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Clinical application of the basic definition of malnutrition proposed by the European Society for Clinical Nutrition and Metabolism (ESPEN): Comparison with classical tools in geriatric care

Dolores Sánchez-Rodríguez[a,b,c,d,*], Cédric Annweiler[e,f], Natalia Ronquillo-Moreno[a], Andrea Tortosa-Rodríguez[g,*], Anna Guillén-Solà[b,c,g], Olga Vázquez-Ibar[a,c,d], Ferran Escalada[b,c,g], Josep M. Muniesa[b,c,g], Ester Marco[b,c,g,h]

[a] Geriatrics Department, Parc de Salut Mar (Centre Fòrum – Hospital del Mar), Barcelona, Spain
[b] Rehabilitation Research Group, Institut Hospital del Mar d'Investigacions Mèdiques (IMIM), Barcelona, Spain
[c] School of Medicine, Universitat Autònoma de Barcelona, Spain
[d] School of Medicine, Universitat Pompeu Fabra, Barcelona, Spain
[e] Department of Neurosciences and Aging, Division of Geriatric Medicine, Angers University Hospital, Angers University Memory Clinic, Research Center on Autonomy and Longevity, UPRES EA 4638, University of Angers, UNAM, Angers, France
[f] Robarts Research Institute, Schulich School of Medicine and Dentistry, University of Western Ontario, London, Ontario, Canada
[g] Physical Medicine and Rehabilitation Department, Parc de Salut Mar (Hospital del Mar – Hospital de l'Esperança), Barcelona, Spain
[h] Universitat Internacional de Catalunya, Barcelona, Spain

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ABSTRACT

Background: Malnutrition is a prevalent condition related to adverse outcomes in older people. Our aim was to compare the diagnostic capacity of the malnutrition criteria of the European Society of Parenteral and Enteral Nutrition (ESPEN) with other classical diagnostic tools.

Methods: Cohort study of 102 consecutive in-patients ≥70 years admitted for postacute rehabilitation. Patients were considered malnourished if their Mini-Nutritional Assessment-Short Form (MNA-SF) score was ≤11 and serum albumin < 3 mg/dL or MNA-SF ≤ 11, serum albumin < 3 mg/dL, and usual clinical signs and symptoms of malnutrition. Sensitivity, specificity, positive and negative predictive values, accuracy likelihood ratios, and kappa values were calculated for both methods: and compared with ESPEN consensus.

Results: Of 102 eligible in-patients, 88 fulfilled inclusion criteria and were identified as "at risk" by MNA-SF. Malnutrition diagnosis was confirmed in 11.6% and 10.5% of the patients using classical methods,whereas 19.3% were malnourished according to the ESPEN criteria. Combined with low albumin levels, the diagnosis showed 57.9% sensitivity, 64.5% specificity, 85.9% negative predictive value,0.63 accuracy (fair validity, low range), and kappa index of 0.163 (poor ESPEN agreement). The combination of MNA-SF, low albumin, and clinical malnutrition showed 52.6% sensitivity, 88.3% specificity, 88.3%negative predictive value, and 0.82 accuracy (fair validity, low range), and kappa index of 0.43 (fair ESPEN agreement).

Conclusions: Malnutrition was almost twice as prevalent when diagnosed by the ESPEN consensus, compared to classical assessment methods: Classical methods: showed fair validity and poor agreement with the ESPEN consensus in assessing malnutrition in geriatric postacute care.

1. Introduction

Malnutrition is highly frequent in older in-patients, with a prevalence ranging from 49%to 67% (Campos del Portillo et al., 2015; Marshall, Young, Bauer, & Isenring, 2016; Strakowski, Strakowski, & Mitchell, 2002); the highest prevalence was observed in postacute care settings (Strakowski et al., 2002). Malnutrition and related syndromes, such as sarcopenia and frailty (Cederholm et al., 2015) are associated

Abbreviations: AND, Academy of Nutrition and Dietetics; ASPEN, American Society of Parenteral and Enteral Nutrition; BMI, Body mass index; ESPEN, European Society for Clinical Nutrition and Metabolism; FFMI, Fat-Free mass index; GLIM, Global Leadership Initiative on Malnutrition meeting; ICD, International Classification of Diseases; k, kappa statistics; LR+, Positive likelihood ratio; MNA-SF, Mini-Nutritional Assessment-Short Form; NPV, Negative predictive value; PPV, Positive predictive value; SD, Standard deviation; WHO, World Health Organization

* Corresponding author.
E-mail address: 97662@parcdesalutmar.cat (D. Sánchez-Rodríguez).

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with longer hospital stays (Agarwal et al., 2013; Correia, Perman, & Waitzberg, 2017; Sanz-París et al., 2016), infectious and non-infectious clinical complications (Carlsson, Haglin, Rosendahl, & Gustafson, 2013; Nunes, Flores, Mielke, Thumé, & Facchini, 2016), poor functional outcomes (Arinzon, Fidelman, Zuta, Peisakh, & Berner, 2005; Cerri et al., 2015; Goisser et al., 2015; Luk, Chiu, Tam, & Chu, 2011; Wakabayashi & Sashika, 2014), lack of recovery during three-month follow-up (Sánchez-Rodríguez et al., 2014), and increased risk of adverse outcomes following discharge, institutionalization, use of health care resources, readmissions, mortality, and costs (Agarwal et al., 2013; Correia et al., 2017; Curtis et al., 2017; Hamirudin, Charlton, & Walton, 2016).

The assessment of malnutrition is a 2-step approach. The first step is to screen for malnutrition, mainly with the Mini-Nutritional Assessment questionnaire (Hamirudin et al., 2016; Kaiser et al., 2009), as recommended by several Societies of Gerontology and Geriatrics (Camina-Martín et al., 2015), especially in postacute rehabilitation care settings (Marshall, Craven, Kelly, & Isenring, 2017; Sánchez-Rodríguez et al., 2017).In the absence of an internationally standardized diagnostic method, the second step is to arrive at a diagnosis with a combination of clinical anamnesis, physical examination, and/or biochemical measurements (Camina-Martín et al., 2015; Campos del Portillo et al., 2015; Reuben, Greendale, & Harrison, 1995). For instance, clinical manifestations may include unintentional weight loss (Cederholm et al., 2015; Evans et al., 2008; Reuben et al., 1995; White et al., 2012; Wirth et al., 2016), reduced anthropometry (body mass index [BMI], calf circumference) (Bahat et al., 2012; Rolland et al., 2014), and changes in behavior (i.e. reduced food intake, anorexia) (Agarwal et al., 2013; Goisser et al., 2015; Reuben et al., 1995; White et al., 2012). Biochemical markers, such as serum albumin concentration, which has been used for years as a marker of malnutrition (Cabrerizo et al., 2015; Camina-Martín et al., 2015; Reuben et al., 1995), are no longer recommended as diagnostic markers because they are also influenced by inflammation (Cederholm et al., 2015, 2017). This heterogeneity of definitions and tools has hindered the development of a best-practice approach to the diagnosis of malnutrition, at least until the recent consensus statement from the European Society for Clinical Nutrition and Metabolism (ESPEN)(Cederholm et al., 2015).

The ESPEN Consensus on malnutrition diagnosis is valid for all adults and healthcare settings, independently of etiology. The definition includes only weight loss, reduced BMI, and reduced fat-free-mass index (FFMI) as clinical criteria (Cederholm et al., 2015). Despite the growing literature reporting benefits of using the ESPEN consensus tool in older adults (Jiang et al., 2017; Sánchez-Rodríguez et al., 2017; Sanz-París et al., 2016), no comparison with previous diagnostic methods has been made available to date. The aim of the present study was to compare the diagnostic properties of the previous methods with the ESPEN basic definition of malnutrition in a postacute care setting.

2. Methods

2.1. Design

Cross-sectional analysis of older hospitalized patients participating in a larger prospective study on sarcopenia and functional outcomes (Sánchez-Rodríguez et al., 2014).

2.2. Setting

The study was conducted in a postacute geriatric rehabilitation care unit in a university hospital in Barcelona (Catalonia, Spain), focused on comprehensive geriatric assessment and rehabilitation during a defined period of time, usually about two weeks before a scheduled home discharge. The data were recorded between January and August 2011 (Sánchez-Rodríguez et al., 2014). ESPEN basic diagnosis was applied retrospectively.

2.3. Participants

The study population consisted of 102 consecutive in-patients who met inclusion criteria: age ≥70 years, admitted to the postacute rehabilitation care unit for functional loss due to a non-disabling medical disease. Patients whose general and/or cognitive condition (Mini-Mental State Examination score < 21/30) prevented completion of the diagnostic tests and those who were participating in an active physical rehabilitation program were excluded from analysis.

2.4. Main outcomes

The main outcomes for analysis were the metrological assessments that determine the diagnostic properties and the overall value of an assessment method: sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), diagnostic accuracy index, and positive likelihood ratio (LR +). Results of the ESPEN definition of malnutrition were compared with two frequently used diagnostic approaches: a) the Mini-Nutritional Assessment (MNA-SF) (Kaiser et al., 2009) plus serum albumin levels and b) the MNA-SF, serum albumin levels, and the presence of clinical signs or symptoms of malnutrition, as detailed below.

The cut-off points for validity of an assessment method have been set as follows: sensitivity and specificity > 80%, good validity; sensitivity **or** specificity < 80% but both values > 50%, fair validity; if sensitivity or specificity < 50%, poor validity (Baek & Heo, 2015; Van Bokhorst-de van der Schueren, Guaitoli, Jansma, & de Vet, 2014). Concordance between the ESPEN consensus and previous diagnostic methods was determined with kappa (k) statistics: k < 0, no agreement; 0.00–0.20, poor agreement; 0.21–0.40, fair agreement; 0.41–0.60, moderate agreement; 0.61–0.80 substantial agreement; 0.81–1, almost perfect agreement (Baek & Heo, 2015; Landis & Koch, 1977).

2.5. Screening for malnutrition

Upon admission to the postacute rehabilitation unit, patients were screened for malnutrition using the short form of the Mini-Nutritional Assessment (MNA-SF): score 12–14, normal; 8–11, risk of malnutrition; and 0–7, malnourished (Camina-Martín et al., 2015; Kaiser et al., 2009). A 10-ml venous blood sample was collected from all patients under standardized conditions between 7 and 9 am, at rest, and following an overnight fast to determine serum albumin level.

2.6. Procedure for ESPEN basic diagnosis

The ESPEN basic diagnosis was applied to all screened subjects with MNA-SF score ≤11. Unintentional weight loss was determined by patient and caregiver anamnesis and medical records documenting at least 5% unintentional weight loss in the previous 12 months during an underlying illness (Evans et al., 2008) and/or by item 11 on the Kihon checklist: “Have you experienced more than 2–3 kg unintentional weight loss over the past 6 months? Yes = 1, No = 0.". Body mass index (BMI) was calculated (kg/m^2) from weight and height. Body weight was measured to the nearest 0.1 kg; height was measured in all patients who were able to stand and a knee height equation was applied in bedridden patients unable to stand safely. Fat-free mass, expressed in kg, was measured by bioimpedance (Bodystat 1500, Bodystat Ltd., Isle of Man British Isles) as previously described (Sánchez-Rodríguez et al., 2014) and values were divided by height squared to obtain the FFMI value, expressed in kg/m^2, and compared with those of the reference population (Schutz, Kyle, & Pichard, 2002).

2.7. Procedure for malnutrition assessment according to previous methods

A positive diagnosis of malnutrition was considered using two