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Nutrition in the elderly.

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Malnutrition in elderly

Definition, consequentes, causes, prevalence.

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Malnutrition: definition (ESPEN)

"a state resulting from lack of uptake or intake of nutrition leading to altered body composition (decreased fat free mass) and body cell mass leading to diminished physical and mental function and impaired clinical outcome from disease".

Although this definition is well-accepted, the condition lacks clear and generally accepted diagnostic criteria.

T. Cederholm et al. Clinical Nutrition 34 (2015) 335-340
M. Besora-Moreno et al. Nutrients (2020) 12, 737

Age and Ageing 2019; **48:** 38–48
doi: 10.1093/ageing/afy144
Published electronically 7 August 2018

SYSTEMATIC REVIEWS

A systematic review, meta-analysis and meta-regression of the prevalence of protein-energy malnutrition: associations with geographical region and sex

Megan Crichton[1], Dana Craven[2], Hannah Mackay[3], Wolfgang Marx[1,4,5], Marian de van der Schueren[6,7], Skye Marshall[1]

The most comprehensive assessment of the prevalence of malnutrition among older adults living independently in the community according to geographical region, sampling frame, rurality and sex.

- The prevalence of malnutrition ranged widely from 0.8 to 24.6% depending on region.
- **Europe** had the largest number of areas analyzed for the prevalence of malnutrition with nine regions (14 countries) analyzed. Prevalence ranged from 0.8% (in the **Netherlands** and **Sweden**) to 11.0% (**Italy** and **France**).
- Homecare recipients have the highest prevalence of all sampling frames (14.6%).
- Prevalence of malnutrition in rural communities (9.9%) is twice that in urban (5.7%).
- Females have 45% higher odds of being malnourished

Age and Ageing 2019; **48:** 38–48
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SYSTEMATIC REVIEWS

A systematic review, meta-ana is and meta-regres n of the pr lence rotein-energy malnutrit ssoc ical region and s

MEGAN C
MARIAN DE VAN

The most comprehensive assessment of the prevalence of malnutrition among older adults living independently in the community according to geographical region, sampling frame, rurality and sex.

In addition:
- 50% of the elderly in rehabilitation, 20% in residential care, and 40% in hospitals are malnourished.
- As a result of population aging, the malnutrition prevalence is increasing, which is expected to reach 29.1% by 2080.

Eurostat 2019

- The prevalenc nding on region.
- **Europe** h evalence of malnutrition with nine regions (14 from 0.8% (in the **Netherlands** and **Swe nce**).
- Homecare recipient ave the st pre e of all sam g frames (14.6%).
- Prevalence of malnutrition in community (9.9%) is twice that in urban (5.7%).
- Females have 45% higher odds being malnourished

Review

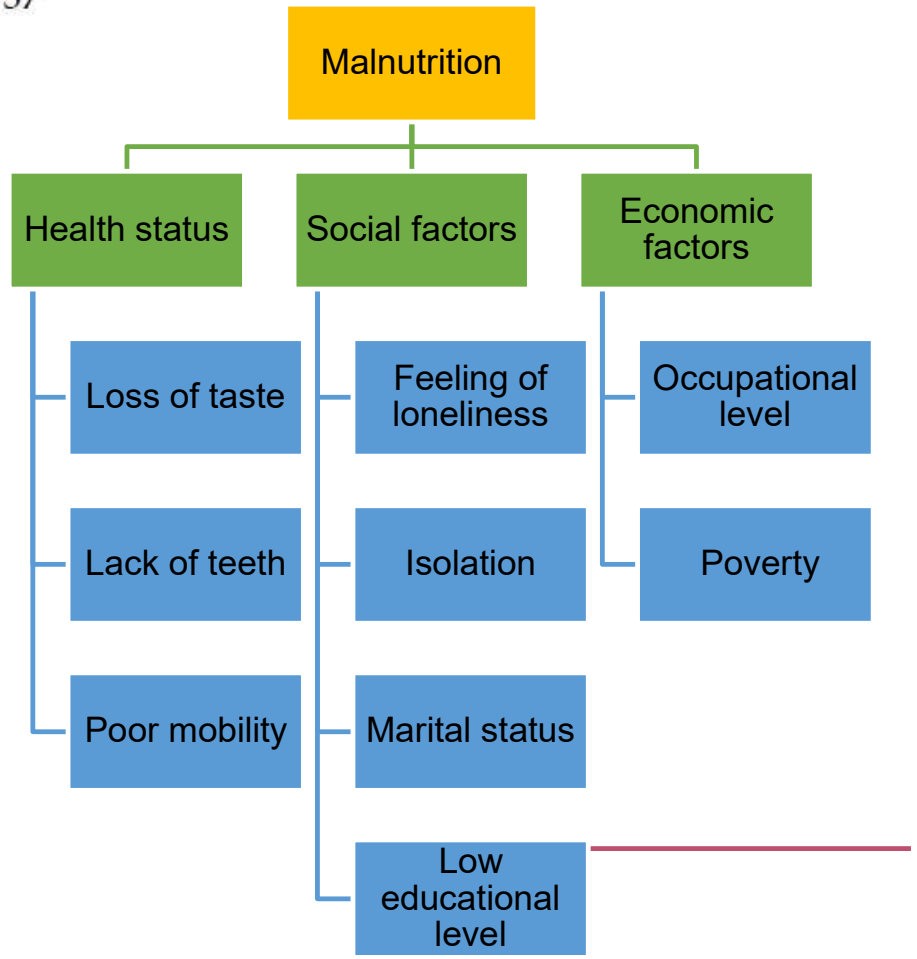
Social and Economic Factors and Malnutrition or the Risk of Malnutrition in the Elderly: A Systematic Review and Meta-Analysis of Observational Studies

Nutrients 2020, 12, 737

Maria Besora-Moreno [1], Elisabet Llauradó [1,*], Lucia Tarro [1,2] and Rosa Solà [1,2,3]

The analysis of the social and economic determinants of the risk of malnutrition and / or the development of malnutrition could be a basis for taking possible actions to reduce malnutrition in the elderly.

AIM: determine the relationship between health and socioeconomic factors with the malnutrition or malnutrition risk in the elderly.



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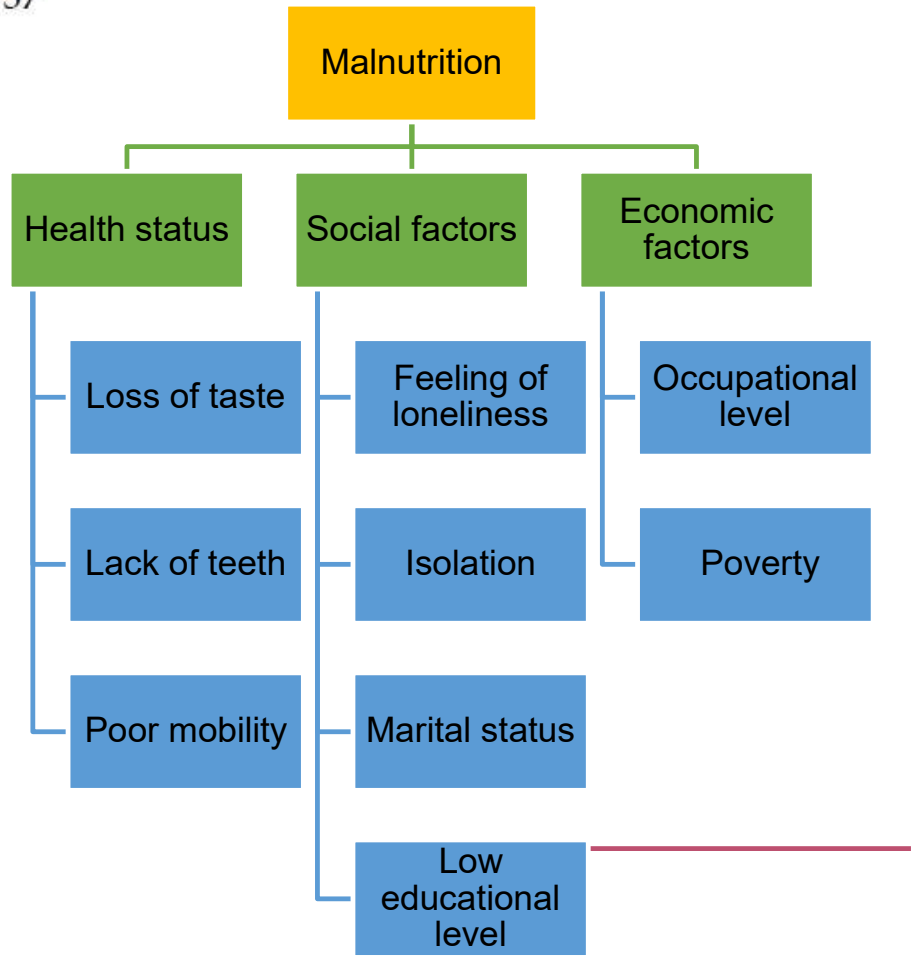
Review

Social and Economic Factors and Malnutrition or the Risk of Malnutrition in the Elderly: A Systematic Review and Meta-Analysis of Observational Studies

Nutrients 2020, 12, 737

Maria Besora-Moreno [1], Elisabet Llauradó [1,*], Lucia Tarro [1,2] and Rosa Solà [1,2,3]

- Elderly are more vulnerable to developing a worse nutritional status because of their lack of teeth, their loss of taste, or their poor mobility; as a consequence, these factors can affect dietary intake.
- Single, widowed, or divorced are the most malnourished or at the most risk of malnutrition.
- The elderly with low educational levels have worse nutritional status due to the lack of cooking skills or insufficient knowledge to make healthy food choices.
- There is a higher prevalence of malnutrition in people who live in rural areas.
- Another determinant of malnutrition is income level, with a strong relationship between the levels of poverty and malnutrition in the elderly.



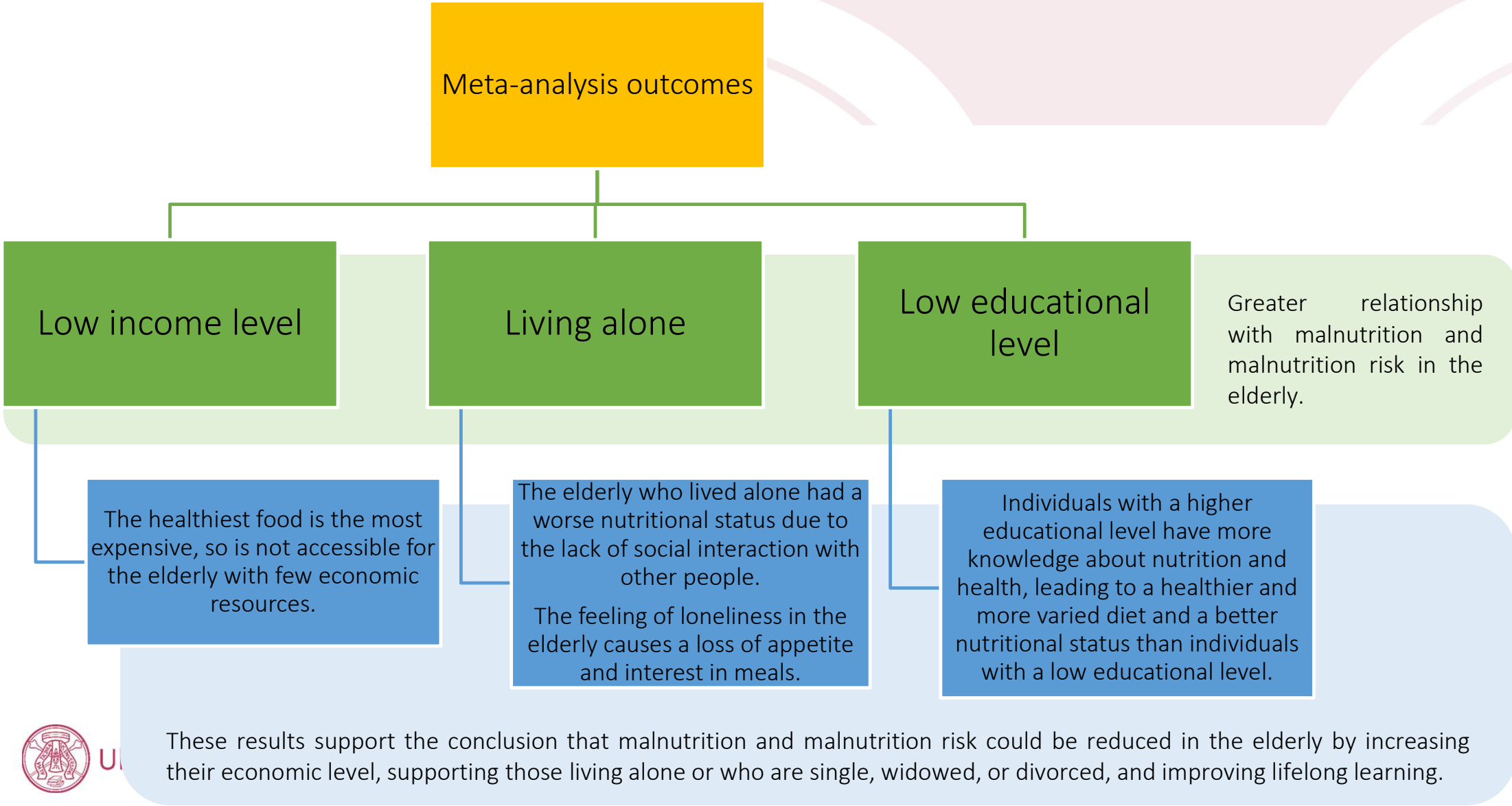

Meta-analysis outcomes
Low income level
Living alone
Low educational level
Greater relationship with malnutrition and malnutrition risk in the elderly.
The healthiest food is the most expensive, so is not accessible for the elderly with few economic resources.
The elderly who lived alone had a worse nutritional status due to the lack of social interaction with other people.
The feeling of loneliness in the elderly causes a loss of appetite and interest in meals.
Individuals with a higher educational level have more knowledge about nutrition and health, leading to a healthier and more varied diet and a better nutritional status than individuals with a low educational level.
These results support the conclusion that malnutrition and malnutrition risk could be reduced in the elderly by increasing their economic level, supporting those living alone or who are single, widowed, or divorced, and improving lifelong learning.

Table 2. Proposal of nutritional interventions to prevent malnutrition and malnutrition risk based on the socioeconomic factors presented in elderly.

Socioeconomic Factors	Nutritional Interventions
Low educational level	Create promotion and education campaigns for healthy eating [71] Form information meetings on nutrition for patients and their families [72]
Living alone Feeling of loneliness Single, widowed, divorced	Socialize during meals, avoid eating alone; go to the relative's home [72] Do group activities and share meals [72] Cook a greater quantity of food and keep it in the fridge for another day of the week
Low income level Low occupational level Low food expenditure	Buy healthy white label products Buy seasonal products Make a shopping list to avoid buying unnecessary things Make a weekly menu and adjust the grocery shop to that menu Buy basic necessities, avoid superfluous products Resort to social organizations or social programs when it is necessary [71,72]
Rural place of residence	Buy local and proximity products Cook traditional local recipes Inform the elderly about healthy eating in local shops

Malnutrition risk and malnutrition: how to evaluate them?

Screening tools, diagnostic criteria.

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Existing screening and assessment tools for malnutrition risk

	NRS-2002[12,a]	MNA-SF[21,a,b]	MUST[22,a]	ESPEN 2015[8,a]	ASPEN /AND[7,a]	SGA[4,a]	Evans 2008[5,c]	PEW 2008[23,d]	Fearon 2011[6,c]
Etiologies									
Reduced food intake	X	X	X	X	X	X		X	X
Disease burden/inflammation	X	X	X	X	X	X	X	X	X
Symptoms									
Anorexia		X				X	X		X
Weakness		X				X	X		
Signs/phenotype									
Weight loss	X	X	X	X	X	X	X	X	X
Body mass index	X	X	X	X			X	X	X
Lean/fat-free mass/muscle mass		X		X	X	X	X	X	X
Fat mass					X	X		X	
Fluid retention/ascites					X	X			
Muscle function (e.g., grip strength)					X	X	X		
Biochemistry							X	X	

AND, Academy of Nutrition and Dietetics; ASPEN, American Society of Parenteral and Enteral Nutrition; ESPEN, European Society for Clinical Nutrition and Metabolism; MNA-SF, Mini Nutritional Assessment-Short Form; MUST, Malnutrition Universal Screening Tool; NRS-2002, Nutritional Risk Screening-2002; PEW, protein-energy wasting; SGA, subjective global assessment.
[a] Malnutrition approach.
[b] Adapted for older adults.
[c] Cachexia approach.
[d] Adapted for chronic kidney disease.

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.

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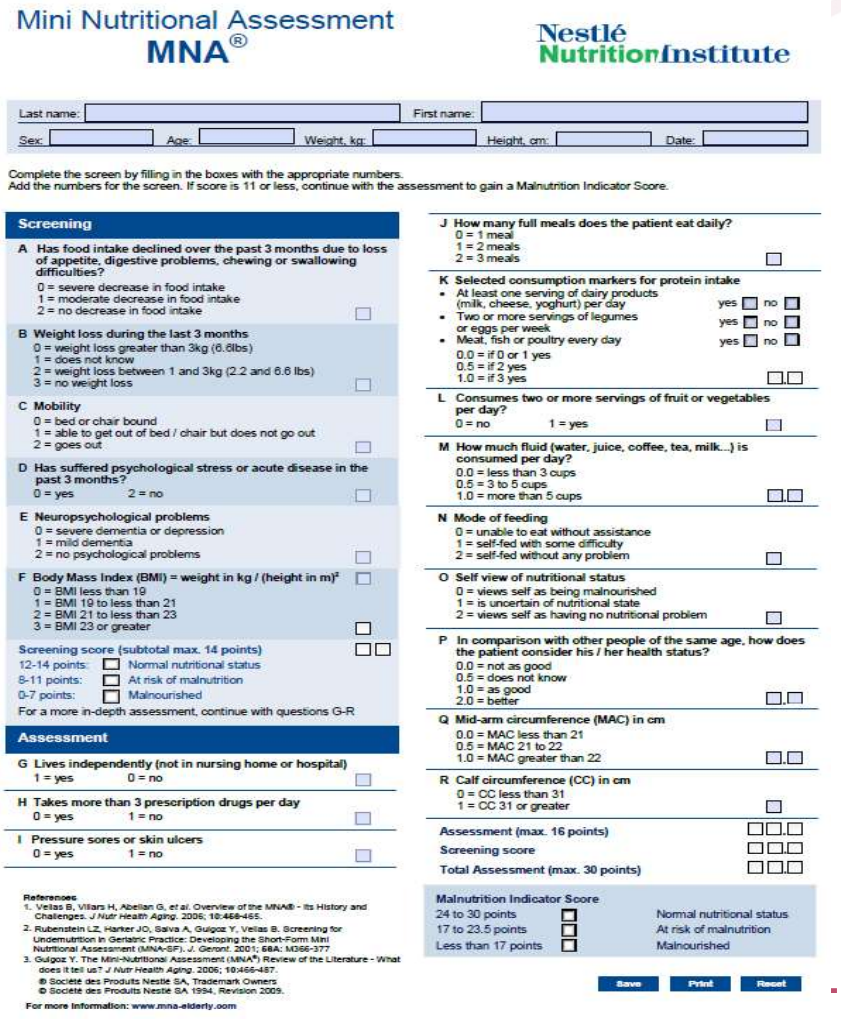
Jensen et al., Journal of Parenteral and Enteral Nutrition (2019) 43(1) 32–40
D. Volkert et al. Clinical Nutrition xxx (2018) 1-38

Screening and assessment tools for malnutrition risk

Mini Nutritional Assessment short form (MNA - SF)

- The most common screening tool developed and validated for older persons.
- In addition to standard screening parameters (BMI, weight loss, reduced intake, disease) it includes two important geriatric syndromes that contribute to the development of malnutrition (immobility and neuropsychological problems).



Mini Nutritional Assessment
MNA®

Nestlé Nutrition Institute

Last name: First name:
Sex: Age: Weight, kg: Height, cm: Date:

Complete the screen by filling in the boxes with the appropriate numbers.
Add the numbers for the screen. If score is 11 or less, continue with the assessment to gain a Malnutrition Indicator Score.

Screening

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 3kg (6.6lbs)
1 = does not know
2 = weight loss between 1 and 3kg (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

F 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

Screening score (subtotal max. 14 points)
12-14 points: Normal nutritional status
8-11 points: At risk of malnutrition
0-7 points: Malnourished
For a more in-depth assessment, continue with questions G-R

Assessment

G Lives independently (not in nursing home or hospital)
1 = yes 0 = no

H Takes more than 3 prescription drugs per day
0 = yes 1 = no

I Pressure sores or skin ulcers
0 = yes 1 = no

J How many full meals does the patient eat daily?
0 = 1 meal
1 = 2 meals
2 = 3 meals

K Selected consumption markers for protein intake
- At least one serving of dairy products (milk, cheese, yoghurt) per day yes no
- Two or more servings of legumes or eggs per week yes no
- Meat, fish or poultry every day yes no

0.0 = if 0 or 1 yes
0.5 = if 2 yes
1.0 = if 3 yes

L Consumes two or more servings of fruit or vegetables per day?
0 = no 1 = yes

M How much fluid (water, juice, coffee, tea, milk...) is consumed per day?
0.0 = less than 3 cups
0.5 = 3 to 5 cups
1.0 = more than 5 cups

N Mode of feeding
0 = unable to eat without assistance
1 = self-fed with some difficulty
2 = self-fed without any problem

O Self view of nutritional status
0 = views self as being malnourished
1 = is uncertain of nutritional state
2 = views self as having no nutritional problem

P In comparison with other people of the same age, how does the patient consider his / her health status?
0.0 = not as good
0.5 = does not know
1.0 = as good
2.0 = better

Q Mid-arm circumference (MAC) in cm
0.0 = MAC less than 21
0.5 = MAC 21 to 22
1.0 = MAC greater than 22

R Calf circumference (CC) in cm
0 = CC less than 31
1 = CC 31 or greater

Assessment (max. 16 points)
Screening score
Total Assessment (max. 30 points)

Malnutrition Indicator Score
24 to 30 points: Normal nutritional status
17 to 23.5 points: At risk of malnutrition
Less than 17 points: Malnourished

Save Print Reset

References
1. Vellas B, Villars H, Abellan G, *et al.* Overview of the MNA® - Its History and Challenges. *J Nutr Health Aging.* 2006; 10:456-465.
2. 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. Gerontol.* 2001; 56A: M366-377
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For more information: www.mna-elderly.com

M. Besora-Moreno et al. Nutrients (2020) 12, 737 BAPEN, 2011

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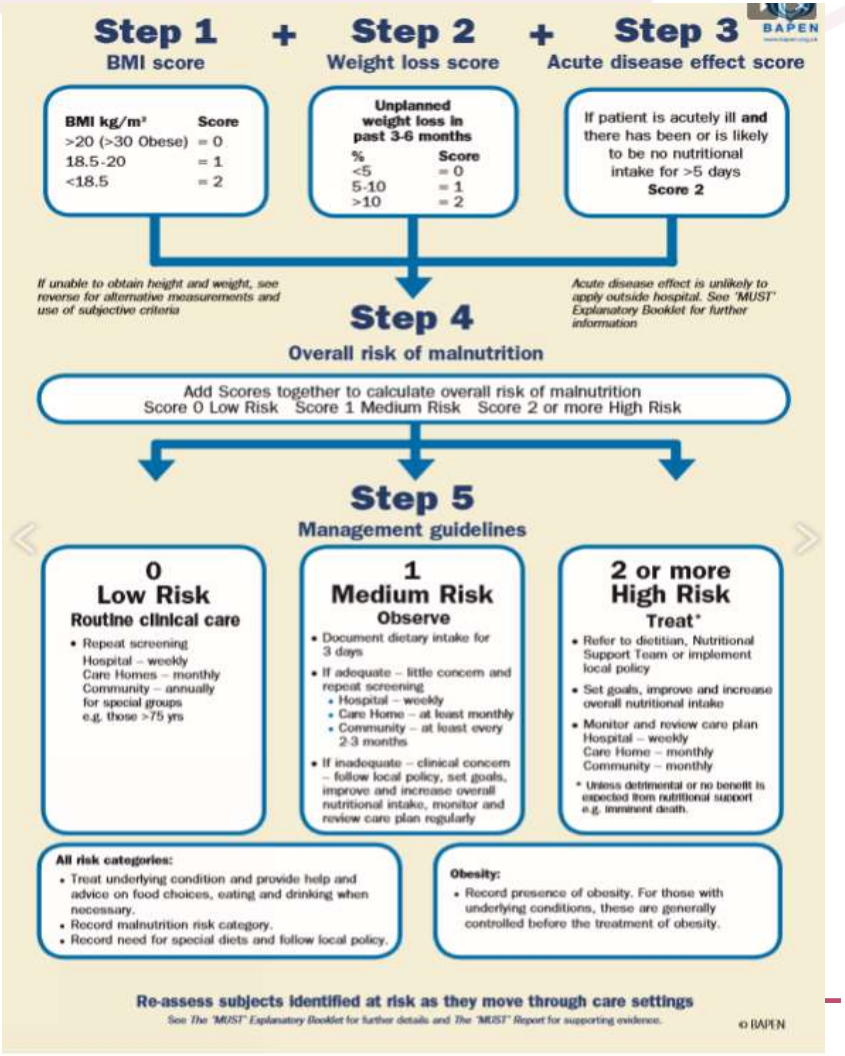
Screening and assessment tools for malnutrition risk

Malnutrition Universal Screening Tool (MUST)

- A quick and simple procedure used by nursing, medical or other staff on first contact with the subject so that clear indications for action can be implemented and appropriate nutritional advice can be provided.
- The 'MUST' can be used in patients for whom it is not possible to obtain height and weight as various alternative measures are provided.

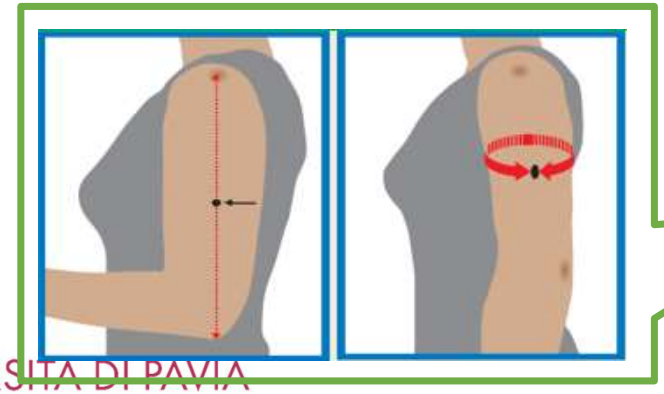


M. Besora-Moreno et al. Nutrients (2020) 12, 737 BAPEN, 2011

MNA and MUST: necessary anthropometric data

Body Mass Index (BMI) is a person's weight in kilograms divided by the square of height in meters. A high BMI can indicate high body fatness. BMI screens for weight categories that may lead to health problems, but it does not diagnose the body fatness or health of an individual. Weight category: underweight (< 18,5), healthy weight (18,5-24,9), overweight (25- 29,9), and obesity (> 30).

BMI = weight (kg)/height (m)^2



Arm circumference

GLIM Criteria for the Diagnosis of Malnutrition: A Consensus Report From the Global Clinical Nutrition Community

GLIM: Global Leadership Initiative on Malnutrition

Journal of Parenteral and Enteral Nutrition
Volume 43 Number 1
January 2019 32–40

DOI: 10.1002/jpen.1440
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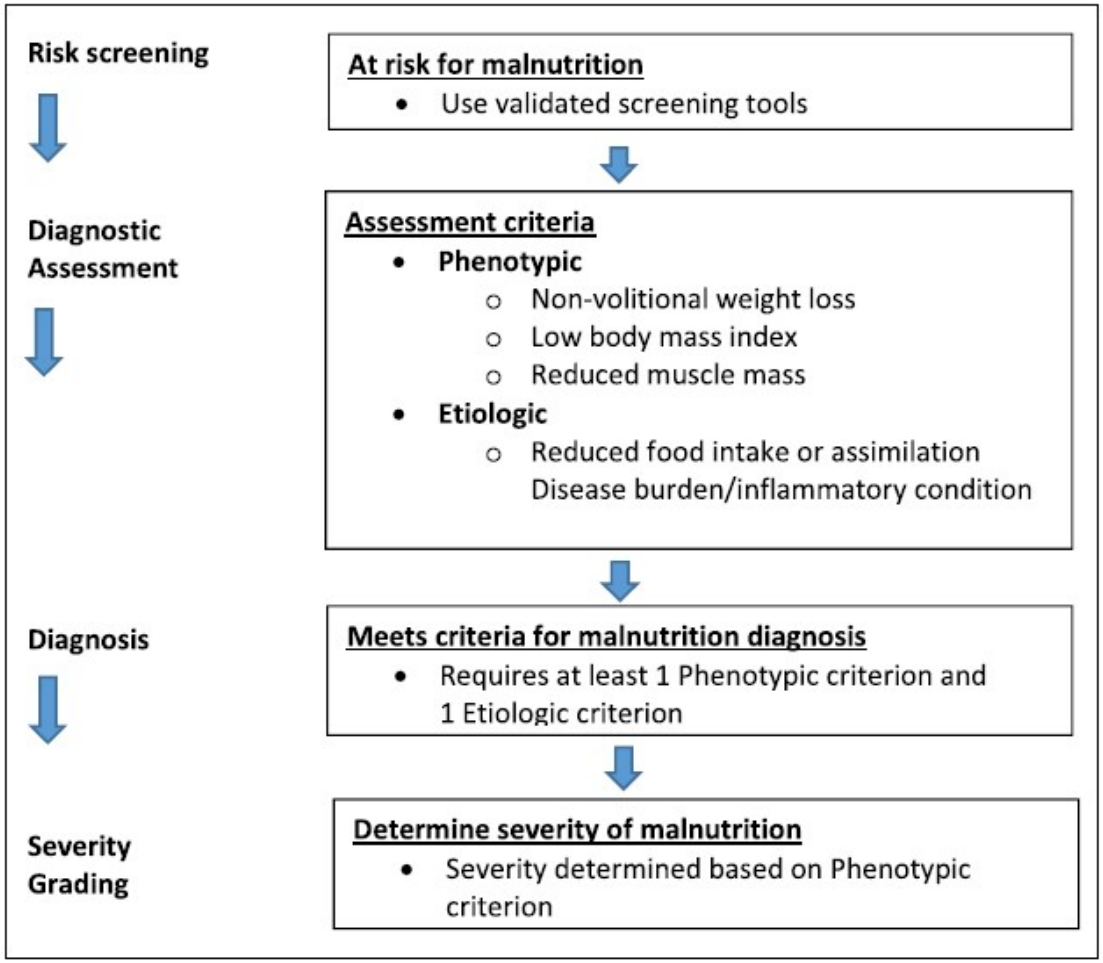
GLIM diagnostic scheme for screening, assessment, diagnosis, and grading of malnutrition.



Jensen et al., Journal of Parenteral and Enteral Nutrition (2019) 43(1) 32–40

GLIM: assessment and diagnosis of malnutrition.

Table 3. Phenotypic and Etiologic Criteria for the Diagnosis of Malnutrition.

Phenotypic Criteria[a]			Etiologic Criteria[a]	
Weight Loss (%)	Low Body Mass Index (kg/m^2)	Reduced Muscle Mass[b]	Reduced Food Intake or Assimilation[c,d]	Inflammation[e,f,g]
>5% within past 6 months, or >10% beyond 6 months	<20 if <70 years, or <22 if >70 years Asia: <18.5 if <70 years, or <20 if >70 years	Reduced by validated body composition measuring techniques[b]	≤50% of ER > 1 week, or any reduction for >2 weeks, or any chronic GI condition that adversely impacts food assimilation or absorption[c,d]	Acute disease/injury[e,g] or chronic disease-related[f,g]

For the diagnosis of malnutrition, at least 1 Phenotypic criterion and 1 Etiologic criterion is required

Jensen et al., Journal of Parenteral and Enteral Nutrition (2019) 43(1) 32–40

GLIM: severity of malnutrition.

Table 4. Thresholds for Severity Grading of Malnutrition Into Stage 1 (Moderate) and Stage 2 (Severe) Malnutrition.

	Phenotypic Criteria[a]		
	Weight Loss (%)	Low Body Mass Index (kg/m^2)[b]	Reduced Muscle Mass[c]
Stage 1/moderate malnutrition (requires 1 phenotypic criterion that meets this grade)	5%–10% within the past 6 months, or 10%–20% beyond 6 months	<20 if <70 years, <22 if ≥70 years	Mild-to-moderate deficit (per validated assessment methods; see below)
Stage 2/severe malnutrition (requires 1 phenotypic criterion that meets this grade)	>10% within the past 6 months, or >20% beyond 6 months	<18.5 if <70 years, <20 if ≥70 years	Severe deficit (per validated assessment methods; see below)

[a]Severity grading is based on the noted phenotypic criteria, whereas the etiologic criteria described in the text and Figure 1 are used to provide the context to guide intervention and anticipated outcomes.
[b]Further research is needed to secure consensus reference body mass index data for Asian populations in clinical settings.
[c]For example, appendicular lean mass index (kg/m^2) by dual-energy absorptiometry or corresponding standards using other body composition methods such as bioelectrical impedance analysis, computed tomography, or magnetic resonance imaging. When not available or by regional preference, physical examination or standard anthropometric measures such as mid-arm muscle or calf circumferences may be used. Functional assessments such as hand-grip strength may be used as a supportive measure.[15]

Jensen et al., Journal of Parenteral and Enteral Nutrition (2019) 43(1) 32–40

Muscle mass evaluation

Definition of sarcopenia, assesment and cut off

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Phenotypic Criteria[a]

Reduced Muscle Mass[b]

Reduced by validated body composition measuring techniques[b]

Considering muscle mass reduction, the GLIM group of experts refers to the European Working Group on Sarcopenia in Older People (EWGSOP)

Age and Ageing 2019; **48:** 16–31
doi: 10.1093/ageing/afy169
Published electronically 24 September 2018

GUIDELINES

Sarcopenia: revised European consensus on definition and diagnosis

Alfonso J. Cruz-Jentoft[1], Gülistan Bahat[2], Jürgen Bauer[3], Yves Boirie[4], Olivier Bruyère[5], Tommy Cederholm[6], Cyrus Cooper[7], Francesco Landi[8], Yves Rolland[9], Avan Aihie Sayer[10], Stéphane M. Schneider[11], Cornel C. Sieber[12], Eva Topinkova[13], Maurits Vandewoude[14], Marjolein Visser[15], Mauro Zamboni[16], Writing Group for the European Working Group on Sarcopenia in Older People 2 (EWGSOP2), and the Extended Group for EWGSOP2

Sarcopenia: definition

'Sarcopenia is a progressive and generalised skeletal muscle disorder that is associated with increased likelihood of adverse outcomes including falls, fractures, physical disability and mortality.'

Table 1. 2018 operational definition of sarcopenia

Probable sarcopenia is identified by Criterion 1.
Diagnosis is confirmed by additional documentation of Criterion 2.
If Criteria 1, 2 and 3 are all met, sarcopenia is considered severe.
(1) Low muscle strength
(2) Low muscle quantity or quality
(3) Low physical performance

Low muscle strength is a primary parameter of sarcopenia because is presently the most reliable measure of muscle function.

Sarcopenia is:

- probable when low muscle strength is detected
- confirmed by the presence of low muscle quantity or quality.
- Severe, when low muscle strength, low muscle quantity/quality and low physical performance are all detected.

Cruz-Jentoft et al. Age and aging (2019) 48, 16-31

Assesment of muscle strength, quality and performance

Measurement of **muscle strength**	Handgrip
	Chair stand test (5-times sit-to-stand)
Measurement of **muscle mass (ASM)**	Dual-energy X-ray absorptiometry (DEXA)
	Bioelectrical impedance analysis (BIA)
Measurement of **physical performance**	Gait speed (4-m usual walking speed test)
	Short physical performance battery (SPPB) (assessment of gait speed, a balance test, and a chair stand test)
	Timed-up-and-go test (TUG) (to rise from a standard chair, walk to a marker 3 m away, turn around, walk back and sit down again)
	400-meter walk or long-distance corridor walk (to complete 20 laps of 20 m, each lap as fast as possible, are allowed up to two rest stops during the test)

Cruz-Jentoft et al. Age and aging (2019) 48, 16-31

Assesment of muscle strength, quality and performance

Measurement of **muscle strength**	Handgrip
	Chair stand test (5-times sit-to-stand)

Grip strength is a simple and inexpensive method.

Low grip strength is a powerful predictor of poor patient outcomes such as longer hospital stays, increased functional limitations, poor health-related quality of life and death.

When measurement of grip is not possible due to hand disability, the chair stand test can be used as a proxy for strength of leg muscles.

Chair stand test: the amount of time needed for a patient to rise 5 times from a seated position without using his or her arms.

	400-meter walk or long-distance corridor walk (to complete 20 laps of 20 m, each lap as fast as possible, are allowed up to two rest stops during the test)

Cruz-Jentoft et al. Age and aging (2019) 48, 16-31

Assesment of muscle strength, quality and performance

Measurement of **muscle strength**	Handgrip
	Chair stand test (5-times sit-to-stand)
Measurement of **muscle mass (ASM)**	Dual-energy X-ray absorptiometry (DEXA)
	Bioelectrical impedance analysis (BIA)

- **Muscle quantity** can be reported as Appendicular Skeletal Muscle Mass (ASM).
- Magnetic resonance imaging, computed tomography: gold standards for non-invasive assessment of muscle mass → these tools are not commonly used in primary care because of high equipment costs, lack of portability, and the requirement for highly-trained personnel.
- DEXA → more widely available instrument to determine muscle quantity non-invasively, in a few minutes, BUT instrument is not yet portable for use in the community.
- BIA → derives an estimate of muscle mass based on whole-body electrical conductivity, using specific conversion equations and raw measures. Equipment is affordable, widely available and portable.

Cruz-Jentoft et al. Age and aging (2019) 48, 16-31

Assesment of muscle strength, quality and performance

- **Physical performance:** an objectively measured whole-body function related to locomotion.
- **Gait speed** → quick, safe and highly reliable test for sarcopenia. A commonly used gait speed test is called the 4-m usual walking speed test, in which speed is measured.
- **SPPB** → a composite test that includes assessment of gait speed, a balance test, and a chair stand test.
- **TUG** → evaluates physical function
- **400-m walk test** → assesses walking ability and endurance
- All these physical performance tests can be performed in most clinical settings.

Measurement of **physical performance**

Gait speed (4-m usual walking speed test)
Short physical performance battery (SPPB) (assessment of gait speed, a balance test, and a chair stand test)
Timed-up-and-go test (TUG) (to rise from a standard chair, walk to a marker 3 m away, turn around, walk back and sit down again)
400-meter walk or long-distance corridor walk (to complete 20 laps of 20 m, each lap as fast as possible, are allowed up to two rest stops during the test)

Cruz-Jentoft et al. Age and aging (2019) 48, 16-31

Cut-off points

Table 3. EWGSOP2 sarcopenia cut-off points

Test	Cut-off points for men	Cut-off points for women
EWGSOP2 sarcopenia cut-off points for low strength by chair stand and grip strength		
Grip strength	**<27 kg**	**<16 kg**
Chair stand	**>15 s for five rises**	
EWGSOP2 sarcopenia cut-off points for low muscle quantity		
ASM	**<20 kg**	**<15 kg**
ASM/height^2	**<7.0 kg/m^2**	**<5.5 kg/m^2**
EWGSOP2 sarcopenia cut-off points for low performance		
Gait speed	**≤0.8 m/s**	
SPPB	**≤8 point score**	
TUG	**≥20 s**	
400 m walk test	**Non-completion or ≥6 min for completion**	

Cruz-Jentoft et al. Age and aging (2019) 48, 16-31

Malnutrition: what to do?

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

ESPEN guideline on clinical nutrition and hydration in geriatrics, 2018

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ESPEN Guideline

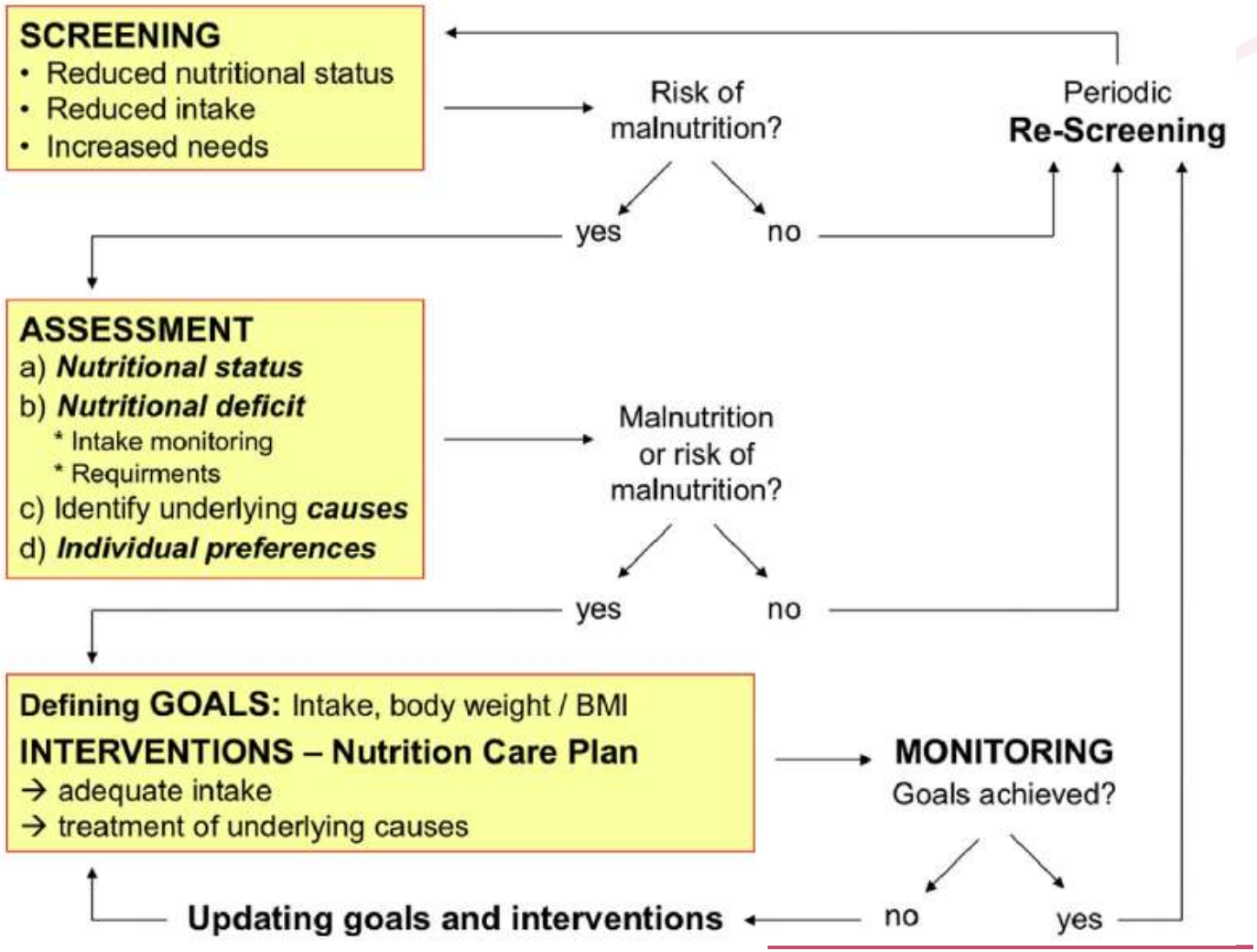
ESPEN guideline on clinical nutrition and hydration in geriatrics

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

D. Volkert et al. Clinical Nutrition xxx (2018) 1-38

Nutritional care process for older persons

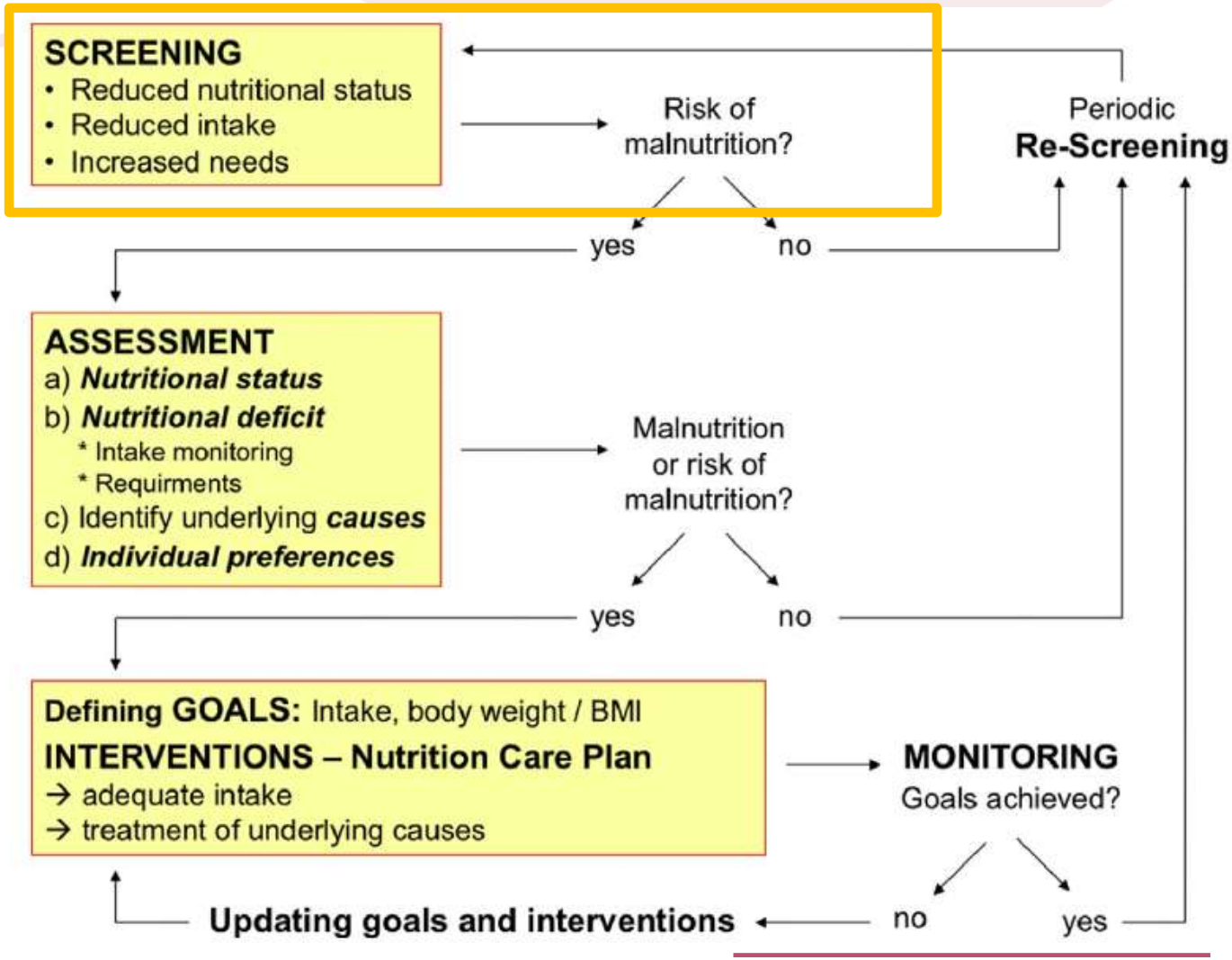
- The flow chart indicates the nutritional care process that should be used in the elderly population.
- The process of nutritional care for older persons consists of several steps which are based on systematic screening for malnutrition.
- If there are any indicators of nutritional risk, a detailed assessment should follow to verify the diagnosis of malnutrition and as a basis for the definition of individual treatment goals and the development of a comprehensive nutritional care plan.
- Interventions need to be implemented, checked for their effectiveness and adjusted if necessary until treatment goals are achieved.



D. Volkert et al. Clinical Nutrition xxx (2018) 1-38

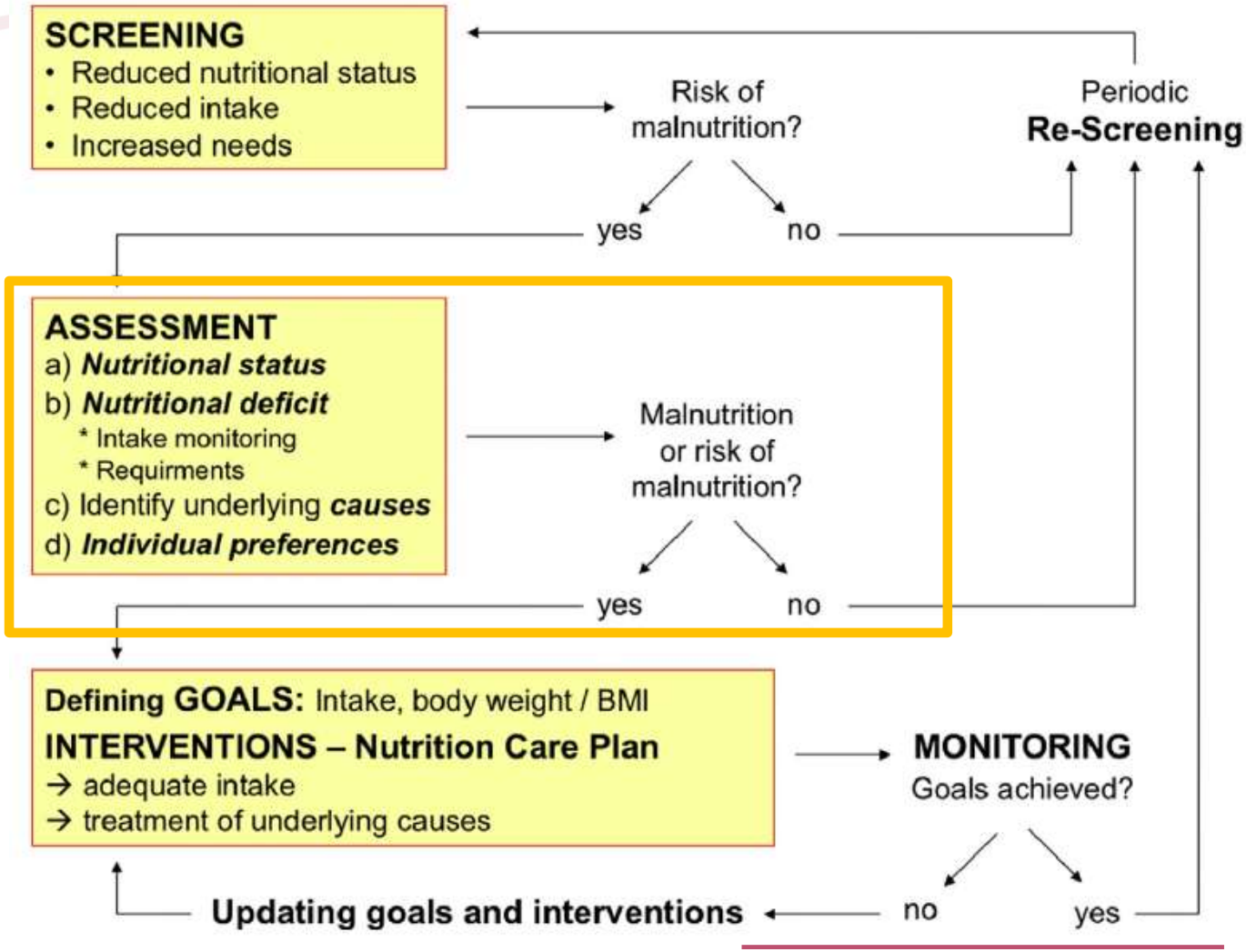
Screening

The screening of malnutrition risk using a validated tool.



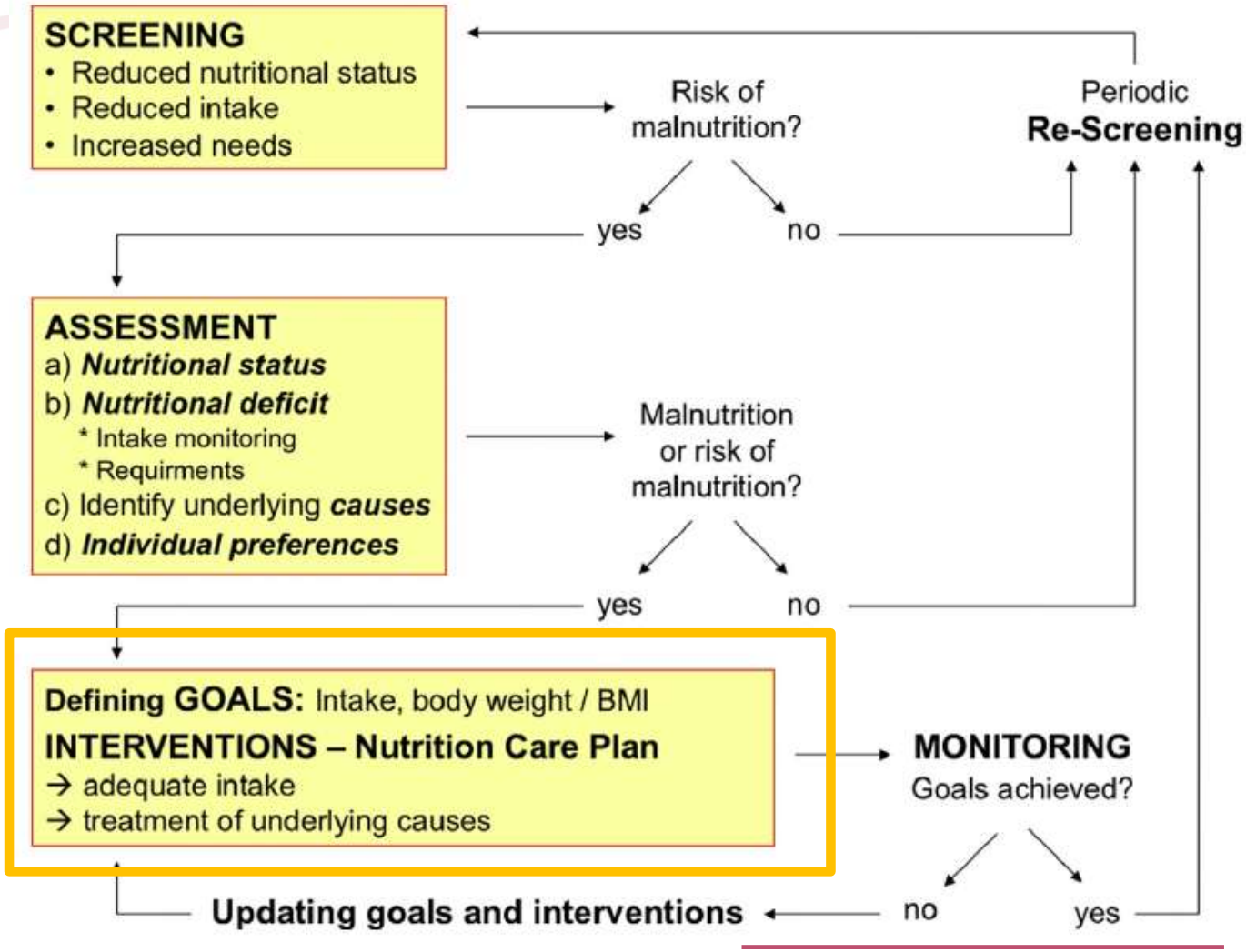
Assessment

- In individuals who are identified as malnourished or at risk of malnutrition by screening, a **comprehensive nutritional assessment** should follow, providing information on kind and severity of malnutrition and its underlying causes as well as on individual preferences (regarding food and beverages) and resources (e.g. chewing and swallowing ability, eating dependence, gastrointestinal function, severity of disease, general prognosis) for nutritional therapy.
- **Dietary intake monitoring** is recommended for several days in order to estimate the amount of food and fluid consumed and relate dietary intake to individual requirements.



Nutritional intervention

- Based on the screening and assessment results, individual **goals** regarding dietary intake and body weight/BMI should be defined, and an individual nutrition care plan developed and implemented in an interdisciplinary team approach.
- All aspects of the patient - physical and mental/psychic, social, clinical as well as ethical - should be considered, and all options used to ensure an adequate dietary intake. Dietetic, nursing and medical actions should be implemented in a coordinated manner.



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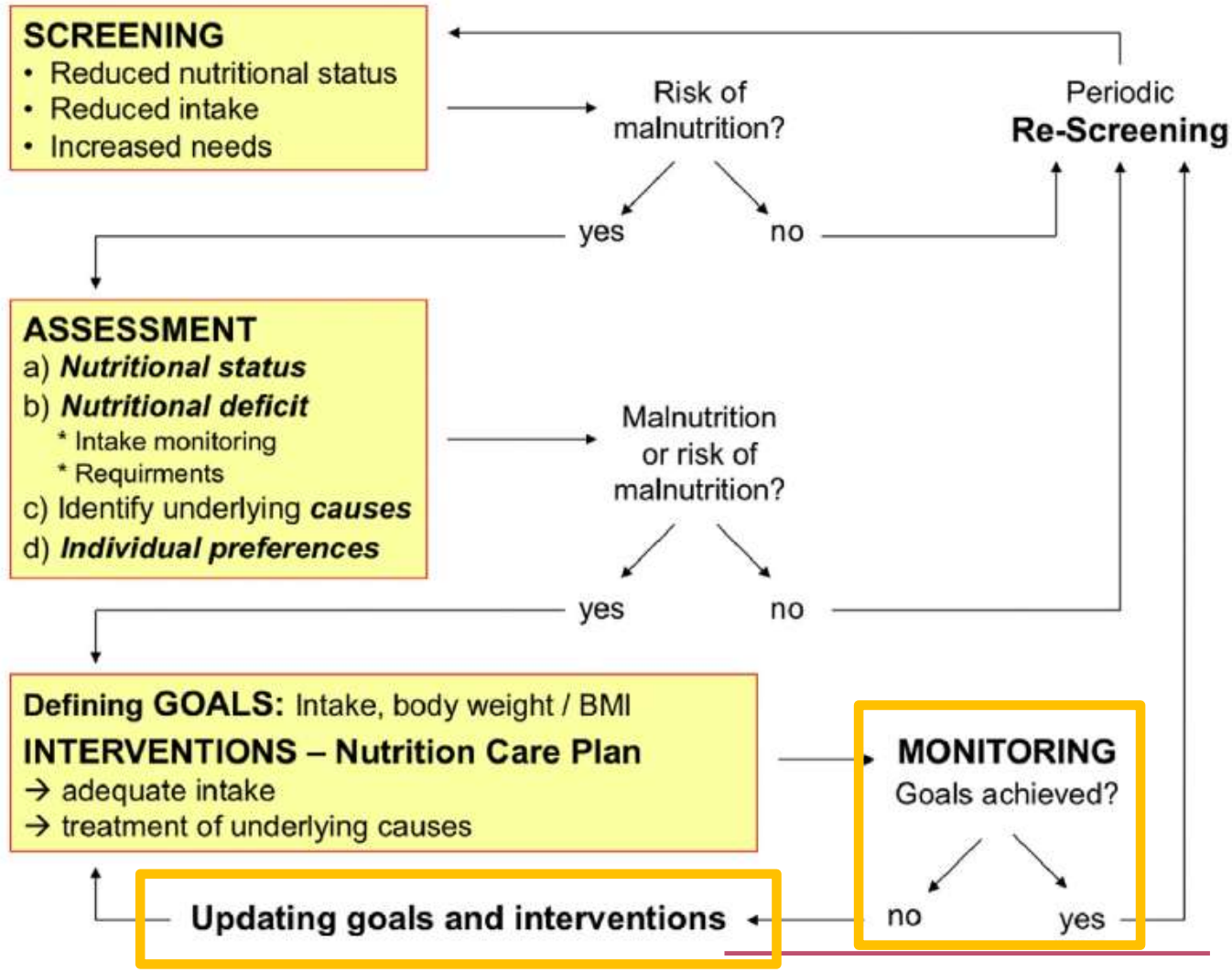
Monitoring

- The intervention process needs to be monitored, and reassessments should be performed in regular intervals, in order to check if goals are achieved.
- If this is not the case, goals and interventions have to be modified and adjusted according to experienced problems and the new situation.
- In the hospital setting, it is important to initiate adequate nutritional care after discharge at home and to ensure the continuation of the nutritional strategy started in hospital.
- Since nutritional therapy may require various persons and professions, all interventions should be coordinated and agreed with all parties involved.
- Intensive communication with the patient and his or her family should take place during the whole process, in order to learn and consider wishes and expectations of the person concerned.



What diet in the elderly to prevent malnutrition?

Energy intake

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.

Energy requirements are influenced by:

- Body composition → in elderly fat-free mass decreases
- Gender
- Nutritional status
- Physical activity
- Clinical condition

➢ With increasing age, resting energy expenditure (REE) is generally decreasing

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Protein

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.

- Based on growing evidence from experimental and epidemiological research older people might need a high 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.
- 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.
- It is important to include a moderate portion of high biological value protein with each meal, providing the daily protein intake equally in the elderly at breakfast, lunch and dinner, to maximize muscle protein synthesis.

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Micronutrients

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

- Dietary recommendations for micronutrients for older persons do not differ from those for younger adults.
- Due to an increasing prevalence of gastrointestinal diseases, which are accompanied by reduced nutrient bioavailability (e.g. atrophic gastritis and impaired vitamin B12, calcium and iron absorption), older persons are at increased risk of micronutrient deficiencies, which should be corrected by supplementation.

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Water

A range of appropriate (i.e. hydrating) drinks should be offered to older people according to their preferences.

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

- Drinks should be chosen according to the preferences of the older person, as well as the drinks' fluid and nutritional content.
- A wide range of age-related physiological changes increase dehydration risk. Aging appears to blunt two key physiological (and protective) responses to drinking too little, thirst and primary urine concentration by the kidney. In addition our total body water is reduced as we get older so we have a smaller fluid reserve.
- Besides physiological changes, a range of other risk factors increase vulnerability to dehydration with age. Memory problems may cause older adults to forget to drink and forget that they haven't drunk (not being prompted to drink by thirst).
- 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.

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Carbohydrates and lipids

Carbohydrates and lipids should be delivered according to the recommendation for healthy older persons. Dietary recommendations do not differ from those for younger adults.

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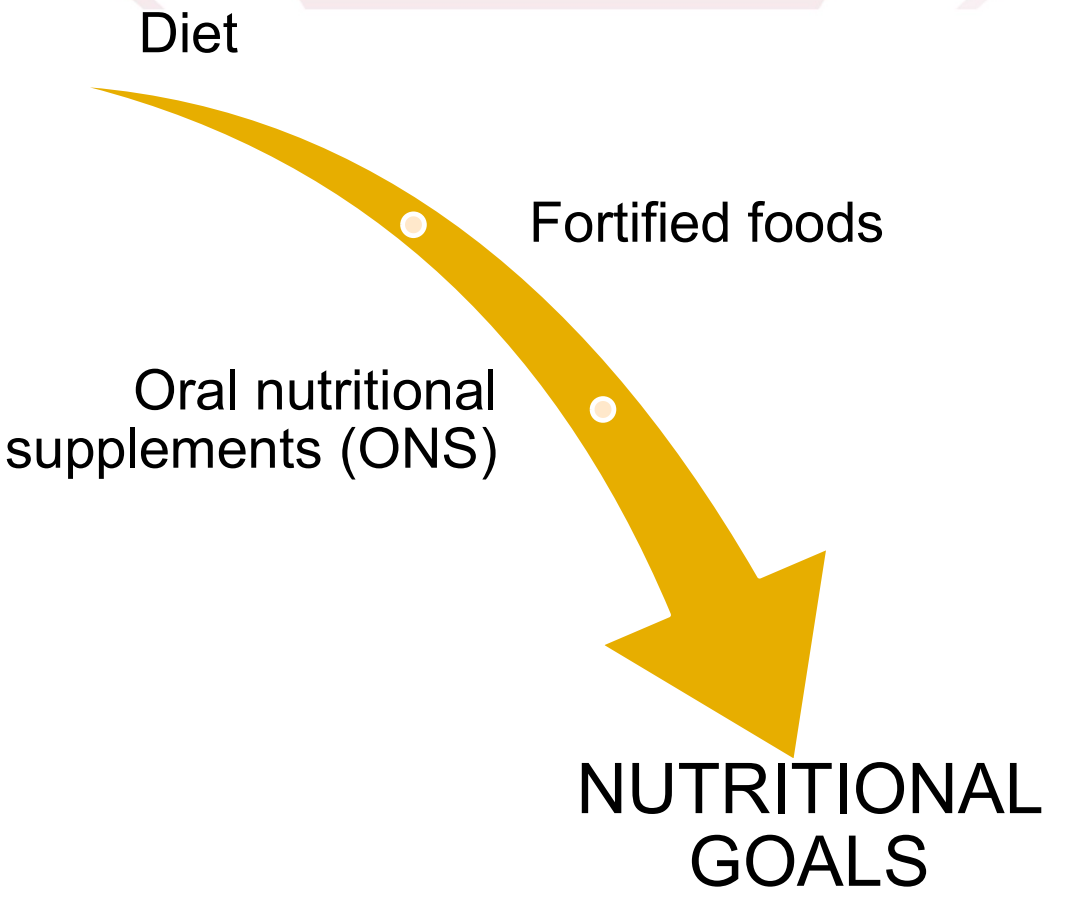
If diet alone is insufficient to meet daily nutritional requirements…

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

- ✓ 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.
- ✓ In order to facilitate dietary intake additional snacks, and/or finger food could be offered.

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



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Oral nutritional supplements (ONS)

- 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), volumes, types (high protein, fiber containing), energy densities (1 to 3 kcal/ml) and flavors available to suit a wide range of needs and requirements.

- They are classified:
  - "high protein" when they provide >20% of energy from protein
  - "high energy" when they provide >1.5 kcal/ml or gram.

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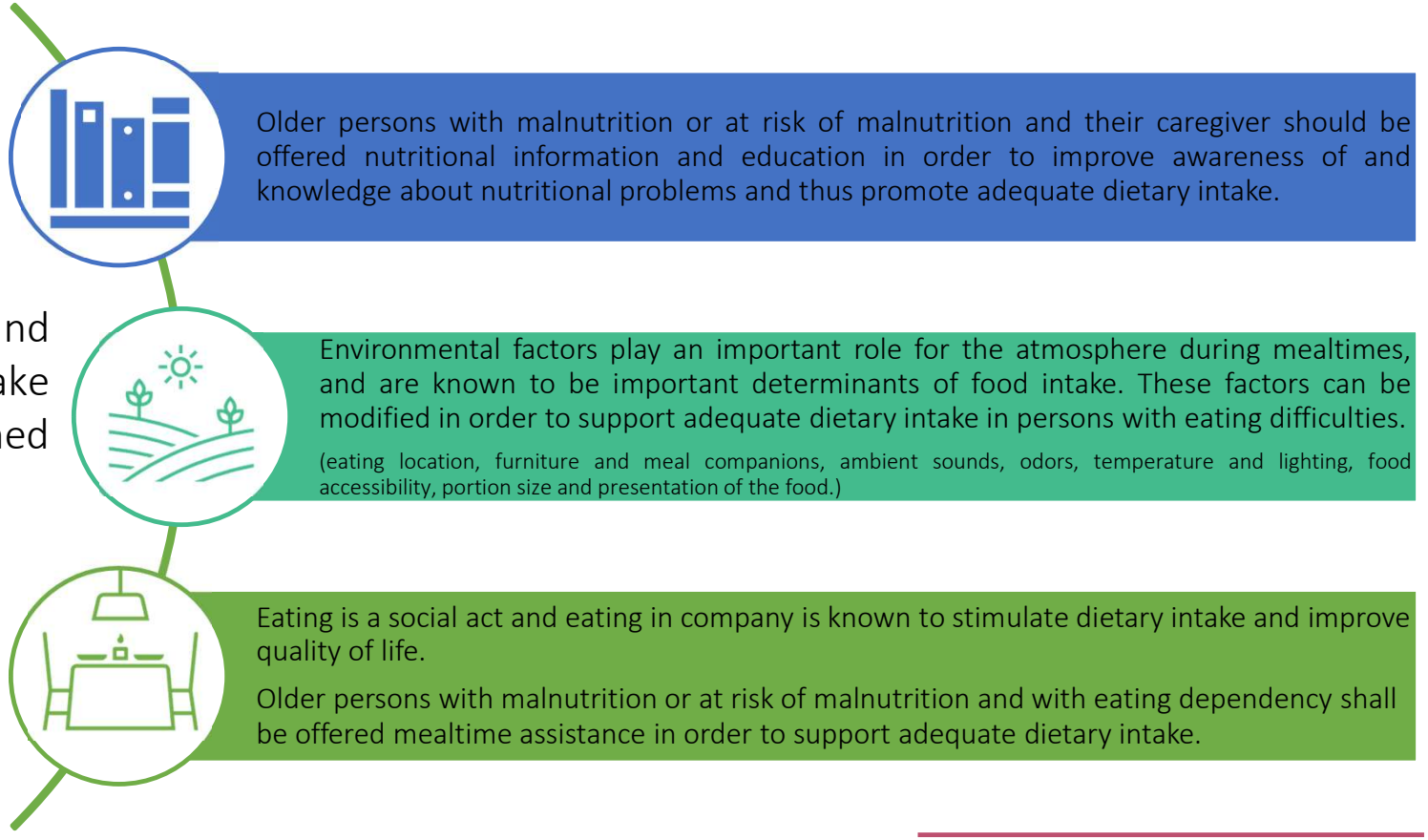
Important factors for the nutrition in elderly.

Several factors can improve and promote the correct nutritional intake in the elderly who are malnourished or at risk of malnutrition.



Older persons with malnutrition or at risk of malnutrition and their caregiver should be offered nutritional information and education in order to improve awareness of and knowledge about nutritional problems and thus promote adequate dietary intake.

Environmental factors play an important role for the atmosphere during mealtimes, and are known to be important determinants of food intake. These factors can be modified in order to support adequate dietary intake in persons with eating difficulties.

(eating location, furniture and meal companions, ambient sounds, odors, temperature and lighting, food accessibility, portion size and presentation of the food.)

Eating is a social act and eating in company is known to stimulate dietary intake and improve quality of life.

Older persons with malnutrition or at risk of malnutrition and with eating dependency shall be offered mealtime assistance in order to support adequate dietary intake.

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Not only nutrition… physical activity

In older people weight loss occurs at the expense of muscle mass and is associated with impaired physical function.

Muscle is still able to react on anabolic stimuli of exercise training. Consequently the decline in muscle function is at least partly reversible by adequate exercise interventions.

In addition to nutritional interventions, older persons with malnutrition or at risk of malnutrition should be encouraged to be physically active and to exercise in order to maintain or improve muscle mass and function.

During periods of exercise interventions, adequate amounts of energy and protein should be provided in order to maintain body weight and to maintain or improve muscle mass.

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The End

Thank you for your attention!

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