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Factors influencing the length of stay in the palliative care unit in patients discharged home: results from a tertiary hospital in Turkey

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Background/aim: Increased length of stay (LOS) in the palliative care unit (PCU) is a serious burden to the patients and the health care system. The predictors of longer LOS in a PCU have not been reported so far from Turkey. Our aim in this study was to evaluate the factors associated with the LOS in the PCU of a tertiary hospital.

Materials and methods: This cross-sectional analysis of a retrospective cohort evaluated adult patients' medical records admitted to the PCU between 2017 and 2019. The main inclusion criteria were 4 or more days of palliative unit stay and being discharged home during the study period. Data on demographics, chronic diseases, mobilization disability, route of feeding, tracheostomy, sleep disturbances, pressure ulcers, and antidepressant use were collected. Potential factors associated with prolonged LOS tertiles were examined by ordinal regression analysis.

Results: A total of 287 discharges from the PCU to home were analyzed. Mean (SD) age was 70.5 (15.8) years, and there was a male predominance (55.7%). The majority of patients had malnutrition, mobility limitation, hypertension, malignant disease, and sleep disturbances. Median LOS was 15 days (4–79). Mean age, hypertension, infections, mobilization limitation, tube feeding, permanent tracheostomy, and pressure ulcers increased from the short stay tertile (4–12 days) to the medium stay tertile (13–20 days) and long stay tertile (>21 days) of LOS. Mobilization limitation [p = 0.013, OR: 2.34 (95% CI: 1.19–4.60)], tube feeding [p = 0.001, OR: 2.63 (95% CI: 1.49–4.66)], permanent tracheostomy [p = 0.007, OR: 4.10 (95% CI: 1.48–11.36)], and hypertension diagnosis [p = 0.023, OR: 1.80, (95% CI: 1.09–2.98)] on admission were associated with being in the medium stay or long stay tertiles of LOS compared to the lowest tertile.

Conclusion: A longer length of PCU stay is associated with mobilization limitation, tube feeding, permanent tracheostomy, and hypertension. We found no evidence that age, infections or pressure ulcers on admission were associated with extra LOS in the PCU in patients discharged home.

Key words: Palliative care, home discharge, tube feeding, pressure ulcer, tracheotomy, length of stay

1. Introduction

Palliative care units (PCU) focus on improving the care and quality of life of complex patients. World Health Organization defines palliative care as relieving the pain and other health problems in patients and families who encounter problems arising from a life-threatening disease. PCUs aim to satisfy spiritual needs by relieving pain and other physical and psychosocial problems through a comprehensive assessment of problems[1].

The discharge plan is an essential component of palliative care activities [1]. An effective discharge plan reduces both re-hospitalization and healthcare costs [2]. Most patients and carers claim that their needs and expectations are met before discharge, including education on care and guidance in preparing the home environment. Indeed, many individuals requiring palliation may not prefer institutional care. A Japanese study indicated that 44% of patients preferred staying home during the last period of life, and the rate of patients who preferred hospital and PCU was 15% and 19%, respectively [3].

On the other hand, effective palliative care reduces healthcare costs, mainly by preventing unnecessary readmissions and decreasing the length of stay (LOS) in the intensive care unit [4–6]. Hence, early discharge contributes to more effective use of healthcare sources, which became more critical during the Covid-19 pandemic. Besides, timely discharge from the PCU can also reduce the risk of potential adverse outcomes due to prolonged hospitalization. It should also be noted that successfully discharging a patient home is a quality indicator for a PCU [7,8].

[1] World Health Organization. Palliative Care [online]. Website https://www. who. Int / news-room /fact-sheets/detail / palliative-care [accessed 14 March 2021].

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To perform a proper home discharge, the patient should no longer have significant health issues requiring hospitalization. On the other hand, factors associated with prolonged LOS in the PCU have not been sufficiently investigated. Prolonged terminal disease phase, difficulties in symptom control, placement problems, need for parenteral medications, and caregiver's emotional status have been associated with prolonged PCU stay in several studies published so far [9–11].

Although there is a clearly defined universal job description of PCUs, institutional arrangements, working protocols, reimbursement plans, and some other regulations may vary in different countries. The clinical features of patients admitted to PCUs for various reasons may also differ according to regions and countries. Therefore, factors associated with prolonged LOS in other countries may not be entirely relevant to Turkey. However, an extensive literature search has suggested that the predictors of longer LOS in the PCU in Turkey have not been reported so far. In the present study, we hypothesized that the clinical variables on admission to PCU could be useful to predict a prolonged LOS. Effective management of potential factors associated with a prolonged stay can help more efficiently use the PCUs and improve health outcomes. This study aimed to examine the baseline characteristics associated with a longer stay in the PCU.

2. Methods

2.1. Study design and participants

This was a single-center and retrospective study. The enrollees were the inpatients of a PCU of a tertiary care hospital hospitalized between April 2017 and April 2019 (University of Health Sciences Turkey, Gülhane Training and Research Hospital, Ankara, Turkey). The inclusion criteria were hospitalization for 4 days or more and having been discharged home at any time before enrollment in the study. The first hospitalization period was evaluated in subjects with multiple admissions. We excluded the patients younger than 18 years of age, discharged to nursing facilities, hospitalized on the day of recruitment, or died before discharge. Patients with unreliable or insufficient data due to the absence of carer support were also excluded. The Institutional Review Board of Non-interventional Research, University of Health Sciences (Code: 19 / 196), and the Board of Medical Specialty Education, Gülhane Training and Research Hospital approved the study protocol (26 / 09 / 2019 - 10).

As part of the routine care, each patient admitted to the current PCU is evaluated by a team of an experienced anesthesiologist, registered nurses, registered dietitian, social workers, psychologist, physiotherapist (including swallowing and respiratory therapist), and spiritual support specialist. When necessary, consultation is requested from other clinics.

2.2. Basic demographic and clinical characteristics

We obtained the data collected on admission to the PCU. The following data are routinely recorded for each patient: age, height, body weight, previously diagnosed chronic conditions, surgery history, pressure wound, tracheostomy status, oxygen demand, mobilization status, nutritional status, insomnia [sleep-onset (difficulty in falling asleep), sleep maintenance (difficulty staying asleep), and early awakening in the morning)] [12], and medications. A registered dietitian evaluates the nutritional status using the NRS 2002 tools [13]. In this study, we combined cases with malnutrition risk and absolute malnutrition in a single category. Pain management, feeding, swallowing and respiratory therapy, in-bed passive or active physical therapy, rehabilitation exercises, care of pressure ulcers, incontinence management, sleep regulation, and delirium management are maintained as stated in the current guidelines. Charlson comorbidity index (CCI) was calculated as previously described [14].

2.3. Outcomes

The primary outcome variable in this study was the prolonged length of stay in the PCU.

2.4. Statistical methods

SPSS (Version 20.0, Chicago, Illinois) program was used for statistical analysis. The distribution of the data was evaluated with the Shapiro–Wilk test. We divided the patients into three tertiles according to the number of days of hospitalization. Tertile 1, 2, and 3 included patients with the short (4–12 days), medium (13–20 days), and long (21–79 days) LOS, respectively. Analysis of continuous variables in these three groups was performed with one-way-ANOVA or the Kruskal–Wallis test, and analysis of categorical variables was performed using the chi-square test. Using ordinal regression analysis, we examined the variables associated with an increased likelihood of being in the medium or long LOS tertiles, taking the short stay tertile as the reference. The variables with significant differences across three LOS tertiles in the univariate analysis formed the predictor variables in the multivariable model, with age and sex as traditional covariates in all models. Statistical significance was accepted at the level of $p < 0.05$.

3. Results

3.1. Basic characteristics

Overall, 287 cases were included in the analysis. The mean (SD) age of the sample was 70.5 (15.8) years, with a male predominance of 56% (Table 1). Hypertension was the most common comorbidity (47.7%), followed by cancer diagnosis (43.6%), cardiovascular disease (CVD) (32.8%), diabetes mellitus (DM) (27.2%), infections (26.5%), and acute/chronic kidney disease (9.8%). The frequency of malnutrition was 96%, and 29% of the patients were on tube feeding. Mobilization limitation was recorded by 83%, and the frequency of pressure ulcers was 36%. The results of other care indicators are displayed in Table 1.

3.2. Analysis of tertiles of LOS

The median LOS was 15 days (4 to 79 days), which was 8 days (4–12) in tertile-1 (short stay), 15 days (13–20) in tertile-2 (medium stay), and 25 days (21–79) in tertile-3

Table 1. Characteristics of patients according to LOS in the PCU.

	All	Short stay (Tertile-1)	Medium stay (Tertile-2)	Long stay (Tertile-3)	p
Number (%)	287	96 (33.4)	93 (32.4)	98 (34.1)	
Length of stay, days, range, median	4–79, 15	4–12, 8	13–20, 15	21–79, 25	
Age, years, mean (SD), median	70.5 (15.8), 72.0	67.0 (16.9), 67.0[a,b]	72.4 (14.2), 74.0	72.3 (15.8), 74.0	0.017*
Sex, male, %	55.7	59.4	46.2[e]	61.2	0.078
Age > 75 years, %	44.3	38.5	47.3	46.9	0.385
Comorbidities					
Hypertension, %	47.7	36.5[d]	51.6	55.5	0.023
Cancer, %	43.6	52.1[d]	43.0	35.7	0.071
Cardiovascular disease, %	32.8	26.0	37.6	34.7	0.208
Diabetes mellitus, %	27.2	24.0	32.3	25.5	0.396
Infection prior to admission, %	26.5	15.6[d]	28.0	35.7	0.006
Pneumonia , %	23.7	3.5	7.7	12.5	0.129
Urinary infection, %	1.4	0.3	-	1	
Other, %	1.4	0.7	0.7	0	
Acute/chr. renal failure, %	9.8	8.3	9.7	11.2	0.794
Other, %	66.6	60.4	67.7	71.4	0.255
Charlson CI, median (IQR)	6.0 (3.0)	5.1 (2.0)[a,b]	6.0 (3.0)	6.0 (3.0)	0.024
Malnutrition (at risk), %	95.8	95.8[d]	96.8	94.4	0.811
Mobilization disability, %	83.3	68.8[c]	88.2	92.9	<0.001
Feeding, oral, %	67.6	86.5[c,d]	64.5	52.0	<0.001
Tube feeding, %	28.9	10.4[c,d]	32.3	43.9	<0.001
Feeding, nasogastric, %	11.1	3.1[c,d]	12.9	17.3	0.006
Feeding, PEG, %	17.8	7.3[c,d]	19.4	26.5	0.002
Feeding, parenteral, %	18.5	19.8	24.7[e]	11.2	0.051
O_2 requirement on admission, %	38.7	30.2[d]	38.7	46.9	0.057
Permanent tracheostomy, %	8.4	2.1[d]	7.5	15.3	0.004
Sleep disturbance, %	41.5	38.5	40.9	44.9	0.661
Antidepressant use, %	13.3	17.9	9.0	12.6	0.200
Pressure ulcer, %	36.1	22.6[d]	34.1[e]	50.0	0.001
Recent readmission, %	19.9	24.0	22.6	13.3	0.127

LOS: Length of stay, PCU: Palliative care unit, PEG: Percutaneous endoscopic gastrostomy, CI: Comorbidity index, PEG: Percutaneous endoscopic gastrostomy

*Kruskal–Wallis test, others chi-square test

[a]adjusted $p < 0.05$ for short stay vs. medium stay; [b]adjusted $p < 0.05$ for short stay vs. long stay

[c]$p < 0.05$ for short stay vs. medium stay; [d]$p < 0.05$ for short stay vs. long stay; [e]$p < 0.05$ for medium stay vs. long stay. p = NS for other post hoc or binary comparisons.

(long stay) (Table 1). Mean age, the frequency of hypertension, infection, mobilization disability, tube feeding, permanent tracheostomy, and pressure ulcer increased significantly from the short stay tertile to medium and long stay tertiles, while the ratio of oral feeding reduced.

The proportion of individuals aged 75 and over, cancer, CVD, DM, renal failure, malnutrition, parenteral feeding, sleep disturbance rate, antidepressant use (mirtazapine, citalopram, sertraline or escitalopram), and recent readmission were similar in all tertiles (Table 1).

3.3. Factors associated with increased LOS

We performed an ordinal regression analysis using the baseline variables as the potential predictors that showed a significant relationship with LOS tertiles. The response variables included age, male sex, hypertension, infections, mobilization disability, tube feeding, permanent tracheostomy, and pressure ulcers, which formed the multivariate model. Taking the short stay (tertile-1) as the reference, mobilization disability [p = 0.013, OR: 2.34 (95% CI: 1.19–4.60)], tube feeding [p = 0.001, OR: 2.63 (95% CI: 1.49–4.66)], permanent tracheostomy [p =

Table 2. Ordinal regression analysis (dependent variable: tertiles of LOS in the PCU; reference category: lowest tertile, short stay).

Variables	Estimate	Std. error	Wald	df	Sig.	OR	95% CI	
							Lower	Upper
Age	0.002	0.010	0.026	1	0.873	1.00	0.98	1.02
Sex, female	0.314	0.259	1.471	1	0.225	0.73	0.44	1.21
Hypertension	0.588	0.258	5.194	1	0.023	1.80	1.09	2.98
Infection	0.279	0.271	1.057	1	0.304	1.32	1.29	2.25
Charlson comorbidity index	0.062	0.068	0.829	1	0.363	1.04	1.07	1.22
Mobilization disability	0.851	0.344	6.124	1	0.013	2.34	1.19	4.60
Tube feeding	0.967	0.291	11.022	1	0.001	2.63	1.49	4.66
Permanent tracheostomy	1.411	0.520	7.376	1	0.007	4.10	1.48	11.36
Pressure ulcer	0.447	0.272	2.689	1	0.101	1.56	0.92	2.66

Ordinal regression analysis, dependent variable LOS tertiles. The results show that four out of nine study variables, presence of mobilization disability, tube feeding, permanent tracheostomy, and hypertension were independently associated with increased likelihood of being classified in higher tertiles of LOS in the PCU.
LOS: Length of stay. PCU: palliative care unit. OR: Odds ratio. CI: Confidence interval.

0.007, OR: 4.10 (95% CI: 1.48–11.36)], and hypertension diagnosis [p = 0.023, OR: 1.80, (95% CI: 1.09–2.98)] were the variables independently associated with being classified in the medium stay and long stay tertiles (Table 2). The significant relationship between the tertiles of LOS and age, CCI, infections, and pressure ulcers in the univariate analyses was no longer significant in the multivariable model.

4. Discussion

Functions of a PCU have expanded from meeting the basic needs of end-of-life care to improving specific outcomes over 20 to 30 years [15,16], which is also the case in the Turkish context. Today, beyond a definite role in end-of-life care, PCUs are expected to maintain or improve functional status of the patient and provide psychological and social support also to the families. Accordingly, home discharge is among the significant goals of care in the PCU, which may be a request by the patient per se [17]. Nevertheless, PCU patients are heterogeneous, and preparation for home discharge requires consideration of various factors to ensure continuous home care is achievable [18,19]. In the present study, we identified potential indicators of prolonged LOS that can be assessed on admission to the PCU. Our participants represented a typical PCU because of the similarities in average age, sex distribution, proportions of patients with major comorbidities, and median LOS with some previous national [20–22] and international [9,23] reports.

Similar to a previous study from Turkey, more than 80% of the patients we evaluated were immobile on admission [20]. The likelihood of prolonged LOS in individuals with mobilization limitation was 2.3 times higher in the medium stay or long stay tertiles than the short LOS tertile. Since immobile patients require a higher level of care, it is plausible that the observed risk augmentation was independent of other variables. Moreover, the consequences of limited mobility such as pressure ulcers, deep vein thrombosis, muscle atrophy, difficulty swallowing, and oral intake can further prolong the LOS in the PCU. Recent studies on dementia [24] and traumatic brain injury patients [25] and palliative care in a similar setting in Turkey showed immobilization among the strongest risk factors for adverse outcomes including transfer to other settings and mortality.

There is little evidence of whether mobilization can be improved in the PCU. In an earlier study, physical exercise intervention in palliative care was shown to be a feasible way to improve well-being [26]. However, the study was performed among patients with incurable cancers who may still make more benefit from such interventions than those with permanently bed-bound individuals like we included in our study. Thus, even though it is impossible to reverse the mobilization problems in most PCU patients, preventing and treating the interrelated problems can help shorten the LOS and provide earlier discharge. Nevertheless, inclusion of palliation cases to the interventional studies is generally limited by the design [27].

Timely initiation of tube feeding, prior to or on admission, in a palliative care patient who has difficulty in food intake may suggest a faster clinical improvement and discharge. However, this is not always applicable in clinical practice. A small number of studies have addressed this question in specific patient groups. Overall, tube feeding did not impact LOS in a randomized controlled study with dementia patients on palliative care [28]. However, switching to tube feeding reduced the rate of readmissions after discharge, suggesting that favorable results can be obtained in the medium to long term following tube feeding initiation in a PCU patient. The effects of tube feeding on LOS in hospitalized individuals also seem to be related to the underlying causes, as it has been shown that gastrostomy reduces the LOS in patients with some cancer types [29]. In contrast, hypoalbuminemia and multimorbidity have been reported as independent variables associated with

delayed discharge in patients with gastrostomy tube placement [30].

In the current study, approximately one-third of patients were on tube feeding on PCU admission, and nearly two-thirds of them were on gastrostomy. Both gastrostomy and nasogastric feeding were statistically associated with prolonged LOS in univariate analysis. In the multivariable model, we combined gastrostomy and nasogastric feeding in a single definition as tube feeding to prevent multicollinearity. Finally, it appeared that tube feeding on admission was associated with 2.6 times increased risk of prolonged LOS, which was statistically significant. This finding is consistent with a previous a study that showed a linear relationship between LOS in the PCU and PEG feeding [22]. Moreover, it has also been previously reported that proper enteral feeding at home can reduce the LOS in the hospital [31].

Tracheostomy is lifesaving, and a permanent tracheostomy generally indicates a severe health condition. Available data indicate that tracheostomy placed early in critically ill patients reduces the LOS in the intensive care unit [32,33]. However, in chronic patients with a permanent tracheostomy who require palliation, preparing the patient and home environment to achieve sustained care after discharge emerges as a challenge to the team [34]. Thus, even if the patient is eventually discharged home, hospitalization may prolong the LOS during the PCU period. In our study, 8.4% of cases had permanent tracheostomy on admission, and it was independently associated with prolonged LOS. To our knowledge, this relationship has not been previously examined in a PCU. In patients with tracheostomy, decannulation was possible in only one-fifth of the cases, and the rate of discharge to home with cannula and cannula/mechanical ventilation was 27% and 41%, respectively [35]. So far, no study has evaluated the success of home mechanical ventilation in Turkey, but most relatives of the patients with tracheostomy claim institutional care instead of home care. All these considerations help explain how permanent tracheostomy on admission to the PCU can suggest to the clinician a prolonged LOS is likely.

While the development of pressure ulcers prolongs the LOS in acute care units [36], a longer stay in the PCU also increases the risk of developing pressure ulcers [37]. In the current study, the finding of pressure ulcers on admission to PCU was one factor that determined the LOS in unadjusted analysis, which is consistent with previous studies [20,38]. Our adjusted analysis, however, suggested that this relationship was dependent on additional factors as the significant univariate association became saturated in the multivariable model (Table 2). This finding opposes two relevant past studies in the field [39,40]. A possible explanation may be that due to recent advances in home care, pressure ulcers can be effectively followed and treated at home [41], which may reduce carers' concerns about the wound care and facilitates the decision of earlier discharge.

Another independent associate of longer LOS in the current study was hypertension. Although the effect size of the relationship was smallest among the four identified predictors a similar finding was previously observed in a similar setting [22]. Of note, a diagnosis of hypertension on admission does not always mean that uncontrolled blood pressure is present but it suggests that the patient is under increased risk of adverse cardiovascular events and premature mortality for a long time. Moreover, based on recent findings from a well-conducted study, deprescribing of antihypertensive medications is recommended for patients with multimorbidity at advanced ages [42]. Nevertheless, the underlying mechanism (e.g., blood pressure variability, interaction cardiovascular disease, end-organ complications) of an association with a hypertension diagnosis and increased LOS in the PCU needs be sought in future studies.

Some limitations of the present study must be indicated. Since the data analysis is cross-sectional, it is impossible to infer a causal relationship between the tested variables and LOS. Secondly, the data in medical records may not precisely indicate all parameters potentially associated with LOS (e.g., culture-positive infections, PEG infections). Since the information was mostly obtained from the family members or caregivers, an unknown degree of reporting bias cannot be neglected. On the other hand, most of the investigated variables (mobilization, tube feeding status, tracheostomy, and pressure ulcer) are severe conditions and cannot be exposed to recall bias. The strengths of the study are the inclusion of nearly 300 patients with home discharge from the PCU and the representation of a typical PCU. Moreover, despite the possibility above mentioned recall errors, the patients were recruited from a tertiary referral center with enhanced data repository.

In conclusion, the current study showed that cluster problems like mobilization limitations, tube feeding, permanent tracheostomy, and hypertension diagnosis on admission to the PCU may persist and delay home discharge of patients with advanced care needs. The study also indicated no relation of LOS to some significant comorbidities in the PCU. Future studies are required to evaluate whether interventions to improve the burden of these care needs can potentially contribute to the more effective discharge of PCU patients to home care.

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Conflict of interest
The authors declare that there are no conflicts of interest.

Informed consent
The study design was retrospective data analysis, so informed consent was not required.

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