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Original Article

Efficacy of serving bedside in-between meals – An intervention study in three medical departments

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SUMMARY

Background & aims: In-between meals (I-BM) and supplements are needed in nutrition risk patients, however often not served. The aim of this study was to increase energy (E)- and protein (P) intake and to investigate associations between food intake and clinical outcome.
Intervention: A manned trolley served I-BM including supplements to patients at bedside in three medical departments (haematology, gastroenterology and infectious disease). Nutrition intake was registered before and after intervention.
Clinical outcome: LOS, 6 months mortality and patient satisfaction were investigated. Independent samples test and Pearson's chi-square test were used for comparisons; logistic regression analysis and Kaplan Meyers plot for outcome.
Results: The study included 628 registration days of E/P intake in 276 patients (111 before and 165 after). No increase in total E – or P intake was found. Reduced oral intake (<50%) was associated to a four times higher mortality ($p < 0.05$), not to LOS. Overall patients expressed a positive attitude to the intervention.
Conclusion: Energy and protein intake was not increased by intensified I-BM. Insufficient energy and protein intake were both related to increased mortality.

Undernutrition during disease and hospitalization leads to increased morbidity and mortality and prolongs length of stay.[1] In a socioeconomic perspective, a longer hospital stay and prolonged restitution period as well as the costlier treatment of nutrition risk patients, seems to be more expensive compared to patients in good nutrition status.[2–5]

The personal consequences of undernutrition are costly. Undernourished patients have a higher infection rate, prolonged wound healing and increased sense of pain. Psychologically, the undernourished patients are more likely to have depressions. All these factors decrease life quality for patients. Optimising protein and energy intake targeted the needs of the individual nutrition risk patient improves wound healing as well as physical and psychological abilities. Furthermore, optimising nutrition intake is known to increase the efficacy of medical treatment and decrease pain.[6–8]

The prevalence of medical patients at risk of undernutrition is far to high, ranging between 26 and 51%.[9,10] The outcome measurements in medical patients in regard to nutrition are however not well described compared to surgical patients.

There is sufficient evidence, that nutrition risk patients need in-between meals including energy and protein rich sip feed supplements (supplements), in order to reach their nutritional requirements. However it has been shown, that in-between meals are not eaten by patients and are not served adequately.[3,11,12] More than half of nutrition risk patients are found to have a nutrition intake less than 75% of their daily requirements, and 40% loose weight during hospitalization.[13,11]

The aims of this study were to increase energy – and protein intake in hospitalized medical patients at nutritional risk by intensified use of in-between meals. Furthermore, to investigate the association between energy – and protein intake and clinical outcome regarding length of stay (LOS), readmittance to hospital and six months mortality rates. Finally, the aim was to evaluate patient satisfaction with the in-between meals.

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1. Study populations and methods

In the study, the following medical specialties participated: Departments of infectious diseases (I), haematology (H) and gastroenterology (G) at Aalborg Hospital, Aarhus University Hospital, Denmark. All three specialties also included general medical diseases. Each department enclosed 26 beds. Mean patient stay for the departments was 6 days (I), 5,5 days (H) and 5,7 days (G), respectively.

1.1. The organisation of in-between meals in the departments before the intervention

Prior to intervention, in-between meals were served by the nursing staff. According to local standards, all patients were screened for nutrition risk on admission. When the patients were found to be at nutritional risk, they were prescribed with supplements three times daily and "Super-meals", which include three energy dense small portioned main meals and three in-between meals a day. Supplement drinks could replace an in-between meal. Supplement drinks were placed inside the department in a cooler. In-between meals mostly consisted of cake and bread. These were served in the afternoon and in the early evening on a counter in the department. Furthermore, a fridge was placed in a kitchen 50 m outside the department. This fridge contained energy and protein dense small meals; e.g. ice cream, porridges, soups and small pizzas. Ice creams were ready for serving, but other in-between meals had to be defrosted in the microwave and eventually heated. Patients, who were not confined to bed or chair, could help themselves to supplements as well as in-between meals inside the department. The more help dependent patients had in-between meals served by the nursing staff. In practise, the nursing staff served supplements as well as in-between meals occasionally when time was spear, most consistently for patients, who had been seen by the dietician or nutrition nurse specialist at request. This way the serving of in-between meals and supplements was rather coincidental.

1.2. Food intake registration system

According to ESPEN Guidelines and the Danish National Board of Health, food intake should be monitored in all patients at nutritional risk.

In the food registration system food items and drinks were premeasured for energy (calories and kilojoules) and protein (grams) and registered in a computer programme. Registrations were divided into registration of three main meals, three in-between meals, other meals and drinks. Data were registered on the registration schedule which was placed on the bedside table by the patients every morning. Each food item and drink was written down on the schedule when served to, or taken by the patient. Food was registered in pieces or approximate quartile portion sizes as given on the schedule. Drinks were registered in approximate millilitres, as also noted in glass and cup sized on the schedule. When the patient's tray or dish was taken out, it was noted how much of the portion was taken, measured by what was left of the served portion. Patient or nursing staff filled in the registration. During the night shift the nursing staff collected the schedules and calculated the intake by use of the computer programme. Results were registered on the schedule and in the patient files.

1.3. The study included two investigations

Study 1. An intervention of intensified in-between meals. The study comprised a pre- and post-measurement of caloric and protein intake and the association of this to clinical outcome.

Study 2. A questionnaire based investigation of patient satisfaction with the in-between meal intervention.

2. Methods study 1

2.1. Inclusion and data registration method

All patients were screened by NRS-2002,[14] which was the method used to screen patients in daily practise in the three departments. Patients could be enrolled in the study on their second day of hospitalization, in order to ensure the whole 24 h intake registration. Food intake registration was carried out either by the unit nursing staff or by the individual patients after teaching or under supervision by the nursing staff. The nutrition intake registration sheets were collected weekly by the investigator. Only registrations for patients found to be at nutritional risk by NRS-2002, were included in the study.

2.1.1. Missing data

Registrations with missing data were excluded. Missing data were defined as missing registration for more than one item (meal, snack or drink) on the nutrition intake record sheet, i.e. if a glass of milk was registered as being served to the patient, but it had not been registered how much the patient had actually had of the drink, when the glass was removed. Registrations where nothing was mentioned for a meal were excluded unless a "minus" sign was written across the meal on the form, indicating that the patients did not have anything served.

2.1.2. Requirements

Requirements were calculated from a standardized, modified scale of Harris–Benedict equation. The requirement used in all included calculations, where those of sedentary activity level.

For overweight patients (BMI $>$ 30), requirements were calculated using energy requirements for a patients with a BMI of 25. Therefore these patients can have the same diet as patients who are underweight.

2.1.2.1. Premeasurement. A three week food intake registration in the three medical departments was made prior to intervention. A random choice of maximum three registrations, were included per patient.

Food intake registrations for each patient ranging between one and three days could be included. Only food registrations covering 24 h were included. Mean intake value for each patient was used for calculation. Furthermore, calculations of requirements for energy and protein intake were made on an individual level. For each patient, actual mean intake was calculated in percent of calculated requirements for energy and protein.

2.1.2.2. Intervention. A trolley manned by uneducated, carefully selected staff was introduced. These initially received teaching in disease related malnutrition for one week. This staff took in-between meals to the patients' bedside two times a day, between 10 and 11 a.m. and again in the middle of the afternoon, for an investigation period of six months. The staff was selected from a social pool of physically slightly injured, with reduced working abilities. This way the staff was economically partly supported by external finances. Selecting the trolley staff we looked for service minded, mature female whom were good at making quick contacts. The trolley staff was supervised by a food consultant on a daily basis and on weekly basis by a nutrition nurse specialist. Furthermore they were at all times in contact with the nursing staff in charge of the patients. The trolley carried varying energy and protein dense small meals and supplements, at all times representing new taste