Malnutrition in hospitalized patients receiving nutritionally complete menus: prevalence and outcomes

Alicia Calleja Fernández, Alfonso Vidal Casariego, Isidoro Cano Rodríguez y María D. Ballesteros Pomar

Unidad de Nutrición Clínica y Dietética. Sección de Endocrinología y Nutrición. Complejo Asistencial Universitario de León. España.

Abstract

Background: The prevalence of malnutrition in hospitals ranges from 20 to 50% and the hospital diet could be a potential risk factor. The aim of the study was to determine the overall and per services prevalence of hospital malnutrition, and assess its impact on clinical outcomes in patients receiving nutritionally complete menus.

Methodology: Cross-sectional study in a university hospital. Nutritional status was assessed using Subjective Global Assessment (SGA), anthropometry, and biochemical parameters. For the assessment of outcomes during hospitalization, length of stay, rate of deaths, and readmissions were collected.

Results: 201 patients were evaluated. The median age was 71.59 (IQR 21.43) years old, and 51.20% were women. According to the results obtained by SGA, 37.8% of individuals were well nourished (WN), 50.2% were at nutritional risk (NR), and 11.9% were malnourished (MN). The prevalence of malnourished (NR+MN) was higher in oncology-hematology and medical wards (80.0% and 70.5%) than in surgical ones (52.4%) (p = 0.047). The worse nutritional status was, the longer the length of stay [WN: 8.0 (IQR 8.0) days; NR: 12.0 (IQR 13.5) days; MN: 18.5 (IQR 18.5) days, p < 0.001].

Conclusions: The prevalence of malnutrition in the evaluated hospital was very high, being particularly striking in medical services, and doubling length of stay.

(Nutr Hosp. 2014;30:1344-1349)
DOI:10.3305/nh.2014.30.6.7901

Key words: Malnutrition. Nutritional assessment. Anthropometry. Length of stay.
Background

Over the last 40 years, multiple studies have been conducted worldwide showing that the prevalence of hospital malnutrition ranges from 20 to 50%, depending on the geographic area, the population studied, and the method and criteria used for the diagnosis. These results may be increased with cancer or ageing.

The situation in Spain is not much more encouraging, and different studies have found that the prevalence of hospital malnutrition also varies between 20 and 50%.[6,9,10,11,12,13,14] However, these data come from studies of restricted areas that do not capture the true magnitude of the health problem (prevalence and cost).[15] In 2008, the first multicenter study to determine the prevalence and costs of hospital malnutrition was carried out in Spain, the PREDyCES® study (Prevalence of Hospital Malnutrition and Associated Costs in Spain) led by the Spanish Society of Parenteral and Enteral Nutrition (SENPE). The results highlighted that 23% of patients admitted in a Spanish hospital were at risk of malnutrition according to NRS-2002, that patients older than 70 years had significantly higher nutrition risk, and those over 85 years had the highest prevalence of malnutrition.

Studies like Schindler’s show that patients classified as at nutritional risk had a significantly lower caloric intake than patients without risk.[17] There has also been shown that only 31% of hospitalized patients satisfy their energy and protein needs eating hospital food.[18] The Nutrition Day survey demonstrated that a decreased food intake is a risk factor for mortality in hospitalized patients.[19]

The increased morbidity and mortality in malnourished patients reflects their clinical situation. Malnutrition affects length of stay, wound and fracture healing, lengthens inflammatory acute phase and decreases fibroblast proliferation, and collagen synthesis and angiogenesis. Malnutrition is associated with a high postoperative risk, especially for nosocomial infection (pneumonia), acute renal failure, and respiratory failure and increased days of mechanical ventilation and intensive care stay.[20]

Our objective was to determine the overall and per service prevalence of hospital malnutrition among patients receiving nutritionally complete menus during hospitalization, and to evaluate the possible association with outcomes such as length of stay or complications.

Methods

An observational study in routine clinical practice conditions was designed. It was conducted at a tertiary university hospital, which has more than 800 beds. The study was approved by the Research Ethics Committee of the Hospital de León in July 2010.

A sample size of 181 patients was calculated for an estimated prevalence of malnutrition of 64%, and a precision of 7%, after a pilot study[21,22] using Epidat 3.1 (Panamerican Health Organization, Washington DC, USA). Inclusion criteria included adult patients of both genders hospitalized for at least 24 hours, subsidiary of theoretically complete nutritional menus (between 1400 to 2500 kcal, and between 58 to 117 g of protein), and capable of understanding participation in the study. The exclusion criteria comprised pregnancy, hospitalized patients for weight loss, those with eating behavior disorders, and all patients who did not meet the study criteria.

A group of 10 to 15 patients were recruited for each hospital ward. Once selected, the principal investigator informed each patient of the characteristics of the study and the voluntary nature of participation. All the patients were included after signing the informed consent document.

All patients were nutritionally assessed by Subjective Global Assessment (SGA). Furthermore, anthropometric assessment was performed at the bedside of the patient. Every patient was weighed standing, in light clothing and barefoot, using a digital scale OMRON TBF 500® (Tanita Corp., Kyoto, Japan) with which the percentage of fat mass and muscle mass were also obtained. The height was estimated by measuring the ulnar distance by the method described and validated by BAPEN.[23] This distance was measured in the dominant arm with a flexible tape, with an accuracy of 1 mm. To measure muscle strength a dynamometer Smedley Dynamo Meter© (YOII / Tsutsumi / TMD, Tokyo, Japan) was used. The test was performed with the patient seated, using the non-dominant arm flexed at an angle of 90° at the elbow; the maximum value of three consecutive measurements with an accuracy of 0.5 kg was used. The detection of malnutrition and nutritional status assessment were performed only once at the time of patient inclusion in the study.

After the physical assessment, we reviewed the records of blood samples requested 48 hours prior to inclusion in the study. Nutritional biochemical parameters were collected in case they had been previously requested by the physician responsible for the patient. The parameters recorded included total protein, albumin, total cholesterol and lymphocytes. All these parameters were routinely determined in the laboratory of the center.

Complications during admission were collected from hospital discharge reports and medical records of patients, including length of stay, death rate and readmissions.

Hospital wards were grouped into five categories: medical (Cardiology, Dermatology, Gastroenterology, Internal Medicine, Nephrology, Neurology, Neurology, and Rheumatology), General Surgery, Orthopedics, other surgeries (Cardiac, Gynecology, Neurosurgery, Otolaryngology, Plastic, Vascular and Urology) and Oncology-Hematology.
Statistical analysis

The normal distribution of quantitative variables was examined by the Kolmogorov-Smirnov test. Those matching a normal distribution were summarized as mean and standard deviation (SD), and were compared with Student’s t test (for independent samples or dependent, as appropriate); when more than two groups were compared ANOVA test was used. Quantitative variables not following a normal distribution were summarized using median (Md) and interquartile range (IQR), and were compared using Mann-Whitney or Kruskal-Wallis test (when comparing more than two groups). The Wilcoxon test was used to compare medians. Categorical variables were summarized with percentages and compared with the $\chi^2$ test. A p value lower than 0.05 was considered as significant.

Results

We evaluated 201 patients. The study population had a median age of 71.6 (IQR 21.4) years old and 51.2 % were women. According to the results obtained by the SGA, 37.8% of individuals were well nourished (WN), 50.2% were at nutritional risk (NR) and 11.9% were malnourished (MN).

The prevalence of malnutrition or nutritional risk was higher in men than in women (WN: Men 29.6% vs. Women 45.6%; NR: Men 54.1% vs. Women 46.6%; MN: Men 16.3% vs. Women 7.8%; p = 0.029) and in those older than the median age (WN: older 29.0% vs. younger 46.5%; NR: older 55.0% vs. younger 45.5%; MN: older 16.0% vs. younger 7.9%; p = 0.021).

There were differences depending on the reason for admission. A higher prevalence of malnutrition was detected in patients admitted for constitutional symptoms, infection or cancer (p = 0.020). By contrast, there were no differences according to primary diagnosis (Fig. 1) (p = 0.284).

If we evaluate the prevalence of malnutrition taking into account the time elapsed from admission to the inclusion in the study, statistically significant differences were observed between patients assessed within 48 hours of admission and those who had remained hospitalized longer (Fig. 2). These differences were not observed if the patient remained hospitalized more days than the median (4.0 days) (p = 0.059) or 24 hours (p = 0.175). At the moment of nutritional assessment, hospital length of stay was 4.00 (IQR 4.00) days for WN, 5.00 (IQR 9.00) days for NR, and 14.00 (IQR 14.00) days for MN (p = 0.001).

The prevalence of NR and MN was found to be higher in medical and oncology-hematology services (80.0% and 70.5%) than in all surgical services (p = 0.047) (Fig. 3).

Baseline anthropometric and biochemical characteristics stratified by presence of malnutrition are presented in table I. The median length of stay was 11.0 (IQR 13.5) days. There were no statistically significant differences by gender (p = 0.460), primary diagnosis (p = 0.629), hospitalization wards (p = 0.548) or being older or younger than the median age (p = 0.229). The length of stay was increased as the nutritional status worsened (WN: 8.0 (IQR 8.0) days; NR: 12.0 (IQR 13.5) days; MN: 18.5 (IQR 18.5) days, p < 0.001).

The readmission rate was 5.5% and in-hospital death 1.5%. None of them was related to any of the factors studied (sex, principal diagnosis, admitting service, being older or younger than the median age and nutritional status of the patient by SGA) (p > 0.05).

Discussion

Hospitalized patients who receive a nutritionally complete menu have a high prevalence of malnutrition. This situation is particularly striking, because it could be hypothesized that these patients have a lower nutritional risk because they have a better provision of energy and protein, and usually patients who receive regular diets have less co-morbidities (dysphagia, malabsorption diseases or therapeutic fasting) that have been related to the development of malnutrition. For this reason, we ai-
malnutrition in hospitalized patients receiving nutritionally complete menus: prevalence and outcomes

Med to investigate that particular group of patients with a theoretically lower risk of malnutrition.

When comparing the results of prevalence of malnutrition with other centers in the country, with the national multicenter study results, and other international studies, we can see that our study presents higher values of hospital malnutrition. There were different patient characteristics that were associated with the prevalence of malnutrition or nutritional risk. It was also found that men and older patients had a higher prevalence of malnutrition than women and younger patients.

The admitted patients in Oncology and Hematology wards often have a higher rate of malnutrition, compared with other services, but in general, our results indicate that medical patients have a higher rate of malnutrition. Other studies have found higher rates of malnutrition in surgical patients compared with those obtained in this study, but this could again be explained by our inclusion criteria. Usually, surgical patients—especially those of gastrointestinal surgery—are nil per os, receive artificial nutritional support or incomplete diets in their transition to normal diet. In this study, surgical patients with higher risk of malnutrition probably have not been recruited. Franklin et al. described the widespread use of fasting and liquid menus in patients after abdominal surgery in a center where there is a nutritional support team, suggesting the need to educate the surgical staff on nutritional topics to solve this serious problem.

Regarding the diagnoses, although the differences were not statistically significant, it was observed that the prevalence of malnutrition was increased especially in patients with tumor process, respiratory, circulatory and digestive.

All these results confirm those published in the literature reflecting determinants of malnutrition like advanced age, male sex, and some diseases such as cancer. Concerning the prevalence of malnutrition and time elapsed from admission to the inclusion in the study, it was found that patients who remained hospitalized longer than 48 hours had a higher prevalence of malnutrition. These data were not observed if the patient remained more or less than 24 hours, but it was de-

<table>
<thead>
<tr>
<th></th>
<th>Well nourished</th>
<th>Nutritional Risk</th>
<th>Malnourished</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usual weight (kg)</td>
<td>71.49 (SD 14.17)</td>
<td>73.00 (SD 14.74)</td>
<td>69.63 (SD 12.40)</td>
<td>0.476</td>
</tr>
<tr>
<td>Current weight (kg)</td>
<td>68.59 (SD 13.98)</td>
<td>73.62 (SD 14.05)</td>
<td>58.24 (SD 12.52)</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td>Weight loss (%)</td>
<td>2.86 (IQR 8.09)</td>
<td>0.26 (IQR 3.71)</td>
<td>-5.40 (IQR 5.61)</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td>Ulnar distance (cm)</td>
<td>24.05 (SD 1.90)</td>
<td>24.14 (SD 1.94)</td>
<td>24.06 (IQR 1.93)</td>
<td>0.854</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>161.46 (SD 8.00)</td>
<td>161.43 (SD 8.04)</td>
<td>161.46 (SD 7.94)</td>
<td>0.881</td>
</tr>
<tr>
<td>BMI (kg/m2)</td>
<td>26.28 (SD 5.10)</td>
<td>28.05 (SD 5.16)</td>
<td>22.24 (SD 4.12)</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td>Dinkyometry (kg)</td>
<td>21.75 (SD 11.24)</td>
<td>23.98 (SD 10.81)</td>
<td>18.63 (SD 10.69)</td>
<td>0.063</td>
</tr>
<tr>
<td>Muscle mass (%)</td>
<td>31.46 (SD 5.46)</td>
<td>30.74 (SD 5.34)</td>
<td>34.13 (SD 4.84)</td>
<td>0.156</td>
</tr>
<tr>
<td>Fat mass (%)</td>
<td>28.54 (SD 9.67)</td>
<td>31.34 (SD 8.41)</td>
<td>21.07 (SD 6.77)</td>
<td>0.002*</td>
</tr>
<tr>
<td>Total proteins (mg/dL)</td>
<td>6.20 (SD 0.82)</td>
<td>6.28 (SD 0.76)</td>
<td>6.08 (0.80)</td>
<td>0.643</td>
</tr>
<tr>
<td>Albumin (mg/dL)</td>
<td>3.63 (SD 0.69)</td>
<td>3.94 (SD 0.54)</td>
<td>3.26 (0.84)</td>
<td>0.003*</td>
</tr>
<tr>
<td>Cholesterol (mg/dL)</td>
<td>157.00 (IQR 51.02)</td>
<td>166.00 (IQR 67.00)</td>
<td>155 (IQR 48.50)</td>
<td>0.756</td>
</tr>
<tr>
<td>Lymphocytes (cel/ml)</td>
<td>1400.00 (IQR 900.00)</td>
<td>1300 (IQR 1400)</td>
<td>1600 (IQR 650)</td>
<td>0.392</td>
</tr>
</tbody>
</table>

* Statistically significant difference.
determined that as the patient remained longer, the prevalence of malnutrition increased significantly. The patient receiving a nutritionally complete menu is beforehand a patient with a lower nutritional risk, with a usually limited length of stay, the diagnosis is benign, the complications are rare, and the treatment he or she receives is not very aggressive. In this way, patients who receive a nutritionally complete menu from the first 24 hours of admission could have a better nutritional diagnosis.

The length of stay has been associated in the study with the patient’s nutritional status. These results agree with those observed in the literature, and if compared with PREbYCES® study results, little difference is detected in the malnourished patient’s 11.7 days length of stay and the 17 days in our study. The differences can be justified by the higher prevalence of malnutrition presented in this study regarding PREbYCES® study and supports the effect of malnutrition in the length of stay. The study of Somanchi et al., conducted on a sample of 400 patients and a malnutrition prevalence rate of 53%, showed that nutritional intervention from admission reduces length of stay by 1.93 days in well-nourished patients and 3.2 days in patients with severe malnutrition, which would mean a reduction in costs.

The recording of complications during hospitalization was very limited, as only 25% of the reports reflected mechanical, infectious or surgical complications. This is an important limitation of the study because it does not allow to be reflected the relationship between malnutrition and clinical complications of the patient, as would have been desirable. This may be due to the low priority given to any of them and, in most cases, especially surgical patients, discharge reports tend to be condensed with and very little detail.

Regarding the 30 days readmission rate, the differences, according to nutritional status observed in previous research, have not been found in the current study. Finally, the death rate was low (1.5%) and not related to nutritional status, as in other studies, although it was more common in cancer and hematological patients.

In summary, the prevalence of hospital malnutrition in patients receiving a complete nutritional menu is high. The hospitalized patient with nutritional risk or malnourished is usually a male, elderly, hospitalized in a medical service, and suffering from a tumor. Hospital length of stay is increased as nutritional status worsens, which may indicate that the clinical situation is compromised, although not able to justify the registration of complications.

Acknowledgments

Department of Education, Spanish Government.

Gerencia Regional de Salud de la Junta de Castilla y León “SACYL GRS 327/B/08”.

Gerencia Regional de Salud de la Junta de Castilla y León “SACYL GRS 528/B/10”.

Gerencia Regional de Salud de la Junta de Castilla y León “SACYL GRS 811/A/13”.

References


