ORIGINAL RESEARCH

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Impact of Malnutrition Status at Admission on Post-discharge Short Term Mortality in Palliative Care Unit

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Abstract

Objective: Malnutrition is an immense problem and highly prevalent in patients admitted to palliative care units. We aimed to determine the impact of nutritional status at admission and the risk factors for short-term (90-day) mortality after discharge.

Materials and Methods: This study included patients admitted to and discharged from the palliative care unit (PCU). A total of 118 patients were classified into two groups: Patients who died within 3-month after hospital discharge and patients who survived in the same period. The nutrition status of the patients was retrospectively assessed with NRS-2002.

Results: The mean age of the patients was 70.9±13.4. The overall post-discharge 90-day mortality was 40% (n=47). Age, gender, and length of stay in PCU were similar between the two groups. Majority of patients (97.5%) had an NRS score of 3 or above, and 70 patients (59%) had pressure ulcers at admission. Seventy-six patients (64%) were discharged with enteral nutrition (percutaneous endoscopic gastrostomy/nasogastric tube), and the rest were on oral nutrition. Nutritional risk score 2002 (NRS) and pressure ulcer rate on admission were higher in patients with 90-day mortality [4 (3-6) vs. 3 (2-5), p≤0.001 and 36 (76.6%) vs. 34 (47.9%), p=0.002, respectively]. In addition, patients had lower both systolic and diastolic blood pressure measurements on admission in the mortality group [108±12.8 vs. 118.6±14.2, p≤0.001 and 67.2±9.5 vs. 72.8±9.5, p=0.002, respectively]. When patients were divided into two groups, 28.8% were terminally ill. Length of hospitalization in the palliative care unit, discharge with enteral nutrition, and frequency of percutaneous endoscopic gastrostomy was lower; however, the number of patients with malignity, NRS 2002 score, and ninety-day post-discharge mortality was higher in the terminally ill group than in those non-terminally ill. At admission, high NRS 2002 score [odds ratio (OR): 4.03, 95% confidence interval (CI): 1.54-10.52; p=0.005] and low systolic blood pressure (OR: 0.94, 95% CI: 0.90-0.98; p=0.008) were independently associated parameters with short-term (90-day) mortality after discharge in multivariable analysis.

Conclusion: In addition to comorbid diseases, hemodynamic findings and nutritional status on admission may be associated with early post-discharge mortality in patients hospitalized in PCU.

Keywords: Palliative care, malnutrition, home discharge, pressure ulcer, blood pressure

Introduction

Palliative care is an approach that aims to improve the quality of life of the patients and their families facing the problems (physical, psychological, social, or spiritual) associated with life-threatening illnesses (1). Not only patients with terminal cancer but also those suffering from other life-limiting illnesses benefit from palliative care. It focuses on optimizing quality of life. To improve quality of life, ensuring nutrition should be one of the goals. Unfortunately, malnutrition is an immense problem and is highly prevalent in patients admitted to palliative care units. In order to assess the nutritional status of hospitalized palliative care patients, simple and practical screening procedures that detect individuals who are malnourished or at risk of developing malnutrition and who can receive specific nutritional support are adopted. It has been proposed numerous validated screening and assessment instruments, of which nutritional risk screening

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2002 (NRS) is a simple, effective, and validated nutritional screening method for hospitalized patients (2).

Malnutrition in hospitalized patients has various clinical and financial outcomes. Upon admission a considerable amount of patients present with malnutrition. Furthermore, not only malnourished inpatients but also normally nourished inpatients may face worsening nutritional status during the course of a hospital stay (3). As their conditions progress many palliative care patients with cardiovascular disease, chronic obstructive pulmonary disease, progressive neurological coniditions as well as advanced cancer experince nutritional problems.

There are scarce studies assessed the association between the nutritional status upon admission and early-late period post discharge clinical outcomes (4,5). Most of them were carried out with patients not require palliative or maintenance care. To the best of our knowledge there is no study assessing the nutritional status at admission and postdischarge outcomes in palliative care unit. Within this context, the main purpose of our study was to determine the impact of nutritional status at admission and the risk factors for short-term (90-day) mortality after discharge. We hypothesized that preexisting malnutrition in patients admitted to PCU would be associated with adverse outcomes following hospital discharge.

Materials and Methods

Study Design and Participants

This retrospective study was carried out in a palliative care unit (PCU) in a tertiary hospital according to the Declaration of Helsinki and the guidelines for Good Clinical Practice. The Ethics Committee of Bursa City Hospital approved the study protocol with number 2020-11/1 in 2020.

This study included patients admitted to and discharged from the PCU. All adult patients >17 years of age who were admitted to and discharged from the PCU in one-year period was recruited. Patients with recurrent admissions and who died during the hospitalization were not included in the study. A total of 118 patients were classified into two groups: Patients who died within 3-month after hospital discharge and patients who survived in the same period. Found by screening the patient ID number on the national health systemAt admission to the PCU, the following variables were recorded: Age, gender, length of hospitalization, chronic diseases, nutritional route, and clinics transferred from. Pressure ulcers/injuries were evaluated with the updated staging system which includes the following definitions: Stage 1-4, unstageable pressure injury, and deep tissue pressure injury (6). Participants were also divided into two groups terminally ill and non-terminally ill. Terminally ill patients had advanced phase solid tumors, for whom antiblastic therapy was no longer indicated, or had life-threatening non-curable diseases.

Each patient admitted to the present PCU was evaluated by a multidisciplinary palliative care team consisting of internal medicine specialist (geriatrician), physician assistant specializing in internal medicine, nurses, dietitian, physiotherapists, psychologist, social workers, and spiritual support specialists. If needed, from other clinics, consultation was requested.

Anthropometric Measurements

Anthropometric measurements were evaluated at the time a patient was admitted to PCU. Due to their clinical condition most participants could not stand on an upright platform scale to be weighed, we used self-reported weight and height from participants or their caregivers to calculate body mass index (7). For the other patients that weight and height could be measured, they were asked to take off their outer wear and shoes to stand on an adult weight scale with height measuring rod (Seca, Hamburg, Germany) for the measurement.

Nutritional Assessment

The nutrition status of the patients was retrospectively assessed with NRS-2002 within 48 hours of hospitalization. NRS-2002 was designed to detect the presence of undernutrition and the risk of developing undernutrition in hospitalized patients through two criteria: Impaired nutritional status and disease severity. NRS 2002 was calculated by summing nutritional status impaired score (0-3) to the severity of disease score (0-3), as well as a score of 1 for patients age >70. The final scoring of NRS-2002 ranges from 0 to 7, and a total score of ≥3 indicates that a patient is "at nutritional risk" (8).

Statistics

Statistical package for the social sciences (SPSS) version 21.0 was used for statistical analyses. Continuous variables were assessed by Kolmogorov-Smirnov test and histograms to find out if they had normal or skewed distribution. Normally distributed parameters were compared by the Student t-test and others by the Mann-Whitney U test. Categorical variables were compared by chi-square or Fisher's Exact tests, where appropriate. Categorical variables were presented as number and frequency. P-value <0.05 was considered statistically significant. Multivariate binary logistic regression was used to identify independent predictors associated with in-hospital mortality. Variables that remained significant ($p<0.05$) in the multivariate model were considered as independent predictors for post discharge short-term mortality. Hosmer-Lemeshow goodness of fit statistics was performed to assess model fit. Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated for each predictor. All variables in Table 1 were determined by clinical significance and tested for multicollinearity; variables with $p<0.2$ after univariate analysis were entered into the multivariable logistic regression model. The final models were determined by backward elimination procedures with $p<0.05$ as model retention criteria.

Results

A total of 118 patients were included in the present data analysis. The mean age of the patients was 70.9±13.4 year and 47% were women. Twenty (16.9%) patients were transferred from other clinics, 17 (14.4%) from home, and 81 (68.6%) from intensive care units to PCU. Patients were hospitalized for a median of 23 days, ranging from 2-107 days (Table 1).

When patients were categorized into two groups (patients who died within 90-day after hospital discharge vs. patients who survived in the same period) the overall post-discharge 90-day mortality was found to be 40% (n=47). Age, gender, and length of stay in PCU were similar between the two groups. With regards to chronic illnesses, chronic obstructive pulmonary disease and malignity were found to be higher in the group with 90-day mortality [9 (19.1%) vs. 5 (7%), p=0.046 and 19 (40.4%) vs. 9 (12.7%), p=0.001, respectively]. NRS 2002 and pressure ulcer rate on admission were higher in patients with 90-day mortality [4 (3-6) vs. 3 (2-5), p≤0.001 and 36 (76.6%) vs. 34 (47.9%), p=0.002, respectively]. In addition, patients had lower both systolic and diastolic blood pressure measurements on admission in the mortality group [108±12.8 vs. 118.6±14.2, p≤0.001 and 67.2±9.5 vs. 72.8±9.5, p=0.002, respectively]. The results of the study regarding ninety day post-discharge mortality are shown in Table 1.

Majority of patients (97.5%) had a NRS score of 3 or above, and 70 patients (59%) had pressure ulcers at admission. Seventy-six patients (64%) were discharged with enteral nutrition [percutaneous endoscopic gastrostomy (PEG)/nasogastric tube], and the rest were on oral nutrition.

When patients were divided into two groups, 28.8% were terminally ill. Age and gender were similar between groups. In addition, length of hospitalization in palliative care unit, discharge with enteral nutrition, frequency of PEG were lower, but the number of patients with malignity, NRS 2002 score, and ninety-day post-discharge mortality were higher in terminally ill group than in those non-terminally ill. Characteristics of the non-terminally and terminally ill patients are denoted in Table 2.

Table 1. The results of the study regarding ninety day post-discharge mortality

	Ninety day post-discharge mortality		
	No (n=71)	**Yes (n=47)**	**p**
Age ± SD	70.8±13.9	71±12.8	0.954
Gender, female, n (%)	36 (50.7)	19 (40.4)	0.273
Length of hospitalization in palliative care unit	23 (3-75)	23 (2-107)	0.766
Length of hospitalization in intensive care unit*	42.5 (7-526)	74 (17-400)	0.007
Body mass index	24.5±3.2	24.6±2.8	0.770
Nutrition type at discharge Oral, n (%) Enteral, n (%)	 24 (33.8) 47 (66.2)	 18 (38.3) 29 (61.7)	0.618
Diabetes mellitus, n (%)	21 (29.6)	13 (27.7)	0.822
Hypertension, n (%)	33 (46.5)	19 (40.4)	0.517
Chronic obstructive pulmonary disease, n (%)	5 (7)	9 (19.1)	**0.046**
Coronary artery disease, n (%)	12 (16.9)	10 (21.3)	0.550
Heart failure, n (%)	6 (8.5)	3 (6.4)	0.679
Dementia, n (%)	16 (22.5)	9 (19.1)	0.659
Atrial fibrillation, n (%)	14 (19.7)	12 (25.5)	0.456
Parkinson disease, n (%)			
Malignity, n (%)	9 (12.7)	19 (40.4)	**0.001**
Metastatic cancer, n (%)	1 (10)	13 (68.4)	**0.005**
Cerebrovascular disease, n (%)	34 (47.9)	15 (32.6)	0.102
Percutaneous endoscopic gastrostomy, n (%)	36 (50.7)	17 (36.2)	0.120
Pressure ulcer, n (%)	34 (47.9)	36 (76.6)	**0.002**
NRS 2002, median (minimum-maximum)	3 (2-5)	4 (3-6)	**<0.001**
Systolic blood pressure ± SD	118.6±14.2	108±12.8	**<0.001**
Diastolic blood pressure ± SD	72.8±9.5	67.2±9.5	**0.002**

*n=78, NRS 2002: Nutritional risk screening, SD: Standard deviation

A binary logistic regression analysis was performed to detect the possible parameters that affect short term post-discharge mortality. Multivariate analysis revealed that, at admission, high NRS 2002 score (OR: 4.03, 95% CI: 1.54-10.52; p=0.005) and low systolic blood pressure (OR: 0.94, 95% CI: 0.90-0.98; p=0.008) were independently associated parameters after adjustment for length of hospitalization in intensive care unit, chronic obstructive pulmonary disease, malignity, cerebrovascular disease, presence of percutaneous endoscopic gastrostomy, NRS 2002 score, presence of pressure ulcer and systolic blood pressure. The results of logistic regression analysis are summarized in Table 3.

Discussion

In this retrospective study, we found that nearly 40% of patients died within three months after hospital discharge from the palliative care unit. We also determined that low systolic blood pressure and a high NRS-2002 score at admission are independently associated risk factors with 3-month mortality after hospital discharge. As far as we know, this study is the first to show the association between nutritional status and short-term mortality after discharge from the palliative care unit.

Palliative care has recently been known as care for patients with neoplasm not responsive to curative treatment or a disease that is life-threatening (definitions from World Health Organization 1990 and 2002) (9). This definition, however, is not synonymous with end-of-life care. For example, patients may receive palliative care earlier in their illnesses while still receiving remedial treatment. Furthermore, having palliative care doesn't necessarily mean that they're likely to die soon-some people have had palliative care for years. For instance, many patients are discharged from our PCU and being followed up for years. Indeed, once a patient is admitted to PCU, home discharge must be among the significant care goals in the PCU, if available (10). After dividing our study sample as terminally ill and non-terminally ill, the vast majority of patients were non-terminally ill. The low number of terminally ill patients in our study may be because the majority of these patients died during hospitalization, and we included patients (majority of non-terminally) who could be discharged from the hospital. As expected, the number of patients with malignity and ninety-day post-discharge mortality was higher, and nutritional status was worse in the terminally ill group than in those non-terminally ill. In addition, the length of hospitalization of the terminally ill patients was lower than those of the terminally ill, which

Table 2. Characteristics of the non-terminally and terminally ill patients

	Non-terminally ill (n=84)	Terminally ill (n=34)	p
Age ± SD	72.1±13	67.9±14.1	0.122
Gender, female, n (%)	42 (50)	13 (38.2)	0.246
Length of hospitalization in palliative care unit	25 (2-107)	16 (3-93)	**0.013**
Nutrition type at discharge Oral, n (%) Enteral, n (%)	 22 (26.2) 62 (73.8)	 20 (58.8) 14 (41.2)	**0.001**
Percutaneous endoscopic gastrostomy, n (%)	46 (54.8)	7 (20.6)	0.001
Malignity, n (%)	1 (1.2)	27 (79.4)	<0.001
NRS 2002	3 (2-5)	4 (2-6)	0.003
Ninety day post-discharge mortality Yes, n (%) No, n (%)	 21 (25) 63 (75)	 26 (76.5) 8 (23.5)	**<0.001**
Systolic blood pressure ± SD	116±14.4	71.1±10	0.055
Diastolic blood pressure ± SD	110.4±14.7	69.4±9.7	0.401

NRS 2002: Nutritional risk screening, SD: Standard deviation

Table 3. Independent predictors of ninety day post-discharge mortality

	Unadjusted		Adjusted	
Risk factors	**OR (95% CI)**	**p**	**OR (95% CI)**	**p**
Systolic blood pressure	0.94 (0.91-0.97)	**<0.001**	0.94 (0.90-0.98)	**0.008**
NRS 2002 score	5.36 (2.66-10.79)	**<0.001**	4.03 (1.54-10.52)	**0.005**
Pressure ulcer	3.56 (1.57-8.09)	**0.002**	5.47 (0.98-30.30)	0.052

The p-value of the Hosmer-Lemeshow test was 0.898, the following factors were entered into the multivariate logistic regression analysis: Length of hospitalization in intensive care unit, chronic obstructive pulmonary disease, malignity, systolic blood pressure, NRS 2002 score, cerebrovascular disease, presence of PEG, presence of decubitus ulcer. CI: Confidence interval, OR: Odds ratio, NRS 2002: Nutritional risk screening, PEG: Percutaneous endoscopic gastrostomy

is consistent with the study in which individuals requiring palliation did not prefer institutional care and preferred discharging and staying home during the last period of life (11).

When acutely ill, despite normally nourished patients may put up with short-term starvation, malnourished patients may not, and early nutrition support as soon as possible is indicated especially for non-terminally ill patients. Valid and quick detection of malnutrition is essential in hospitalized palliative care patients. In our study, at admission, a significant number of patients, approximately 97.5 percent, had a score of 3 and over, suggesting that they were malnourished or at risk of nutrition. So, nutritional treatment may be of utmost importance, even in the palliative care unit. There are several ways to deliver nutrition and hydration to patients, of which the oral route is the preferred method; nasogastric tubes, PEG, and parenteral nutrition are the others. In our study, most patients (64%) were discharged with enteral nutrition (either PEG or nasogastric tube). PEG tubes, unlike nasogastric tubes, are effective on a long-term basis and possess less risk of aspiration (12). However, providing comfort with PEG tubes for palliative care patients is controversial. Some authors believe that PEG placement for nutritional supplementation is inconsistent with the goal of palliative care which prioritizes comfort without any pain (13). In contrast, others state that these problems (pain, discomfort, and infection) can be dealt with through good nursing management and care (14). In our study, a considerable amount of patients, nearly 4 out of 10 discharged with a PEG. In addition, we found no difference concerning mortality between patients having PEG or not.

Pressure ulcers are more prevalent in palliative care units compared with the general population and those in nursing homes. They are physically and psychosocially distressing for the patients and their carers and associated with significant morbidity and mortality (15). Pressure ulcer prevalance varies from 17 to 47% in palliative care (16). In our study sample, not consistent with previous studies, 59% had pressure ulcers, which may be attributable to the majority of patients transferred from intensive care unit. Moreover, we found that mortality group had significantly higher pressure ulcer rate at admission. These findings are concordant with those reported previously, in which increased mortality rate was reported in patients with pressure ulcer (17).

The results of our analysis demonstrated that low admission both systolic and diastolic blood pressure is an independent predictor of post-discharge mortality in palliative care unit. Patients with low blood pressure may more likely to have advanced disease, low cardiac output and organ perfusion, responding unfavorably to treatment. This finding is in keeping with other studies evaluating the relationship between blood pressure at admission and mortality (18).

Study Limitations

The present study has some potential limitations. First of all, a retrospective method was used for data collection. This might lead to bias owing to missing information and the unavailability of information on confounders in clinical records. Secondly, measurements of skeletal muscle mass and muscle strength, as well as calf circumference, which are powerful indicators of malnutrition, could not be performed due to the design of the study in the patients included in this study. Furthermore, since this study was conducted in a single site, its results may not be widely generalized.

Conclusion

The current study showed that in addition to comorbid diseases, hemodynamic findings, presence of pressure ulcer, and nutritional status on admission may be associated with early post-discharge mortality in patients hospitalized in PCU.

Information: This study has been accepted by the Scientific Committee to be presented during the ASPEN Nutrition Science and Practice Conference which was held from 26 to 29 March, 2022 in Seattle/United States of America and 18. Uludağ İç Hastalıkları Ulusal Kış Kongresi which was held from 03 to 06 March 2022 in Bursa/Turkey. Abstract of this study has been published in the abstract book of these conferences.

Ethics

Ethics Committee Approval: This retrospective study was carried out in a palliative care unit (PCU) in a tertiary hospital according to the Declaration of Helsinki and the guidelines for Good Clinical Practice. The Ethics Committee of Bursa City Hospital approved the study protocol with number 2020-11/1 in 2020.

Informed Consent: Retrospective study.

Peer-review: Internally and externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: O.D., N.S.K., Concept: O.D., Design: O.D., Data Collection or Processing: O.D., N.S.K., Analysis or Interpretation: O.D., N.S.K., Literature Search: O.D., N.S.K., Writing: O.D., N.S.K.

Conflict of Interest: No conflict of interest was declared by the authors.

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