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CURRENT APPROACH IN MALNUTRITION MANAGEMENT: role of low lean mass

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OUTLINE

- Physician’s blind spot
- Available screening tools
- ONS role in addressing malnutrition
- Take Home Messages
PHYSICIAN’S BLIND SPOT:
Nutrition therapy: little attention among medical practitioners

LOW NUTRITION AWARENESS
Nutrition education was lacking in preclinic medical school¹

PATIENTS + FAMILIES DO WORRY

HERBS, DIETARY SUPPLEMENTS - LIMITED SCIENTIFIC EVIDENCE

Frailty state among Indonesian elderly: prevalence, associated factors, and frailty state transition

https://doi.org/10.1186/s12877-019-1198-8
Diagnostic Criteria for Malnutrition

**WHO¹**: deficiencies, excesses or imbalances in a person’s intake of energy and/or nutrients

**ESPEN²**
- Significant unintentional weight loss
- Significant reduced body mass (BMI) or fat free mass index

**Global Consensus (GLIM)³**: Combination of at least 1 phenotypic criterion **AND** 1 etiologic criterion should be present

**Phenotypic Criteria**

<table>
<thead>
<tr>
<th>Non-volitional Weight Loss</th>
<th>Low BMI (ASIA)</th>
<th>Reduced Muscle Mass (ASIA)</th>
</tr>
</thead>
</table>
| ➢ >5% within the past 6 months  
OR ➢ >10% beyond 6 months | ➢ age <70 years old ➔ <18.5 kg/m²  
OR ➢ age >70 years old ➔ <20 kg/m² | ➢ **AWGS:**
| | | ➢ DXA
σ <7 kg/m²; ♀ <5.4 kg/m²  
➢ BIA
σ <7 kg/m²; ♀ <5.7 kg/m² |

**NOTE**: severe malnourished when >10% within the past 6 months

**Etiologic Criteria**

<table>
<thead>
<tr>
<th>Reduced food intake or assimilation</th>
<th>Inflammation</th>
</tr>
</thead>
<tbody>
<tr>
<td>➢ Any reduction for &gt;2 weeks OR ➢ Any chronic GI condition that adversely impacts food assimilation or absorption</td>
<td>➢ Acute disease/ injury OR ➢ Chronic disease-related</td>
</tr>
</tbody>
</table>

**NOTE**: for severe malnourished criteria in Asia, further research is needed to secure consensus

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²ESPEN guideline on clinical nutrition and hydration in geriatrics. 2018
Key Principles in advancing patient nutrition

1. Recognize & diagnose all patients at risk
2. Use valid SCREENING TOOLS
   Include malnutrition characteristics in MR
3. Implement prompt intervention & continue monitoring
4. Intervention within 24 hour for patient at risk
5. Redefine roles to include nutrition
6. Discharge nutrition care & education plan
7. Communicate nutrition care plan
8. Ensure nutrition care plan during discharge
   Educate patient and their families
9. Improve nutrition documentation

## When to Screen and Rescreen

<table>
<thead>
<tr>
<th>SETTING</th>
<th>SCREEN</th>
<th>RESCREEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community</td>
<td>At initial visit with a health care professional&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Annually&lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
<tr>
<td>Outpatients</td>
<td>At first contact with a health care professional&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Every 3 months&lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
<tr>
<td>Inpatients</td>
<td>Within 24 hours of admission&lt;sup&gt;1,2&lt;/sup&gt;</td>
<td>At least weekly&lt;sup&gt;1,2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Long-term Care</td>
<td>At admission or within 14 days of admission&lt;sup&gt;1,2&lt;/sup&gt;</td>
<td>Every 3 months&lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
<tr>
<td>Home Care</td>
<td>On initial home care visit&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Whenever a change in clinical condition occurs&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Monitor more frequently whenever a change in clinical condition occurs

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4. Nutrition Screening as easy as mna: a guide to completing the MNA-SF. NestleNutritionInstitute
AVAILABLE SCREENING TOOLS

- **Nutrition Screening:**
  - To identify those subjects at risk for nutritional problems (malnourished or at risk for malnutrition)
  - Nutrition screening ≠ nutrition assessment
  - Screening tools → simple and quick to administer
  - Outcome: need for assessment

**AVAILABLE SCREENING TOOLS**

- **MST**
  - Malnutrition Screening Tool

- **MNA**
  - *Short form*
  - Mini Nutritional Assessment

- **MUST**
  - Malnutrition Universal Screening Tool

- **NUFE**
  - Nutritional Form for the Elderly

- **SNAQRC**
  - Short Nutritional Assessment Questionnaire-Residential Care

**NRS-2002**
- Nutritional Risk Screening

**GNRI**
- Geriatric Nutritional Risk Index

**DETERMIN**
- Disease
  - Eating poorly
  - Tooth loss/mouth pain
  - Economic hardship
  - Reduced social contact
  - Multiple medicines
  - Involuntary weight loss
  - Need assistance in self care
  - Elder years above age 80

APPETITE - an indicator of health

<table>
<thead>
<tr>
<th>Parameter measured</th>
<th>Weight change s</th>
<th>Appetite</th>
<th>Intake</th>
<th>BMI</th>
<th>Acute disease</th>
<th>Mobility</th>
<th>Dementia / depression</th>
<th>Age</th>
<th>Suppl / Tube feed</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST</td>
<td>At risk score: ≥ 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MNA-SF</td>
<td>At risk score: ≤ 11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MUST</td>
<td>At risk score: ≥ 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NRS-2002</td>
<td>At risk score: ≥ 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SNAQ</td>
<td>At risk score: ≥ 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MST: Quick, Simple, & Valid for inpatient & outpatient

1. Have you lost weight recently without trying?
   - No: 0
   - Unsure: 2

2. If Yes, how much weight (kg) have you lost?
   - 1 – 5: 1
   - 6 – 10: 2
   - 11 – 15: 3
   - > 15: 4
   - Unsure: 2

   Weight Loss Score: 

2. Have you been eating poorly because of a decreased appetite?
   - No: 0
   - Yes: 1

   Appetite Score: 

Total MST Score (weight loss + appetite scores) 

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Nutrition Assessment

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td><strong>Anthropometry:</strong> weight, height, BMI, skin fold, mid-upper arm, waist, thigh, calf circumference</td>
</tr>
<tr>
<td>B</td>
<td><strong>Biochemical &amp; Body composition</strong></td>
</tr>
<tr>
<td>C</td>
<td><strong>Clinical:</strong> comprehensive geriatric assessment (comorbidities, cognitive, mental, functional, &amp; socio-economic status, medications, etc.), <strong>physical examination</strong> (weight loss, loss of subcutaneous fat, muscle atrophy, edema, oral &amp; dental problems, signs of micronutrient deficiencies)</td>
</tr>
<tr>
<td>D</td>
<td><strong>Dietary assessment:</strong> dietary intake (<strong>prospective:</strong> e.g. 3-day or 7-day food diary; <strong>retrospective:</strong> e.g. 24-hour food recall, FFQ), appetite, swallowing &amp; GI function, restrictive diets, weight loss</td>
</tr>
<tr>
<td>E</td>
<td><strong>Ecological/ Environment</strong></td>
</tr>
</tbody>
</table>

The process of collecting & assessing data (A-B-C-D-E) in order to:

a. identify malnutrition risk factors  
b. establish nutritional diagnosis  
c. develop an appropriate nutrition therapy plan  
d. evaluate effects of interventions

### Cut-offs suggested in the major screening tools.

<table>
<thead>
<tr>
<th>Phenotypic criteria</th>
<th>Low body mass index (kg/m²)</th>
<th>Reduced muscle mass/muscle function</th>
<th>Etiologic criteria</th>
<th>Severe disease/inflammation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NRS-2002 [12]</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>&gt;5% in 3 mo</td>
<td>NS</td>
<td>50–75% of required preceding week</td>
<td>E.g. hip fracture, chronic disease</td>
</tr>
<tr>
<td>Moderate</td>
<td>&gt;5% in 2 mo</td>
<td>18.5–20.5</td>
<td>25–60% of required preceding week</td>
<td>E.g. major abdominal surgery, stroke</td>
</tr>
<tr>
<td>Severe</td>
<td>&gt;5% in 1 mo</td>
<td>&lt;18.5</td>
<td>0–25% of required preceding week</td>
<td>E.g. head injury, bone marrow transplantation, intensive care</td>
</tr>
<tr>
<td><strong>MNA-SF² [21]</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>1–3 kg in last months</td>
<td>21–23</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Moderate</td>
<td>“Does not know”</td>
<td>19–21</td>
<td>“Does not go out”</td>
<td>NS</td>
</tr>
<tr>
<td>Severe</td>
<td>&gt;3 kg last months</td>
<td>&lt;19</td>
<td>Bed or chair bound</td>
<td>Mild dementia</td>
</tr>
<tr>
<td><strong>MUST [22]</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium risk</td>
<td>5–10% in 3–6 mo</td>
<td>18.5–20</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>High risk</td>
<td>&gt;10% in 3–6 mo</td>
<td>&lt;18.5</td>
<td>Acute illness AND no food intake for &gt;5 d</td>
<td>NA</td>
</tr>
<tr>
<td><strong>SGA [4]</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate/Stage B</td>
<td>5–10% past 6 mo</td>
<td>NA</td>
<td>Mild to moderate deficits in function or muscle mass</td>
<td>“Definite decrease”</td>
</tr>
<tr>
<td>Severe/Stage C</td>
<td>&gt;10% past 6 mo</td>
<td>NA</td>
<td>Severe deficit in function</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>ASPEN/AND 2012 [7]</strong></td>
<td></td>
<td></td>
<td>Mild muscle loss</td>
<td>&lt;75% of ER for 7 d-3 mo</td>
</tr>
<tr>
<td>Moderate</td>
<td>1–2% in 1 w to 20% in 1 y</td>
<td>NA</td>
<td>Moderate to severe muscle loss, or reduced grip strength</td>
<td>&lt;50% of ER for &gt;5 d-&lt;1 mo</td>
</tr>
<tr>
<td>Severe</td>
<td>&gt;2% in 1 week to &gt;20% in 1 year</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ESPEN 2015 [8]</strong></td>
<td></td>
<td></td>
<td>FFMI &lt;15 kg/m² (f), &lt;17 kg/m² (m)</td>
<td>According to any validated tool</td>
</tr>
</tbody>
</table>

Causes of Malnutrition

- Psychological, socio-economic, cultural problems
- Decreased appetite
- Decreased dietary intake
- Iatrogenic drug's side effects
- Age-related changes
- Diseases

MALNUTRITION

Complication

## Causes of Involuntary Weight Loss in Elderly

<table>
<thead>
<tr>
<th>M</th>
<th>Medication effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Emotional problems</td>
</tr>
<tr>
<td>A</td>
<td>Anorexia nervosa</td>
</tr>
<tr>
<td>L</td>
<td>Late-life paranoia</td>
</tr>
<tr>
<td>S</td>
<td>Swallowing disorders</td>
</tr>
<tr>
<td>O</td>
<td>Oral factors</td>
</tr>
<tr>
<td>N</td>
<td>No money</td>
</tr>
<tr>
<td>W</td>
<td>Wandering &amp; other dementia-related behaviors</td>
</tr>
<tr>
<td>H</td>
<td>Hyperthyroidism, Hypothyroidism, Hyperparathyroidism</td>
</tr>
<tr>
<td>E</td>
<td>Enteric problems</td>
</tr>
<tr>
<td>E</td>
<td>Eating problems</td>
</tr>
<tr>
<td>L</td>
<td>Low-salt, Low-cholesterol diet</td>
</tr>
<tr>
<td>S</td>
<td>Social problems</td>
</tr>
</tbody>
</table>

Muscle mass plays a very important role in patient recovery. Nutritional intervention can help improve recovery outcomes.

- To keep the body from turning to muscle mass to meet metabolic needs, intervention with nutritional supplements should be initiated at an early stage of metabolic stress. This helps preserve muscle mass and improve recovery.

- As an alternative energy source, muscle mass partially compensates for metabolic needs that increase during stress.

- Loss of muscle mass (or recent non-volitional weight loss during sickness) is associated with increased risk of hospital complications such as infections due to reduced immunity, pressure sores, reduced wound healing and in acute cases may even cause death.

Early Nutrition Intervention associated with reduction of:

- Complication rate<sup>1,2</sup>
- Length of stay<sup>1,3</sup>
- Readmission rate<sup>1,3</sup>
- Mortality risk<sup>1,4</sup>
- Cost of care<sup>1,3</sup>

Nutritional support was a protective factor for complications in at-risk patients (OR 0.54; p< 0.001)

Decreased a 1.9 day (21.5%)

13.1% reduction

Results of a large meta-analysis showed that nutritional supplementation lowered risk of death by more than 20% in undernourished elderly patients

12.5% cost reduction

Initiating ONS within 24 hours of admission promotes fast recovery — reducing length of stay (26%) and chances of readmission within 30 days (29%)<sup>5</sup>

ONS can be integrated into any existing nutrition screening protocols at hospitals or private clinics.
STRATEGIES TO TACKLE MALNUTRITION

In most cases malnutrition can be treated:

- **Dietary Counseling** to increase food intake
- **Oral Nutritional Supplements (ONS)** to improve nutritional status
- **Enteral tube feeding. Parenteral nutrition**

Does not meet 50-70% nutrient goals with food + ONS

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**What it is?**
- Multi-nutrient liquid, semi-solid, or powder
- provide both macronutrients and micronutrients with high quality
- Energy dense, typically between 1 to 2.4 Kcal/ml
- Scientifically designed based on people’s nutritional need

**Usage:**
- Typically used on top of normal diet
- Can be used between meals like a snack, first thing in the morning or before bed
- ONS not only increase energy and protein intake, but also the intake of micronutrients

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Energy Requirements

**Rule of Thumb**

- Energy Requirement for elderly ≈ 30 Kcal/KgBW/day → individually adjusted with regard to gender, nutritional status, physical activity level, disease status, and tolerance.¹,²

- In healthy and sick elderly,² REE 20 Kcal/KgBW/day → ♂ > ♀; ↑ ≈ ↓ IMT →
  - Usual activity level between 1,2-1,8 → TEE ≈ 24-36 Kcal/KgBW/day²
  - Underweight BMI → TEE ≈ 32-38 Kcal/KgBW/day²
  - Minimal requirement for sick elderly → TEE ≈ 27-30 Kcal/KgBW/day²

- Energy requirement may increase to 30-35 Kcal/Kg BW/day in geriatric patient with severe metabolic stress (e.g. infection, burns, pressure ulcer, etc.)¹,²

→ **START LOW GO SLOW** to prevent **REFEEDING SYNDROME**

**Note:** total EE may be lower during illness due to ↓ physical activity, though stress metabolism ↑ EE and BMR may be similar in healthy & sick elderly (when adjusted for BW & FFM)

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The Importance of Protein in ONS Intervention

- **Decreased usual protein intake** (e.g., anorexia, GI problems)
- **Reduced ability to use available protein** (e.g., insulin resistance, immobility, high splanchnic extraction)
- **Greater need for protein** (e.g., inflammatory disease, oxidative modification of proteins)

Loss of functionality (muscle, bone, immune systems)

Low protein intake and loss of lean body mass

- Muscle loss is greatest when protein intake is lowest
- Standard protein intake balance may not be sufficient in older people

Adjusted lean mass (LM) loss by quintile of energy-adjusted total protein intake

Protein intake in grams per kg body weight per day, by quintile

Protein Requirement

- Protein requirement in the elderly > young adult → PROT-AGE recommends 1.0-1.2 gram protein/KgBW/day for healthy elderly. 1-3

- Paddon-Jones et al. 4 and Layman 5 suggested that it is important to consume 25-30 gram of protein at each meal to maximize muscle protein synthesis in order to prevent loss of muscle mass and function (sarcopenia).

- In general, protein intake for elderly with multi-morbidities: at least 1.0 g/KgBW/day; critically ill 1.3-1.5 gram/KgBW/hari 3,6

- It is recommended to consume 1.2-1.5 gram protein/Kg BW/day for malnourished or at risk of malnourished geriatric patient due to acute or chronic diseases. 1,3

- Geriatric patient with severe illness, injury or with obvious signs of malnourished, protein intake may be up to 2 gram protein/KgBW/day. 2,3

Note: protein requirement must be adjusted to kidney function

ONS intervention: The importance of amounts and quality of protein to support sustained protein synthesis

Activating protein synthesis depends on how much amino acids are available and can be taken up by the muscle

- **AMOUNT**
  - Adding more protein

- **ABSORPTION**
  - Combining 3 types of protein

- Casein
- Soy
- Whey

- The blend promotes protein synthesis with sustained delivery of amino acids

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1Huynh, et al. J Hum Nut Diet 2015;
With 3 types of high-quality protein, **Triple Protein Blend** provides sustained delivery of amino acids for protein synthesis.

**TRIPLE PROTEIN BLEND**

Contains a blend of whey, casein and soy protein that have different digestion profiles thus ensuring sustained availability of amino acids in the blood.

- References:
Evaluate the Effect of Nutrition Therapy

- Improvement of **MUSCLE MASS AND/OR FUNCTION** → the **CORE** of nutrition care process/ nutrition therapy strategy
- Weight gain
- MNA score improvement
- Improvement in clinical conditions and biochemical data
- **Monitor regularly**: fluid and electrolyte balance, blood glucose, kidney and hepatic function, plasma protein, body weight, tube feeding, catheter-related complications

**Muscle Gain VS. Weight Gain**

TAKE HOME MESSAGES

1. Nutrition therapy is a critical non-pharmacological treatment. MST is preferred screening tool due to validity & practicality. Recommended for geriatric patients: MNA-SF.

2. Early nutrition intervention has been shown to improve outcomes, associated with lowered complications and reduced cost of care.

3. Improving amount and quality of protein help preserve lean body mass. Choose ONS that provides sustained delivery of amino acids for sustained protein synthesis.
Thank
Terima Kasih