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ORIGINAL RESEARCH / *ÖZGÜN ARAŞTIRMA*

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Evaluation of the End-stage Patients in Intensive Care

Yoğun Bakımda İzlenen Son Dönem Hastaların Süreçlerinin Değerlendirilmesi

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ABSTRACT *Objective:* The benefit of medical interventions applied in terminal patients who have no hope of recovery and whose death is thought to be approaching is still a controversial issue. In this study, it was aimed to analyze the terminal stage patients hospitalized in the intensive care unit.
Materials and Methods: The general characteristics and laboratory results of 61 end-stage patients admitted to the adult intensive care unit of university hospital between December 2016 and may 2017 were examined. Life expectancy, mortality rates, factors affecting mortality, and costs per patient were evaluated according to the palliative prognostic index (PPI) and palliative care admission score (PCAS) of the patients.
Results: Exitus patients had an average of 13.83 days of intensive care stay and patients who survived had a mean 30.69 days ($p<0.05$). The PCAS was not statistically significant between ex and alive patients. Exitus patients had a PPI of 6.48, whereas survivors had a PPI of 3.73, ($p<0.05$). Exitus patients had a mean palliative life expectancy of 3.78 days, whereas the palliative life expectancy of surviving patients was 71.42 days ($p<0.05$). The most common primary disease for intensive care admission is malignancy, with 33 patients. The average cost of treatment for exitus patients was $3654,50, while the cost of treatment for surviving patients was $7053,38 ($p<0.05$).
Conclusion: End-stage patients should be admitted to the palliative care unit or hospice using prognostic scoring systems. The bed capacity in intensive care units should be used for patients who have a chance to be treated. It is thought that unnecessary health expenditures can be avoided by hospitalizing terminal patients in palliative care units and hospices.
Keywords: End-stage patient, palliative care, intensive care unit, cost

ÖZ *Amaç:* İyileşme umudu kalmayan ve ölümün yaklaştığı düşünülen terminal dönem hastalarda uygulanan tıbbi müdahalelerin hastaya yararı halen tartışılan bir konudur. Bu çalışmada yoğun bakım ünitesinde yatan terminal dönem hastaların prospektif olarak analiz edilmesi amaçlanmıştır.
Gereç ve Yöntem: Üniversite hastanesi erişkin yoğun bakım ünitesine Aralık 2016 ile Mayıs 2017 tarihleri arasında yatan 61 son dönem hastanın, genel özellikleri ve laboratuvar sonuçları incelenmiştir. Burada hastaların palyatif prognostik indeks (PPI) ve palyatif bakım yatış skoruna (PBYS) göre beklenen yaşam süreleri, mortalite oranları ve mortaliteye etki eden faktörler, hasta başı maliyetler değerlendirilmiştir.
Bulgular: Ölen hastaların yoğun bakım kalış süresi ortalama 13,83 gün iken hayatta olan hastaların ortalama 30,69 gün idi ($p<0,05$). PBYS ölen ve hayatta kalan hastalar arasında istatistiksel olarak anlamlı farklı bulunmadı. Ölen hastaların PPI 6,48 ve hayatta olan hastaların PPI 3,73 olarak bulundu ($p<0,05$). Ölen hastaların palyatif beklenen yaşam süresi ortalama 3,78 gün iken hayatta olan hastaların palyatif beklenen yaşam süresi ortalama 71,42 gün olarak bulundu ($p<0,05$). Yoğun bakım kabulünde malignite en sık görülen primer hastalıktı (33 hasta). Ölen hastaların tedavi maliyeti ortalama 3654.50 dolar iken hayatta olan hastaların tedavi maliyeti ortalama 7053.38 dolar olarak bulundu ($p<0,05$).
Sonuç: Gerekli prognostik skorlama sistemleri kullanılarak son dönem hastalar palyatif bakım ünitesine veya hospise alınmalıdır. Yoğun bakımlardaki yatak kapasitesi tedavi edilme şansı olan hastalar için kullanılması sağlanmalıdır. Terminal dönem hastaların palyatif bakım ünitelerine ve hospislere yatışı ile gereksiz sağlık harcamalarından kaçınılabileceği düşünülmektedir.
Anahtar Kelimeler: Son dönem hasta, palyatif bakım, yoğun bakım ünitesi, maliyet

Introduction

Developments in the field of medicine, especially innovations in medical technology have allowed to extend life expectancy. The transformation of many diseases that used to be acute and rapidly developing into chronic and severe diseases; made some medical facts more complicated than before. Undoubtedly, the medical problems encountered in the last period of human life and the criteria used to make decisions about these cases have become more intensely debated.

It is still a matter of debate around the world how much benefit the medical interventions applied in end-stage patients who have no hope of recovery and whose death is thought to be inevitable. Many countries show different methods in the management of patients depending on their ethical, cultural, medical, legal and economic structures. The management of these patients has been taken to hospice, palliative care and home care systems and has been separated from the acute care system in developed countries (1,2). How long the treatment of untreatable care will last and whether it can be terminated or not constitute the basis of scientific and ethical discussions. In addition, scientific and ethical circles continue to debate whether the purpose of treatment should focus on the patient's life span or whether it is for life comfort, stopping the treatment, withdrawing life support, resuscitation indication and even the right to life-terminating treatment (3).

In our country, these patients are hospitalized and treated in acute care centers with the principle of "full support until death". In addition, institutional, legal and social pressure is applied to monitor these patients in intensive care units (ICUs) (4). As in the whole world, intensive care beds and resources are limited in our country; the units are special and expensive. ICUs are that units where patients who have a chance to survive after the acute event (organ failure, septic condition, etc.) are followed up and treated. For this reason, these units do not want to use their resources for end-stage patients who do not have a chance for treatment and whose results are known from the beginning.

In this study, we prospectively analyzed the end-stage patients hospitalized in Pamukkale University Faculty of Medicine Anesthesia ICU. It was aimed to evaluate the intensive care processes, their PCAS, expected life expectancy according to palliative prognostic index (PPI), mortality rates, risk factors affecting mortality per patient and cost of these patients.

Materials and Methods

Following the approval of the Pamukkale University Faculty of Medicine Ethics Committee (no: 60116787-020/3413, date: 10.01.2017), the clinical characteristics and laboratory results of the end-stage patients hospitalized in the anesthesiology intensive care of Pamukkale University Faculty of Medicine, Department of Anesthesiology and Reanimation between December 2016 and May 2017 were included. General characteristics and laboratory results were evaluated prospectively for life expectancy and costs were calculated according to the PCAS and PPI.

The demographic data of the patients and the type, location and duration of malignancy were noted in months. At the time of admission to the ICU systolic blood pressure, heart rate and PaO_2/FiO_2 ratio from arterial blood gas taken were recorded. The acute physiology and chronic health evaluation-II (APACHE-II) score was calculated at the time of hospitalization. Mechanical ventilation (MV) support was recorded as yes/no. If the patient was on ventilation support, this parameter was documented such as non-invasive (NIMV), orotracheal intubation (OTI) or tracheostomy. The organ failure was recorded. Initiation of vasopressors for circulatory failure, RIFLE criteria for renal failure (stage 3 and above), and Child Pugh scoring system for liver failure (Child Pugh B and above) were determined as criteria. ICU stay, intensive care discharge status, hospital stay, discharge status and the situation 3 months after discharge the hospital were recorded by contacting the patient's relatives with the phone numbers on the patient card. Palliative care admission score was determined according to palliative care admission criteria and scoring (5). Mean life expectancy was calculated according to the PPI system. The cost of the patient's treatment was calculated from hospital record. Intensive care treatments were billed in accordance with government health practice statement. Some drugs specified in the statement were invoiced separately.

Statistical Analysis

Data were analyzed with the SPSS 18 (SPSS Inc., Chicago, IL, USA) package program. Continuous variables were given as mean ± standard deviation, and categorical variables as numbers and percentages. When the parametric test assumptions are provided in independent group comparisons, the test of significance of the difference between two means or analysis of variance in the comparison of differences between groups; when parametric test assumptions were

not met, Mann-Whitney U test or Kruskal-Wallis analysis of variance was used to compare the differences between groups. The relationship between the variables was analyzed by Spearman or Pearson correlation analysis. Chi-square analysis was used to compare categorical variables.

Results

Sixty-one patients included in the study that ages ranged from 33 to 92 years, with a mean age of 64.5±13.01 years. 42.6% (n=26) of the patients were female and 57.3% (n=35) were male. There was no statistically significant difference between died and alive groups for admission results (Table 1). When the reasons for hospitalization of the patients were examined, 39 patients (63.9%) were admitted to the ICU for respiratory failure, 13 patients (21.3%) for general condition problems, and 9 patients for various problems. The primary diseases of the patients admitted to the ICU are given in Table 2. In intensive care admission, malignancy was the most common cause with 33 patients whereas 10 patients were diagnosed with lung ca. In terms of non-cancer primary disease, the most common cause was chronic obstructive pulmonary disease with five patients.

Infection was detected in 47 patients. Thirty-two patients had lung infection and 13 had bloodstream infection. Infection was not found in 14 patients (Table 3). Thirty eight of infected patients were died. Respiratory failure was found in 40 patients, circulatory failure in 36 patients, renal failure in 22 patients, and liver failure in 3 patients. Multiple organ failure was detected in 32 patients, and organ failure was not observed in 7 patients. Vasopressor therapy was initiated in 29 of 48 patients who died, while 7 patients out of 13 surviving patients received vasopressor therapy. There was no statistically significant difference between the deceased and surviving groups in terms of vasopressor therapy. There was no statistically significant difference between the two groups also in terms of renal replacement therapy (RRT). APACHE-II scores were statistically different in the deceased and surviving groups. The number of days of NIMV, orotracheal intubation and MV of the patients were given in Table 3 and there was no statistically significant difference between the two groups. MV as a tracheostomy were 14.75±7.68 days in the dead group and 27.17±13.67 days in the surviving group. The difference was statistically significant (Table 3).

The mean length of stay in the ICU, the mean hospital stay, the PPI and palliative life expectancy were different statistically significant between the deceased and surviving groups. The average cost of treatment per patient in the patients with exitus was 3654,50±3081,34 dollars, while the average cost of treatment per patient in the surviving patients was 7053,38±5974,67 dollars, and the difference between them was statistically significant (Table 4).

Table 1. Admission data of the patients

	Dead (48)	Survived (13)
Age	63.49±12.27	68.23±15.36
Gender (F/M)	20 (41.7%)/28 (58.3%)	6 (46.2%)/7 (53.8%)
PaO_2/FiO_2 ratio	229.17±67.05	199.46±47.70
Systolic blood pressure (mmHg)	117.52±24.09	106.54±24.14
Diastolic blood pressure (mmHg)	66.13±15.44	60.62±12.20
Heart rate (/min)	105.08±21.24	100.08±22.44
3 months after discharge	48 (78.69%)	13 (21.31%)

Table 2. Diagnosis at admission

Lung Ca	10	Acute renal failure	1
COPD	5	Xeroderma pigmentosum	1
Chronic heart failure	3	Multiple myeloma	2
Alzheimer	1	Bladder Ca	3
Neuroblastoma	1	HIV	1
Esophagus Ca	1	Larynx Ca	2
AML	1	Polymyosit	1
Colon Ca	3	Tonsil Ca	1
Cirrhosis	3	CABG	2
Chronic renal failure	1	Cardiac arrest	1
Pancreas Ca	3	Pneumonia	2
Interstitial lung disease	1	Endometrium Ca	1
Over Ca	2	Toxoplasma encephalitis	1
Stomach Ca	3	GIS bleeding	1
Breast Ca	2	Pulmonary embolism	1

Ca: Cancer, COPD: chronic obstructive pulmonary disease, AML: acute myeloid leukemia, HIV: human immunodeficiency virus, CABG: coronary artery bypass graft, GIS: gastrointestinal system

Table 3. APACHE-II score and supportive treatments for patients		
	Dead (48)	Survived (13)
APACHE-II score	61.24±13.44*	54.0±12.85
Vasopressor necessity (+/-)	29 (60.4%)/19 (39.6%)	7 (53.8%)/6 (46.2%)
RRT (+/-)	9 (18.8%)/39 (81.3%)	0 (0%)/13 (100%)
Infection (+/-)	38 (79.2%)/10 (20.8%)	9 (69.2%)/4 (30.8%)
NIMV (day)	3.42±3.11 (n=45)	7.60±7.34 (n=12)
MV OTE (day)	8.95±7.26 (n=48)	13.20±5.86 (n=12)
MV tracheostomy (day)	14.75±7.68 (n=24)*	27.17±13.67 (n=10)
Total MV (day)	12.31±11.74 (n=48)*	30.92±20.19 (n=12)

RRT: Renal replacement therapy, NIMV: non-invasive mechanical ventilation, MV: mechanical ventilation, APACHE-II: acute physiology and chronic health evaluation-II, OTI: orotracheal intubation
*p<0.05, between groups

Table 4. Cost, length of ICU, length of hospital and PCAS			
	Dead (n=48)	Survived (n=13)	p
Length of ICU (day)	13.83±11.37	30.69±21.90	0.0001*
Length of hospital (day)	15.71±12.65	33.23±20.94	0.003*
PCAS	8.33±1.27	7.67±2.10	0.227
PPI	6.48±2.42	3.73±1.68	0.0001*
Palliative expected life (day)	3.78±24.81	71.42±23.64	0.0001*
Cost of therapy (dollar)	3654.50±3081.34	7053.38±5974.67	0.012*

*p<0.05, between groups
ICU: Intensive care unit, PPI: palliative prognostic index, PCAS: palliative care admission score

Discussion

As stated in the ICU standards, ICUs are equipped with advanced technology devices that aim to support critical patients with serious dysfunction in one or more organ systems, are equipped with advanced technology, monitor the vital signs of the patients 24 hours a day, have intensive and invasive applications, and provide patient treatment and care. Intensive care is the units where service is provided by a multidisciplinary team (6).

Perceiving death as a failure for healthcare workers and measuring the success of ICUs with survival statistics also affect this situation. The main reason behind these is that, despite everything, the motivation to live is kept in the foreground and concepts such as quality of life, cost-effectiveness, and fair use of limited resources are ignored (7).

Prognosis assessment in intensive unit and palliative care settings is of great importance in order to create a balance in the care of end-stage patients and to contribute to the quality of life of patients and to use resources correctly, because prognosis is an indispensable element in the decision-making process in the selection of end-of-life treatment options. However, a number of studies have shown that survival estimates based on physicians' clinical experience are moderately associated with exact survival (8). Various clinical methods have been developed to predict the prognosis of patients with end-stage terminal illness (9). PPI was validated 245 cancer patients in a single-residence nursing home (10). In our study, we evaluated the processes of end-stage patients hospitalized in our ICU by using PPI and life expectancy according to that study.

In the study of Aygencel and Türkoğlu (11) on end-stage patients based in Turkey, the mean age of 83 patients was 63 years, and clinical data including mean age, gender, disease groups and presence of malignancy were in line with our study, and exitus rates were 5% higher than in our study. Similarly, Brown et al. (12) were followed up in the ICU, and their last-term follow-up was carried out in which the cases with various diseases. The demographic data of their study are parallel with the demographic data of our study. In our study, the mean age of the patients was 63.49±12.27 years in the exitus group and 68.23±15.36 years in the surviving group.

In another Aygencel et al. (13) study, high APACHE-II score at the time of admission to the ICU, presence of sepsis/septic shock at ICU admission and need for vasopressors are considered as poor prognostic factors if the underlying cancer is in remission. In our study, statistically significant differences were found between the APACHE-II, the need for invasive MV, the length of stay in the ICU, and the survivors group. We also found that the NIMV, IMV, and MV lengths of the surviving patients with tracheostomy were longer than those of the died group. It was noteworthy that all nine patients who received RRT were dead. Our finding, which is not in line with the study of Aygencel et al. (13), is that although the patients who needed vasopressors were more in the exitus group in our study but the difference was not statistically significant. In a retrospective study conducted in the USA (14), the length of hospital stay of terminally ill patients was found to be between 11.2 and 12.9 days. Our results seem to be compatible with the

literature. The mean hospital stay of the patients who died was 15.71±12.65 days, while the mean of 33.23±20.94 days for the patients who survived, and the difference between them was statistically significant in our study.

In a study conducted by Maltoni et al. (15) in 14 centers in Italy, the average palliative care score of 45% of the end-stage patients admitted to the ICU was in the range of 5.6-11 days. The mean PCAS in our study was similar to this group. While the mean PCAS of the patients who died was 8.33±1.27 days, the mean PCAS of the patients who survived was 7.67±2.10 days. The difference between groups was not statistically significant. In addition, the relatively high mean PCAS in the died and surviving patient group may be attributed to the inclusion of end-stage patients in both groups.

According to a study conducted in Ireland that found the correlation between PPI and prognosis, the average life expectancy of patients with a PPI score above 6 was 5 days (15). The PPI is used to predict survival in intensive care patients (mean survival according to this scoring system: PPI 0-2→90 days, PPI 2.1-4.0→61 days, PPI >4→12 days) (40). In a study by Arai et al. (16) that tested the accuracy of PPI, it was found that PPI was useful in predicting prognosis. In our study, the PPI of the patients who died was 6.48±2.42, while the PPI of the patients who survived was 3.73±1.68; the difference between them was statistically significant. Expected life expectancy calculated according to PPI, which is based on Karnofsky performance score and scoring according to clinical symptoms and the predictive power of our patients were found to be quite successful. While the palliative life expectancy of the patients who died was 3.78±24.81 days, the palliative life expectancy of the patients who survived was 71.42±23.64 days; the difference between them was statistically significant.

Unfortunately, we could not find a study in which cost analysis was performed, even though there have been recent advances in palliative care in our country. According to the international studies, both palliative care and the cost of care in hospices were found to be lower than in standard hospitals. According to a study conducted in Ohio, while the care in the hospice is $65 per day, the care of the same patient in the hospital is $125 (17). In another study, the weekly care fees of those who died at home or in nursing homes without entering the ICU ranged from 150-700 dollars, while the weekly expenditure for those who died in the ICU was around 2550-5000 dollars (18). In our study, the sum of the bills deducted from the patients in the last period followed up was 26,171 dollars; the average is $270,6 per day of hospitalization. These costs are calculated according to the package reimbursement system applied by health system according to the level of intensive care patients. Finally, while the average treatment cost per patient for the patients who died was 3654,50±3081,34 dollars, the average treatment cost per patient for the surviving patients was 7053,38±5974,67 dollars, and the difference between them was statistically significant.

Conclusion

Patients who die due to a disease that cannot be treated or who do not accept treatment should be taken to the palliative care unit or hospital by making a decision together with their primary care physician with prognostic scoring systems. Instead of filling the beds of these patients who have no possibility of recovery in ICUs, the bed capacity in ICUs should be used to patients that have treatment options. At the same time, it is thought that unnecessary cost will be avoided by hospitalizing terminal patients in palliative care units and hospices. In conclusion, with the necessary arrangements, the establishment of appropriate palliative care units for all end-stage patients in our country is necessary for more rational use of limited intensive care resources.

*****This article is derived from Semiha Yalçın's thesis on "Evaluation of the End Stage Patients in Intensive Care".

Ethics

Ethics Committee Approval: The study approval was obtained from the Non-Invasive Clinical Research Ethics Committee of Pamukkale University on 10th January 2017 (no: 60116787-020/3413).

Informed Consent: Written consent was obtained at admission.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: H.S., S.Y., Concept: H.S., S.Y., Design: H.S., Data Collection and Process: S.Y., Analysis or Interpretation: H.S., Literature Search: H.S., S.Y., Writing: H.S., S.Y.

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References

1. Lorenz KA, Lynn J, Dy SM, Shugarman LR, Wilkinson A, Mularski RA, et al. Evidence for improving palliative care at the end of life: a systematic review. Ann Intern Med 2008;148:147-59.
2. Vincent JL. Cultural differences in end-of-life care. Crit Care Med. 2001;29(2 Suppl):N52-5.
3. Schonwetter RS. Overview of Hospice and Palliative Care in Oncology. Cancer Control 1996;3:197-203.
4. Komurcu S. Current status of palliative care in Turkey. J Pediatr Hematol Oncol 2011;33 Suppl 1:S78-80.
5. Palyatif Bakım Evde ve Hastanede Çalıştay Raporu. T.C. Sağlık Bakanlığı Türkiye Kamu Hastaneleri Kurumu. İzmir Kuzey Kamu Hastaneleri Birliği Genel Sekreterliği. Tepecik Eğitim ve Araştırma Hastanesi. Ege Geriatri Derneği Yayınları No:1. 2013.
6. Yoğun Bakım Ünitelerinin Standartları Genelgesi [Internet]. Sağlık Bakanlığı. 2016 [cited 04/01/2018]. Available from: http://www.saglik.gov.tr/TR,10979/yogun-bakim-unitelerinin-standartlari-genelgesi-200853.html
7. Büken NÖ, Büken E. „Nedir Şu Tıp Etiği Dedikleri?". Sürekli Tıp Eğitimi Dergisi 2002;11:17-20.
8. Buchan JE. Nurses' estimations of patients' prognoses in the last days of life. Int J Palliat Nurs 1995;1:12-6.
9. Maltoni M, Nanni O, Pirovano M, Scarpi E, Indelli M, Martini C, et al. Successful validation of the palliative prognostic score in terminally ill cancer patients. Italian Multicenter Study Group on Palliative Care. J Pain Symptom Manage 1999;17:240-7.
10. Morita T, Tsunoda J, Inoue S, Chihara S. The Palliative Prognostic Index: a scoring system for survival prediction of terminally ill cancer patients. Support Care Cancer 1999;7:128-33.
11. Aygencel G, Türkoğlu M. Bir Dahili Yoğun Bakım Ünitesindeki Terminal Dönem Hastaların Genel Özellikleri ve Maliyetleri. Turkish Journal of Medical & Surgical Intensive Care Medicine/Dahili ve Cerrahi Bilimler Yogun Bakim Dergisi 2014;5.
12. Brown CE, Engelberg RA, Nielsen EL, Curtis JR. Palliative Care for Patients Dying in the Intensive Care Unit with Chronic Lung Disease Compared with Metastatic Cancer. Ann Am Thorac Soc 2016;13:684-9.
13. Aygencel G, Turkoglu M, Turkoz Sucak G, Benekli M. Prognostic factors in critically ill cancer patients admitted to the intensive care unit. J Crit Care 2014;29:618-26.
14. Angus DC, Barnato AE, Linde-Zwirble WT, Weissfeld LA, Watson RS, Rickert T, et al. Use of intensive care at the end of life in the United States: an epidemiologic study. Crit Care Med 2004;32:638-43.
15. Maltoni M, Caraceni A, Brunelli C, Broeckaert B, Christakis N, Eychmueller S et al. Prognostic factors in advanced cancer patients: evidence-based clinical recommendations--a study by the Steering Committee of the European Association for Palliative Care. J Clin Oncol 2005;23:6240-8.
16. Arai Y, Okajima Y, Kotani K, Tamba K. Prognostication based on the change in the palliative prognostic index for patients with terminal cancer. J Pain Symptom Manage 2014;47:742-7.
17. Namal A. Terminal dönem hastalarına yaklaşıma eleştirel bir bakış ışığında hospis düşüncesi. Demirhan AE, Oğuz Y, Elçioğlu Ö, Doğan H. Klinik Etik. Nobel Tıp Kitabevi, İstanbul 2000:595-616.
18. Morgan L, Howe L, Whitcomb J, Smith K. Improving communication and cost-effectiveness in the intensive care unit through palliative care: a review of literature. Dimens Crit Care Nurs 2011;30:133-8.