Abstract

Undernutrition is a public health problem all over the world. More than 30 million people are currently affected by undernutrition in Europe, mainly hospitalized or elderly people. Undernutrition has several medical consequences and in the elderly can be associated with adverse clinical symptoms, contributing to frailty, morbidity, hospitalization, and mortality. These medical situations highlight the importance of an early detection and diagnosis, the objective being to prevent or treat undernutrition. This is why the implementation of a complete nutritional assessment in clinical practice is important. Nutritional screenings are essential tools to identify patients that will likely benefit from nutrition therapy. There are currently several screening methods to identify nutritional risk or malnutrition. However, the lack of a standard has aroused controversy about the best tool to use. Our objective is to describe the screening tools available for the elderly.

Keywords: elderly, undernutrition, malnutrition assessment, malnutrition biomarkers

1. Introduction

Scientific evidence suggests that nutritional status has a great impact on the health and functional status of older people. In addition, during the aging process there are a series of changes that can have a negative impact on nutritional status. These biological, physiological, social, and psychological changes, together with a higher prevalence of morbidities, further increase the susceptibility of the elderly to malnourishment [1].

The etiology of malnutrition is multifactorial in the elderly. The literature indicates that the elderly are at risk of nutritional deficiencies due to changes in body composition, the digestive system, and the regulation of fluids and electrolytes, sensory alterations, increased likelihood of chronic diseases, poly medication, and hospitalization. But also, social changes—such as retirement, less family responsibility, loneliness, widowhood, or lower purchasing power—increase the risk of inadequate nutrition. Although certain autonomy is maintained, the functional capacity is modified, which makes the daily tasks of life—such as shopping,
preparing food, or moving from one place to another—difficult. In addition, the coexistence of physical and mental illnesses may increase or decrease nutritional requirements or may limit the individual’s ability to obtain adequate nutrition, thereby increasing the risk of malnutrition [2, 3].

This is why the evaluation of the nutritional risk in this type of population is of the utmost importance.

2. Nutritional parameters related to undernutrition

The assessment of the nutritional status is the step previous to dietary-nutritional treatment [4]. It is a global evaluation that includes the nutritional status of the individual as well as the severity of the underlying disease, due to the relationship between them. It establishes a methodology to obtain information about the current and past situation of the elderly person in relation to their diet, body composition, and functional and health status [5, 6]. In addition, it will help in the detection of nutritional risk or malnutrition. Two steps can be established in this assessment process: a first step of screening the nutritional risk or malnutrition, and a second step of complete nutritional assessment to identify the causes and consequences of malnutrition. The second step would be carried out when a nutritional risk or malnutrition has been detected [4, 5, 7].

As there is no single marker or nutritional tool that is useful for all types of individuals or physiological or pathological situations and is easily reproducible, predictable, and reliable, correct nutritional assessment involves the use of different nutritional parameters in order to perform an evaluation of the nutritional status that is as complete as possible, according to the subject with which we are dealing; in this case, the geriatric population. In addition, the social and cultural aspects of the patient must also be taken into account, because these data provide information on their resources and ability to prepare food, as well as sociocultural, religious, or personal nutritional habits that may affect the intake and nutritional status. Among the different factors or parameters related to malnutrition that can be assessed in the elderly, we find health status, social and clinical conditions, anthropometry, dietary habits and dietary intake, lifestyle, blood biochemistry, etc. [5, 6]. These factors or parameters and their relationship with malnutrition are described below.

2.1 General health status self-assessment

Perceived health status is one of the most consolidated indicators and is easy to enquire about in health surveys. It is a feasible tool and has been studied in recent years because it is useful as a global indicator of the level of population health. Some of the factors that lead to a poor self-perception of the state of health in the elderly are age, female sex, comorbidity, not receiving treatments, and little accessibility to other health services [8].

2.2 Social condition

Many aspects of the individual’s life are covered here. Some of the causes that can lead to an inadequate consumption of food and, therefore, to malnutrition, are isolation, the loss of loved ones in charge of organizing meals, difficulties in buying or cooking, poor pensions, or changes in feeding when moving to a geriatric residence. It is important to know where the individual lives and with whom, the main career’s situation, characteristics of the home, the level of income, their leisure activities, etc. [9].
2.3 Clinical condition

This is data from the clinical evaluation performed by a medical professional. It will be necessary to know if the individual suffers or has suffered from any disease, as well as the drugs he or she has taken or is taking for said disease(s). Regarding the intake of drugs, it is important to gather information about the dosage and interactions between food and drugs [5].

2.4 Anthropometry

Anthropometric measurements provide information about the morphological dimensions of individuals. It is a non-invasive, low cost, and portable method, when compared to techniques requiring more complex devices. The anthropometric parameters include weight, height, skin folds, diameters, lengths, and girth. Some of these have been related to malnutrition: specifically, weight loss in a short period of time (1–6 months) with respect to usual weight, low percentile of the triceps skin fold, and decrease in body mass index (BMI) [6, 9].

2.5 Dietary intake and eating attitudes

Food intake is a process that varies according to the day of the week, month, or season of the year. Other factors that influence food intake are food preferences and aversions, the person preparing the meals, feeling full (before and during meals), and the ease or difficulty of food intake and/or food preparation, among others. Information concerning these factors is relevant to evaluate food intake [6].

To determine the intake of food and liquids, methods that give similar results if they are repeated in the same situation are required; that is, instruments that offer better reproducibility or precision (agreement of results when the same dietary evaluation method is administered more than once, and on different occasions, to the same individual or group). Currently, there are prospective or retrospective methods, such as the dietary diary, 24-hour recall, and food consumption frequency questionnaire (CFCA), among others. The use of two or more methods can give a better and more accurate estimate of the habitual diet of the individual who has been interviewed, since the disadvantages of one method are offset by the advantages of the other. In addition, it is necessary to use a food composition database to obtain information on energy and nutritional intake (macro and micronutrients), thereby allowing comparison with the recommendations for the intake of energy, carbohydrates, proteins, lipids, and micronutrients [5, 6, 10].

2.6 Blood biochemistry

Some of the blood biochemical parameters are biomarkers related to nutritional status. In spite of the fact that most nutritional risk screenings aimed at the elderly population do not contemplate biochemical parameters, they are included in the screening of hospitalized patients. Decreases in the values of some of these biochemical parameters (albumin, lymphocytes, cholesterol, etc.) are important in the detection and assessment of protein malnutrition [6, 9–11]. These parameters are described below:

- Albumin: this protein is easily determined due to its long half-life (20 days), but has limitations as a nutritional marker. Changes in blood volume, different pathological situations, or any degree of aggression can produce a decrease in its plasma values, although its decrease is related to an increase in the occurrence of complications and mortality [6, 10].
• Prealbumin: this is a protein with a half-life of 2 days that decreases in some situations of malnutrition, infection, or liver failure and increases upon renal failure. It should be interpreted with caution if used as a nutritional marker; despite this, it is considered a good indicator for assessing acute nutritional changes [9].

• Protein binding retinol: this is a protein with a half-life of 10 hours, whose levels increase with vitamin A intake or renal failure, and are decreased by liver disease, infection, or severe stress. Due to its sensitivity to stress and renal function, it is considered of little clinical use [9].

• Lymphocytes: these are related to immunity and nutritional status. Total lymphocytes are related to protein depletion and loss of immune defenses as a result of malnutrition [10, 11].

• Total cholesterol: in malnourished patients with renal and kidney failure and malabsorption syndrome, low cholesterol levels are associated with an increase in mortality. A decrease in their values to below 150 mg/dl is related to malnutrition [10, 11].

3. Nutritional screening tools available for elderly people

A wide range of nutritional screening tools have been developed. The screening tools used most commonly, have been developed in several countries specifically for elderly people, are Australian Nutrition Screening Initiative (ANSI) [12], Ayrshire Nutrition Screening Tool (ANST) [13], Canadian Nutrition Screening Tool (CNST) [14], Chinese Nutrition Screen (CNS) [15], Council of Nutrition Appetite Questionnaire (CNAQ) [16], Simplified Nutritional Appetite Questionnaire (SNAQ) [16], Short Nutritional Assessment Questionnaire (SNAQ) [17], Short Nutritional Assessment Questionnaire for the Residential Care (SNAQ RC) [18], Malaysian Tool (MT) [19], Malnutrition Risk Screening Tool-Hospital (MRSTH) [20], Mini Nutritional Assessment (MNA) [21], Mini Nutritional Assessment Short Form (MNA-SF) [22], Minimal Eating Observation and Nutrition Form Version II (MEONF-II) [23], Nursing Nutrition Screening Assessment (NNSA) [24], Nursing Nutritional Assessment (NNA) [25], Nutrition Screening Initiative (NSI “DETERMINE”) [26], Nutritional Form for the Elderly (NUFFE) [27], Nutritional Risk Assessment Tool (NRAT) [28], Seniors in the Community Version I (SCREEN I) [29], Seniors in the Community Version II (SCREEN II) [30], South African Screening Tool (SAST) [31], The Burton Score (TBS) [32] and Geriatric Nutrition Risk Index (GNRI-NRI) [33] (Table 1). All of them contain several domains, and the parameters included most frequently are those concerning anthropometry, dietary intake, and clinical condition. Among the anthropometric parameters, the most used value is weight change, being the only anthropometric item reported in some of the protocols. Dietary intake comprises information about the quantity and the quality of the food consumed by the patient and, in particular, regarding their appetite and frequency of meals. Some of the instruments also include an item about fluid intake, which is an important aspect to be considered in elderly people. Aspects related to diseases and functional status are the items included most frequently in the clinical condition domain.

Concerning the clinical setting used to develop and/or validate the instrument, the three main contexts found are community, hospital, and long-term care.
facilities (including nursing homes and residential facilities). Among these settings, the self-administration form is used only in the community or in long-term care facilities. However, in hospitals the administration form used most frequently is filled in by qualified health personnel. The number of items comprising the presented tools ranges from 2 (CNST) to 18 (MNA). Taking into account that the respondents are elderly people, the interviews performed by health professionals seem to be the best option, as well as tools with a low number of items, to minimize the burden of the interviewee.

In order to have the appropriate arguments for using one or other of the screening methods, the main psychometric parameters that should be considered are the sensitivity and specificity of the test. Among the selected tools the sensitivities ranged from 0.32 for the ANSI [34] to 99% for the MNA [22] and the specificities of the tools ranged from 0.38% for the SCREEN I [29] to 0.96% for the MRSTH [20]. Only for five of these instruments Receiver Operating Characteristic (ROC) curves, as a combined measure of sensitivity and specificity, has been informed [16, 17, 22, 29, 30]. The tool which has shown the best values for both, sensitivity and specificity is MNA and its short form (MNA-SF) and, consequently are the nutritional screening tests most commonly used (Table 2).

### 4. Characteristics of nutritional screening: advantages and limitations

All the screening tools described here were designed specifically for elderly people; however, there is a set of screenings developed for other populations, mainly adults, which could be used also for aged people. This supposes an advantage if different populations need to be compared. Nevertheless, these instruments could lose content validity in comparison with specific aged-population tools.

Among the different forms of data collection, face to face interview has been demonstrated to be the most suitable form for this age group. A low number of items are also recommended in order to reduce the burden of the respondent [35]. The domains included in each tool can influence the validity of the evaluations. The use of parameters that examine aspects related to the patient’s perception could be less appropriate for elderly patients. The frequent sensorial and cognitive problems of these patients make the collection of accurate data more difficult [36].

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**Table 1.**

*Anthropometric parameters related to malnutrition.*

| Parameter            | Definition                                    | Range              | Equation                                                     |
|----------------------|-----------------------------------------------|--------------------|--------------------------------------------------------------|
| % Habitual weight loss | Weight variation with respect to the usual weight | Mild: 85–95%       | % Habitual weight loss = (actual weight (kg)/habitual weight (kg)) x 100 |
|                      |                                               | Moderate: 75–84%   |                                                               |
|                      |                                               | Severe: <75%      |                                                               |
| Body mass index (BMI) | Relationship between weight and height         | Mild: 17–18.4 kg/m² | BMI = weight (kg)/height (m²)                                |
|                      |                                               | Moderate: 16–16.9 kg/m² |                                                               |
|                      |                                               | Severe: <16 kg/m²  |                                                               |
| Triceps skinfold     | Vertical skinfold in the middle back of the arm | Mild: percentile 10–15 | Review percentiles of the population of origin |
|                      |                                               | Moderate: percentile 5–10 |                                                               |
|                      |                                               | Severe: percentile <5 |                                                               |
| Nutrition screening tool | Parameters          | Specific                              | No. of items | Setting    | Administration                  | Nutritional score                                      |
|--------------------------|---------------------|---------------------------------------|--------------|------------|---------------------------------|--------------------------------------------------------|
| ANSI [12]                | Anthropometry       | Weight change                         | 12           | Community  | Self-administered               | Range: 0–29                                             |
|                          |                     |                                       |              |            | Administered by family members or caregivers | 0–3: good 4–5: moderate nutritional risk 6 or more: high nutritional risk |
|                          | Social condition    | Loneliness                            |              |            |                                 |                                                        |
|                          |                     | Food access                           |              |            |                                 |                                                        |
|                          | Clinical condition  | Functional status                    |              |            |                                 |                                                        |
|                          |                     | Disease                               |              |            |                                 |                                                        |
|                          |                     | Oral problems                         |              |            |                                 |                                                        |
|                          |                     | Drugs                                 |              |            |                                 |                                                        |
|                          | Dietary intake      | Frequency of meals and food intake    |              |            |                                 |                                                        |
|                          |                     | Fluid intake                          |              |            |                                 |                                                        |
|                          | Life style          | Alcohol intake                        |              |            |                                 |                                                        |
| ANST [13]                | Anthropometry       | Weight change                         | 6            | Hospital   | Nursing staff                   | Range: 0–18                                             |
|                          | Clinical condition  | Disease                               |              |            |                                 | 6 or less: moderate risk 7 or more: high risk          |
|                          | Dietary intake      | Frequency of meals                     |              |            |                                 |                                                        |
|                          |                     | Fluid intake                          |              |            |                                 |                                                        |
|                          |                     | Appetite                              |              |            |                                 |                                                        |
| CNST [14]                | Anthropometry       | Weight change                         | 2            | Hospital   | Dietitians                      | Range: 0–2                                             |
|                          | Dietary intake      | Food frequency intake                 |              |            |                                 | 0–1: no risk 2: nutrition risk                         |
| Nutrition screening tool | Parameters       | Specific                      | No. of items | Setting               | Administration | Nutritional score |
|--------------------------|------------------|-------------------------------|--------------|-----------------------|----------------|-------------------|
| CNS [15]                 | Anthropometry    | Weight change                 | 16           | Hospital              | Professional not indicated | Range: 0–32 ≤16: malnourished 17–19: risk >19: normal |
|                          | Social condition | Loneliness                    |              | Long-term care facilities |                |                   |
|                          | Clinical condition | Functional status |              |                       |                |                   |
|                          |                 | Disease                       |              |                       |                |                   |
|                          |                 | Drugs                         |              |                       |                |                   |
|                          |                 | Skin status                   |              |                       |                |                   |
|                          | Dietary intake  | Appetite                      |              |                       |                |                   |
|                          |                 | Food intake                   |              |                       |                |                   |
|                          |                 | Frequency of meals            |              |                       |                |                   |
|                          |                 | Fluid intake                  |              |                       |                |                   |
|                          | Emotional status | Happiness                    |              |                       |                |                   |
|                          | Self-assessment  | Health status                 |              |                       |                |                   |
| CNAQ [16]                | Dietary intake  | Frequency of meals            | 8            | Long-term care facilities | Self-administered | Range: 8–40 ≤28: significant risk of at least 5% weight loss within 6 months |
|                          |                 | Appetite                      |              | Community             |                |                   |
|                          | Emotional status | Sadness                      |              |                       |                |                   |
|                          | Eating attitudes | Food tastes                  |              |                       |                |                   |
|                          |                 | Feel full, hungry or nauseated |              |                       |                |                   |
| SNAQ [16]                | Dietary intake  | Frequency of meals            | 4            | Long-term care facilities | Self-administered | Range: 4–20 ≤14: significant risk of at least 5% weight loss within 6 months |
|                          |                 | Appetite                      |              | Community             |                |                   |
|                          | Eating attitudes | Food tastes                  |              |                       |                |                   |
|                          |                 | Feeling of fullness           |              |                       |                |                   |
| SNAQ [17]                | Anthropometry    | Weight change                 | 3            | Hospital              | Nursing staff | Range: 0–5 ≥2: moderate malnourishment ≥3: severe malnourishment |
|                          | Dietary intake  | Appetite                      |              | Dietitians            |                |                   |
|                          |                 | Supplemental drinks or tube feeding |              |                       |                |                   |
| Nutrition screening tool | Parameters                  | Specific                  | No. of items | Setting             | Administration                                      | Nutritional score                        |
|--------------------------|-----------------------------|---------------------------|--------------|---------------------|-----------------------------------------------------|------------------------------------------|
| SNAQRC [18]              | Anthropometry               | Weight change BMI         | 3 + 1 (BMI)  | Long-term care facilities | Self-administered
Administrated by family members or care workers
Trained care workers for anthropometric measures | Traffic light system
Red score: high risk of undernourishment
Orange score: moderate risk of undernourishment
Green score: no risk |
|                          | Clinical condition          | Functional status         |              |                     |                                                     |                                          |
|                          | Dietary intake              | Appetite                  |              |                     |                                                     |                                          |
| MT [19]                  | Anthropometry               | Weight change             | 11           | Rural community     | Interviewer (professional not indicated)            | Two sections:
A (range: 0–7): undernutrition
≥4 high risk of undernutrition
B (range: 0–5): dietary inadequacy; ≥2 high risk of consuming an inadequate diet |
|                          | Social condition            | Food access               |              |                     |                                                     |                                          |
|                          | Clinical condition          | Functional status         |              |                     |                                                     |                                          |
|                          |                             | Disease                   |              |                     |                                                     |                                          |
|                          |                             | Oral problems             |              |                     |                                                     |                                          |
|                          | Dietary intake              | Frequency of meals and food intake |              |                     |                                                     |                                          |
|                          |                             | Appetite                  |              |                     |                                                     |                                          |
|                          | Life style                  | Smoking                   |              |                     |                                                     |                                          |
| MRSTH [20]               | Anthropometry               | Weight change Arm circumference Calf circumference | 5            | Hospital            | Health care professionals                           | Range: 0–8
≥5: high risk of malnutrition |
|                          | Social condition            | Food access               |              |                     |                                                     |                                          |
|                          | Clinical condition          | Functional status         |              |                     |                                                     |                                          |
| Nutrition screening tool | Parameters | Specific | No. of items | Setting | Administration | Nutritional score |
|--------------------------|------------|---------|--------------|---------|----------------|------------------|
| MNA [21]                 | Anthropometry | Weight change BMI, Arm circumference, Calf circumference | 18 | Long-term care facilities, Community, Hospital | Health care professionals | Range: 0–30 ≥24: well nourished 17–23: at risk of malnutrition <17: malnourished |
|                          | Clinical condition | Functional status, Disease | | | | |
|                          | Dietary intake | Frequency of meals and food intake, Fluid intake, Appetite | | | | |
|                          | Self-assessment | Nutritional problems, Health status | | | | |
| MNA-SF [22]              | Anthropometry | Weight change BMI | 6 | Long-term care facilities, Community, Hospital | Health care professionals | Range: 0–14 ≥12: normal-no need for further assessment ≤11: possible malnutrition—continue assessment |
|                          | Clinical condition | Functional status, Disease | | | | |
|                          | Dietary intake | Appetite | | | | |
| MEONF-II [23]            | Anthropometry | Weight change BMI (or calf circumference) | 6 | Hospital | Nursing staff | Range: 0–8 0–2: low risk of undernutrition 3–4: moderate risk of undernutrition ≥5: high risk of undernutrition |
|                          | Clinical condition | Functional status, Oral problems, Clinical signs | | | | |
|                          | Dietary intake | Appetite | | | | |
| NNSA [24]                | Anthropometry | Weight change | 5 | Hospital | Nursing staff, Dietitians | Range: 0–100 <65: high risk 65–79: moderate risk 80–100: minimal risk |
|                          | Clinical condition | Functional status, Disease | | | | |
| Nutrition screening tool | Parameters | Specific | No. of items | Setting | Administration | Nutritional score |
|-------------------------|------------|---------|--------------|---------|----------------|------------------|
| NNA [25]                | Anthropometry | Weight change | 9 | Hospital | Nursing staff | Range: 9–36 |
|                         |             |         |              |         | Dietitians     | <18: low risk    |
|                         |             |         |              |         |                | 19–27: moderate risk |
|                         |             |         |              |         |                | 28–36: high risk  |
|                         | Clinical condition | Functional status | 9 |         |             |         |
|                         |             | Disease |              |         |                |         |
|                         | Dietary intake | Appetite |              |         |                |         |
|                         |             | Frequency of meals |              |         |                |         |
| NSI “DETERMINE” [26]    | Anthropometry | Weight change | 10 | Community | Self-administered | Range: 0–21 |
|                         |             |         |              |         | Administered by | 0–2: good |
|                         |             |         |              |         | family members or | 3–5: moderate nutritional risk |
|                         |             |         |              |         | caregivers       | 6 or more: high nutritional risk |
|                         | Social condition | Loneliness |              |         |                |         |
|                         |             | Food access |              |         |                |         |
|                         | Clinical condition | Functional status |              |         |                |         |
|                         |             | Disease |              |         |                |         |
|                         |             | Oral problems |              |         |                |         |
|                         |             | Drugs |              |         |                |         |
|                         | Dietary intake | Frequency of meals and food intake |              |         |                |         |
|                         | Life style | Alcohol intake |              |         |                |         |
| NUFFE [27]              | Anthropometry | Weight change | 15 | Long-term care facilities | Nursing staff | Range: 0–30 |
|                         | Social condition | Loneliness |              |         |                | Norwegian version cut-offs: |
|                         |             | Food access |              |         |                | <6: low risk |
|                         | Clinical condition | Functional status |              |         |                | 6–10: medium risk |
|                         |             | Disease |              |         |                | ≥11: high risk |
| Nutrition screening tool | Parameters | Specific                          | No. of items | Setting      | Administration | Nutritional score                     |
|-------------------------|------------|-----------------------------------|--------------|--------------|----------------|---------------------------------------|
| NRAT [28]               | Anthropometry | Weight change                      | 9            | Community    | Nursing staff, Dietitians             | Range: 0–26  
                           | Clinical condition | Functional status, Oral problems |              | Cancer patients | Self-administered, professional not indicated | 0–6: little or no risk  
                           | Dietary intake | Frequency of meals, Appetite       |              | Dietitians     | Dietitians                  | 7–16: probable risk  
                           | Eating attitudes | Feeling of fullness                |              | Dietitians     | Dietitians                  | ≥17: malnourished   
                           | Self-assessment | Health status, Thinness            |              | Dietitians     | Dietitians                  |
| SCREEN I [29]           | Anthropometry | Weight change                      | 15           | Community    | Self-administered, Interviewer (professional not indicated) | Not specified |
|                         | Social condition | Food access, Loneliness            |              | Community    | Self-administered, Interviewer (professional not indicated) | Not specified |
|                         | Clinical condition | Functional status, Oral problems   |              | Community    | Self-administered, Interviewer (professional not indicated) | Not specified |
|                         | Dietary intake | Frequency of meals and food intake | Fluid intake, Appetite, Supplemental drinks, Dietary intake changes, Quality of meals | Community    | Self-administered, Interviewer (professional not indicated) | Not specified |
| SCREEN II [30]          | Anthropometry | Weight change                      | 17           | Community    | Self-administered, Dietitians           | Range: 0–64  
                           | Social condition | Food access, Loneliness            |              | Dietitians     | Dietitians                  | Cut-offs not specified |
|                         | Clinical condition | Functional status, Oral problems   |              | Dietitians     | Dietitians                  |
|                         | Dietary intake | Frequency of meals and food intake | Fluid intake, Appetite, Supplemental drinks, Dietary intake changes, Quality of meals | Community    | Self-administered, Interviewer (professional not indicated) | Not specified |

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| Nutrition screening tool | Parameters | Specific | No. of items | Setting | Administration | Nutritional score |
|--------------------------|------------|----------|--------------|---------|----------------|------------------|
| SAST [31]                | Anthropometry | Arm circumference | 10 | Community Long-term care facilities | Trained fieldworkers | Range: 0–23
Men 9.5-14.5: risk of malnutrition >14.5: well nourished
Women <9.5: malnourished 9.5-16: risk of malnutrition >16: well nourished |
|                         | Social condition | Functional status |              |         |                |                  |
|                         | Clinical condition | Disease |              |         |                |                  |
|                         | Dietary intake | Frequency of meals and food intake | |         |                |                  |
|                         | Self-assessment | Health status | |         |                |                  |
| TBS [32]                 | Anthropometry | Weight change BMI | 7 | Hospital | Nursing staff Dietitians | Range: 6–28
0–5: well nourished
6–10: moderately nourished
11–15: poorly nourished
≥16: very poorly nourished |
|                         | Social condition | Age | |         |                |                  |
|                         | | Sex | |         |                |                  |
|                         | Clinical condition | Functional status Symptoms Skin risk areas | |         |                |                  |
|                         | Dietary intake | Appetite | |         |                |                  |
| GNRI-NRI [33]            | Anthropometry | Knee height Usual weight | No items | Hospital | Professional not indicated | Grades of nutrition-related risk: 
<82: major risk
82 to <92: moderate risk
92 to ≤98: low risk
>98: no risk |
|                         | Social condition | Age | |         |                |                  |
|                         | Biochemistry | Albumin | |         |                |                  |

Table 2.
Summary of nutritional screening tools.
The inclusion of objective parameters, such as anthropometric measurements or clinical data, helps to avoid this disadvantage. However, the collection of such data, especially for parameters derived from biochemical analyses, involves a high cost and cannot be achieved in all settings.

The absence of a Gold Standard criterion to validate this kind of instrument supposes a disadvantage. This is a reason for the ongoing development of new, appropriate parameters. Although most of these tools are widely used, none of them has been compared to standard criteria used to evaluate nutritional status.

5. Conclusions

There is no single nutritional marker that can predict or diagnose malnutrition; rather, the state of health, social and clinical conditions, anthropometry, eating habits, and blood chemistry of the elderly person under consideration—in relation to their specific situation (health, illness, hospitalization, or institutionalization)—must be taken into account. Therefore, the tools described here that include various dimensions are currently the most recommended.

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