Clinical Nutrition 30 (2011) 289–296

Contents lists available at ScienceDirect

Clinical Nutrition

journal homepage: http://www.elsevier.com/locate/clnu

Original Article

Assessment of food intake in hospitalised patients: A 10-year comparative study of a prospective hospital survey☆

Ronan Thibault [a], Marinette Chikhi [a], Aurélie Clerc [a], Patrice Darmon [a], Pierre Chopard [b], Laurence Genton [a], Michel P. Kossovsky [c], Claude Pichard [a,*]

[a] Unité de Nutrition, Hôpitaux Universitaires de Genève, Rue Gabrielle-Perret-Gentil 4, 1211 Genève 14, Switzerland
[b] Service Qualité des soins, Geneva University Hospital, Geneva, Switzerland
[c] Service de Médecine de Premier Recours, Geneva University Hospital, University of Geneva, Geneva, Switzerland

ARTICLE INFO

Article history:
Received 28 May 2010
Accepted 3 October 2010

Keywords:
Hospital food service
Food quality control
Nutritional needs
Protein–energy intake
Oral nutritional supplements
Undernutrition

SUMMARY

Background & aims: A food quality control and improvement permanent process was initiated in 1999. To evaluate the food service evolution, protein–energy needs coverage were compared in 1999 and 2008 with the same structure survey in all hospitalized patients receiving 3 meals/day.
Methods: Nutritional values of food provided, consumed and wasted over 24 h including non-exclusive nutritional support were calculated individually. Nutritional needs were estimated as 110% of Harris–Benedict formula for energy and 1.2 or 1.0 g protein/kg/day for patients <65 or ≥65 years old, respectively. Multivariate analysis identified factors associated with low nutritional intake in both populations standardized to body mass index (BMI) of 1999's patients.
Results: Out of 1677 patients, 1291 were included. Mean BMI was higher in 2008 than 1999 ($P < 0.001$). The proportion of underfed patients was unchanged (69 *vs.* 70%, NS). The consumption of ≥1 oral nutritional supplements (ONS) daily increased the protein needs coverage from 80% to 115% ($P < 0.001$). The year 1999, high BMI, 1st week of hospital stay, specific diet, ONS absence and low meal quality were associated with low nutritional intakes.
Conclusion: The nutritional needs coverage could have improved in 2008 if BMI was similar to 1999's. ONS consumption is associated with a lower risk of underfeeding in hospitalized patients.

1. Introduction

As already stated by Hippocrate in the 5th century BC, food is entirely part of the therapy during sickness. At hospital, feeding is also a significant element of comfort and quality of welcome offered by the institution. Meals and snacks should cover the patients' nutritional needs and meet their food expectations. Financial constrains force hospital to reach a compromise between reasonable costs of production and distribution of food, patient's satisfaction, and coverage of energy and protein needs. Indeed, food hospital must contribute to prevent undernutrition or limit its development during hospital stay.

Undernutrition affects 30–50% of adult patients admitted to hospitals in Western countries, and is associated with increased mortality, morbidity, length of stay, and costs.[1–8] It has been demonstrated that undernutrition worsens during the hospital stay in the absence of nutritional therapy.[6] The European Society for Clinical Nutrition and Metabolism (ESPEN) and the American Society of Parenteral and Enteral Nutrition (ASPEN) therefore recommend an early and systematic screening for undernutrition for all hospitalized patients.[9,10] Reduction of dietary intake during hospital stay, together with the increase of energy requirements, is the main cause of hospital undernutrition, and can contribute to its worsening. Indeed, several studies have shown that decreased food intake is associated with increased complications and mortality during hospital stay.[1,2,11] For care providers, it is therefore mandatory to evaluate food intake in hospitalized patients on a regular basis with the aims to lower the risk of undernutrition, and thus improve clinical outcome and reduce health costs.

In 1999, the hospital food service of our University hospital was assessed through a prospective comprehensive hospital survey.[12] We found that 70% of patients did not cover their energy or protein needs. The main reasons were the absence of patient-self menu selection, inadequation of meal serving time and inadapted

☆ Conference presentation: part of this work was presented at the ESPEN meeting, Vienna, Austria, August 31, 2009 and published as an abstract (*Clin Nutr* 2009;**4**(Suppl. 2):116).

* Corresponding author. Tel.: +41 22 3729345; fax: +41 22 3729363.
E-mail address: claude.pichard@unige.ch (C. Pichard).

0261-5614/$ – see front matter
doi:10.1016/j.clnu.2010.10.002

cooking of food. In response to these specific patient's expectations, we and our hospital administration have implemented during the last ten years a declaration of patient's alimentary rights, the application of food recommendations, the patient-self menu selection, the changes in meal serving time and duration of cooking, and the decrease of restrictive diets. In 2008, we reconducted the same prospective survey (i) to assess the impact of these corrective measures on the coverage of protein and/or energy needs and the appreciation by the patient her/himself of the hospital food service, and (ii) to determine the factors associated with low energy and protein intakes. The results should allow us to implement institutional nutritional recommendations, further improve hospital catering and the quality–cost ratio of nutritional cares, and make the care staff aware of the importance of screening and management of hospital undernutrition.

2. Patients and methods

2.1. Study procedure

The study procedure was the same than in 1999 and was previously described.[12] The survey was performed in all adult departments of the Geneva University Hospital between September 25 and November 3rd, 2008. A team of 45 dieticians assessed the individual food provision, intake and reasons for non-consumption of all hospitalised adults over a 24 h period. All tray meals, oral nutritional supplements (ONS) and supplemental enteral and parenteral nutritional intakes were taken into account. To optimise data collection and accuracy of the nutritional assessment of intakes, dieticians received a standardized training to assess food items on different tray models. The nursing staffs of each medical ward were informed about the study goals and procedures prior to the start of the study. The ethical committee of the Geneva University Hospital gave its consent for the study and authorized us to include the patients without any written consent. All patients were orally informed by the nurse staff before their inclusion of the study, and a written document delivered on their tray the day of the survey.

2.2. Inclusion/exclusion criteria

All hospitalised patients in the Geneva University Hospital were included, except those with exclusive enteral or parenteral nutritional support and those who did not receive all three daily meals, because of fasting for medical reasons, death, transfer, admission or discharge from the ward.

2.3. Stratification of patients

Patients were stratified into sub-groups according to duration of hospital stay ($\leq$8 days, 9–24 days, 25–89 days, $\geq$90 days) with respect to the hospital billing regulation in Switzerland, the ward speciality (acute care, rehabilitation, psychiatry and long-term facility),[13] body mass index (BMI) ($<$18.5, 18.5–24.9, 25.0–29.9, $\geq$30), gender, age $\leq$65 or $>$65 years, and ONS consumption (0, $\geq$1).

2.4. Organization of hospital food service

At the time of the study, hospital catering was in charge of supplying a daily food ration of 2000 kcal and 60 g of protein/patient. All three daily meals were served on individual trays. Since 2007, all patients have the ability to choose their menu. Breakfast, lunch and supper were served between 07 h45 and 08 h30, 11 h35 and 12 h15, 17 h45 and 18 h45 (*vs.* 07 h15 and 08 h15, 10 h50 and 12 h15, 17 h15 and 18 h30 in 1999), respectively, depending on the department.

2.5. Calculation of the food served, consumed and wasted

All nutritional parameters were reported by the dieticians on a data sheet specifically conceived for the study. Specific diets prescribed by the medical staff were noted on this sheet. The energy and protein values of menus were calculated using the nutrient analysis software Winrest (FSI, Noisy-le-Grand, France). For every patient, 24-h energy and protein intakes were determined by a dietician by a systematic assessment of the food portions remaining on the tray after each meal and considered as plate waste. Complete tray waste due to over-ordering, NPO prescription, transfer, admission, and discharge from the ward or death was not taken into account. In addition, dieticians listed ONS consumed during the study day. Food served was calculated by adding up the nutritional values of the menus and ONS consumed. Food consumed was calculated by subtracting plate waste from the menus. The breakdown of energy and protein provided by tray meals, ONS, and supplemental enteral and parenteral nutrition, was specified.

2.6. Coverage level of patients' nutritional needs

Nutritional needs were calculated as previously shown[12] according to the current ESPEN recommendations.[14–18] Energy needs were calculated with the Harris–Benedict formula increased by 10% to cover increased needs due to hospitalization and disease (e.g. stress, fever, digestive or renal losses).[14,15] Protein needs were calculated using 1.2 and 1.0 g/kg actual body weight/day for patients $\leq$65 or $>$65 years old, respectively.[16–18] For adult surgical and non-surgical oncologic patients, a daily protein delivery of 1.5 g/kg ideal body weight/day[16] and a minimum protein supply of 1 g/kg body weight/day,[17] respectively, are recommended by the ESPEN guidelines. As in our hospital population, we included medical as well as surgical patients, we chose the cut-off value of 1.2 g/kg actual body weight/day for evaluating the protein needs of patients aged less than 65 years. Moreover, as fat mass is a more important contributor to total body mass in elderly subjects, recent ESPEN guidelines state that the majority of sick elderly patients require at least 1.0–1.2 g protein/kg actual body weight/day.[18] Energy and protein intakes were considered as low when inferior to 100% of needs. This threshold of 100% was chosen to take into account the possible methodological inaccuracy and to avoid the overestimation of insufficient food intake. Patients were considered underfed when energy or protein intakes were below 100% of needs.

2.7. Evaluation of the meals and the causes for insufficient food intake

On the study day, the causes for insufficient food intake were obtained by a direct interview of patients or considered 'non-assessable' when the patient was unable to express his own opinion. All patients were asked to evaluate the quality of hospital meals using an analogical verbal scale from 0 (very bad) to 10 (very good). Values between 0 and 4, 5 and 7, and 8 and 10 were assembled together to be interpreted as 'unacceptable', 'acceptable-good', and 'excellent-very good', respectively. Patients who did not eat all of the food served were further asked to specify the underlying reasons. They could choose among inadequate cooking, taste or mealtime and absence of choice. Although it is a non validated approach, the relationship between insufficient food intake and disease and/or treatment(s) was subjectively classified by the