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RESEARCH

EVALUTION OF GERIATRIC INFECTIONS IN PALLIATIVE CARE CENTER

Abstract

Introduction: Palliative care aims to improve quality of care by providing symptom control among geriatric patients; therefore, infection control is of utmost importance as complications increase symptom burden, thus decreasing quality of life.

Materials and Method: Medical records of patients aged ≥65 years hospitalized at the palliative care center were retrospectively reviewed. Data on age, sex, diagnosis, comorbidities, length of stay, discharge status and cultures were collected.

Results: Mean age of 305 patients was 80.4±7.1 years and length of stay was 31.1±38.1 days. In total, 131 patients died, whereas 74 were referred to the intensive care unit, and 100 were discharged home. Main comorbidities included cerebrovascular diseases (37.4%), cancer (31.8%), hypertension (40%) and diabetes mellitus (21.3%) in patients who had dementia and Parkinson's disease. The highest growth was observed in urinary culture (67.9%), followed by blood, wound with the least growth in the tracheal aspirate (8.2%). E.coli was most commonly isolated in urinary, wound and tracheal aspirate culture, whereas Methicillin-Resistant Coagulase Negative Staphylococ was more in blood culture. While wound culture growth was less common in cancer patients, it was significantly more common in patients with Parkinson's disease, diabetes, and pressure ulcer ($p<0.05$). Growth in the tracheal aspirate was also significantly more common in patients with hypoxic brain, percutaneous endoscopic gastrostomy, and tracheostomy ($p<0.05$).

Conclusion: Among patients receiving inpatient palliative care, bacterial growth was most common in urinary cultures, whereas it was higher in the tracheal aspirates of patients with diabetes, tracheostomy, and percutaneous endoscopic gastrostomy.

Keywords: Palliative care; Geriatrics; Infections

ARAŞTIRMA

PALYATİF BAKIM MERKEZİNDE GERİATRİK ENFEKSİYONLARIN DEĞERLENDİRİLMESİ

Öz

Giriş: Palyatif Bakımın amacı semptom kontrolünün sağlanarak hastaların yaşam kalitesinin artırılmasıdır. Geriatrik hastalar en fazla palyatif bakım ihtiyacı olan hasta grubu olması nedeniyle semptom yükünü artırarak yaşam kalitelerinin azalmasına yol açan enfeksiyonların kontrolü daha önemli hale gelmektedir.

Gereç ve Yöntem: Palyatif bakım merkezinde yatan 65 yaş ve üstü hastaların yaşı, cinsiyeti, tanıları ile eşlik eden komorbiditeleri ve kültürleri retrospektif olarak değerlendirildi.

Bulgular: Toplam 305 hastanın yaş ortalaması 80.37±7.1 yıl, yatış süreleri 31.11±38.07 gün idi. 131 hastanın exutus olduğu 74 hastanın yoğun bakım ünitesine çıktığı 100 hastanın da eve taburcu edildiği gözlendi. Başta serebro vasküler hastalık (%37.37) olmak üzere, sırasıyla kanser, demans ve parkinson tanısı olan hastaların %40 da hipertansiyon %21.31 de diyabet eşlik ettiği tespit edildi. En fazla üreme idrar kültüründe (%67.86) olup sırasıyla kan, yara ve en azda trakeal aspirat (%8.19) üremesi gözlendi. İdrar, yara ve trakeal aspirat kültüründe en fazla oranda E.coli izole edilirken, kan kültüründe Methicillin-Dirençli Koagulaz Negative Staphylococ daha fazla idi. Kanser hastalarında yara kültür üremesi daha düşük, parkinson, diyabet ve bası ülseri olan hastalarda yara kültürlerinde üreme oranı istatiksel olarak anlamlı derecede yüksek ($p<0.05$) bulundu. Hipoksik beyin tanısı, perkütan endoskopik gastrostomi ve trakeostomisi olan hastalarda TA kültür üremesi istatistiksel olarak da anlamlı derecede fazla gözlendi ($p<0.05$).

Sonuç: Palyatif bakımdaki geriatrik hastalarda en fazla yüzde ile idrar kültürlerinde üreme gözlenirken diyabeti olan trakeostomili ve perkütan endoskopik gastrostomili hastalarda trakeal aspirat üremesinin daha yüksek olduğu tespit edildi.

Anahtar sözcükler: Palyatif bakım; Geriatrik; Enfeksiyon

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INTRODUCTION

With the worldwide life expectancy increasing, chronic critical diseases associated with aging, and their symptom burden are also increasing day by day (1,2). Palliative care (PC) is defined as an approach that increases the quality of life of patients/their relatives who experience difficulties due to life-threatening diseases by preventing or eliminating all physical, psychosocial, and psychological problems, especially pain, after performing early and effective assessment (3). At present, 80% of deaths occur during old age, a majority of which are in patients requiring PC in the last stages of their disease course (4). Most of the deaths are observed in individuals who are >65 years of age in developed countries, and as the life expectancy increases, the elderly population also increases with a relative reduction in the ratio of working population and an increasing mean age of potential caregivers. For this reason, the importance of PC is gradually becoming more acknowledged (5). In recent years, it was reported that increased health expenditures for the geriatric population with both chronic conditions and functional impairment led to the integration of geriatrics and PC implementation principles, which resulted in improved care quality and reduced use of costlier emergency services, hospitals, and nursing homes (6). It is estimated that only 14% of the 20 million patients who require PC every year receive such services (7,8). The effective utilization of PC services is very important given the very limited access to PC. Several studies have shown that PC-related infections prolong the length of hospitalization. The prevention of infectious diseases is of paramount importance in cancer patients receiving PC. However, little is known with regard to the factors that cause infection in these patients (9). Despite the high infection prevalence, antimicrobial therapy in the PC setting remains unclear as its indications and benefits are not well understood (10).

Furthermore, it is known that infection management would be more effective with the identification of infectious agents and implementation of necessary precautions in the care of geriatric patients requiring PC. Therefore, in this study, we aimed to investigate the infections and affecting factors in the geriatric patients who were followed up in a PC setting.

MATERIALS AND METHOD

This study was performed in accordance with the Declaration of Helsinki principles after being granted an approval by the Ethics Committee of Ankara Numune Training and Research Hospital (Ankara, Turkey) in 06/07/2018 (Approval no. 1974). Medical records of patients aged ≥65 years admitted at the PC Center of Ulus State Hospital between 01/01/2013 and 12/31/2017 were retrospectively examined. Patients with missing file records were excluded from the study, whereas those with growth in their cultures were included in the study. Collected data comprised information on age, sex, and presence of comorbidities or conditions including cancer, cerebrovascular disease (CVE), dementia, chronic obstructive pulmonary disease (COPD), hypoxic brain (HB), Parkinson's disease (PD), motor neuron disease(MND), heart failure (HF),, hypertension (HT), diabetes mellitus (DM), percutaneous endoscopic gastrostomy (PEG), tracheostomy, and pressure ulcer (PU). The length of stay (LOS) at the PC center and discharge status [death, intensive care unit (ICU), or at home] were determined. Culture growth in blood, urine, wound, and tracheal aspirate (TA) were recorded.

Statistical analysis

In this study, the data obtained from patients hospitalized at the PC center were entered into the computerized program. Where in necessary error checks and corrections were made. Normal distribution of continuous variables (age and LOS) was graphically examined using the Kolmogorov Smirnov test. Chi-square test was employed to investigate the relationship between two independent categorical variables. Categorical variables and frequency distributions are expressed as numbers and percentages, whereas numerical variables were expressed as mean±standard deviation.

All statistical analyses and calculations were performed with the use of MS Excel 2010 and IBM SPSS Statistics Ver. 23.0 software (IBM Corp., Armonk, NY, USA). An overall type I error level of 95% was used to indicate statistical significance.

Table 1. Demographic characteristics of the patients.

Variable		Value
Ages (Years) *		
		80.37±7.1
Gender**		
	Female	139 (45.6)
	Male	166 (54.4)
LOS in PCC (days)*		
		31.11±38.07
Discharge**		
	Exutus	131 (43.0)
	Intensive Care Unit	74 (24.3)
	Home	100 (32.8)
Diagnosis		
	Cancer	97 (31.80)
	Cerebrovascular Disease	114 (37.37)
	Dementia	55 (18.03)
	COPD	26 (8.52)
	Hypoxic Brain	7 (2.29)
	Parkinson's disease	23 (7.54)
	Motor Neurone Disease	4 (1.31)
	Trauma	11 (3.60)
	Other	7 (2.29)
Comorbidity		
	Heart Failure	52 (17.04)
	Hypertension	122 (40.00)
	Diabetes Mellitus	65 (21.31)
	PEG	95 (31.14)
	Tracheostomy	68 (22.29)
	Pressure Ulcer	179 (58.68)

* Values are presented as the mean±standard deviation. **Values are presented as n (%).

LOS in PCC: Length of Stay in PCC; COPD: Chronic Obstructive Pulmonary Disease; PEG: Percutaneous Endoscopic Gastrostomy;

Table 2. Culture results of patients.

Organism	Type of culture			
	Urine n (%)	Blood n (%)	Wound n (%)	Tracheal Aspirate n (%)
Acinetobacter spp.	29 (14.00)	20 (20.40)	27 (29.34)	6 (24.00)
Enterococcus spp.	27 (13.04)	9 (0.09)	3 (3.26)	_
Escherichia coli	179 (86.47)	70 (71.42)	67 (72.82)	18 (72.00)
MR-CoNS	120 (5.79)	80 (81.63)	15 (16.30)	4 (16.00)
MRSA	_	3 (3.06)	8 (8.69)	3 (12.00)
MS-CoNS	3 (1.44)	17 (17.34)	_	2 (8.00)
MSSA	_	9 (0.09)	8 (8.69)	_
Proteus spp.	22 (10.62)	4 (4.08)	41 (44.56)	3 (12.00)
Pseudomonas spp.	59 (28.50)	14 (1.28)	43 (46.73)	15 (60.00)
Total of isolates n (%)	207 (67.86)	98 (32.13)	92 (30.16)	25 (8.19)

MR: Methicillin-Resistant; CoNS: Coagulase Negative Staphylococci; SA: Staphylococcus Aureus; MS: Methicillin-Sensitive

Table 3. Comparison of culture results according to discharge status of the patients.

		Exutus n (%)	ICU n (%)	Home n (%)	$\chi 2$ value	p
Blood	Present	38 (26.76)	66 (46.48)	37 (26.06)	5.463	0.065
	Absent	64 (39.26)	36 (22.09)	63 (38.65)		
	Total	131 (42.95)	74 (24.26)	100 (32.79)		
Ürine	Present	86 (41.55)	48 (23.19)	73 (35.27)	1.81	0.405
	Absent	45 (45.92)	26 (26.53)	27 (27.55)		
	Total	131 (42.95)	74 (24.26)	100 (32.79)		
Wound	Present	36 (39.13)	19 (20.65)	37 (40.22)	3.374	0.185
	Absent	95 (44.6)	55 (25.82)	63 (29.58)		
	Total	131 (42.95)	74 (24.26)	100 (32.79)		
Rectal	Present	20 (37.04)	12 (22.22)	22 (40.74)	1.913	0.384
	Absent	111 (44.22)	62 (24.7)	78 (31.08)		
	Total	131 (42.95)	74 (24.26)	100 (32.79)		
Tracheal Aspirate	Present	7 (28)	11 (44)	7 (28)	5.98	0.051
	Absent	124 (44.29)	63 (22.5)	93 (33.21)		
	Total	131 (42.95)	74 (24.26)	100 (32.79)		

Chi-square test was used, and $p<0.05$ is significant

Table 4. Comparison of culture results according to diagnosis and co-morbidities of the patients.

		Blood		Urine		Wound		Rectal		Tracheal Aspirate	
		n (%)	p	n (%)	p	n (%)	p	n (%)	p	n (%)	p
Cancer	Present	42 (29.58)	0.436	64 (30.92)	0.629	19 (20.65)	**0.006**	13 (24.07)	0.179	4 (16)	0.077
	Absent	100 (70.42)		143 (69.08)		73 (79.35)		41 (75.93)		21 (84)	
Cerebrovascular Event	Present	56 (39.44)	0.488	80 (38.65)	0.505	38 (41.3)	0.351	24 (44.44)	0.237	11 (44)	0.475
	Absent	86 (60.569		127 (61.35)		54 (58.7)		30 (55.56)		14 (56)	
Demantia	Present	27 (19.01)	0.677	36 (17.39)	0.672	22 (23.91)	0.079	10 (18.52)	0.918	3 (12)	0.391
	Absent	115 (80.99)		171 (82.61)		70 (76.09)		44 (81.48)		22 (88)	
COPD	Present	14 (9.86)	0.436	15 (7.25)	0.346	5 (5.43)	0.295	2 (3.7)	0.126	5 (20)	0.059
	Absent	128 (90.14)		192 (92.75)		87 (94.57)		52 (96.3)		20 (80)	
Hypoxic Brain	Present	3 (2.11)	0.576	3 (1.45)	0.217	2 (2.17)	0.644	0 (0)	0.096	3 (12)	**0.011**
	Absent	139 (97.89)		204 (98.55)		90 (97.83)		54 (100)		22 (88)	
Parkinson's Disease	Present	10 (7.04)	0.928	190 (91.79)	0.679	13 (14.13)	**0.009**	5 (9.26)	0.607	3 (12)	0.411
	Absent	132 (92.96)		17 (8.21)		79 (85.87)		49 (90.74)		22 (88)	
Motor Neurone Disease	Present	2 (1.41)	0.635	2 (0.97)	0.596	2 (2.17)	0.587	0 (0)	0.457	1 (4)	0.291
	Absent	140 (98.59)		205 (99.03)		90 (97.83)		54 (100)		24 (96)	
Trauma	Present	4 (2.82)	0.702	7 (3.38)	0.762	4 (4.35)	0.654	1 (1.85)	0.41	0 (0)	0.166
	Absent	138 (97.18)		200 (96.62)		88 (95.65)		53 (98.15)		25 (100)	
Other	Present	5 (3.52)	0.171	6 (2.9)	0.436	2 (2.17)	0.644	2 (3.7)	0.474	0 (0)	0.271
	Absent	137 (96.48)		201 (97.1)		90 (97.83)		52 (96.3)		25 (100))	
Heart Failure	Present	19 (13.38)	0.112	33 (15.94)	0.455	11 (11.96)	0.12	9 (16.67)	0.934	2 (8)	0.172
	Absent	123 (86.62)		174 (84.06)		81 (88.04)		45 (83.33)		23 (92)	
Hypertension	Present	55 (38.73)	0.673	77 (37.2)	0.147	42 (45.65)	0.185	27 (50)	0.098	10 (40)	1
	Absent	87 (61.27)		130 (62.8)		50 (54.35)		27 (50)		15 (60)	
Diabetes Mellitus	Present	30 (21.13)	0.941	46 (22.22)	0.572	28 (30.43)	**0.011**	15 (27.78)	0.201	3 (12)	0.207
	Absent	112 (78.87)		161 (77.78)		64 (69.57)		39 (72.22)		22 (88)	
PEG	Present	51 (35.92)	0.093	64 (30.92)	0.9	37 (40.22)	0.025	18 (33.33)	0.702	15 (60)	**0.002**
	Absent	91 (64.08)		143 (69.08)		55 (59.78)		36 (66.67)		10 (40)	
Tracheal Aspirate	Present	31 (21.83)	0.856	47 (22.71)	0.802	17 (18.48)	0.293	9 (16.67)	0.273	19 (76)	**0.001**
	Absent	111 (78.17)		160 (77.29)		75 (81.52)		45 (83.33)		6 (24)	
Pressure Ulcer	Present	84 (59.15)	0.877	122 (58.94)	0.898	92 (100)	**0.0001**	38 (70.37)	0.055	17 (68)	0.869
	Absent	58 (40.85)		85 (41.06)		0 (0)		16 (29.63)		8 (32)	

Chi-square test was used, and P<0.05 is significant COPD: Chronic Obstructive Pulmonary Disease; PEG: Percutaneous Endoscopic Gastrostomy;

RESULTS

Medical records of patients aged ≥65 years admitted at the PC Center of Ulus State Hospital between 1/01/2013 and 12/31/2017 were retrospectively examined. With the exclusion of 35 patients with missing data, a total of 305 patients who had growth in their cultures were included in the study. The mean age of the patient population, comprising 139 females and 166 males, was 80.34±7.1 years. The LOS in PC was 31.1±38.1 days. The distribution of patients' prognosis showed death in 131 patients, referral to ICU in 74 patients, and home discharge in 100 patients (Table 1).

The main comorbidities included CVE (37.4%), cancer (31.8%), HT (40%), and DM (21.3%) in patients who had dementia and PD. More than half of the patients (58.7%) had PU, followed by PEG (31.1%) and tracheostomy (22.3%; Table 1). Growth in cultures is demonstrated in Table 2 as follows: highest growth was observed in urinary culture (67.9%), followed by blood, wound, and the least in TA (8.2%). E.coli was most commonly isolated in urine, wound and tracheal aspirate culture (respectively 86.5%, 72.8%, 72.0%) whereas Methicillin-Resistant (MR) Coagulase Negative Staphylococci (CoNS) was more in blood culture (81.6%). When the prognosis of the patients was compared by the growth in their cultured specimens, growth was most likely to be observed in the blood culture (37%) of patients referred to the ICU, whereas growth in urinary culture was higher (n=86, 41.6%) in cases that resulted in death, albeit not statistically significant (p=0,065) (Table 3). The growth in cultures was also compared in terms of the patients' diagnosis (Table 4). While wound culture growth was less common in cancer patients, it was significantly more common in patients with PD, DM, and PU ($p<0.05$). Growth in TA was also significantly more common in patients with HB, PEG, and tracheostomy ($p<0.05$).

DISCUSSION

Patients requiring PC, especially those in the terminal stage, are very susceptible to infections, with the symptom burden from these infections further reducing their quality of life (11). The main purpose of PC is to improve the quality of life of patients by providing symptom control (12). Infection control becomes a top priority as the geriatric population is the group of patients with the greatest need for PC, whereby the emergence of particularly resistant bacterial strains and infection control measures may result in additional burden on the patients and their family (13,14). In our study, we found that among geriatric patients receiving PC, the most common condition was urinary tract infections, and growth in TA was more frequent in diabetic patients with PEG and tracheostomy. Bacterial growth was observed in urine cultures of 207 out of 305 patients. Consistent with our results, a study performed in a PC unit reported growth in cultures from the urinary tract (42.5%), respiratory tract (22.9%), blood (12.5%), and skin and subcutaneous tissues (12.5%) (11). In our study, growth in urinary culture was 67.9%, in blood culture 32.1%, and in wound culture 30.2%. Pereira et al. (15) reported a retrospective chart review of the prevalence of infections in 100 consecutive admissions to palliative care unit. There were 74 infections in 55 patients, with urinary tract, respiratory tract, skin and subcutaneous tissue, blood, and mouth as the most common infection sites. E. coli S. aureus, and Enterococcus were the most common organisms. Another study conducted on 255 patients having advanced cancer in order to develop guidelines for the use of antimicrobials in PC reported that the most frequent infections were urinary tract infections, followed by respiratory tract and skin/subcutaneous tissue infections. It was further reported that the use of antimicrobials did not improve survival yet provided effective symptom control (16). Similar to our results, Reinbolt et al.(12) reported that E. coli was the most common urinary tract infection. The most frequent urinary tract organisms were E. coli. Also, that patients' survival was not affected by the presence of infection or use of antimicrobials and that, despite improving symptoms in most of the patients with urinary tract infections, antimicrobial use was less successful in symptom control in respiratory tract,

oral/pharyngeal, skin/subcutaneous tissue, or blood infections. Yamada et al. (17) reported that MR-CoNS are the most common microorganisms in blood cultures and most patients are malignant. In studies, CoNS is a major cause of nosocomial bacteremia and septicemia, especially for the patients who have been reported to be immune deficiency and malignancy (11,17). Patients with prosthetic devices, intravascular catheters, or other implanted foreign bodies are at particular risk of CoNS infection (17). In accordance with the literature, we assume that the high rate of MR-CoNS isolation in blood cultures is due to the patients in terminal period in our study and the frequent use of urinary catheter and intravenous catheter.

As additionally reported by Reinbolt et al. (12), blood infections manifest with more dramatic symptoms such as fever, disorientation, and hypotension compared to urinary tract and wound infections. In fact, urinary tract infections are mostly asymptomatic and usually overlooked due to often atypical presentations (18). We also believe that patients who had growth in their blood cultures were referred to the ICU upon patients' or families' requests for a more effective therapy due to the observation of more dramatic symptoms and that urinary tract infections were relatively more common in those who died as they were not referred to the ICU because of the atypical course of these infections.

In our study, the rate of wound culture in PD, DM and PU patients was significantly higher than that of wound culture in cancer patients ($p<0.05$). The fact that wound culture growth is less common in cancer patients and more common in patients with PD is consistent with the literature. In fact, it is acknowledged that the disease course is usually shorter in cancer, whereas in neurological diseases such as PD, the decline in functional capacity has a slow progression with longer patient life span; however, patients become gradually dependent. After the diagnosis of cancer, the prognosis becomes worse with a shortened life span (19,20). Therefore, PU was less observed in cancer patients with less common growth in wound cultures compared to the higher occurrence of PU and wound infections in patients with PD, whereby immobilizatio was also more frequent with a longer disease course. Thomsen et al. (21) compared diabetic patients to non-diabetic patients and reported that diabetes increased the risk of community-acquired bacteremia and was associated with poor prognosis. Consistent with the literature, our findings suggest that DM increases susceptibility to infections, a probable reason explaining the observation of high frequency of growth in wound cultures of DM patients in our study.

In patients with HB, PEG, and tracheostomy, growth in TA culture was significantly more common ($p<0.05$). At present, the insertion of gastrostomy and tracheostomy tube is a common practice in cases of hypoxic encephalopathy, especially in those whom rapid clinical improvement is not expected (22,23). By providing viruses and bacteria a direct entry to the lower respiratory tract, tracheostomy cannulas are known to predispose patients to respiratory tract infections and additionally lead to a local inflammatory reaction, further increasing the risk for infection (24,25). Furthermore, patients with chronic tracheostomy are exposed to bacterial colonization of the respiratory tract, a risk factor for respiratory tract infections (25).

In conclusion, we mostly observed urinary tract infection in geriatric patients receiving PC and noted TA growth to be more common in diabetic patients with tracheostomy and PEG. Therefore, we believe an effective symptom control could be achieved in patients receiving PC with the early detection of urinary tract infections and of pulmonary infections in diabetic patients with tracheostomy and PEG. As a limited number of studies exist both in our country and in the literature, further studies are warranted to support these findings.

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Conflicts of interest

None declared

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