

A Dietician's Bedside Supervision in a Geriatric Ward Is Effective

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Abstract

Introduction: Health professionals have greater focus on nutrition issues when having access to a dietician. The aim of this study was to examine the effect of having bed-side access to a clinical dietician in a geriatric ward.

Methods: A follow-up study included consecutively all patients admitted in two geriatric wards during three time periods of 2½ months each. The intervention was health professionals' bed-side access to a clinical dietician. Patients hospitalized during the intervention period were compared to patients hospitalized before and after. Patients hospitalized ≤2 days and not screened were excluded. Data on nutritional screening, patients' daily energy and protein intake, change in body weight from admission to discharge, and a nutrition plan and prescribed oral nutritional supplement at discharge were analysed using ANOVA analysis of variance and Chi-squared test. **Results:** A total of 554 patients (81%) were at nutritional risk. During the intervention period the compliance of diet registration was better. The patients' protein and energy intake was higher during the intervention compared with that before and after the intervention ($p = 0.04/p = 0.005$). Fewer patients lost weight during and after the intervention. Length of hospital stay (LOS) was 1 median day longer in the period before the intervention compared with that during and after the intervention (7 days). LOS was associated with weight change. **Conclusions:** Health professionals' access to a bedside dietician in a geriatric ward seems to improve protein and energy intake and thereby the older patients' body weight, but not sufficiently. The dietician also enhances the staffs' awareness of nutrition improvements after discharge.

Keywords

Aged, Malnutrition, Dietician, Geriatrics, Hospitalization, Protein Intake, Energy Intake

1. Introduction

Malnutrition in older adults mainly occurs in the context of diseases. Among hospitalized older adults, the prevalence of malnutrition ranges from 23% to 60%, depending on the definition, screening tool, and population [1]. Advanced age is a strong predictor of malnutrition. The prevalence of malnutrition in patients aged 80 years is five times higher than among patients below 50 years [2]. Older individuals living alone, of low social status, with a high intake of alcohol, and a large consumption of medicines are at greater risk of malnutrition compared to younger individuals [3] [4].

Malnutrition is a state resulting from lack of intake or uptake of nutrition that leads to altered body composition and body cell mass leading to diminished physical and mental function and impaired clinical outcome from disease [5]. The human body's response to critical illness involves increased metabolic activity and decreased appetite and food intake, leading to weight loss and changes in body composition. Malnutrition increases the risk of complications, including impaired immune response, impaired muscle and respiratory function, delayed wound healing, prolonged rehabilitation and length of hospital stay, and mortality [6] [7] [8] [9].

Much effort has been put into identifying malnutrition and several screening tools have been developed for that purpose [10]. In Danish hospitals, the Nutritional Risk Screening (NRS 2002) tool is used [9]. NRS 2002 has been validated in retrospective and prospective studies across a range of patients [11]. Patients fulfilling the NRS 2002 criteria are more likely to have a clinical effect of nutritional intervention [12]. Only 25% of the patients in the Danish hospitals meet their nutritional needs [13]. Patients admitted to geriatric wards are among the most frail of the older patients and more susceptible to the consequences of malnutrition. Thus, geriatric wards should place a strong emphasis on identifying patients at risk of malnutrition and ensure an optimal nutritional intervention. Staff training, well-defined tasks, and a clinical dietician as a part of the staff are necessary and important factors for implementation of nutritional therapy [11]. Generally, doctors and nurses have a greater focus on nutrition when they have access to a clinical dietician [14].

The aims of this study was to examine the effect of having bed-side access to a clinical dietician on nutritional screening, the patients' daily energy and protein intake, change in body weight during hospitalization, and prescribing nutrition plan and oral nutritional supplements at discharge.

2. Materials and Methods

2.1. Design and Population

This study was designed as a retrospective follow-up study. Patients were consecutively recruited from Department of Geriatrics at Aarhus University Hospital within three time periods during one year. All time periods consisted of 2½

months each: from 1 January to 16 March 2011, 1 May to 15 July 2011, and 16 July to 30 September 2011. We registered data before, during, and immediately after a dietician's bedside intervention in our wards. This gave us data on three groups of patients: 1) "before group", 2) "intervention group", and 3) "after group". Inclusion criteria were age 65 years or older, and acute illness due to a neurological, orthopaedic or medical disease. Exclusion criteria were hospitalization for two days or less, and no nutritional risk screening. The follow-up period was the length of hospital stay. We compared the patients' continuity of care from admission to discharge.

2.2. Measurements and Data Collection

According to the hospital guidelines, all patients should be screened by the nursing staff using the NRS 2002 within 24 hours after admission. The NRS 2002 is based on assessment of: 1) nutritional status (BMI/weight loss/diet intake), 2) disease burden (mild/moderate/severe), and 3) age ≥ 70 years, patients were assigned a score from 0 to 7 [9]. Patients with a screening score of 3 or more were defined as being at nutritional risk and received a nutrition plan. A nutrition plan includes estimates of energy and protein requirements according to Nordic Nutrition Recommendations for older adults [15], nutritional therapy including type and texture, recording of food and fluid intake for at least 3 days, and discharge arrangements with the home care facilities. Caregivers were able to choose between three diet types: hospital diet (fat/energy% 35 - 45), diet in poor appetite (fat/energy% 50), and diet based on the patient's individual requests.

All food and fluid intake were measured and recorded by the nursing staff. Subsequently, the content of energy and protein were daily calculated. Energy intake was measured in kilojoules (kJ) per day and protein intake in grams (g) per day. The food intake was compared with the patient's estimated energy and protein requirements. If the daily energy and/or protein intake did not meet the estimated needs, the patients were offered oral nutritional supplements. Receiving 75% or more of the estimated nutritional requirements on both energy and protein intake were classified as "sufficient", and less was "insufficient" [11]. Also, we measured the average of three days' food recording and its sufficiency on energy and protein.

The patients were weighed on the first day of admission and at discharge or the day before. Height was measured or estimated at admission. All measurements were registered in the patients' medical chart. If any nutritional interventions were carried out during the stay, such as use of naso-gastric tube or assistance by a trained dietician, this was likewise registered in the charts. At discharge, an individualized nutritional plan for patient and home care was provided along with a prescription of nutritional supplements to individuals who had been at nutritional risk during admission. The individualized nutrition plan contained information on nutritional risk and recommendations about diet, oral nutritional supplement, and possible support for preparing and eating meals.

Using the medical charts, we collected data on age, gender, length of hospital stay, weight at admission, weight at discharge, NRS 2002 screening score, dietary intake during hospital stay, nutritional requirements, nutritional intervention, and plans for nutritional follow-up.

Two experienced nurses and a physician registered the data.

2.3. Intervention

In the period 1 May to 15 July 2011 (the intervention period) a clinical dietician was available on a daily basis in the two geriatric wards in order to support, guide and check the healthcare professionals' actions and documentation relating to nutrition screening, nutrition plan and follow-up. The clinical dietician could prescribe additional nutritional therapy if necessary and was present at interdisciplinary conferences where doctors, nurses, physiotherapists and occupational therapists, discussed the patients, including nutritional issues. The same dietician conducted the intervention throughout the intervention period.

Before and after the intervention period, the dietician was not available in the wards on a daily basis, but the staff could contact her for questions and support in relation to nutritional issues.

2.4. Statistical Considerations

Continuous variables are presented as means with standard deviations for normally distributed data, and as medians with interquartile ranges (IQR) for non-normally distributed data. Differences between groups were analysed by ANOVA analysis of variance, and Chi-squared test. Categorical variables are presented as number (n) and percent. In nutritional risk patients, weight changes measured from admission to discharge between the three groups were adjusted for gender, age, NRS 2002 score, and length of hospital stay. We used a multivariate linear regression model to examine a difference between the groups and associations.

All statistical analyses were carried out using Stata version 15 with a level of significance of 0.05 or less.

2.5 Ethical Statement

The study was a quality improvement project. Therefore approval by the Central Denmark Region Ethical Committee was not required and neither informed consent from the patients. The Regional Data Protection Agency approved the study (case nr. 1-16-02-286-13). Data were stored according to good research practice.

3. Results

3.1. Baseline

A total of 684 patients were included in the study. **Figure 1** shows the number of patients included, nutritionally screened, and identified as being at nutritional risk. **Table 1** shows the baseline characteristics of all admitted patients during

the three time periods. The follow-up period from admission to discharge was 7 days in average across the three groups.

During their hospital stay 592 patients (87%) were nutritionally screened. Of these, 358 patients (60%) were screened within 24 hours after admission. No statistically significant differences between groups were found with regard to gender, age, weight, BMI, and nutritional risk. Thirty four patients (5%) died during hospitalization.

3.2. Patients at Nutritional Risk

Across the groups, 81% of the screened patients were found to be at nutritional risk. According to the guidelines, these patients should have their dietary intake registered for at least three days from admission to the geriatric ward. The best registration compliance, of dietary intake, was found during the intervention period (**Table 2**). Across all groups, 20% of the patients at nutritional risk had a

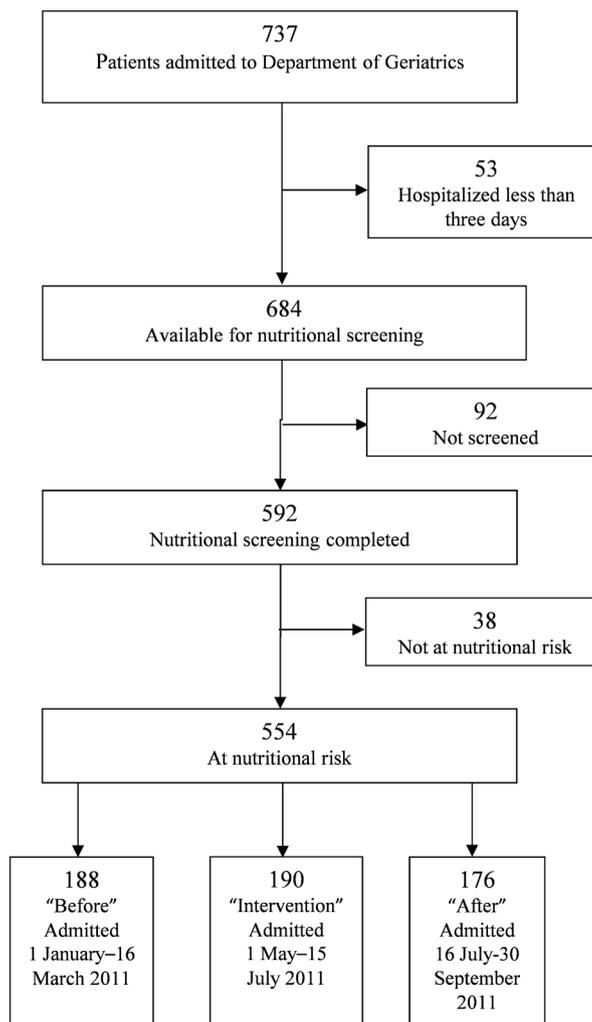


Figure 1. Flow chart of 65+ years old nutritional screened patients consecutively admitted to geriatric wards within three time periods according to bed-side access to a clinical dietician, and the periods before and after the intervention.

Table 1. Baseline characteristics.

	Before group (n = 227)	Intervention group (n = 241)	After group (n = 216)	p-value
Female (%)	144 (63)	147 (61)	144 (67)	0.45
Mean age, y (sd)	83.8 (7.3)	83.4 (7.3)	82.9 (6.8)	0.39
Mean weight, kg (sd)	67.5 (16.3)	66.9 (14.9)	64.7 (14.8)	0.15
BMI (%)				
≤21	74 (32)	87 (36)	72 (33)	0.71
>22	149 (66)	150 (62)	140 (65)	
Missing values	4 (2)	4 (2)	4 (2)	
Degree of disease (%)				
Not confined to bed	159 (70)	172 (71)	128 (59)	0.39
Bedridden	42 (19)	45 (19)	45 (21)	
Missing values	26 (11)	24 (10)	43 (20)	
At nutritional risk				
Yes	188 (83)	190 (79)	176 (81)	0.54
No/no screening	39 (17)	51 (21)	40 (19)	
Ability to eat (%)				
Independent	175 (77)	183 (76)	143 (66)	0.20
Dependent on help	21 (9)	26 (11)	29 (13)	
Missing data	31 (14)	32 (13)	44 (21)	

Table 2. Follow-up until discharge in patients at nutritional risk before, during and after a nutritional intervention.

	Before group (n = 188)	Intervention group (n = 190)	After group (n = 176)	p-value
Patients at nutritional risk				
Diet registration (%)				
First day	135 (72)	158(83)	123 (70)	0.01
Second day	116 (62)	138 (73)	124 (71)	0.05
Third day	93 (49)	123 (65)	110 (63)	0.002
Mean sum-score of 3 days registration				
Protein intake, g (sd)	28.2 (23.9)	34.3 (24.4)	29.4 (24.8)	0.04
Energy intake, kJ (sd)	3657 (3062)	4548 (3114)	3657 (2988)	0.005
Protein sufficiency intake ¹ (%)	23/148 (16)	37/154 (24)	26/125 (21)	0.18
Energy sufficiency intake ¹ (%)	51/148 (34)	73/155 (47)	56/126 (44)	0.07
Nutrition plan and/or prescription of oral nutritional supplement at discharge (%)	80 (43)	106 (56)	107 (61)	0.001
Median length of stay (IQR ²)	8 (6 - 10)	7 (6 - 9)	7 (5 - 8.5)	0.03
Weight change ³ (%)				
Weight loss	87 (46)	77 (41)	57 (32)	0.01
No change/weight increase	84 (45)	88 (46)	103 (59)	
Missing data/deaths	17 (9)	25 (13)	16 (9)	

¹Sufficient intake of protein/energy intake ≥ 75% of protein/energy requirements. ²IQR = interquartile range. ³Weight change is the difference between measured admission weight and discharge weight.

sufficient intake of protein with no difference between groups; whereas 42% had a sufficient energy intake. In the “intervention group” the registered energy and protein intake was higher than in both the “before group” and the “after group”.

3.3. Weight Loss during Hospital Stay

Table 2 presents the outcome of the patients at nutritional risk (N = 554). Of these, 40% lost weight during hospitalization. Change in crude weight loss was found between the groups (coefficient = 307 gram [95% CI: 50; 567] $p = 0.02$). When adjusting for gender, age, NRS 2002-screening score, and length of hospital stay there was no longer a difference ($p = 0.07$). Length of hospital stay was highly associated with weight loss in all groups which means that the longer the stay, the greater is the loss of weight ($\beta = -133$ gram [95% CI: $-185; -82.0$], $p < 0.001$). Length of hospital stay differed between the groups.

3.4. Continuity of Nutritional Care

Statistically significant more patients at nutritionally risk in the “intervention group” (52%) and “after group” (59%) were provided with a nutritional plan at discharge compared to the “before group” (40%). Also, more patients were prescribed oral nutritional supplements in the “intervention group” (23%) and “after group” (25%) compared to the “before group” (11%) ($p = 0.003$).

4. Discussion

We examined the quality of the nutritional screening and therapy by measuring the number of patients screened within 24 hours after admission, their weight change, and the number of patients at nutritional risk receiving nutritional therapy during hospital stay.

4.1. Nutritional Screening

In this study, we found that using the “Nutrition Risk Screening 2002” tool, in a predefined prospective protocol, 81% of the patients admitted acutely to a geriatric ward for more than two days were at nutritional risk. Our findings are consistent with other studies. Holyday *et al.* found that 83% of patients admitted to acute geriatric care were malnourished [16]. In a pooled analysis including 1384 hospitalized older adults, Kaiser *et al.* documented that 86% were malnourished or at risk of malnutrition. Moreover, the prevalence of malnutrition and risk of malnutrition increased to 91% for patients in the rehabilitation setting, indicating that malnutrition continues after the acute illness and probably after discharge from the hospital [17]. The patients admitted to geriatric wards are among the frailest and most undernourished patients, as malnutrition rates increase with age, physical dependency and frailty [18]. It is unsatisfactory that 13% of the patients in our study were not nutritionally screened, as their nutritional status are unknown and their need for nutritional therapy unknown. Also, the screening procedure for 40% of the screened patients, took place more than 24

hours after admission to the ward. This may delay initiation of nutrition therapy and worsen the nutritional status. The delayed screening may be due to a lower priority of nutrition screening in favour of more urgent nursing tasks.

4.2. Nutritional Intake

The patients' mean protein and energy intake increased during the intervention. We defined sufficient daily energy and/or protein intake to be $\geq 75\%$ of the estimated energy and/or protein needs. According to this definition, only 42% of the patients achieved their energy needs and 20% their protein needs. Poor appetite and decreased food intake are consequences of increased metabolic activity related to acute illness and hospitalization. In addition, some patients may already suffer from the consequences of age-related sarcopenia leading to loss of muscle mass and functions [8]. Nieuwenhuizen identified three factors that affect food intake in older adults: The individual, the food, and the environment [19]. In our study the patients were offered to eat the meals of the day in a dining room with other patients, but we do not know the proportion of patients who eat in the dining room. Several studies have reported the negative impact of hospitalization on nutritional status. Sullivan *et al.* found that 21% of older hospitalized adults consume less than 50% of their energy requirements. This is associated with increased weight loss and mortality [20]. Dupertuis *et al.* reported that more than two thirds of the patients do not cover their recommended energy and protein needs. This is most evident in the acute care settings (84%) and among the patients with the shortest length of stay at the hospital (7 days) [21].

4.3. Weight Change during Hospitalization

Weight change during hospitalization may indicate a change in nutritional status. In this study, 40% of patients at nutritional risk lost weight. Length of hospital stay was associated with weight loss and might indicate that a longer hospital stay is related to patient frailty and loss of muscle mass. However; we did not have data on severity of comorbidities to adjust the analysis. Weight loss must be considered with caution, as weight might also be influenced by changes in fluid balance, and not loss or gain of muscles and fat tissue alone. Changes in relation to fluid balances are evident in acutely ill older patient, e.g. in relation to dehydration or fluid overload.

Age associated sarcopenia [22] in combination with inactivity due to hospitalisation, may have serious consequences on functions [23], leading to deterioration of the activities of daily living (ADL) function [24] and increased dependency of help, increased risk of institutionalization, and readmission to hospital [25] [26] [27].

4.4. Continuity of Nutritional Care

In our study, the median length of stay was 7 - 8 days. As the length of hospital stay over the years is reduced, there is a risk that more elderly may suffer from

malnutrition or are at risk of malnutrition after discharge from hospital [17] [28]. In the “intervention group” and the “after group”, more patients received an individualized nutrition plan and prescription of oral nutritional supplements at discharge compared to the “before group”. Access to a clinical dietician on a daily basis seems to enhance the staffs’ awareness of nutrition plans after discharge and prescription of oral nutritional supplements.

4.5. Strength and Limitations

Our study included all the screened patients admitted to geriatric wards. This ensures high internal validity. The admitted patients were a broad mix of neurological, orthopaedic and internal medicine patients. This ensures a high external validity, probably making our observations applicable to the majority of patients admitted to other geriatric wards. The nutrition screening of the patient was carried out by the nursing staff as part of the routine care of the patients and entered into the medical chart immediately following the screening, minimizing the risk of recall bias. In order to minimize information bias, research data were collected by two nurses and a physician, exclusively. They had special knowledge and experience in collecting data from patient medical charts.

The retrospective study design is a limitation to the study, because it cannot be controlled for unknown exposures in the three time periods. However, the statistical differences were found in three similar patient groups without adjusting for potential confounders.

Other studies have shown that the effect of nutritional intervention may differ, not only between groups, but also depending on the severity of nutritional risk and the underlying diseases. We obtained data on a pooled group of patients, including patients with e.g. hip fracture, stroke, and infections.

Our study shows that the majority of the screened patients are at nutritional risk, and do not have sufficient intake of energy and protein, but it does not clarify the many causes. The present study addresses only some of them.

4.6. Generalizability and Future Aspects

This study was conducted in a Danish hospital. Nutritional screening and intervention may differ between countries. The ESPEN guidelines are developed to be applicable internationally, and our results indicate that using these guidelines may be applied in other settings too.

Insufficient or inadequate screening is another possible reason behind the nutritional problem. However, our study shows that early nutritional screening is needed as a routine task during hospitalization to identify any nutritional problems. Our study shows that ensuring sufficient intake of energy and protein among geriatric patients at nutritional risk still remains a challenge.

Providing nutritional recommendations after discharge and prescribing oral nutritional supplements, ensures the nutritional care continues in the transition from hospital to home. Even more could be done to support the malnourished

hospitalized older patients since oral nutritional supplement can improve the nutritional status and seems to reduce mortality and complications [9]. Nutritional follow-up after discharge can increase nutritional and functional status of geriatric patients [29], prevent deterioration of ADL function [30] and prevent hospital readmission [31]. Therefore, hospitals as well as primary health care should be able to identify malnutrition, provide nutritional therapy and continue nutrition plans across health care settings.

5. Conclusion

More than 81% of the patients admitted to a geriatric ward are undernourished or at nutritional risk. Awareness of this crucial issue is important to improve the quality of nutritional treatment and care. Having access to bedside supervision by a trained dietician seems to increase the prevalence of diet registration, heightens the patients' protein and energy intake, and improves the discharge planning of nutritional interventions. But still, the majority of the older patients do not achieve sufficient intake of energy and protein. It remains a challenge and further quality improvements need to be examined both during hospital stay and in the transition from hospital to home care.

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Statement of Authorship

JLP and MG were responsible for carrying out the study with the dietician. MJJ, JLP and MG collected the data for each time period. Statistical analysis was undertaken by MG. MJJ prepared the first draft of the article and JLP and MG critically reviewed and contributed to drafts. All authors read and approved the final manuscript.

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Conflicts of Interest

There is no conflict of interest.

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