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Original article

Comparison of nutritional diagnosis methods and prediction of clinical outcomes in patients with neoplasms and digestive tract diseases

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SUMMARY

Background & aims: Nowadays studies are advised to compare nutritional risk assessed by different instruments with clinical outcomes. This study compared nutritional diagnosis methods and identified the best predictor of clinical outcomes.

Methods: This cross-sectional study included 500 hospitalized patients with neoplasms and digestive tract diseases (DTD). Their nutritional status was determined by nutritional risk screening (NRS), subjective global assessment (SGA), and anthropometry, and compared with the clinical outcomes. The Kappa coefficient measured the agreement between the methods. Associations between risk factors and clinical outcomes were investigated by Cox, univariate logistic, and multiple logistic regression analyses at a significance level of 5%.

Results: In DTD and cancer patients, SGA and NRS presented good agreement, but agreement of either with anthropometry was poor. According to Cox regression, both SGA and NRS predicted complications in DTD patients. However, none of the instruments was capable of predicting complications in cancer patients or death in DTD patients. In cancer patients, SGA and age were considered risk factors for death. In DTD patients, age, SGA, and NRS predicted a long hospital stay. In cancer patients, long stays were associated with age and SGA.

Conclusion: SGA and NRS are highly sensitive for predicting complications in DTD patients. Old age and SGA predicted death in cancer patients. Advanced age and SGA also predicted long hospital stays for DTD and cancer patients, but NRS predicted long hospital stays only for DTD patients.

1. Introduction

Many nutritional status assessment and diagnosis methods have been used routinely in in-hospital clinical practice to identify nutritional risk or malnutrition in hospitalized patients. Naturally, depending on hospital characteristics, location, study population, and nutritional status assessment methods [1–3], malnutrition rates vary widely [1,4–6] and may be related to longer hospital stays and higher mortality in gastrointestinal cancer patients [4]. Thus, efforts are being made to develop nutritional status diagnosis and intervention strategies that reduce the number of unsatisfactory clinical outcomes promoted by poor nutritional status.

The literature provides no undisputed gold standard for assessing and diagnosing hospital malnutrition. Many methods have been developed for this purpose and used alone or in combination, such as nutritional risk screening (NRS), subjective global assessment (SGA), nutritional risk index (NRI), anthropometry, and laboratory tests [7].

Some studies suggest that SGA better identifies patients at nutritional risk [8], others suggest that NRS [2,9,10] better detects nutritional risk and its association with hospital morbidity and mortality or that NRI [7] better reflects the risk of malnutrition, and many studies claim that biochemical and anthropometric markers are good indicators of the nutritional status of hospitalized patients [3,11].

Filipovic et al., 2010 [1], compared nutritional status assessment methods in 299 patients with gastrointestinal diseases and found that 45.7% of the patients assessed by SGA and 63.9% of those assessed by NRI were malnourished to varying degrees. In another multicentric study, Amaral et al., 2010 [5], found that 36% of the

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patients were at risk of malnutrition according to NRS and 9.7% were malnourished according to anthropometry.

However, a recent study compared the accuracy of traditional nutritional status assessment methods and found that they were poor predictors of clinical outcomes, death, infection, and length of hospital stay [3]. Using NRS and SGA in Latin America, Cardenas et al., 2013 [12], found high hospital prevalences of nutritional risk and malnutrition and suggested the creation of nutritional care policies. NRS was developed and validated by a European group [13,14], and its use is recommended by the European Society for Clinical Nutrition and Metabolism (ESPEN). Many recent studies around the world and a few in Brazil [7,9,14–17] have successfully identified nutritional risk using NRS and found a relationship between NRS-identified nutritional risk and clinical outcomes, pointing out that NRS should only be used in hospitalized patients, especially surgical patients. This justified the interest of the present study in NRS and in comparing it with other methods.

Therefore, this study aimed to investigate and compare the efficacy of different nutritional status assessment methods in patients with neoplasms and digestive tract diseases (DTD) and to determine which instrument best predicts clinical outcomes.

2. Sample and method

2.1. Sample, sample size, study location, and ethics committee approval

This cross-sectional study was conducted in the Pontifical Catholic University of Campinas' Hospital and Maternity Hospital Celso Pierro from 2012 to 2013 after approval of the institution's Research Ethics Committee under protocol no. 0425/11. Patients awaiting surgery were systematically selected to participate in the study. Other inclusion criteria were: recent hospital admission, age greater than 20 years, nutritional status assessment within the first 24 h of hospital admission, and nutritional status information recorded in the medical records of the institution. The exclusion criteria were patients in the terminal phase of a disease, with edema or ascites, undergoing hemodialysis, with psychiatric illness, in isolation, admitted only for clinical investigation and tests, bedridden, and/or unable to speak. The final study sample consisted of 500 patients hospitalized for neoplasms or digestive tract diseases as the primary and/or associated cause.

2.2. Data collection

A form was used to collect the following data: gender, age, length of hospital stay, disease, surgery, postoperative complications, and nutritional status-related data and assessment methods, namely nutritional risk screening (NRS), subjective global assessment (SGA), and classical anthropometry (CA). The variables surgery, complications, length of hospital stay, and death were considered clinical outcomes.

2.2.1. Nutritional risk screening (NRS)

NRS [13,14] was developed recently to detect nutritional risk in hospitalized patients early. NRS determines nutritional risk by investigating disease severity and decreases in weight, body mass index (BMI), and food intake. Nutritional risk is classified according to the final score: at risk if score $\geq$3 and not at risk if score <3 [13,14].

2.2.2. Subjective global assessment (SGA)

SGA subjectively assesses nutritional status by investigating weight loss, food intake, and clinical and physical signs of malnutrition. Individuals are classified as nourished, mildly malnourished, moderately malnourished, or severely malnourished. SGA data were analyzed as recommended by Detsky et al., 1987 [8].

2.2.3. Classical anthropometry (CA)

The following data were collected to determine nutritional status by classical anthropometry: body weight, height, arm circumference (AC), and triceps skinfold thickness (TST). The following were then calculated: body mass index (BMI) and mid-upper arm muscle circumference (MUAMC). BMI was classified as recommended by the World Health Organization (WHO, 1998) [18] for adults aged up to 60 years and as recommended by Lipschitz (1994) [19] for older adults aged $\geq$ 60 years. AC, TST, and MUAMC were classified according to the percentile ranges suggested by Frisancho (1990) [20] or Burr & Phillips (1984) [21] when participants were aged more than 65 years. AC and MUAMC equal to or below the fifth percentile ($\leq$P5) indicated depletion of lean body mass; between the fifth and fifteenth percentiles (P5–P15) indicated risk of lean body mass depletion; and above the fifteenth percentile (>P15) indicated preservation of lean body mass. TST equal to or below the fifth percentile ($\leq$P5) indicated fat mass depletion; between the fifth and fifteenth percentiles (P5–P15) indicated risk of fat mass depletion; and above the fifteenth percentile (>P15) indicated fat mass preservation [20,21].

Like other studies [5,22], patients with BMI $\leq$20 or AC, TST, and MUAMC equal to or below the fifteenth percentile ($\leq$P15) were considered malnourished.

2.3. Statistical analysis

First, the patients in the two disease groups were characterized by descriptive analysis. The chi-square test or Fisher's exact test when needed verified associations or compared proportions. The Mann–Whitney test compared continuous or ordinal data between the two disease groups. The Kappa coefficient verified agreement between nutritional status assessments (NRS, SGA, and CA). Agreement was defined as follows: $K \geq 0.75$ indicated excellent agreement; $0.40 < K < 0.75$ indicated fair to good agreement; and $K \leq 0.40$ indicated poor agreement. Univariate and multivariate Cox regression analyses identified the risk factors associated with the clinical outcomes, such as death and complications. Stepwise univariate and multiple logistic regression analyses (proportional odds model) identified the risk factors associated with long hospital stays. The significance level was set at 5% [23–26].

3. Results

The medical records of 500 patients were studied, 40% females and 60% males. Table 1 shows general descriptive data like gender, disease, surgery, complications, death, and nutritional status according to three assessment methods (SGA, NRS, and CA). All variables of the two disease groups differed, except the variable death (Table 1). Complications included fever (18.52%), fistula (14.81%), sepsis (11.11%), phlebitis (11.11%), respiratory infection (11.11%), pyelonephritis (7.41%), bleeding (7.41%), diarrhea (3.70%), wall infection (3.70%), pancreatic pseudocyst (3.70%), supraventricular tachycardia (3.70%), and vascular complications (3.70%).

Table 2 shows the agreement between the nutritional status assessment methods by disease. SGA presented good agreement with NRS in patients with DTD (0.4607) and neoplasms (0.5262). SGA and NRS presented poor agreement with CA, regardless of disease.

Malnutrition (SGA) in DTD ($p = 0.0036$) and cancer ($p = 0.0227$) patients was associated with death (Table 3). Malnutrition (SGA, $p = 0.0285$) and nutritional risk (NRS, $p = 0.0285$) were associated

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