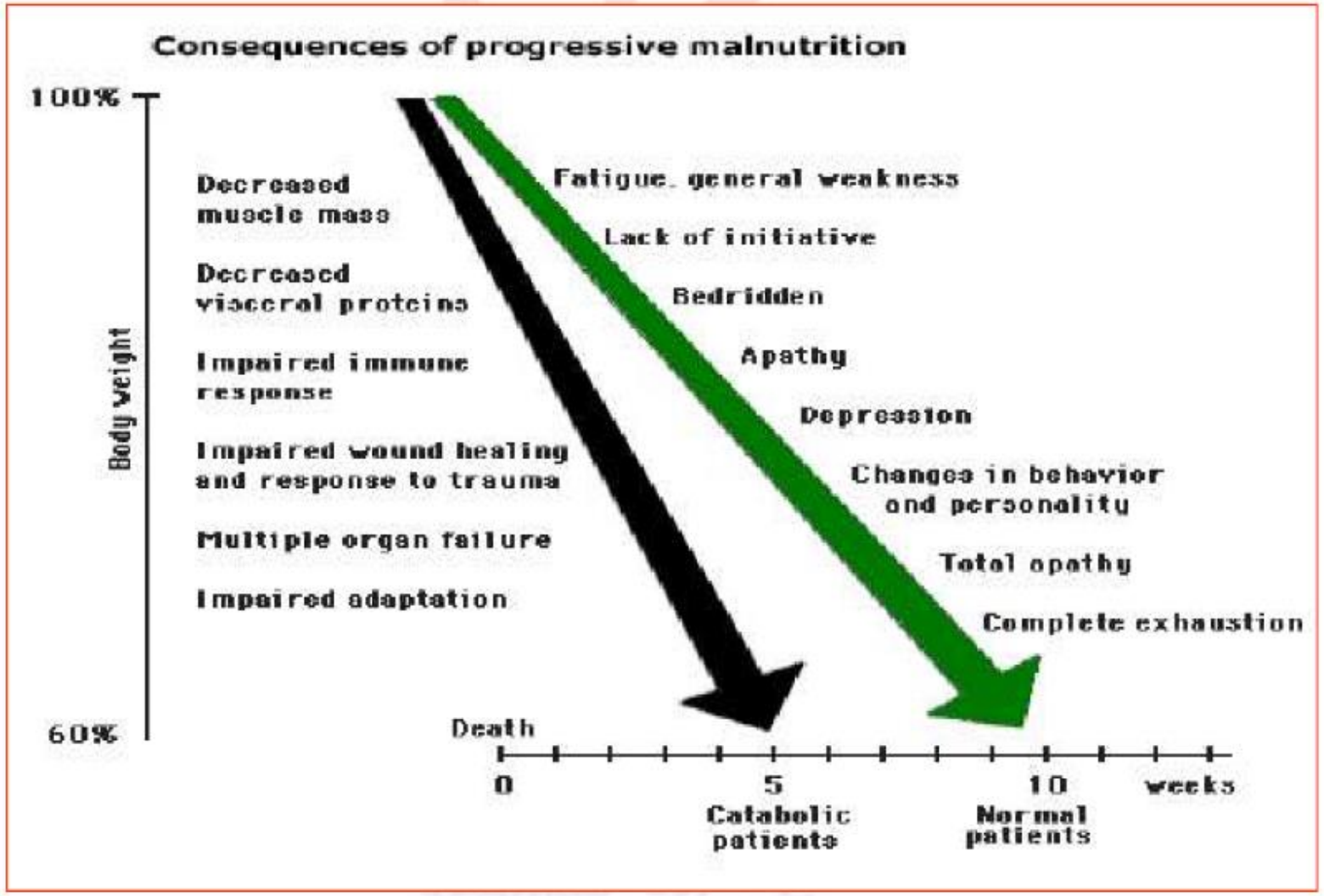
Cause organiche patologia-correlate

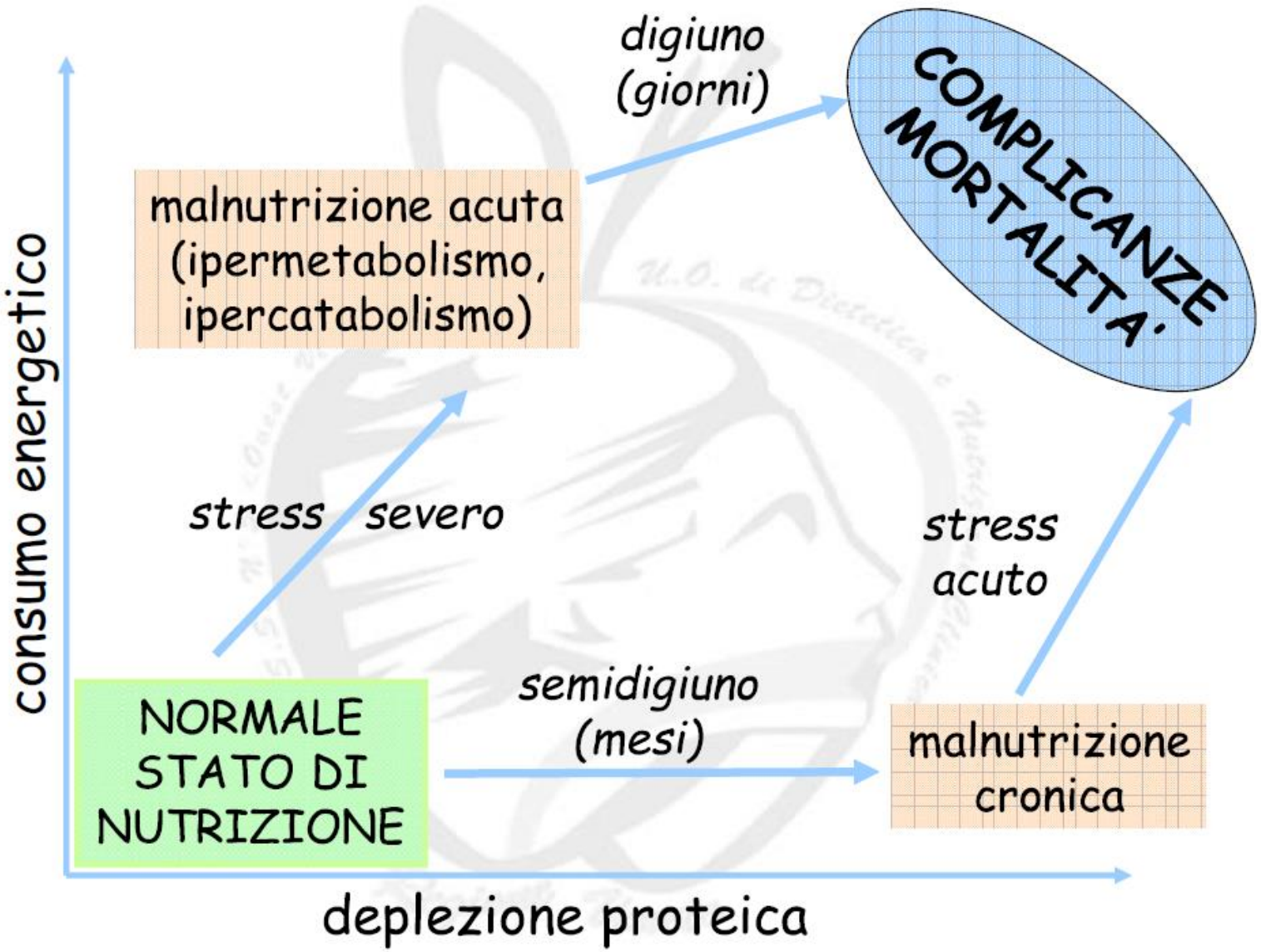
Alterazioni della deglutizione, come la presbifagia e la disfagia, sono un problema diffuso nella popolazione anziana fragile: si riscontra disfagia dal 20 al 50% nei pazienti istituzionalizzati.
Le insufficienze d'organo (scompenso cardiaco, insufficienza renale cronica avanzata, insufficienza respiratoria, ecc.) e le neoplasie, causano incremento dei fabbisogni nutrizionali ed ipoanoressia con ridotti introiti.
I numerosi farmaci che spesso vengono assunti dall'anziano possono interferire con l'assorbimento (antiacidi, lassativi) o con l'escrezione renale (diuretici) di alcune sostanze e possono determinare alterazioni del gusto.

Cause sociali, ambientali e psicologiche

Le ristrettezze economiche, l'isolamento, la solitudine e/o l'istituzionalizzazione possono essere causa di inadeguata assunzione di cibo.

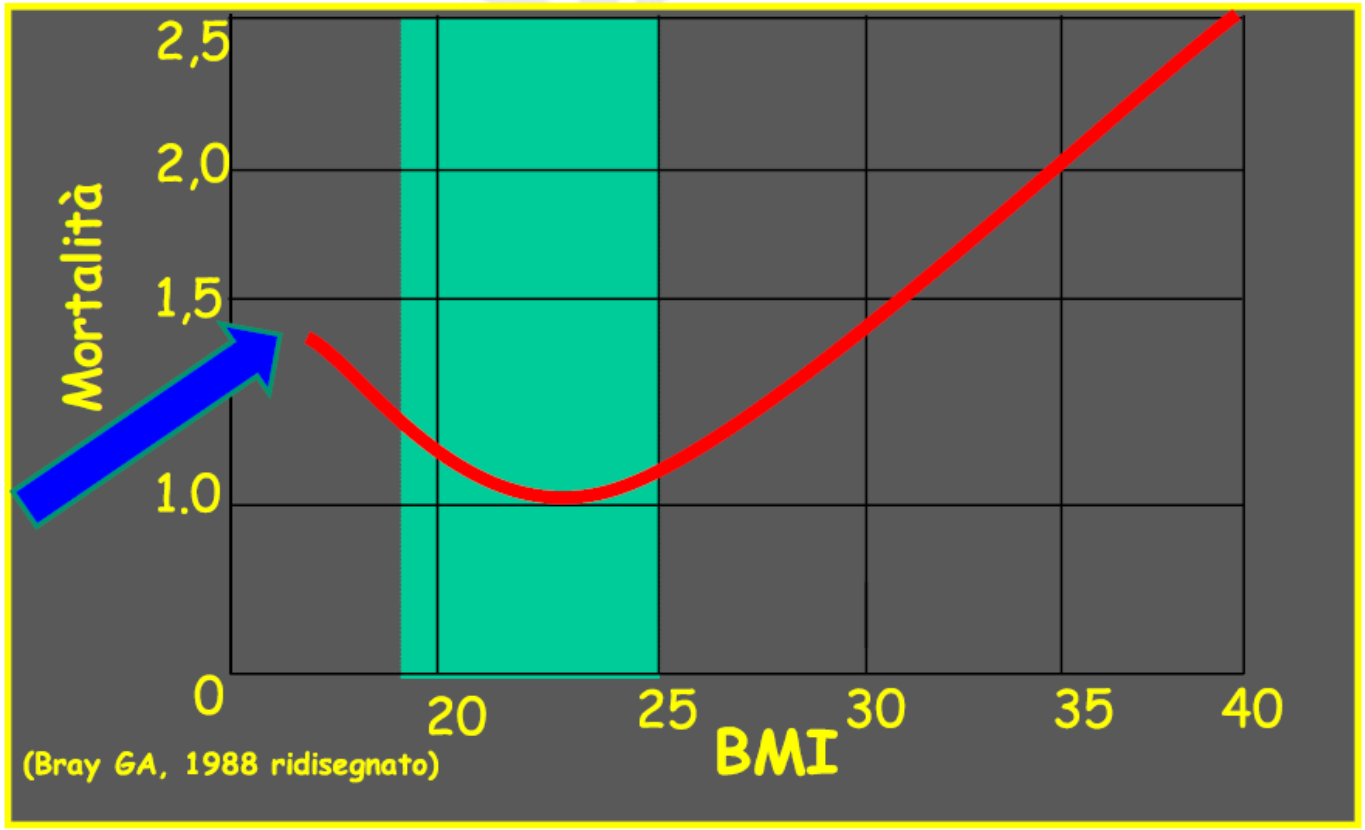
L’anoressia coincide con la perdita di appetito e / o una ridotta assunzione di cibo. E’ una vera e propria sindrome geriatrica che colpisce rispettivamente **oltre il 25 % e il 30 % di uomini e donne anziani** in particolare i residenti di case di cura e i pazienti ospedalizzati.
L’origine è da collegare al declino di specifiche aree cerebrali, tra cui l'ipotalamo, in risposta a stimoli periferici (nutrienti e ormoni circolanti).
Anche l’infiammazione, legata al processo di invecchiamento, contribuisce alla sua insorgenza e gioca un ruolo chiave nell’ anoressia associata a malattie croniche.
Altre condizioni associate all'età possono inoltre contribuire a far comparire tale patologia come le alterazioni del gusto, dell'olfatto e della masticazione, le problematiche gastro-intestinali (es. il reflusso gastroesofageo e la stipsi), la riduzione dell’attività fisica, la depressione e la solitudine.
Inoltre la riduzione globale dell'assunzione di cibo si associa a modelli alimentari alterati, caratterizzati da un minore consumo di cibi ricchi di nutrienti (e.g. carne, uova e pesce).


Consequences of progressive malnutrition
100%
60%
Body weight
Decreased muscle mass
Decreased visceral proteins
Impaired immune response
Impaired wound healing and response to trauma
Multiple organ failure
Impaired adaptation
Fatigue, general weakness
Lack of initiative
Bedridden
Apathy
Depression
Changes in behavior and personality
Total apathy
Complete exhaustion
Death
0
5
10
weeks
Catabolic patients
Normal patients


digiuno
(giorni)
COMPLICANZE
MORTALITA'
malnutrizione acuta
(ipermetabolismo,
ipercatabolismo)
consumo energetico
stress severo
stress
acuto
NORMALE
STATO DI
NUTRIZIONE
semidigiuno
(mesi)
malnutrizione
cronica
deplezione proteica

Correlazione tra BMI e mortalità

$$\text{Indice di Massa Corporea (BMI)} = \frac{\text{Peso (Kg)}}{\text{Altezza}^2 \quad (m^2)}$$



Indici Biochimici di valutazione dello stato di nutrizione

- *Proteine plasmatiche:*

diverse proteine plasmatiche di origine epatica sono state considerate un buon indice dello stato nutrizionale.

In genere il ripristino di una dieta adeguata induce la sintesi proteica e riporta i livelli proteici plasmatici alla normalità

Tra le varie classi di proteine plasmatiche le più studiate quali indicatori dello stato di nutrizione ci sono:

- **albumina e proteine di trasporto**
- **prealbumina**
- **proteina legante il retinolo**
- **transferrina**
- **fibronectina (*proteina presente nella matrice extracellulare del sistema nervoso centrale*) è stata inserita nell'elenco solo di recente.**

Limiti all'utilizzo delle proteine plasmatiche quali indicatori di deplezione e carenza di proteine:

Esse svolgono un ruolo importante nella risposta alla "fase acuta di situazioni patologiche" e quindi la loro concentrazione è influenzata anche da fattori non nutrizionali.

La concentrazione plasmatica di albumina, prealbumina, transferrina, proteina legante il retinolo, e di fibronectina diminuiscono in seguito ad una situazione infiammatoria acuta dovuta a differenti fattori quali:

- interventi chirurgici
- infarto
- traumi
- tumori

REVIEW

The need for biomarkers to determine response to enteral nutrition during and after critical illness: an update

Annika Reintam Blaser[a,b], Jean-Charles Preiser[c] and Alastair Forbes[a]

Purpose of review
Biomarkers proposed to provide prognosis or to determine the response to enteral nutrition have been assessed in a number of experimental and clinical studies which are summarized in the current review.

Recent findings
There are several pathophysiological mechanisms identified which could provide biomarkers to determine response to enteral nutrition. Several biomarkers have been studied, most of them insufficiently and none of them has made its way to clinical practice. Available studies have mainly assessed a simple association of a biomarker with outcomes, but are less focused on dynamic changes in the biomarker levels. Importantly, studies on pathophysiology and clinical features of gastrointestinal dysfunction, including enteral feeding intolerance, are also needed to explore the mechanisms potentially providing specific biomarkers. Not only an association of the biomarker with any adverse outcome, but also a rationale for repeated assessment to assist in treatment decisions during the course of illness is warranted.

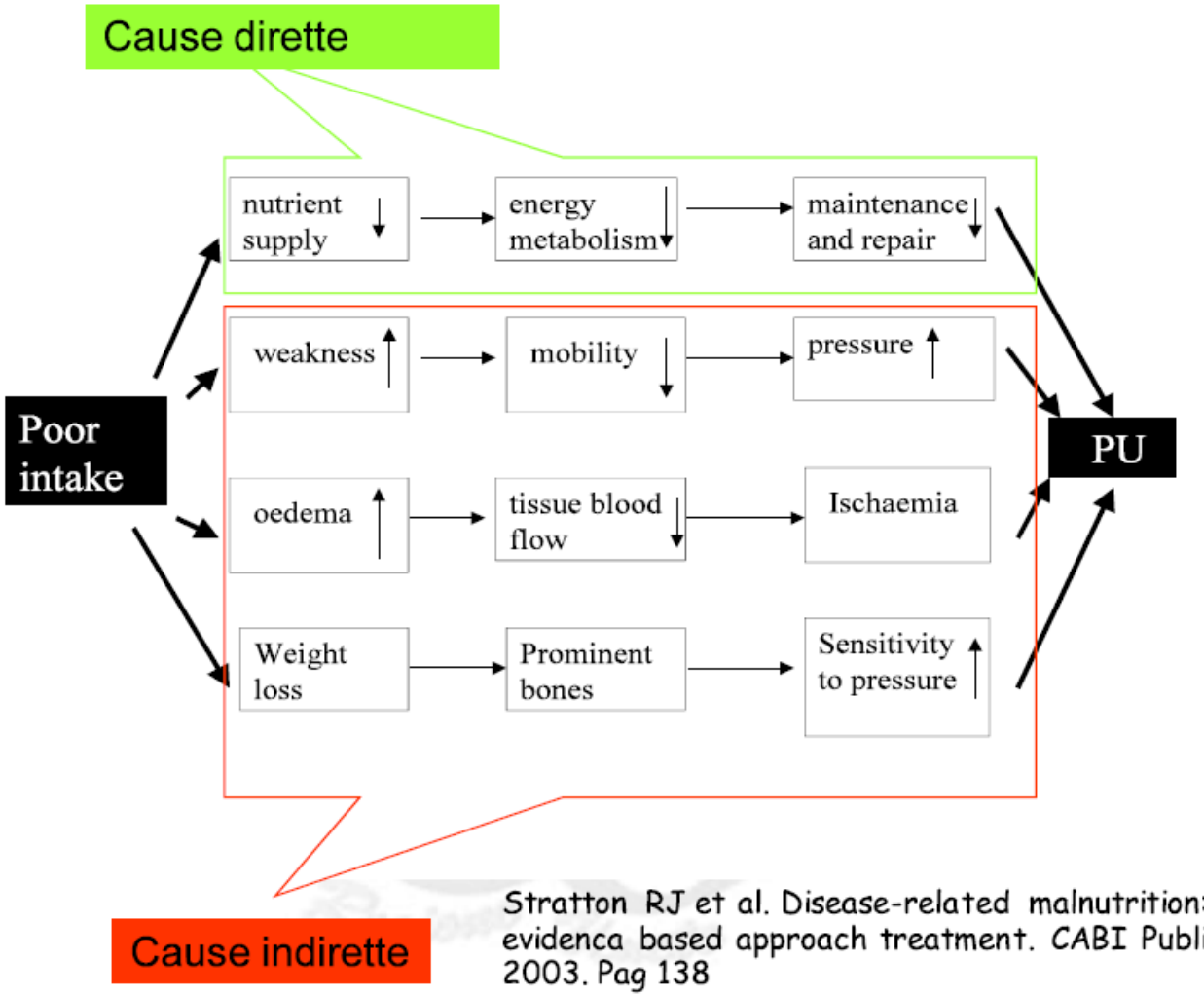
Summary
There is no biomarker currently available to reliably provide prognosis or determine the response to enteral nutrition in clinical practice, but identification of such a biomarker would be valuable to assist in clinical decision-making.

Keywords
biomarkers, critical illness, enteral nutrition, pathophysiology

Conseguenze della malnutrizione nell'anziano.

- Gravi conseguenze sull'autonomia del paziente
- Comparsa di piaghe da decubito
- Maggior rischio di fratture
- Peggioramento di patologie croniche
- Maggior rischio di essere ospedalizzati
- Depressione ed apatia
- Peggioramento della qualità di vita

Ruolo della malnutrizione nello sviluppo delle UP



Stratton RJ et al. Disease-related malnutrition: an evidenca based approach treatment. CABI Publishing, 2003. Pag 138

Malnutrizione durante la degenza

Cause

- mancato riconoscimento della malnutrizione
- mancata valutazione dell'introito alimentare
- mancata valutazione di variazioni dei fabbisogni
- mancato monitoraggio dello stato nutrizionale
- mancato od inadeguato intervento nutrizionale
- mancata assistenza ai pasti
- rigidità degli orari dei pasti
- inadeguata assistenza ai pazienti con dipendenza alimentare
- digiuno o interruzione del supporto nutrizionale
- prescrizione di diete eccessivamente restrittive od inappetibili
- uso di farmaci che interferiscono con l'appetito o che presentano effetti collaterali sull'apparato gastrointestinale
- interazione farmaci–nutrienti
- mancato monitoraggio di peso, altezza ed Indice di Massa Corporea
- patologie di base e sue complicanze
- immobilizzazione a letto
- uso prolungato di perfusioni parenterali gluco-saline o alimentazione artificiale ipocalorica protratta
- scarsa conoscenza della composizione dei prodotti nutrizionali

(Dupertuis, 2003; Kondrup et al,2002)

"Iatrogenic malnutrition:the skeleton in the hospital closet"

Sulla base delle numerose evidenze disponibili appare del tutto chiaro che il non affrontare un problema clinico come quello della malnutrizione per difetto conseguente alle patologie acute e croniche dovrebbe essere oggi considerato “cattiva pratica clinica”, in grado di aumentare la spesa sanitaria in maniera non sostenibile, al contempo riducendo qualità di vita, autonomia ed aspettativa di vita di moltissime categorie di pazienti.

1. La Nutrizione Clinica è una disciplina medica.

2. La malnutrizione per difetto è una vera “malattia nella malattia”.

3. La malnutrizione iatrogena è quella non imputabile alla malattia di per sé, ma all’inappropriatezza dell’intervento nutrizionale che causa un aggravamento delle condizioni cliniche rispetto all’ingresso. Le sue cause sono molteplici: mancato riconoscimento della malnutrizione all’ingresso, vitto inadeguato, ripetuti digiuni per indagini, inappetenza, politerapia, mancata assistenza ai pasti. Si stima riguardi almeno il 15% dei pazienti a rischio di malnutrizione. Più in generale in Ospedale e nelle RSA un paziente su 3 è malnutrito o a rischio di malnutrizione.

4. 1 paziente oncologico su 5 muore di malnutrizione.

5. La maggior parte dei soggetti malnutriti o a rischio di malnutrizione vive a domicilio.

6. La malnutrizione si associa a maggior rischio di complicanze, più elevata morbidità e mortalità ed alla riduzione della qualità di vita.

7. La malnutrizione è un rilevante problema di salute pubblica, spesso non diagnosticato e non trattato. I costi sanitari della malnutrizione sono superiori ai costi dell’obesità.

8. La Nutrizione Enterale (NE) e la Nutrizione Parenterale (NP) hanno la stessa finalità, ma indicazioni, controindicazioni e costi differenti. La costo-efficacia del trattamento è dipendente dall’appropriatezza della scelta.

9. L’accessibilità alle cure è molto diversa da Regione a Regione. Per esempio la rimborsabilità dei Supplementi Nutrizionali Orali (ONS) e prodotti per disfagia non è attualmente garantita in tutte le Regioni Italiane.

10. I costi degli ONS standard sono compresi tra 0.7 e 2 euro, mentre quelli specifici per patologia possono raggiungere circa 12 euro. Il costo di una giornata di Nutrizione Enterale ospedaliera varia tra 5 e 11 euro. I costi per l’utilizzo di miscele enterali specifiche raggiungono circa 35 euro al giorno. La ristorazione assistenziale ospedaliera standard varia dai 10 ai 17 euro a giornata.

Clinical Nutrition 38 (2019) 10–47

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ESPEN Guideline

ESPEN guideline on clinical nutrition and hydration in geriatrics

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[j] Krankenhaus Barmherzige Brüder, Regensburg, Germany
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ESPEN Guideline

ESPEN practical guideline: Clinical nutrition and hydration in geriatrics

Dorothee Volkert [a,*], Anne Marie Beck [b], Tommy Cederholm [c,d], Alfonso Cruz-Jentoft [e], Lee Hooper [f], Eva Kiesswetter [a], Marcello Maggio [g], Agathe Raynaud-Simon [h], Cornel Sieber [a,i], Lubos Sobotka [j], Dieneke van Asselt [k], Rainer Wirth [l], Stephan C. Bischoff [m]

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Recommendation 1

Guiding value for energy intake in older persons is 30 kcal per kg body weight and day; this value should be individually adjusted with regard to nutritional status, physical activity level, disease status and tolerance. (BM)

Grade of recommendation B – strong consensus (97% agreement)

Because of great heterogeneity and large individual variation of energy requirements, even in healthy older persons [26,27], adequacy of energy intake needs to be controlled by close monitoring of body weight (taking water retention or losses into account), and intake adapted accordingly. It should be kept in mind that spontaneous oral energy intake of acutely hospitalized older patients is usually low and does not cover requirements.

Recommendation 2

Protein intake in older persons should be at least 1 g protein per kg body weight and day. The amount should be individually adjusted with regard to nutritional status, physical activity level, disease status and tolerance. (BM)

Grade of recommendation B – strong consensus (100% agreement)

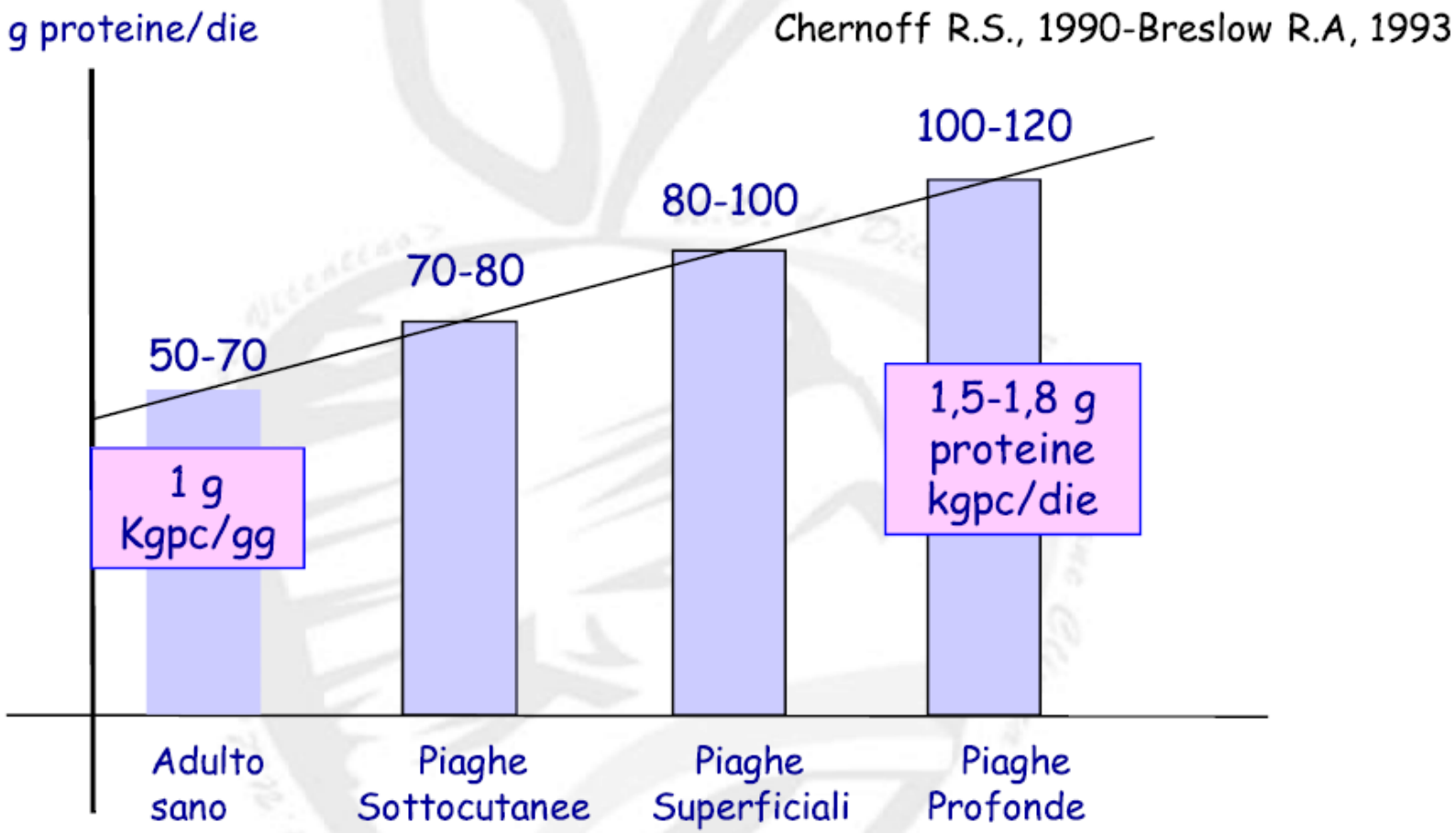
Commentary

The traditional recommendation for protein intake 0.8 g/kg body weight and day for adults of all ages [28,29] is currently under discussion for older persons, based on growing evidence from experimental and epidemiological research that older people might need higher amounts of protein for optimal preservation of lean body mass, body functions and health. Daily amounts of 1.0–1.2 g/kg body weight have been suggested for healthy older persons by several expert groups [30–32]. In case of illness, protein requirements may even be further increased, e.g. due to inflammation (including inflamm-aging), infections and wounds, however, to which extent is difficult to assess. Very little is known about the protein needs of frail and ill older persons, and scientific evidence, e.g. from intervention trials, is presently insufficient to derive concrete figures. Daily amounts of 1.2–1.5 g/kg have been suggested for older persons with acute or chronic illness [30,31] and up to 2.0 g/kg body weight and day in case of severe illness, injury or malnutrition [30].

Until more evidence is available, an intake of at least 1.0 g/kg should be ensured in all older persons, particularly in those at risk of malnutrition, e.g. frail and multimorbid persons, whose intake is often far below this amount [33–35]. Increased requirements, e.g. for muscle growth with strength training, for tissue regeneration in malnutrition or wound healing or for increased metabolic demands in case of critical illness, should be met by appropriately increased intake.

It is important to bear in mind that an insufficient intake of energy increases protein requirement. Thus, regarding protein status it is important to ensure not only adequate intake of protein but also appropriate intake of energy.

Aumento delle richieste proteiche



Fabbisogni proteici aumentano di 20-60 g/die

Recommendation 5

All older persons – independent of specific diagnosis and including also overweight and obese persons – shall routinely be screened for malnutrition with a validated tool in order to identify those with (risk of) malnutrition.

Grade of recommendation GPP – strong consensus (100% agreement)

Recommendation 6

A positive malnutrition screening shall be followed by systematic assessment, individualized intervention, monitoring and corresponding adjustment of interventions.

Grade of recommendation GPP – strong consensus (100% agreement)

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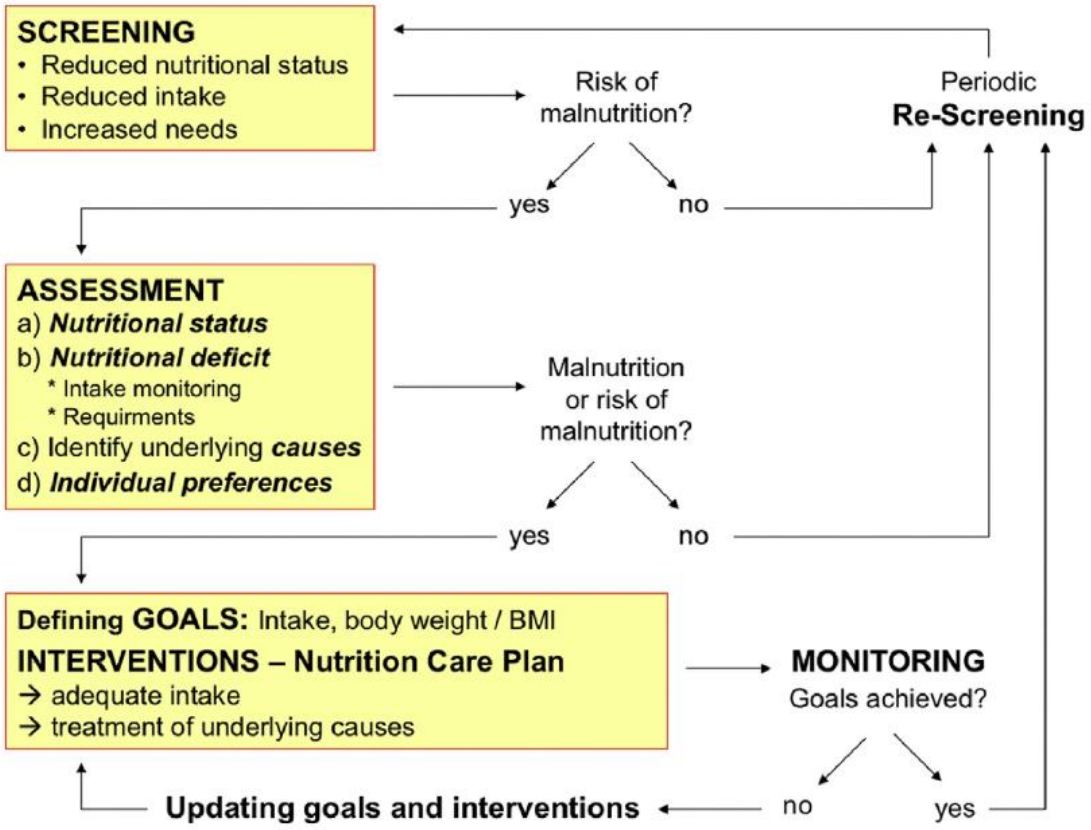


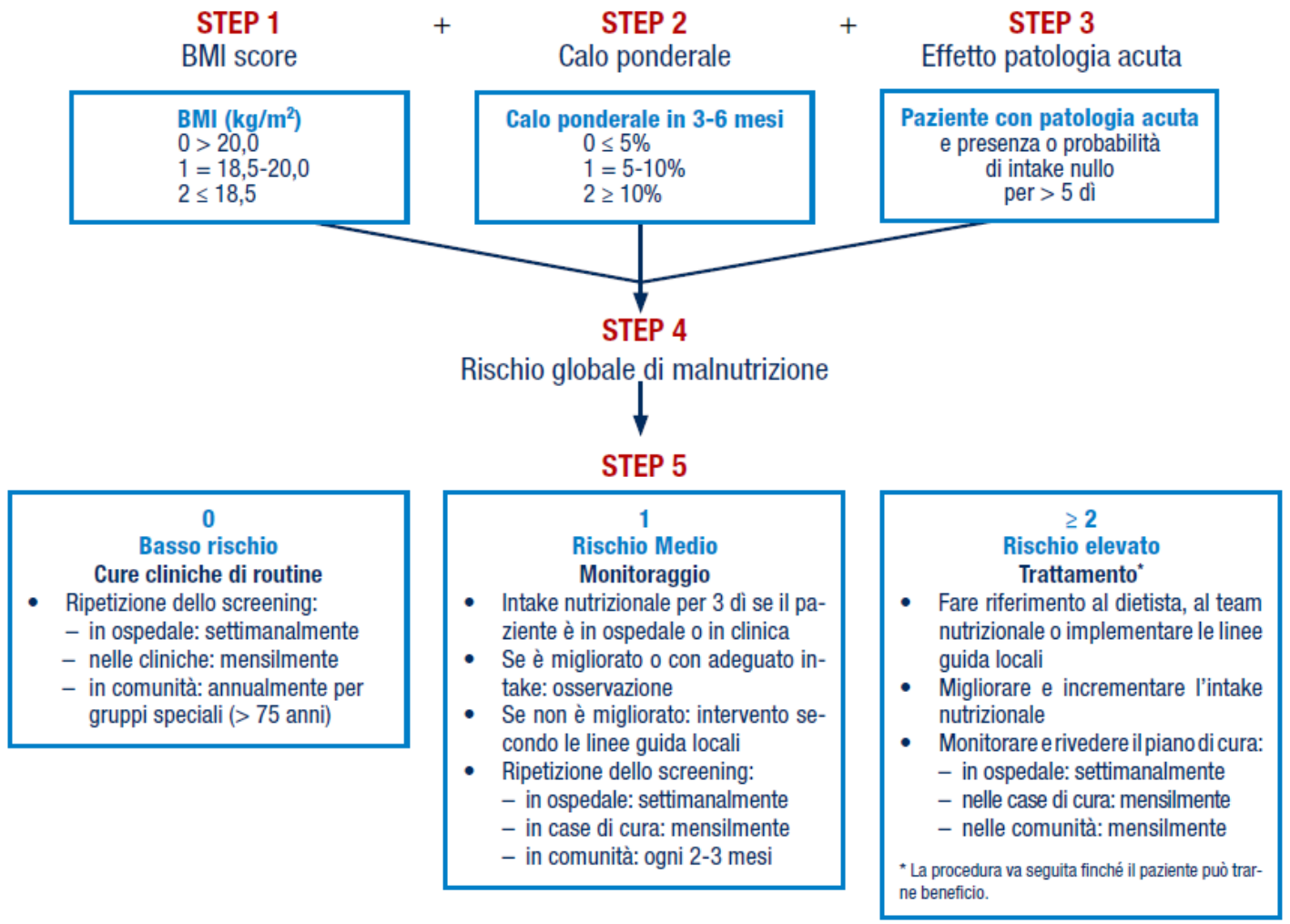


Figura 2
Malnutrition Universal Screening Tool (MUST).

Recommendation 7

In institutional settings, standard operating procedures for nutritional and hydration care shall be established and responsibilities well regulated.

Grade of recommendation GPP – strong consensus (100% agreement)

As malnutrition is highly prevalent in older persons, especially if institutionalized, geriatric institutions should provide a defined care plan and adequate resources to screen for malnutrition and identify persons with or at risk of malnutrition as well as to prevent and treat malnutrition. Special attention should be drawn to the interface management, as important information concerning the nutritional situation is frequently lost in the situation of patients' transition to another healthcare sector.

[55]. Multidisciplinary nutritional care concepts including regular team meetings increased dietary intake and improved quality of life in hip fracture patients [56], and improved nutritional status, wellbeing and quality of mealtimes in demented nursing home residents [57]

Recommendation 9

Nutritional interventions for older persons should be part of a multimodal and multidisciplinary team intervention in order to support adequate dietary intake, maintain or increase body weight and improve functional and clinical outcome. (BM)

Grade of recommendation B – strong consensus (100% agreement)

Recommendation 17

Health care professionals as well as informal caregivers should be offered nutritional education in order to ensure awareness of and basic knowledge on nutritional problems and thus promote adequate dietary intake of older persons with malnutrition or at risk of malnutrition. (BM)

Grade of recommendation B – strong consensus (95% agreement)

Recommendation 10

Potential causes of malnutrition and dehydration shall be identified and eliminated as far as possible.

Grade of recommendation GPP – strong consensus (95% agreement)

Table 7
Potential causes of malnutrition and reasonable interventions.

Potential cause	Potential interventions
Chewing problems	• Oral care • Dental treatment • Texture modified diet, if adequate
Swallowing problems (dysphagia)	• Professional swallowing evaluation • Swallowing training • Texture-modified diet, according to swallowing evaluation
Impaired upper extremity function	• Physiotherapy, occupational therapy • Adequate help with eating and drinking (e.g. cutting food, hand-feeding) • Provision of adequate eating and drinking aids • Finger foods • Shopping/cooking aid, meals on wheels
Restricted mobility, immobility	• Physiotherapy • Resistance training • Group exercise • Shopping/cooking aid, meals on wheels
Cognitive impairment	• Supervision of meals • Adequate meal assistance (e.g. verbal prompting, help with eating) • Shopping/cooking aid, meals on wheels • Family style meals in institutions
Depressive mood, depression	• Adequate medical treatment • Eating and drinking with others/shared meals • Pleasant meal ambience/eating environment • Group activities, occupational therapy
Loneliness, social isolation	• eating and drinking with others/shared meals • Group activities
Poverty	• Social programs
Acute disease, (chronic) pain	• Adequate medical treatment
Adverse effects of medications (e.g. xerostomia, apathy)	• Check medication for potential side effects • Reduce dose of medication • Replace or stop medications
Restricted diets	• Revision and liberalization of dietary restrictions

Recommendation 20

Older persons with malnutrition or at risk of malnutrition should be offered fortified food in order to support adequate dietary intake. (BM)

Grade of recommendation B – strong consensus (100% agreement)

Commentary

Food fortification (or dietary enrichment) by using natural foods (e.g. oil, cream, butter, eggs) or specific nutrient preparations (e.g. maltodextrin, protein powder) can increase energy and protein density of meals and beverages and thus enable an increased intake by eating similar amounts of food.

Recommendation 21

Older persons with malnutrition or at risk of malnutrition should be offered additional snacks, and/or finger food, in order to facilitate dietary intake.

Grade of recommendation GPP – strong consensus (100% agreement)

Commentary

Dietitians and other healthcare professionals traditionally use a number of dietary strategies to improve the energy and nutrient intake of older adults with malnutrition or at risk of malnutrition including the use of snacks between meals or finger foods, the latter in particular for persons who have difficulties using cutlery and remaining at the table for the entire duration of a meal.

Literature search identified four SLRs that included studies offering additional snacks and/or finger foods [78,88,116,117].

Recommendation 23

Older persons with malnutrition or at risk of malnutrition with chronic conditions shall be offered ONS when dietary counseling and food fortification are not sufficient to increase dietary intake and reach nutritional goals.

Grade of recommendation GPP – strong consensus (100% agreement)

ONS are energy and nutrient dense products designed to increase dietary intake when diet alone is insufficient to meet daily nutritional requirements. There are a wide range of ONS styles (milk, juice, yoghurt, savory), formats (liquid, powder, pudding, pre-thickened), volumes, types (high protein, fiber containing), energy densities (one to three kcal/ml) and flavors available to suit a wide range of needs and requirements. ONS are classified "high protein" when they provide >20% of energy from protein and "high energy" when they provide >1.5 kcal/ml or gram.

Integratori per via orale

Le recenti Linee Guida ESPEN [4] definiscono gli integratori orali (*Oral Nutrition Supplement*, ONS) come prodotti a formulazione definita, da utilizzare come supporto nutrizionale (integratori) dell'alimentazione comune. Questa strategia ha la finalità di fornire, a pazienti ancora in grado di alimentarsi per via naturale, una quota aggiuntiva di nutrienti sufficiente a coprire i fabbisogni nutritivi, impedendo il ricorso a tecniche di supporto nutrizionale più invasive quali la nutrizione enterale o parenterale.

Gli ONS possono essere utili in soggetti malnutriti o a rischio di malnutrizione in cui la supplementazione (*food fortification*) mediante cibi naturali sia risultata inefficace ma che siano ancora in grado di assumere con gli alimenti naturali almeno la metà dei loro fabbisogni, quando cioè si verifichi una riduzione complessiva delle ingesta valutabile in circa la metà della quantità di carboidrati e proteine abitualmente assunte nel periodo precedente quello dell'evento in causa.

Nel corso degli ultimi anni la gamma degli ONS è andata ampiamente allargandosi, in termini sia di composizione bromatologica, sia di varianti gustative con migliore palatabilità dei diversi prodotti. Questo ha permesso un impiego nutrizionalmente più mirato e ha favorito la compliance dei pazienti nell'assunzione prolungata.

L'impiego degli ONS viene chiaramente raccomandato (Livello di evidenza A) dalle linee guida per la nutrizione artificiale nel paziente anziano: *"la supplementazione orale per os (ONS) è chiaramente raccomandata per garantire l'assunzione di energia, proteine e micronutrienti, mantenere o migliorare lo stato nutrizionale e migliorare la sopravvivenza nei pazienti malnutriti o a rischio di malnutrizione"*.

Una recente metanalisi, infatti, ha dimostrato in modo statisticamente significativo un aumento del peso corporeo con riduzione della mortalità negli anziani malnutriti trattati con integratori orali proteico-calorici. Inoltre i supplementi orali, in particolare quelli ricchi in proteine, possono ridurre il rischio di ulcere da pressione per cui sono chiaramente raccomandati nelle succitate linee guida.

In caso di mancato raggiungimento dell'obiettivo nutrizionale per via orale è necessario ricorrere alla nutrizione artificiale enterale (NE) e/o parenterale (NP).

Type	Notes
Juice type	Volume ranges from 200-220ml with an energy density of 1.25-1.5kcal/ml. They are fat free
Milkshake type	Volume ranges from 125-220ml, energy density ranges from 1-2.4kcal/ml. Also available with added fibre.
High-energy powders	Volume ranges from ~125-350ml, ideally made up with full cream milk to give an energy density of 1.5-2.5kcal/ml.
Soup type	Volume ranges from 200-330ml. Some are ready mixed and others are a powder and can be made up with water or milk to give an energy density of 1–1.5kcal/ml.
Semi-solid/dysphagia ranges	Range of presentations from thickened liquids (stage 1 and 2) to smooth pudding styles (stage 3), with an energy density of ~1.4-2.5kcal/ml.
High protein	Range of presentations; jellies, shots, milkshake style containing 11-20g of protein in volumes ranging from 30–220ml.
Low volume high concentration (shots)	These are fat and protein based products that are taken in small quantities (shots), typically 30-40ml as a dose taken 3-4 times daily.

FARMACONUTRIENTI

Glutamina

Facilita la guarigione delle ferite stimolando la sintesi di collagene
Sostiene la sintesi proteica in condizioni di stress

Arginina

Stimola:

- la produzione di collagene
- il deposito di collagene nell'area della ferita
- migliora la circolazione sanguigna da e verso la parte malata

HMB (ß-idrossi- ß-metilbutirrato)

Supporta la sintesi proteica

Riduce il catabolismo muscolare

HMB+Arginina+Glutamina

- Preservano le proteine corporee
- Supportano al sintesi di collagene
- Sono substrato delle cellule immunitarie, possono migliorare le difese dell'organismo per prevenire o contrastare le infezioni dannose per la guarigione delle ferite

Study or Subgroup	Std. Mean Difference	SE	Weight	Std. Mean Difference IV, Random, 95% CI
HMB alone				
Fitschen 2017 (39)	0.192	0.35	7.9%	0.19 (-0.49, 0.88)
Subtotal (95% CI)			**7.9%**	**0.19 (-0.49, 0.88)**
Heterogeneity: Not applicable				
Test for overall effect: Z = 0.55 (P = 0.58)				
HMB/ARG/GLN				
Clark 2000 (26)	0.9627	0.322	8.7%	0.96 (0.33, 1.59)
Clements 2011 (45)	-0.0492	0.322	8.7%	-0.05 (-0.68, 0.58)
Marcora 2005 (40)	-0.1902	0.334	8.3%	-0.19 (-0.84, 0.46)
May 2002 (27)	0.876	0.258	10.8%	0.88 (0.37, 1.38)
Nishizaki 2015 (38)	0.8853	0.44	5.9%	0.89 (0.02, 1.75)
Subtotal (95% CI)			**42.4%**	**0.49 (-0.01, 0.99)**
Heterogeneity: Tau² = 0.22; Chi² = 12.13, df = 4 (P = 0.02); I² = 67%				
Test for overall effect: Z = 1.93 (P = 0.05)				
HMB in ONS				
Cramer 2016 (severe sarcopenia) (31)	-0.1329	0.168	14.4%	-0.13 (-0.46, 0.20)
Cramer 2016 (severe sarcopenia) (31)	0.1501	0.148	15.3%	0.15 (-0.14, 0.44)
Malafarina 2017 (44)	0.14	0.207	12.8%	0.14 (-0.27, 0.55)
Olveira 2016 (37)	0.0189	0.378	7.2%	0.02 (-0.72, 0.76)
Subtotal (95% CI)			**49.7%**	**0.05 (-0.14, 0.24)**
Heterogeneity: Tau² = 0.00; Chi² = 1.84, df = 3 (P = 0.61); I² = 0%				
Test for overall effect: Z = 0.53 (P = 0.60)				
Total (95% CI)			**100.0%**	**0.25 (-0.00, 0.50)**
Heterogeneity: Tau² = 0.09; Chi² = 21.20, df = 9 (P = 0.01); I² = 58%				
Test for overall effect: Z = 1.93 (P = 0.05)				
Test for subgroup differences: Chi² = 2.71, df = 2 (P = 0.26), I² = 26.1%				

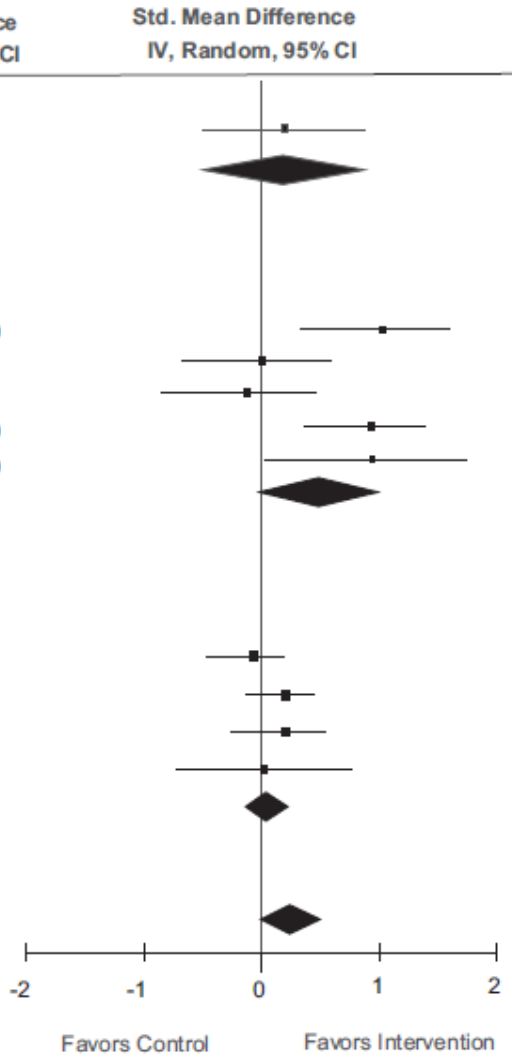


FIGURE 3 Forest plot for the effect of HMB or supplements containing HMB on change in muscle mass. Forest plot of a random-effects meta-analysis of 9 studies for change in muscle mass. Results are presented as SMDs with 95% CIs. Subgroup analyses are included for studies including HMB alone, HMB in combination with glutamine and arginine (HMB/ARG/GLN), and HMB incorporated in an oral nutrition supplement (HMB in ONS). HMB, β-hydroxy-β-methylbutyrate; SMD, standard mean difference; Std., standard.

Study or Subgroup	Std. Mean Difference	SE	Weight	Std. Mean Difference IV, Random, 95% CI
HMB alone				
Fitschen 2017 (39)	0.263	0.135	50.3%	0.26 (-0.00, 0.53)
Subtotal (95% CI)			**50.3%**	**0.26 (-0.00, 0.53)**
Heterogeneity: Not applicable				
Test for overall effect: Z = 1.95 (P = 0.05)				
HMB/ARG/GLN				
Marcora 2005 (40)	0.4291	0.337	8.1%	0.43 (-0.23, 1.09)
Nishizaki 2015 (38)	0.2017	0.423	5.1%	0.20 (-0.63, 1.03)
Subtotal (95% CI)			**13.2%**	**0.34 (-0.18, 0.86)**
Heterogeneity: Tau² = 0.00; Chi² = 0.18, df = 1 (P = 0.67); I² = 0%				
Test for overall effect: Z = 1.29 (P = 0.20)				
HMB in ONS				
Ekinci 2016 (42)	0.58	0.26	13.6%	0.58 (0.07, 1.09)
Malafarina 2017 (44)	0.282	0.235	16.6%	0.28 (-0.18, 0.74)
Olveira 2016 (37)	0.1307	0.378	6.4%	0.13 (-0.61, 0.87)
Subtotal (95% CI)			**36.6%**	**0.37 (0.06, 0.68)**
Heterogeneity: Tau² = 0.00; Chi² = 1.19, df = 2 (P = 0.55); I² = 0%				
Test for overall effect: Z = 2.31 (P = 0.02)				
Total (95% CI)			**100.0%**	**0.31 (0.12, 0.50)**
Heterogeneity: Tau² = 0.00; Chi² = 1.63, df = 5 (P = 0.90); I² = 0%				
Test for overall effect: Z = 3.25 (P = 0.001)				
Test for subgroup differences: Chi² = 0.26, df = 2 (P = 0.88), I² = 0%				

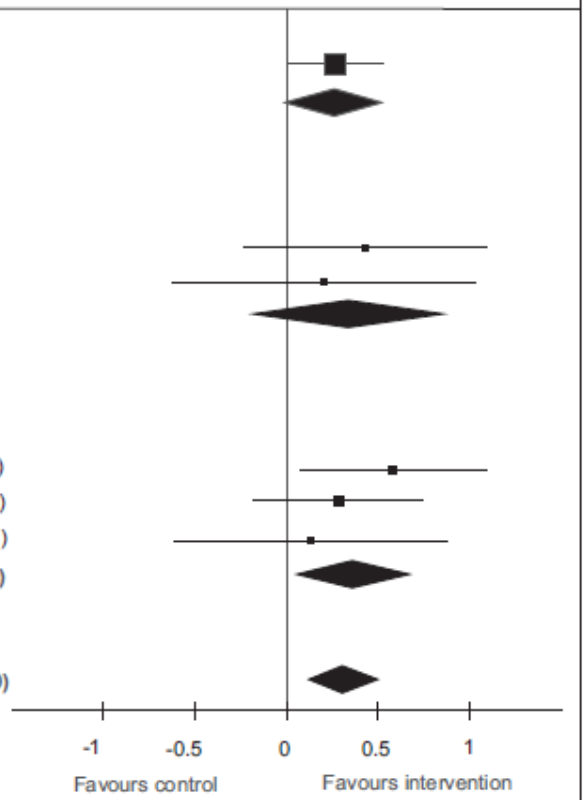


FIGURE 5 Forest plot showing the effect of HMB or supplements containing HMB on absolute strength. Forest plot of a random effects meta-analysis of 6 studies for absolute strength. Results are presented as SMDs with 95% CIs. Subgroup analyses are included for studies including HMB alone, HMB in combination with glutamine and arginine (HMB/ARG/GLN) and HMB incorporated in an oral nutrition supplement (HMB in ONS). HMB, β-hydroxy-β-methylbutyrate; SMD, standard mean difference; Std., standard.

Monitoring

ONS should not be prescribed without being monitored to ensure that they remain appropriate and are being taken as prescribed. ONS may be stopped when:

- Dietary intake is meeting nutritional requirements.
- Weight has increased to target.
- BMI is within healthy range.
- The individual's medical condition has changed, e.g. an individual with a swallowing difficulty recovers some/all of their functionality.
- The individual can no longer tolerate them due to taste fatigue.

Recommendation 26

Oral nutritional supplements offered to an older person with malnutrition or at risk of malnutrition, shall provide at least 400 kcal/day including 30 g or more of protein/day. (BM)

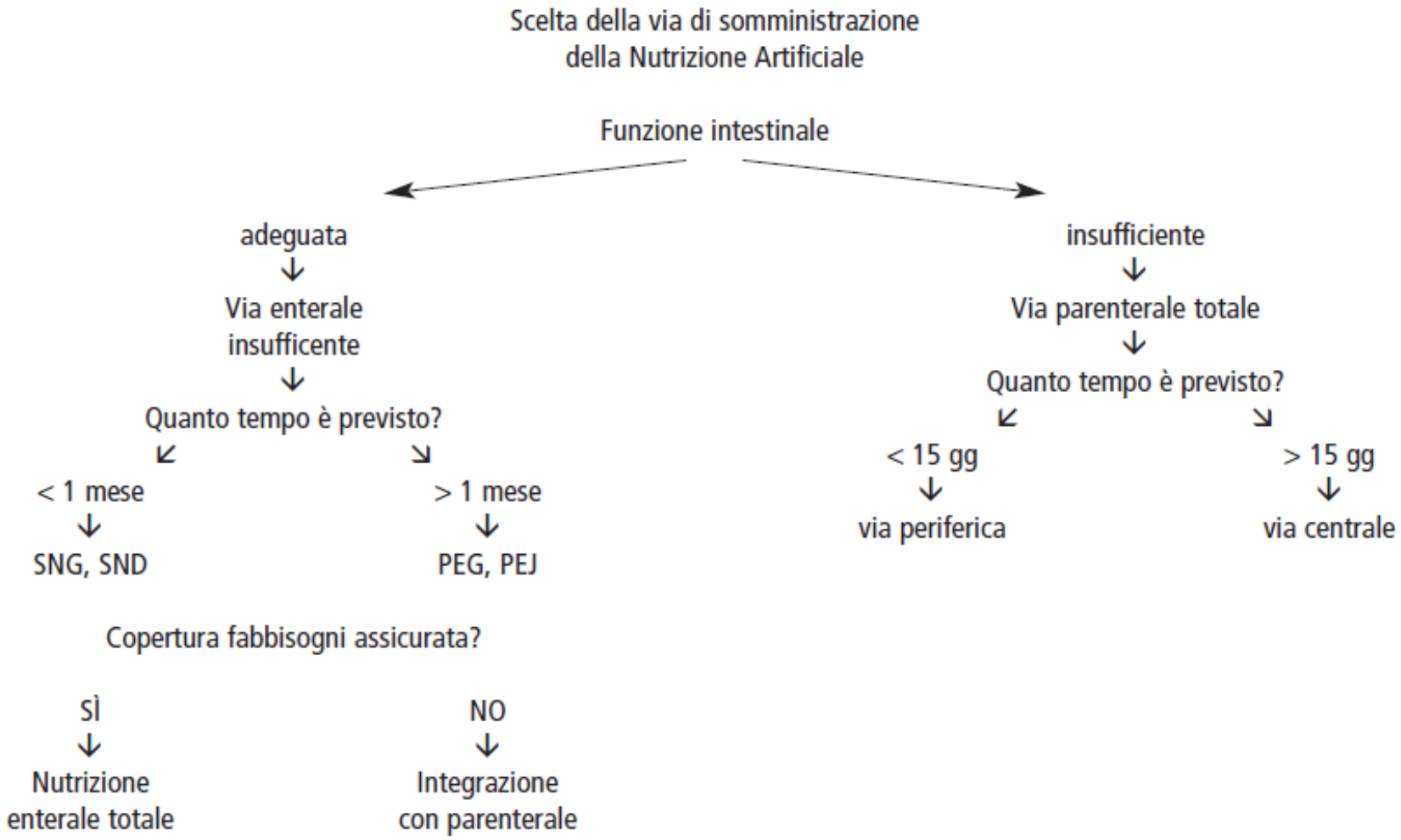
Grade of recommendation A – strong consensus (97% agreement)

Recommendation 27

When offered to an older person with malnutrition or at risk of malnutrition, ONS shall be continued for at least one month. Efficacy and expected benefit of ONS shall be assessed once a month.

Grade of recommendation GPP – strong consensus (100% agreement)

Fig. 3. *Flow-chart* per la scelta della via di somministrazione della Nutrizione Artificiale (NA).



SNG = Sondino naso-gastrico; SND = Sondino naso-digiunale (da preferire in pazienti con storia di reflusso gastro-esofageo (REG) e polmoniti da aspirazione). PEG = Gastrostomia endoscopica percutanea; PEJ = Digiunostomia endoscopica percutanea (nei pazienti con REG o frequenti polmoniti da aspirazione).

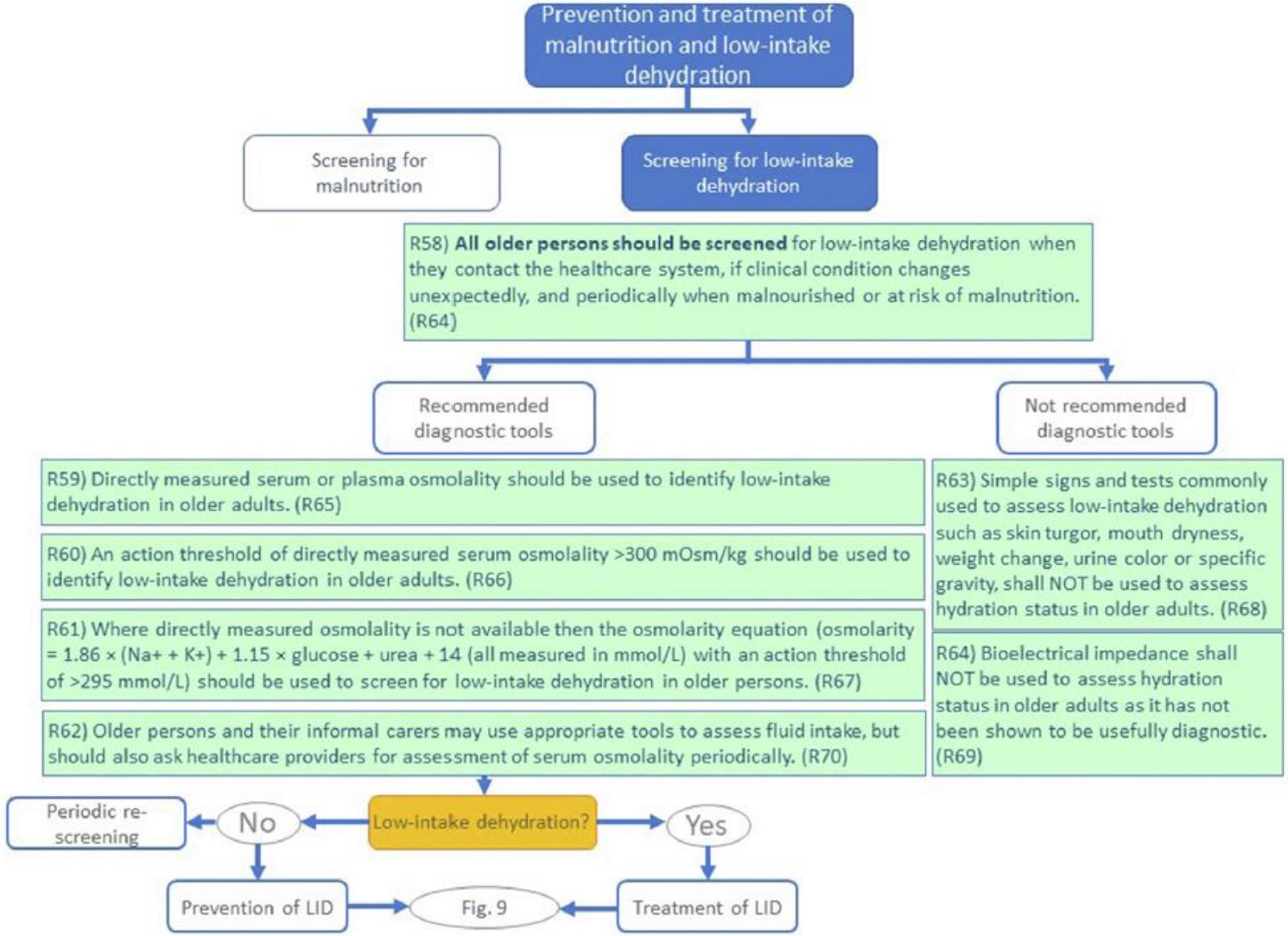


Fig. 9. Prevention and treatment of malnutrition and low-intake dehydration - Screening for low-intake dehydration. LID, low-intake dehydration.

Recommendation 63

All older persons should be considered to be at risk of low-intake dehydration and encouraged to consume adequate amounts of drinks. (BM)

Grade of recommendation GPP – strong consensus (100% agreement)

Recommendation 61

Older women should be offered at least 1.6 L of drinks each day, while older men should be offered at least 2.0 L of drinks each day unless there is a clinical condition that requires different approach. (BM)

Grade of recommendation B – strong consensus (96% agreement)

Recommendation 68

Simple signs and tests commonly used to assess low-intake dehydration such as skin turgor, mouth dryness, weight change, urine color or specific gravity, shall NOT be used to assess hydration status in older adults. (DM)

Grade of recommendation A – consensus (83% agreement)

Recommendation 67

Where directly measured osmolality is not available then the osmolarity equation (osmolarity = 1.86 × (Na+ + K+) + 1.15 × glucose + urea + 14 (all measured in mmol/L) with an action threshold of >295 mmol/L) should be used to screen for low-intake dehydration in older persons. (DM)

Grade of recommendation B – strong consensus (94% agreement)

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ESPEN Guideline

ESPEN guideline on ethical aspects of artificial nutrition and hydration

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Se non mangia… muore!” deve lasciare gradualmente il posto alla consapevolezza che “**Non mangia più perché sta morendo…**”.

Dal punto di vista operativo è importante aiutare i familiari a **riscoprire la bellezza dello stare insieme** al loro caro condividendo il pasto piuttosto che obbligarlo a mangiare: condividere la fase di preparazione del pasto quando ciò è gradito dal paziente, privilegiare pasti piccoli e frequenti con alimenti ad elevato contenuto calorico, scegliere i cibi che in quel momento piacciono di più al malato, tenendo conto dei gusti che inevitabilmente cambiano nel fine vita, adattare e adattarsi agli orari e agli spazi che il paziente desidera, senza irrigidirsi su abitudini pregresse o su convenzioni anacronistiche, sono solo alcuni degli esempi che si possono fare per permettere la riscoperta del **pasto come sigillo di una relazione.**

Statement 1:

Prerequisites of artificial nutrition and hydration are

1. *an indication for a medical treatment and*
2. *the definition of a therapeutic goal to be achieved and*
3. *the will of the patient and his or her informed consent.*

In all cases however the treating physician has to take the final decision and responsibility. [Strong Consensus]

Commentary

When oral intake of food and liquids is not possible anymore or does not adequately provide nutrients, and medically assisted nutrition and hydration have to be considered, we are confronted with a medical intervention that requires specific rules indicated in the statement.

Artificial nutrition: includes oral nutritional supplements (ONS), enteral nutrition (EN) or parenteral nutrition (PN). Enteral delivery of nutrients includes nasogastric and nasogastrojejunal tubes or percutaneous endoscopic gastrostomy (PEG) or jejunostomy (PEG-J) or surgically induced feeding tubes. Parenteral delivery can involve peripheral intravenous access or central venous access [3].

Artificial hydration: provision of water or electrolyte solutions by any other route than the mouth. This can be achieved by tubes, intravenous and subcutaneous (= dermoclysis) administration [3].

6.1. Nutrition, hydration and old age

Statement 12:

Nutritional therapy for older patients is frequently intended not merely as a temporary measure, but to ensure a permanent supply of nutrition and hydration up to the end of life. Therapy can be effective until the dying phase in cases of chronic disease. The justification for such a treatment should be critically reviewed at regular intervals. [Strong Consensus]

6.2. Nutrition, hydration and dementia

Statement 15:

The decision to discontinue artificial feeding might be misunderstood as an order "do not feed" as nutrition is associated with life and its absence with starvation. For patients with eating difficulties requiring support an individual care plan has to be established. Such a feeding care plan should be called "comfort feeding" to avoid the negative connotation of the wording. Especially in regard to medical decisions at the end of life, appropriate terminology has to be carefully chosen. [Strong Consensus]

Statement 16:

For patients with advanced dementia priority should always be given to careful eating assistance (feeding by hand). [Consensus]

Statement 33:

A medical treatment, which does not provide any benefit or has become disproportionate can be withdrawn or withheld. Limitation of treatment may imply progressively withdrawing it or reducing the dose administered to limit side effects. [Strong Consensus]

Recommendation 37

EN and PN and hydration shall be considered as medical treatments rather than as basic care, and therefore should only be used if there is a realistic chance of improvement or maintenance of the patient's condition and quality of life.

Grade of recommendation GPP – strong consensus (96% agreement)

Commentary

Any kind of medical treatment is contraindicated when it is obvious that it cannot be help for the patient. EN and PN are medical treatments because they require the insertion of a feeding tube or intravenous cannulation and a physician's prescription. The most important reason for commencement of EN or PN or hydration should be anticipated beneficial effects of such treatment for the individual person. If EN, PN or hydration are initiated, the effect of such treatment should be controlled. Clinical improvement as well as prevention of further clinical deterioration can both be relevant goals for an individual patient. Conversely, as for any other medical treatment, EN and PN should not be initiated or are contraindicated in situations when no benefits for the patient are expected. Especially in patients where death is imminent, e.g. within the next four weeks, or in patients with incurable disease, which cannot be improved by any treatment including nutritional support (e.g. advanced dementia, terminal phase of malignant cancer disease) the patient's comfort is the highest priority [17].

General principles of nutritional care

Guidance for nutritional intake

R1) Guiding value for **energy** intake in older persons is **30 kcal per kg body weight** and day; this value should be individually adjusted with regard to nutritional status, physical activity level, disease status and tolerance. (R1)

R2) **Protein** intake in older persons should be at least **1 g protein per kg body weight** and day. The amount should be individually adjusted with regard to nutritional status, physical activity level, disease status and tolerance. (R2)

R3) For EN, **fiber**-containing products should be used. (R3)

R4) Provided that there is no specific deficiency, **micronutrients** should be delivered according to the recommendation for healthy older persons. (R4)

R5) Older **women** should be offered at least **1.6 L of drinks each day**, while older **men** should be offered at least **2.0 L of drinks each day** unless there is a clinical condition that requires different approach. (R61)

Basic principles of nutritional care

R6) In institutional settings, **standard operating procedures** for nutritional and hydration care shall be established and responsibilities well regulated. (R7)

R7) Nutritional and hydration care for older persons shall be **individualized** and **comprehensive** in order to ensure adequate nutritional intake, maintain or improve nutritional status and improve clinical course and quality of life. (R8)

R8) Nutritional interventions for older persons should be part of a **multimodal** and **multidisciplinary team intervention** in order to support adequate dietary intake, maintain or increase body weight and improve functional and clinical outcome. (R9)

R9) Potential **causes** of malnutrition and dehydration shall be **identified and eliminated** as far as possible. (R10)

R10) **Dietary restrictions** that may limit dietary intake are potentially harmful and should be **avoided**. (R11)

R11) Health care professionals as well as informal caregivers should be offered **nutritional education** in order to ensure awareness of and basic knowledge on nutritional problems and thus promote adequate dietary intake of older persons with malnutrition or at risk of malnutrition. (R17)

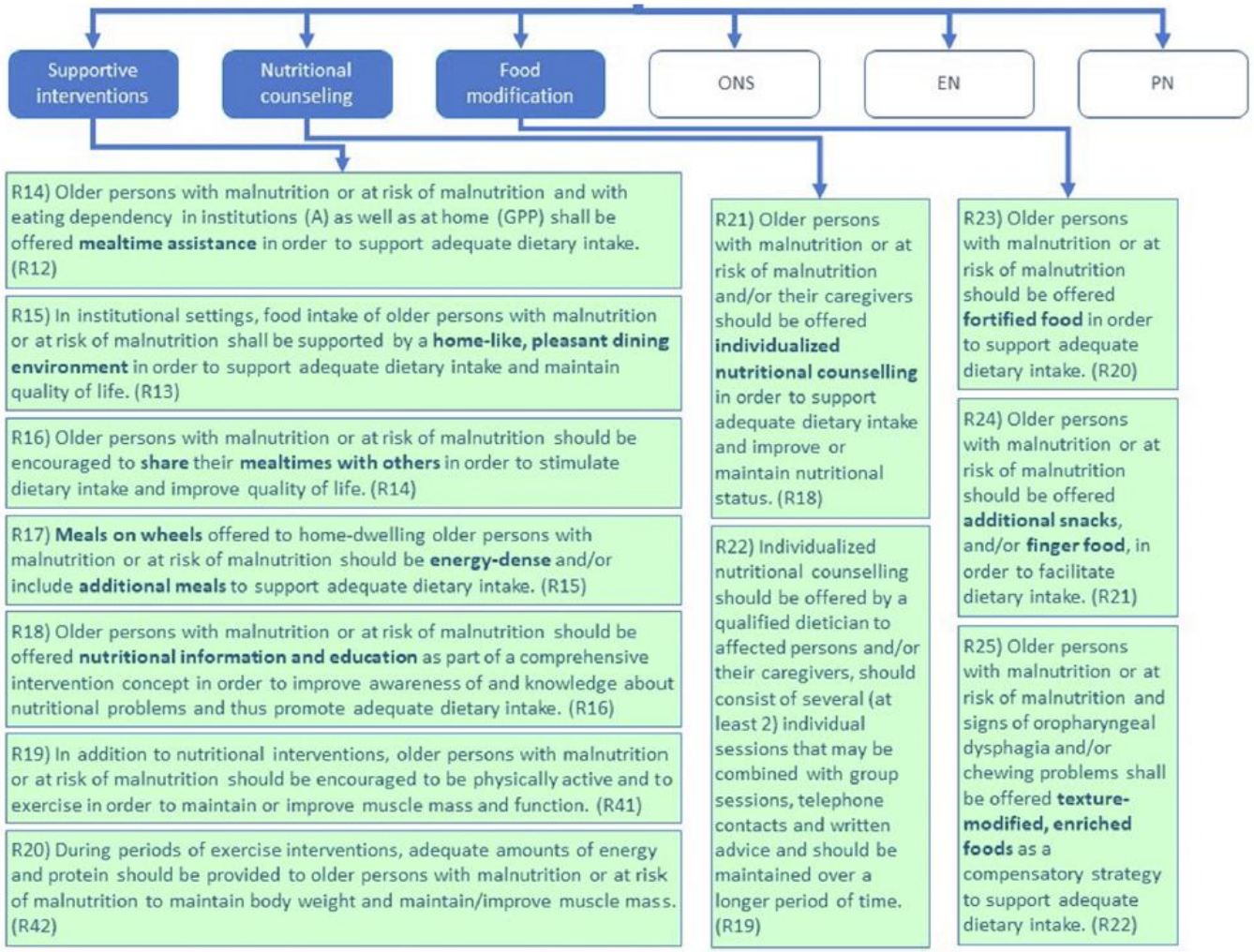

Fig. 4. Prevention and treatment of malnutrition in general (I): Supportive interventions, nutritional counseling, and food modification. EN, enteral nutrition; ONS, oral nutritinal supplements; PN, parenteral nutrition.

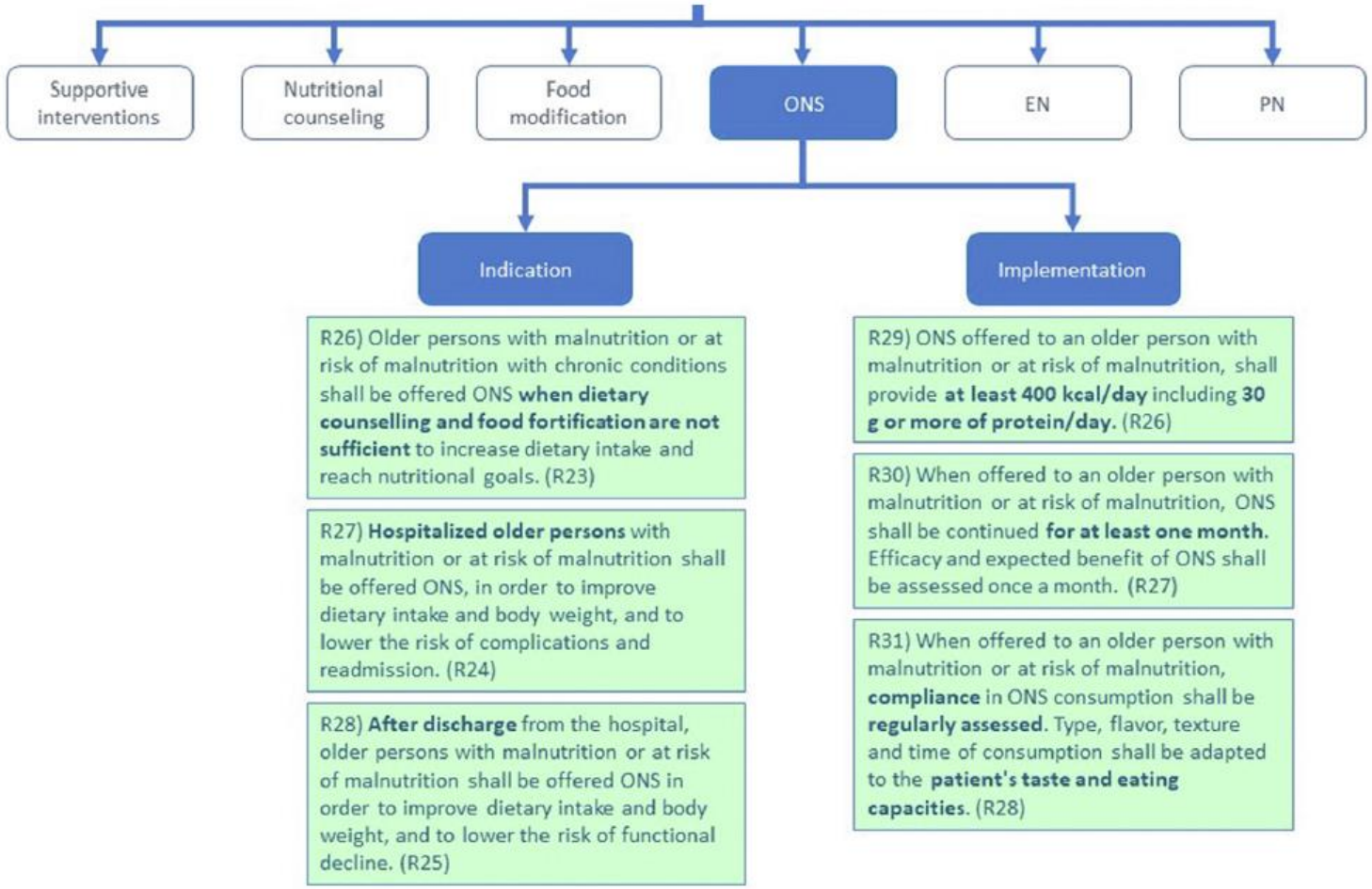

Fig. 5. Prevention and treatment of malnutrition in general (II): Oral nutritional supplements. EN, enteral nutrition; ONS, oral nutritinal supplements; PN, parenteral nutrition.

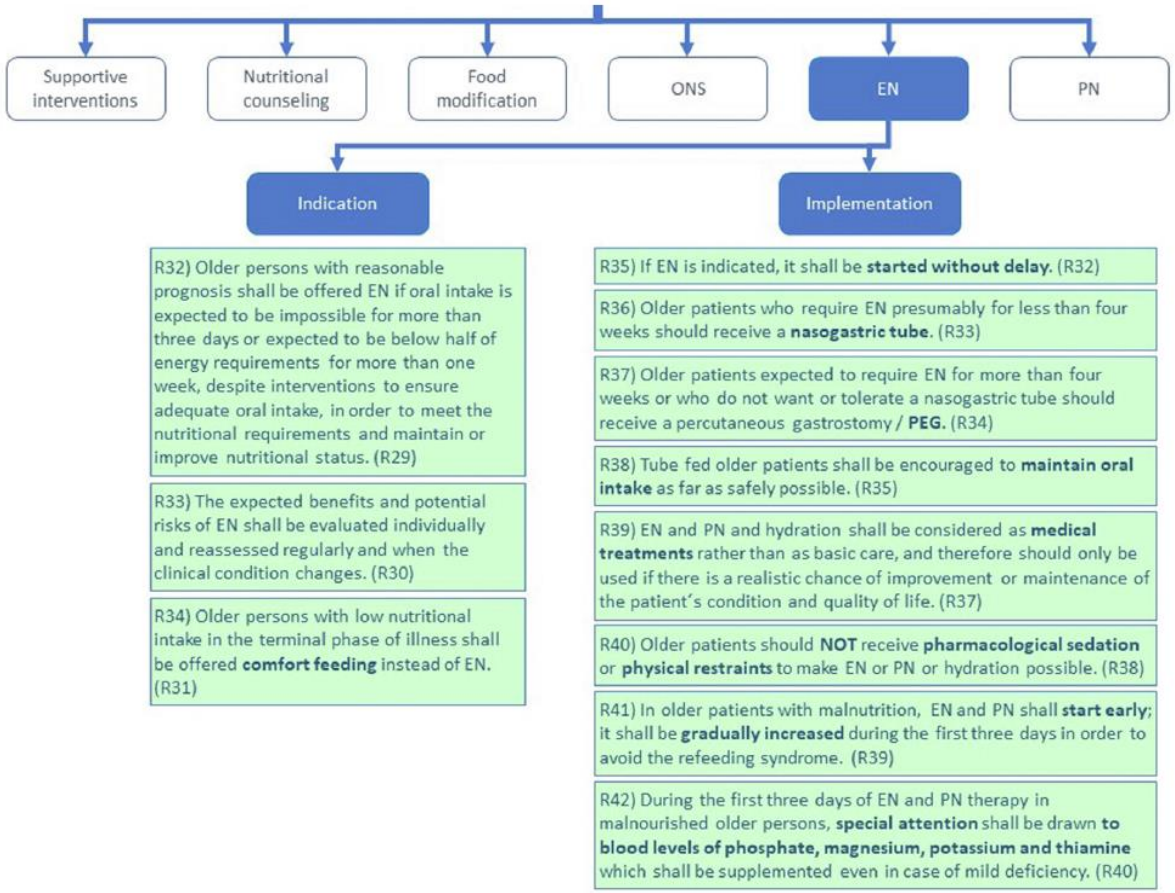

Fig. 6. Prevention and treatment of malnutrition in general (III): Enteral nutrition. EN, enteral nutrition; ONS, oral nutritinal supplements; PEG, percutaneous endoscopic gastrostomy; PN, parenteral nutrition.

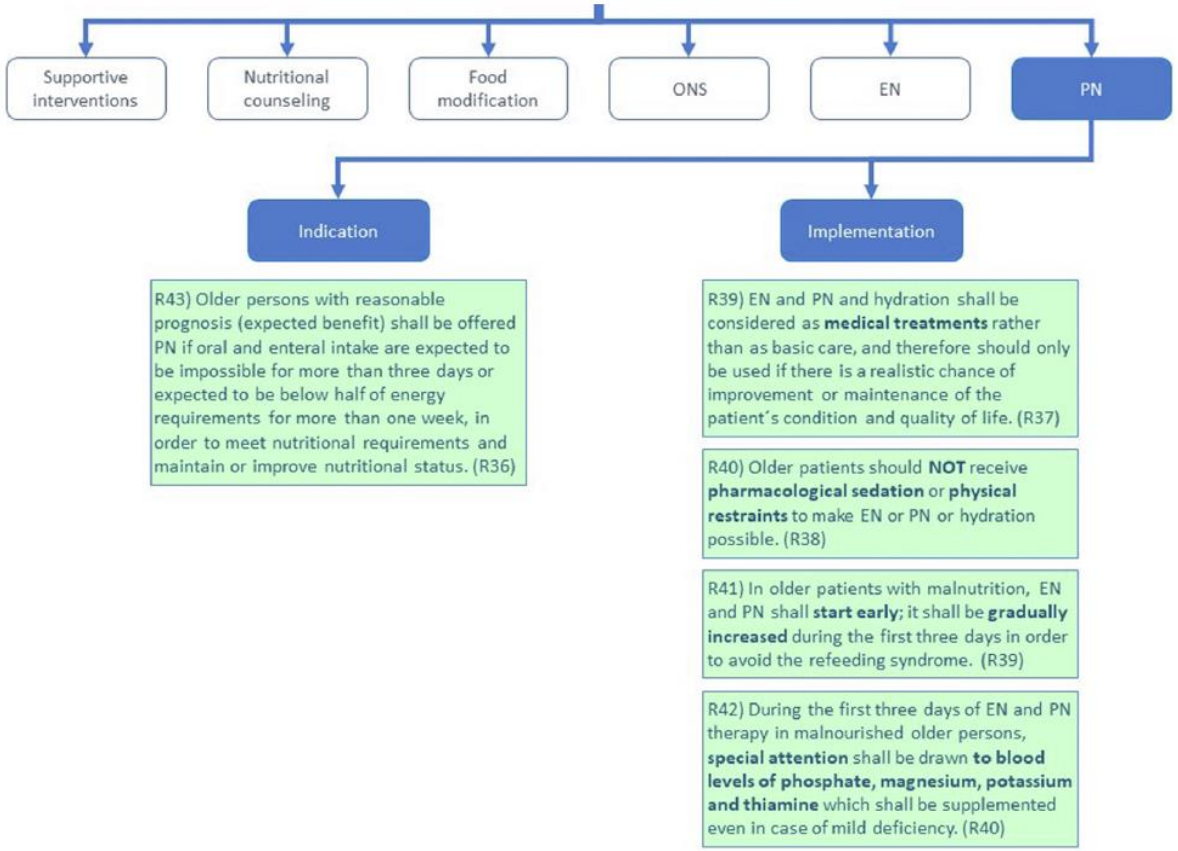

Fig. 7. Prevention and treatment of malnutrition in general (IV): Parenteral nutrition. EN, enteral nutrition; ONS, oral nutritional supplements; PN, parenteral nutrition.