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Original article

ESPEN diagnostic criteria for malnutrition – A validation study in hospitalized patients

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SUMMARY

Background & aims: The European Society for Clinical Nutrition and Metabolism (ESPEN) released a consensus statement for undernutrition diagnosis: ESPEN diagnostic criteria for malnutrition (EDC). The EDC lacks validation and therefore, the present study aims to assess the concurrent and predictive validity of this tool in a cohort of inpatients.
Methods: A prospective observational study took place in a university hospital. Concurrent validity of EDC was evaluated using the Patient Generated Subjective Global Assessment (PG-SGA) nutrition status classification as the reference method. Sensitivity, specificity, positive and negative predictive values were determined. The EDC predictive validity was assessed by its independent association with length of hospital stay (LOS), applying Cox proportional hazards ratio method.
Results: Of the 632 included patients, 455 participants (72%) were nutritionally-at-risk (Nutritional Risk Screening initial screening). For those that had screened positive, 260 (57.1%) and 55 participants (12.1%) were undernourished according to PG-SGA and to EDC, respectively. Compared to PG-SGA, the EDC revealed a sensitivity of 17.1% and a specificity of 98.3%. Positive and negative predictive values were respectively 89.1% and 58.9%. Undernutrition evaluated by EDC was independently associated with lower hazard ratio for being discharged home over time, 0.695 (95% confidence interval: 0.509; 0.950).
Conclusions: The EDC could be used in clinical settings to confirm undernutrition suggested by other methods. The independent association of undernutrition by EDC with LOS shows this method is of clinical relevance.

1. Introduction

Despite the heterogeneity in the published literature on hospital undernutrition prevalence [1], its frequency is worrying. In developed countries, undernutrition or undernutrition risk is documented to range between circa 10% and 60%. These figures are dependent on disease and patient's characteristics, as well as the method and criteria used for its identification and diagnosis [1–7]. In fact, although undernutrition assessment of hospitalized patients is recommended by clinical and scientific societies [8], there is no consensus on the most appropriate criteria for undernutrition diagnosis [9].

The European Society for Clinical Nutrition and Metabolism (ESPEN) recently released a consensus statement for undernutrition diagnosis [9]. This consensus was reached by a Delphi-process in an assigned expert group that included e-mail communications, a one-day face-to-face meeting, and ballots as well as an anonymous ballot of ESPEN members. The objective was to select, among a number of nutritional variables, which individual criteria best

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captures the state of undernutrition: weight loss, reduced body mass index (BMI), reduced fat-free mass index (FFMI), reduced fat mass index, reduced food intake, reduced appetite, a biochemical indicator, or subjective professional evaluation. There was a preference for the use of weight loss, reduced BMI and reduced FFMI. Thus, these three variables were chosen to most accurately reflect undernutrition. According to ESPEN diagnostic criteria for malnutrition (EDC), undernutrition is defined as low BMI or the combined finding of unintentional weight loss and at least one of either reduced BMI or low FFMI [9].

The EDC lacks validation and therefore, the present study aims to assess the concurrent and predictive validity of this tool in a cohort of inpatients.

2. Subjects and methods

2.1. Study sample and design

A prospective observational study took place in a Portuguese university hospital between July 2011 and December 2014.

Concurrent validity of EDC was evaluated using the Patient Generated Subjective Global Assessment (PG-SGA) [10] nutrition status classification as the reference method. The EDC predictive validity was assessed by its independent association with hospital length of stay (LOS).

Recurring to the daily list of patients admitted to each ward and following a consecutive sampling approach, those who met inclusion criteria were invited to participate in the study. Eligibility criteria were age ≥18 years old, Caucasian ethnicity, expected length of stay >24 h, consciousness, cooperation and ability to provide written informed consent.

Patients with a critical illness, i.e., failure of at least one vital organ and admission to intensive care units, pregnant women, individuals in isolation, those who were hospitalized for procedures that implied strict bed rest (e.g. biopsies), in which the study protocol evaluation could put them clinically at risk and those with haemodynamic instability at the time of study assessment were excluded from the study. Hence, inpatients from angiology and vascular surgery; cardiology; digestive, non-digestive and hepato-biliary surgeries; endocrinology; gastroenterology; internal medicine; nephrology; orthopaedics; otolaryngology; and urology wards were recruited for this study.

A total of 984 patients were invited to participate but 198 declined to take part in the study whereas four did not meet inclusion criteria. Patients presenting with possible cognitive impairment (n = 13) and that did not complete the study protocol (n = 15) were excluded. Furthermore, patients without bioelectrical impedance analysis (BIA), due to implanted defibrillators, major amputation or because the equipment was not available at the time of the evaluation (n = 112) and patients that could not provide information on weight change (n = 10) were excluded. This study sample was therefore composed of 632 participants (Fig. 1). All patients were followed up from admission until death, hospital discharge or 30 days after admission.

2.2. Ethical statement

The research here presented was carried out according to the guidelines established by the Declaration of Helsinki and was approved by the Institutional Review Board and the Ethics Committee of Centro Hospitalar do Porto. All study participants signed an informed consent form.

2.3. Data collection

Data on demographic characteristics, clinical history, medical diagnoses, date of hospital admission and of discharge, discharge destination (home, another ward, another hospital, continuing care unit and discharge against medical advice or death) and prescription of nutritional support, defined as at least one of those: the use of enteral or parenteral nutrition, supplementation in vitamins and/or minerals, were obtained from patient's medical records. Two previously trained registered nutritionists collected the remaining information by the application of a structured questionnaire. Patients were evaluated within 72 h of hospital admission.

The Abbreviated Mental Test [11] was used to assess cognitive impairment. This test consists of ten questions, each correct answer scored one point. A cut-off score of seven or eight out of ten discriminates between cognitive impairment and normality in older adults [11] but the Abbreviated Mental Test was previously applied to adults younger than 65 years [12]. In the present study, a cut-off score of 6 was used to discriminate cognitive impairment from normality because it showed to have the best combination of sensitivity and specificity in a mixed sample of adults and older adults [13].

Education was assessed as the number of completed school years. Categories of 0–4, 5–12, and more than 12 years were subsequently created.

Functional activity during the month before hospital admission was categorized in 4 classes: “normal with no limitations” (score = 0); “not normal, but able to be up and about with fairly normal activities” (score = 1); “not feeling up to most things, but in bed or chair less than half the day (score = 2); “able to do little activity and spend most of the day in bed or chair” (score = 3); and “primarily bedridden, rarely out of bed” (score = 4) [10].

The Charlson disease severity index [14] was determined using the medical discharge diagnoses in the patient's clinical record. This index takes into account the number and the seriousness of comorbid diseases, each scored from 0 to 6 [14].

Detailed information about the participant's nutrition risk was collected using the first four questions of Nutritional Risk Screening (NRS-2002) – initial screening [15]. For the patients that had screened positive, nutrition status was evaluated by the PG-SGA [10], as well as according to EDC. The EDC based definition of malnutrition offers two options to reach the diagnosis. Option one requires BMI <18.5 kg/m^2; whereas option two requires the combined finding of unintentional weight loss >10% (indefinite of time) or >5% last 3 months with BMI <20 kg/m^2 (if age <70 years) or <22 kg/m^2 (if age >70 y) or with FFMI <15 and 17 kg/m^2 for women and men, respectively [9].

Whole-body resistance (ohm) and reactance (ohm) were measured by unifrequency tetrapolar BIA, with equipment from Biodynamics Model 450 (Biodynamics Corporation, Shoreline, WA) with 0.1 Ω resolution. BIA was conducted with subjects in supine position, with upper and lower limbs apart so as not to have contact with the torso [16]. Electrodes were placed on the non-dominant side except for the patients with atrophy, hemiplegia, metal prosthesis or implants on the non-dominant side, for whom the dominant side was used [16].

Standing height (cm) was measured with a metal tape measure (Rosscraft® Innovations Incorporated, Surrey, Canada) with 0.1 cm resolution and a headboard [17]. Body weight (kg) [17] was measured with a calibrated portable beam scale with 0.5 kg resolution, with the individuals wearing light pyjamas.

For bedbound patients, those presenting limitations to their ability to stand or presenting visible kyphosis, hand length, obtained using a small bone calliper with a 0.1 cm resolution (Kennon

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