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Improved meal presentation increases food intake and decreases readmission rate in hospitalized patients

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SUMMARY

Background: Reduced food intake is a frequent problem at a hospital setting, being a cause and/or consequence of malnutrition. Food presentation can affect food intake and induce nutritional benefit.

Objectives: To investigate the effect of improved meal presentation supported by gastronomy expertise on the food intake in adults hospitalized in internal medicine departments.

Design: Controlled before and after study.

Methods: Two hundred and six newly hospitalized patients in internal medicine departments were included and divided in two groups, a) control: receiving the standard lunch from the hospital and b) experimental: receiving a lunch improved in terms of presentation by the advices received by the Institut Paul Bocuse, Ecully, Lyon, France together with the hospital kitchen of the Beilinson Hospital, without change in the composition of the meal. The amount of food left at the participants' plates was estimated using the Digital Imaging Method, which consisted in photographing the plates immediately to previous tray collection by the researcher. In addition, the nutritionDay questionnaire was used to measure other variables concerned to their food intake during hospitalization. Charlson Comorbidity Index was calculated.

Results: There was no significant difference between the groups regarding demography or Charlson Comorbidity Index. Patients who received the meal with the improved presentation showed significantly higher food intake than those who received the standard meal, despite reported loss in appetite. Participants from the experimental group left on their plate less starch (0.19 ± 0.30 vs. 0.52 ± 0.41) ($p < 0.05$) and less from the main course than the control group (0.18 ± 0.31 vs. 0.46 ± 0.41) ($p < 0.05$). However, both of the groups left the same amount of vegetables (0.37 ± 0.36 vs. 0.29 ± 0.35) ($p > 0.05$). Both of the groups were asked how hungry they were before the meal and no significance was shown. More participants from the experimental group reported their meal to be tasty in comparison to those in the control group (49.5% vs. 33.7% $p < 0.005$). Length of stay was not different but readmission rate decreased significantly in the study group ($p < 0.02$) from 31.2% to 13.5%.

Conclusion: Improvement of meal presentation at a hospital setting can increase food intake, reduce waste food substantially and reduce readmission rate to hospital.

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Abbreviations: BMI, Body Mass Index; CCI, Charlson Comorbidity Index; CI, Confidence interval; LOS, Length of stay; NS, Not significant; n, Number of observations; ONS, Oral nutritional supplements; P, Probability; SD, Standard deviation.

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1. Introduction

The role of nutrition in health and disease has been well identified. Hospital malnutrition is frequently both a cause and consequence of disease [1–3]. It is estimated to occur in up to 85% of patients [4–6], depending on the screening tool implemented and the clinical setting [7]. Ill patients are assumed to have higher nutrition needs than healthy subjects [2–5,8,9], the reason is that disease can induce metabolic and/or psychological disorders, which may increase nutritional requirements (fever, catabolism, anxiety), and/or decrease food intake (anorexia, gastrointestinal dysfunction, physical disability). Depression, apathy, withdrawal or disinterest in food, physical problems with chewing and swallowing, inability to feed themselves, side effects of medication or disease state, all increase risk of poor dietary intake during the hospital stay [8]. An international audit process has been proposed to perform prevalence study of malnutrition in hospitals and has shown a malnutrition prevalence of around 45% and a close relationship between lunch eating and clinical outcome (length of stay, mortality) using multivariate analysis [1,2].

Further hospital malnutrition can be attributed to mediocre hospital meal service including unsatisfactory quality and flexibility of hospital catering [10]. Poor food quality, inadequate food availability, lack of nutrition training and knowledge among medical and nursing staff are some environmental causes of reduced oral intake [2,11,12].

Hospital food provision contributes significantly to patient well-being and recovery, supporting them physically and emotionally during their confinement [13]. Therefore, improving hospital menus and the mealtime atmosphere may improve food intake and help meet patient nutritional requirements [14,15].

It has been shown that meal appearance stated by patients was important for generating or maintaining appetite. Appetizing meals were often described as being small portions carefully arranged on the plate [6]. In addition, some patients with poor appetite found that the aroma of particular foods promoted their desire to eat [16]. Regarding taste, most patients preferred natural flavors [17]. Variety was found to be another factor associated with a positive hospital meal service experience, together with motivation to eat [18], pleasure and comfort to ensure survival [6]. Food presentation is the major factor in food intake, *ceteris paribus*, nutritional benefit [13,19]. Ordinary food is vital to prevent or correct undernutrition. Yet little importance has been attached to food as a means of restoring health [20]. Hospital catering has not been well-researched; however, it is the platform for initiating innovative nutrition support [21], including the development of creative and attractive food to promote patient dietary intake, especially among those patients identified as being at increased nutritional risk.

1.1. Objective

The aim of this study was to use the expertise of a well known gastronomy center to improve the presentation of a hospital meal while preserving the same cost and to study modifications in food intake and clinical outcome using the Nutrition Day Questionnaire.

2. Methods

2.1. Study population

Adults newly hospitalized in Internal Medicine Departments F and G, Rabin Medical Center, Beilinson Hospital, from April 21 to

May 16, 2013 and from July 1 to July 23 respectively, were included in the present study (n = 206). The prospective open labeled, non randomized controlled study was approved by the IRB of the Rabin Medical Center. Patients receiving partial or total enteral or parenteral nutrition supplementation, patients with dementia or otherwise cognitively impaired were excluded because they were requested to respond to a food service satisfaction questionnaire in the framework of the project.

Food intake was measured resting food wastage from trays collected immediately after the patients finished their meal, using the Digital Imaging Method [22] and from the collection of the nutritionDay questionnaire after the completion of the meal [23].

2.2. Institut Paul Bocuse and Beilinson Hospital's participation

The regular meals of the hospital were reproduced at the Institut Paul Bocuse, Ecully, Lyon, France and suggested a new presentation of the dishes served at lunch time at the Beilinson hospital. In total 19 recipes, using same ingredients, were improved in terms of presentation and reproduced by the chef of the hospital in a training given by the Institut. An example of one of the dishes as they were served before and after the improvement is shown in Fig. 1.

2.3. Digital imaging method: image acquisition

Patient trays were photographed approximately 45 min after luncheon meal delivery, immediately prior to lunch tray collection. Each main meal plate was digitally captured and labeled using a Canon PowerShot A495 10.0 mega pixel camera. Images were all taken with the photographer standing in front of the tray, shooting down, so that the main meal plate was centered and occupied the entire frame. Each image was numbered, date and time stamped, and stored in jpg format on a computer. Food intake was estimated from each of the digital images which were viewed using PowerPoint (Microsoft USA).

2.4. Rating method

Each rater independently viewed each of the digital images in PowerPoint and completed the modified Comstock scale to assess food waste [24]. In this method, the rater indicated the proportion of the menu item remaining on the plate: 0%, 25%, 50%, 75%, 90% or 100%. This rating was undertaken for each of the following meal components: vegetable, starch and main course.

Furthermore, total eaten amount was calculated, resting from 100%, the sum of what was left on the plate of the three components of the dish: vegetable, starch and main course (divided by 3).

2.5. NutritionDay questionnaire

The nutritionDay questionnaire was used to assess patient nutrition intake and status. The questionnaire for each patient regarding medical, anthropometric and demographic data was completed by the study investigator. The section of food intake of the questionnaire has two subsections. The first subsection examines functional and nutrition status and was completed by the patient. The second subsection examines dietary intake and was completed by the patient at the conclusion of each meal [23,25].

2.6. Length of stay (LOS)

A short hospital stay was set at 2 days of hospitalization, an average hospital stay was set from 3 to 7 days a long hospital stay

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