

## Characteristics of the admissions of cancer patients to emergency department

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### Summary

**Purpose:** To identify the characteristics of admission of patients with cancer in the emergency department of a university hospital.

**Methods:** The medical records of 468 emergency department admissions of 336 cancer patients due to medical conditions that were related either to their cancer or its treatment were reviewed and retrospectively analysed.

**Results:** There were 226 (67%) males and 110 females (37%), with a median age of 60 years (range 17-93). Regarding cancer staging, 156 (46%) patients had locoregional disease and 180 (54%) metastatic disease. Regarding performance status (PS), 321 (69%) were Eastern Cooperative Oncology Group (ECOG) 1-2, and 147 (31%) were ECOG 3-4. The main causes of emergency department admission were cancer progression in 188 (40%) patients, cancer-related signs and symptoms in 203 (43%) and treatment-related complications in 77 (16%). The most common primary cancer sites were the thorax, the gastrointestinal system and the genitourinary system. The medical condition necessitating emergency department admission was local tumor compression in 144 (31%) admissions, infection in 86 (19%) and end-of-life support in 63 (13%).

**Conclusion:** Cancer patients seeking nonscheduled medical care and admitting to emergency departments present many challenges to the emergency physician. Due to the associated high morbidity and mortality, initial evaluation of the patient in the emergency department and therapy have utmost importance in the outcome of the patient. Accurate diagnosis and appropriate treatment of cancer-related problems can improve the quality of life dramatically in patients with cancer.

**Key words:** cancer, emergency admission, emergency care

### Introduction

Cancer is a health problem and, despite the developments in its management, still remains one of the leading causes of death. As a result of the better management strategies that both translate to a prolonged lifespan and pronounced complications, patients with cancer will be increasingly seeking for care for medical conditions related either to their cancer or its treatment. These patients will be admitted to the emergency departments for their urgent, unexpected and potentially life-threatening medical conditions that might be associated with serious consequences. Therefore, the emergency physicians will be confronted with a broad spectrum of patients with cancer and their urgent medical conditions, and they should be able recognize and treat them.

The purpose of the present study was to identify

the characteristics of admissions of patients with cancer in an emergency department of a university hospital.

### Methods

This study was conducted at an emergency department associated with a university hospital in eastern Turkey. The population is around three quarters of a million, although the university hospital serves as a tertiary care referral center for neighboring cities. During one year (May 2006-April 2007) 23,860 emergency department admissions of adult patients were evaluated from the hospital registry that was searched for the diagnosis of any solid cancer using the International Statistical Classification of Diseases and Related Health Problems (ICD-10) coding system. A total of 371 patients was identified as having a previously established diagnosis of a solid cancer. Of 371 patients, 336 were included in this study since they had been admitted to the emergency department for medical conditions that were related either to their cancer or its treatment, whereas 35 were

not included in the study since they had been admitted to the emergency department for reasons related neither to their cancer nor to its treatment. The patients' medical records were reviewed and retrospectively classified. The study design was approved by the Institutional Review Board.

Patient demographics (age and gender), cancer characteristics (primarily involved system, disease stage and metastatic sites) and cancer treatment (surgery, radiation therapy and chemotherapy) were recorded on standardized data sheets. Cancers were classified based on the primarily involved system, namely the central nervous system, head and neck, gastrointestinal system, thorax, breast, genitourinary system, skin (excluding basal cell carcinoma) and the soft tissues as well as cancers of unknown primary site. The patient PS, the condition necessitating the emergency department admission (the main complaint and the final diagnosis), the means of arrival at the emergency department, the history (or the number) of previous emergency department admissions and the immediate outcome were documented on each admission.

ECOG PS scale was evaluated on each admission by the emergency physician who was caring for patients with cancer. The conditions requiring emergency department admissions were: (1) cancer-related signs and symptoms; (2) treatment-related complications; (3) cancer progression, as evaluated by the attending oncologist. The means of arrival at the emergency department were: (1) an ambulance; (2) any other means of transportation. The immediate outcome was reported as: (1) discharge from the emergency department; (2) hospitalization. The length of stay in the hospital and mortality were documented for those patients who required hospitalization.

## Results

From May 1st, 2006 until April 30th, 2007, 336 patients and 468 emergency department admissions of these patients were evaluated. Patient, cancer and treatment characteristics are presented in Table 1. There were 226 (67%) males and 110 (33%) females. Their median age was 60 years (range 17-93). Tumors according to the primarily involved system are presented in Table 2. Among them the most common were the thorax in 88 (26%) patients, the gastrointestinal system in 86 (26%) and the genitourinary system in 58 (17%). The main complaints on admission are presented in Table 3. The most common complaints were pain on 107 (22%) admissions, shortness of breath in 80 (17%) admissions, deteriorated general health status (defined as getting bedridden, fatigue, lack of oral feeding and weight loss) in 57 (12%) and fever in 42 (9%) admissions. The medical condition that had been established by the emergency physician to necessitate the emergency department admission is presented in Table 4. The medical condition necessitating admission was local tumor compression for 144 (31%) admissions, infection (including neutropenic fever) for 86 (19%) and end-of-life support for 63 (13%) admissions.

Regarding disease stage, 156 (46%) patients were classified as having locoregional disease and 180 (54%)

**Table 1.** Patient, cancer and treatment characteristics

<i>Characteristics</i>	<i>N</i>	<i>%</i>
Gender		
Male	226	67
Female	110	33
Age (years)		
< 65	164	49
≥ 65	172	51
Cancer stage		
Locoregional	156	46
Metastatic	180	54
Previous cancer treatment		
Surgery alone	83	25
Radiation therapy alone	22	7
Chemotherapy alone	24	7
Surgery and radiation therapy	34	10
Surgery and chemotherapy	50	15
Radiation therapy and chemotherapy	31	9
Surgery, radiation therapy and chemotherapy	37	11
None	55	16
ECOG performance status*		
1	127	27
2	194	42
3	104	22
4	43	9
Conditions necessitating emergency admission*		
Cancer-related signs and symptoms	203	43
Treatment-related complications	77	16
Cancer progression	188	40
Means of arrival at the emergency department*		
Ambulance	239	51
Other means of transportation	229	49
Number of emergency admissions		
1	260	77
2	50	15
3	17	6
≥ 4	9	2
Immediate outcome*		
Discharge from the emergency department	165	35
Hospitalization	303	65
Length of hospital stay (days)**		
≤ 5	109	36
> 5	194	64
Mortality		
Death in the emergency department	10	3
Death during hospitalization	85	25

\*on each admission \*\*only for hospitalized patients

as having metastatic disease. With respect to previous cancer treatment, 281 (84%) patients had been treated by surgery, chemotherapy and radiation therapy (alone or in combination), whereas 55 (16%) patients had not received any treatment. Metastatic disease was detected in the bones (36; 20%), brain (34; 19%), liver (31; 17%), lung (21; 12%), peritoneum (14; 8%), skin (6; 3%) and multiple metastases in 38 (21%). Of 180 patients having metastatic disease, the diagnosis of metastatic lesions was established in the emergency depart-

**Table 2.** Tumors by primarily involved system

<i>System</i>	<i>N</i>	<i>%</i>
Thorax	88	26
Gastrointestinal	86	26
Genitourinary	58	17
Head and neck	34	10
Breast	32	10
Central nervous	15	4
Skin	8	2
Soft tissues	6	2
Unknown	9	3

ment in 56 (17%). Of these patients, brain lesions were diagnosed in 19 (34%), bone in 11 (20%), liver in 9 (16%), lung in 4 (7%), peritoneum in 4 (7%) and multiple metastases in 9 (16%).

During the study period, 468 emergency department admissions were registered. ECOG PS 1 was noted in 127 (27%) admissions, ECOG PS 2 in 194 (42%), ECOG PS 3 in 104 (22%) and ECOG PS 4 in 43 (9%) admissions. The conditions requiring emergency department admissions were cancer-related signs and symptoms (203 admissions; 43%), treatment-related complications (77 admissions; 16%), and cancer progression (188 admissions; 40%).

Patients were brought and admitted to the emergency department by ambulance (239; 51%) and by other means of transportation (229; 49%). Of 239 emer-

**Table 3.** Main complaints

<i>Complaints</i>	<i>N</i>	<i>%</i>
Pain	107	23
Shortness of breath	80	17
Deterioration in general health status	58	12
Fever	42	9
Bleeding	34	7
Fatigue	27	6
Dysuria, oliguria and anuria	24	5
Altered level of consciousness and seizure	24	5
Nausea and vomiting	23	5
Obstipation	17	4
Abdominal distention	12	3
Diarrhea	7	1
Asymmetric limb edema	7	1
Paralysis or plegia	6	1

gency department admissions by ambulance, the conditions requiring emergency department admissions were cancer-related signs and symptoms (80; 29%), treatment-related complications (23; 11%) and cancer progression (136; 60%). The number of emergency department admissions for each patient ranged between 1 and 10 (median 1) during the study period. Of 336 patients, 260 (77%) had been admitted to the emergency department once, whereas 76 (23%) had been admitted twice or more. Of all emergency department admissions, 165 (35%) had resulted in discharge from the emergency department and 303 (65%) in hospitaliza-

**Table 4.** Medical conditions necessitating emergency admission

<i>Medical conditions</i>	<i>N</i>	<i>%</i>
Infection	86	19
Neutropenic fever	18	4
Others (pneumonia, urinary tract infection etc.)	68	15
Local tumor compression	144	31
Increased intracranial pressure	41	9
Bowel obstruction	27	6
Obstructive uropathy	19	4
Intrahepatic/extrahepatic cholestasis	14	3
Pleural/pericardial effusion	13	3
Ascites	13	3
Airway obstruction	8	2
Spinal cord compression	5	1
Superior vena cava syndrome	4	1
End-of-life support	63	13
Pain control	45	10
Hemorrhage	33	7
Diarrhea and vomiting after treatment	28	6
Hematological problems	25	5
Anemia	18	4
Thromboembolism (deep vein thrombosis)	7	1
Respiratory failure	25	5
Hypercalcemia/hypocalcemia/hyponatremia/hypernatremia	14	3
Pathologic fracture	5	1

tion. Overall hospitalization rate of the patients without cancer were 8251 (35%) during the study period (May 2006-April 2007). The hospital stay ranged between 1 and 82 days (median 7). Of 303 hospitalizations, 109 (36%) had lasted for 5 days or less whereas 194 (64%) for 6 days or more.

Of 336 patients, 10 (3%) died of their disease during their emergency department care, while 85 (25%) died of their disease during their hospitalizations following their emergency department admissions. Among these, 63 (66%) patients died within 5 days of their emergency department admission. Of 95 patients who died of their disease, 29 (31%) had locoregional disease, 66 (69%) metastatic disease, 82 (86%) had ECOG PS 3-4 and 69 (73%) had cancer progression. The most common causes of death were deteriorated general health status in 52 (55%), infection (including febrile neutropenia) in 11 (12%), bleeding in 7 (7%), increased intracranial pressure in 6 (6%), airway obstruction in 4 (4%) and pleural or pericardial effusions in 3 (3%).

During the emergency department admissions, interventions included blood transfusion in 34 (7%) patients, cardiopulmonary resuscitation in 12 (3%), placement of a biliary stent by endoscopic retrograde cholangiopancreatography in 13 (3%), tracheostomy in 8 (2%), paracentesis in 11 (2%), thoracentesis in 6 (1%), emergency surgery in 7 (1%), nephrostomy in 3 (0.6%) and dialysis in one patient (0.2%).

## Discussion

Emergency department admissions of cancer patients present a challenge not only to the oncologists, but to the emergency physicians as well. Actually, such admissions are unexpected since cancer patients are usually expected to be admitted to the oncology ward because of some sort of medical problems. However, these patients are admitted to the emergency department due to various medical conditions such as disease-related signs and symptoms and treatment-related complications. The emergency department admissions should be recognized as acutely-developing and potentially life-threatening events [1] that, if not anticipated, promptly recognized and effectively managed, might result in significant morbidity and even death [2,3]. Although substantial information has been published on the management of treatment-related complications, only few studies have evaluated the management of disease-related signs and symptoms necessitating admissions to the emergency department [4-9].

The often debilitated general health status, altered homeostasis and immunological compromise might ren-

der patients with cancer more vulnerable, as compared to the healthy population, to urgent medical conditions. Since patients with cancer could instantly proceed to a mortal or severely morbid state during their emergency department admissions, their initial assessment in the emergency department should be prompt, with a focused questioning regarding their main complaint, a baseline evaluation of their vital signs and a rapid overall physical examination. Although cancer is a chronic disease, acute complaints such as pain, nausea and vomiting, fever and shortness of breath may prompt emergency department admissions. An emergency department might be the sanctuary site for immediate relief of their complaints for the majority of patients with cancer. Swenson et al. have reported that the most common complaint at presentation was pain in 34% of the patients, followed by nausea and vomiting in 30%, shortness of breath in 17% and fever in 14% [4]. Similar results have also been reported by Escalante et al. [10] and Bozdemir et al. [5]. Likewise, in the present study pain was the most common complaint at presentation, followed by shortness of breath, deteriorated general health status, fever and bleeding. Pain might result from the cancer *per se* or be a consequence of cancer treatment. The very high incidence of pain among patients with cancer admitting to the emergency department might be interpreted as the result of an insufficient supportive care in the outpatient clinics. This leads to an increased number of avoidable emergency department admissions that could be counteracted through advanced and effective pain management strategies in the outpatient clinics.

In the present study, the most common medical condition necessitating emergency admission was local tumor compression, followed by infection and end-of-life support. Deteriorated general health status has not been mentioned among the presenting complaints of patients with cancer in previous studies. It might be a manifestation of cancer progression and, even, a sign of the end of life. This specific complaint may be a harbinger of the doom for patients with cancer, as they gradually become bedridden. Therefore, in the eye of the patients and their caregivers, the emergency department admission becomes the means of an easier access to the end-of-life support. The end-of-life support is associated with changing attitudes of cancer patients and their distressed caregivers. The emergency department admission might be precipitated in case the care provided by the caregivers fails to sufficiently meet the needs of the patients.

Infection, and the associated febrile neutropenia in particular, is a potentially life-threatening complication of cancer treatment and a very common cause of hospitalization [11,12]. Therefore, early identification and management is extremely important. The increase

in the administration of the commonly used chemotherapy regimens in the outpatient setting should contribute to the likelihood that most emergency physicians would encounter patients with complications secondary to treatment-induced febrile neutropenia. Although patients with febrile neutropenia might appear relatively stable in the emergency department on admission, they subsequently experience clinical deterioration in a matter of several hours or days. Since delaying the administration of antibiotics could increase the likelihood of death, the empirical administration of broad-spectrum antibiotics could be considered in the emergency department, in agreement with the relevant national or international guidelines. Large studies have shown that neutropenic fever after chemotherapy causes death in 4-30% of the patients [13-15]. The present study revealed results similar with previous studies.

The hospitalization rate of cancer patients was higher than for patients without cancer, since cancer patients admitted to the emergency department were vulnerable to more complicated medical conditions such as end-of-life support. In previous studies, the length of hospitalization of cancer patients was higher than for patients without cancer. According to Swenson et al. [4] the mean length of hospitalization was 8 days, and Yates et al. [16] reported a similar hospitalization of 9 days. In this study, the mean length of stay in the hospital was 7 days. These results reveal that the patient population using the emergency departments for cancer symptomatology consists of complex cases that require a higher hospitalization rate and longer hospital stay compared to patients without cancer.

Since the PS score depends mainly on the patient's daily activities, it might prove to be simple and practical in the emergency setting in an attempt to predict the outcome. For cancer patients, poorer ECOG PS has been shown to be associated with poorer prognosis. Escalante et al. found that poor ECOG PS was most significantly associated with the levels of both fatigue and pain [10]. Bozcuk et al. reported that poor PS is associated with an increased risk of intrahospital mortality [17]. Similarly, Bozdemir et al. [5] reported that poor ECOG PS in the emergency department was found highly predictive for short-term mortality. Our results were consistent with previous studies. These findings indicate that PS is the main prognostic factor for accurate survival estimations of cancer patients and should alert the emergency physician and the oncologist regarding the short-term survival.

In several studies, admission to the hospital via the emergency department has been argued to be an important marker of poorer survival [6,8,18-20]. Earle et al. [21] have demonstrated that emergency department admissions and hospital admissions were quite common in

the last month of life in older patients who died of cancer. The high percentage of emergency department admissions has been recognized as one indicator for poor-quality end-of-life cancer care [22,23]. In the present study, the mortality rate of cancer patients admitted to the emergency department was 28% and these patients had either cancer progression or metastatic disease, and showed signs of deteriorated general health status or requiring end-of-life support. Hence, cancer progression and symptom-derived emergency admissions might be prognostic factors related to poorer short-term survival.

In conclusion, cancer patients frequently seek non-scheduled medical care and admit to emergency departments for a range of conditions that include pain, breathing problems, fever and bleeding, that generally result from advanced disease, as well as end-of-life support. Since deteriorated general health status - mostly as a result of getting bedridden - fatigue, lack of oral feeding and weight loss might be associated with high morbidity and mortality, initial evaluation of the patient in the emergency department has a great impact on the patient outcome. Close collaboration between the oncology team and the emergency medicine physicians is required regarding the care of cancer patients for their urgent medical conditions, thus a consensus algorithm of management should be developed.

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