Supportive Care in Cancer (2019) 27:2649–2655
https://doi.org/10.1007/s00520-018-4554-x

ORIGINAL ARTICLE

Association of emergency department admission and early inpatient palliative care consultation with hospital mortality in a comprehensive cancer center

Imad El Majzoub[1,2] · Aiham Qdaisat[1] · Patrick S. Chaftari[1] · Sai-Ching J. Yeung[1] · Rasha D. Sawaya[2] · Mazen Jizzini[1] · Maria Teresa Cruz Carreras[1] · Hussna Abunafeesa[1] · Ahmed F. Elsayem[1]

Received: 1 May 2018 / Accepted: 13 November 2018 / Published online: 24 November 2018

Abstract

Purpose Consultation to palliative care (PC) services in hospitalized patients is frequently late after admission to a hospital. The purpose of this study is to examine the association of in-hospital mortality and timing of palliative care consultation in cancer patients admitted through the emergency department (ED) of MD Anderson Cancer Center.

Methods Institutional databases were queried for unique medical admissions over a period of 1 year. Primary cancer type, ED versus direct admission, length of stay (LOS), presenting symptoms, and in-hospital mortality were reviewed; patient data were analyzed, and risk factors for in-hospital mortality were identified. The association of early palliative care consultation (within 3 days of admission) with these outcomes was studied. Descriptive statistics and multivariate logistic regression model were used.

Results Equal numbers of patients were admitted directly versus through the ED (7598 and 7538 respectively). However, of all patients who died in the hospital, 990 (88%) were admitted through the ED, compared with 137 admitted directly ($P < 0.001$). Patients who died in the hospital had longer median LOS compared with patients who were discharged alive (11 vs. 4 days, respectively, $P < 0.001$). Early palliative care consultation was associated with decreased mortality, compared with late consultation ($P < 0.001$). Chief complaints of respiratory problems, neurologic issues, or fatigue/weakness were significantly associated with in-hospital mortality.

Conclusion We found an association between ED admission and hospital mortality. Decedent cancer patients had a prolonged LOS, and early palliative care consultation for terminally ill symptomatic patients may prevent in-hospital mortality and improve quality of cancer care.

Keywords Emergency · Palliative care · Mortality · Hospitalization · Symptoms

Introduction

Although most cancer patients prefer to die at home [1], many are admitted to hospital in the last month of life and some die in intensive care units [2]. This is due mainly to the availability of more cancer therapies over the last two decades [3]. As a result, the cost of cancer care is increasing, while length of stay (LOS) in hospices is decreasing [4].

Cancer is an increasingly common presenting condition among hospital admissions [5]. However, admission sometimes occurs directly from outpatient clinics, and a large percentage of cancer patients who visit an emergency department (ED) during the last weeks of life will die in the hospital [6]. Frequent ED visits in the last month of life and in-hospital mortality are considered indicators of poor-quality cancer care [7, 8]. In our previous work, we found a strong association between ED presenting symptoms of altered mental status and dyspnea and in-hospital mortality [9]. Patients admitted through the ED experienced high intensive care unit (ICU) admission and in-hospital mortality rates. Although a considerable number of patients admitted to the hospital are admitted directly from outpatient centers, the contribution to in-hospital

✉ Ahmed F. Elsayem
AElsayem@mdanderson.org

[1] Department of Emergency Medicine, Unit 1468, The University of Texas MD Anderson Cancer Center, 1515 Holcombe Blvd, Houston, TX, USA

[2] Department of Emergency Medicine, American University of Beirut Medical Center, Beirut, Lebanon

mortality is lacking. Information in the literature on comparison of outcomes of mortality, LOS, ICU admission, and need for palliative care among cancer patients admitted through ED and those admitted directly to a hospital is limited [10].

Palliative care is known to improve quality of life for cancer patients and to reduce the intensity and cost of cancer care in the outpatient setting [11]. Our survey of US cancer hospitals revealed that most have established palliative care services. However, referral to these services occurs very late, during the last week of life [12]. In one study, Gruzden et [13] al randomized patients with advanced cancer who presented in the ED to either palliative care consultation or usual care, and found that patients who received palliative care had a better quality of life 3 months later. Furthermore, another study [14] explored the effects of initiating palliative care consultation in the ED on inpatient LOS. The authors found that patients with life-limiting illnesses seen by palliative care teams in EDs experienced a decrease in inpatient LOS [14].

Health systems are now focusing on initiating, sustaining, growing, and evaluating palliative care through finding a model to screen for patients with unmet palliative care needs and requesting health care services to report metrics of clinical care quality and customer satisfaction [12, 15]. We hypothesized that early palliative care would decrease LOS and in-hospital mortality. The data presented in our study can be used in conjunction with results from other studies to create a protocol for emergency physicians to initiate palliative care in the ED.

Methods

This retrospective cohort study was conducted under a clinical research protocol approved by the Institutional Review Board of The University of Texas MD Anderson Cancer Center, a comprehensive cancer center located in Houston, Texas USA.

Patients

All consecutive unique patients admitted to MD Anderson from September 1, 2016 to August 31, 2017 were identified by querying the admissions database. In this study, we examined the mortality outcomes in cancer patients admitted to the hospital through our ED and those admitted directly. We characterized the patients by cancer type and discharge status (alive or dead), profiled LOS in the admitted patients, and showed the impact of early palliative care consultation on their outcomes, all in an effort to integrate a palliative care model into our oncologic ED service lines. We included the last admission for patients with more than one admission. Surgical patients, those with benign neoplasms, and those who did not have cancer were excluded. See Fig. 1.

Patient demographics, ICU admission, and date of palliative care consultation were collected. Patients were stratified by cancer type and admission type (through the ED or directly from outpatient clinics). Direct admission was defined as hospitalization without receiving care in the hospital's ED. In-hospital mortality, which was the outcome of interest, was defined as death that occurred during the hospital stay. Patients were analyzed according to cancer type to test for differences in in-hospital mortality by admission type.

LOS was calculated as the time from hospital admission to hospital discharge or mortality. Median values with their interquartile ranges (IQRs) were reported for the various patient groups.

Presenting symptoms are the reasons why patients came to ED, and reported in their medical records by triage nurses. Most of the time, it was the patient's own expressed symptoms such as pain, nausea or vomiting, bleeding, fever, or shortness of breath. The triage page include a space for the main (primary) presenting symptom and a separate space for secondary symptoms. We identified more than 40 presenting symptoms. Two physicians grouped all symptoms into six groups: respiratory, neurological, fatigue and weakness, fever and infections, pain, or others. Patients with multiple secondary presenting symptoms and no primary (main symptom) were added to the group of other together with less frequent symptoms. Diagnosis of the ED visits, such as pneumonia or UTI, was not included.

Palliative care consultation

If palliative care was consulted during admission, the date of that consultation was recorded and the period from admission was calculated. These patients were used to assess the effect of palliative care consultation timing on in-hospital mortality.

ICU admission

Data on admission to ICU was matched with data of source of admission (ED vs. direct) and type of cancer (hematological vs. solid).

Statistical analysis

Descriptive statistics and significance were appraised using chi-square or Fisher's exact tests. The Wilcoxon Mann–Whitney *U* test was used to detect any significant differences in admission LOS and in-hospital mortality after grouping patients by cancer type (hematological or solid) and admission type, given that LOS was not normally distributed in the Shapiro–Wilk test.

Presenting symptoms were grouped into six categories: respiratory, neurological, fatigue and weakness, fever and infections, pain, and others. We used univariate and multivariate logistic regression to study the impact of these symptoms on in-hospital mortality.

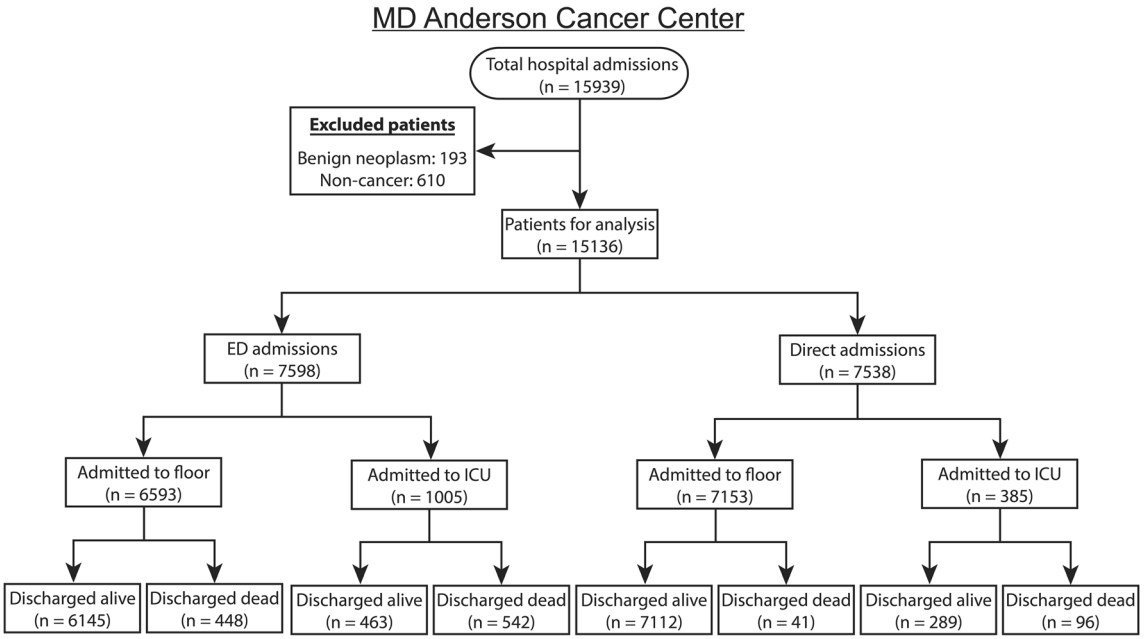

Fig. 1 Flow chart for the patients recruited in our study

Univariable logistic regression analysis was performed to determine the association between the palliative care consultation timing and in-hospital mortality rate, with calculation of odds ratios (ORs) and 95% confidence intervals (CIs).

Palliative care consultation was categorized as early or late, using a cutoff point of 3 days as in similar studies [14, 16]. The association of these two groups with in-hospital mortality risk was analyzed using multivariable logistic regression with calculation of ORs and 95% CIs after controlling for patient age, sex, chief complaint, cancer type, LOS, ICU stay, and admission type. Two-tailed *P* values less than 0.05 were considered significant. All statistical analyses were performed using the R computing language (version 3.4.2).

Results

During the study period, 15,939 medical oncology patients were admitted to MD Anderson for treatment. We excluded 193 patients with benign neoplasms and 610 who did not have cancer. Of the remaining 15,136 patients, 7598 (50.2%) were admitted through the ED, whereas 7538 (49.8%) were admitted directly to the hospital (Fig. 1).

The in-hospital mortality rate for the patients admitted through the ED was 13% (990/7598), which was significantly higher than the 1.8% rate for patients admitted directly (137/7538; $P < 0.001$) (Table 1). Of the 1127 patients who died in the hospital, 990 (88%) were admitted through the ED and 137 (12%) were admitted directly ($P < 0.001$). Regardless of the admission type, patients with hematological tumors had a higher in-hospital mortality rate (11.5% [396/3454]) than did those with solid tumors (6.3% [731/11,682]; $P < 0.001$). Among the patients with hematological tumors, those with leukemia had the highest in-hospital mortality rate. Among patients with solid tumors, mortality rate differed according to cancer type: those with brain cancer had the lowest in-hospital mortality rates, whereas those with lung cancer or melanoma had the highest rate (Table 1).

LOS and in-hospital mortality

Patients who died in the hospital had longer median LOS (11 days, IQR = 5–20 days) compared with patients who were discharged alive (4 days, IQR = 2–7 days), $P < 0.001$.The median LOS for all patients was 4 days (IQR, 2–8 days) (Table 2). The median LOS was significantly higher in patients with liquid tumors than in those with solid tumors (6 days [IQR, 3–16 days] vs. 4 days [IQR, 2–7 days]; $P < 0.001$). The median LOS was also significantly higher in patients admitted through the ED than in those admitted directly (5 days [IQR, 3–9 days] vs. 4 days [IQR, 2–7 days]; $P < 0.001$).

Analysis according to cancer and admission type along with discharge status (alive or dead) demonstrated that patients with hematological tumors who died during their hospital stay had the longest median LOS, whereas patients with solid tumors who were discharged alive had the shortest median LOS (Table 2).

Palliative care consultation timing and in-hospital mortality risk

Of all the patients eligible for analysis, 2655 patients had palliative care consultations during their hospital stays. The

Table 1 In-hospital mortality according to cancer and admission type

	N (%)				
Cancer type	ED admission, alive at discharge	ED admission, dead at discharge	Direct admission, alive at discharge	Direct admission, dead at discharge	*P*
Solid tumors (*N* = 11.682)					
Brain	206 (94.93)	11 (5.07)	341 (99.71)	1 (0.29)	< 0.001*
Breast	574 (88.72)	73 (11.28)	507 (99.41)	3 (0.59)	< 0.001*
Endocrine	250 (88.97)	31 (11.03)	353 (99.72)	1 (0.28)	< 0.001*
Gastrointestinal and hepatobiliary	1181 (87.68)	166 (12.32)	1267 (99.06)	12 (0.94)	< 0.001
Genitourinary	743 (91.05)	73 (8.95)	1520 (99.74)	4 (0.26)	< 0.001*
Gynecological	371 (88.33)	49 (11.67)	390 (97.50)	10 (2.50)	< 0.001
Head and neck	379 (90.67)	39 (9.33)	431 (99.08)	4 (0.92)	< 0.001*
Lung	640 (80.20)	158 (19.80)	391 (98.24)	7 (1.76)	< 0.001*
Melanoma	227 (87.98)	31 (12.02)	252 (97.67)	6 (2.33)	< 0.001*
Sarcoma	314 (90.23)	34 (9.77)	504 (99.21)	4 (0.79)	< 0.001*
Other	74 (88.10)	10 (11.90)	36 (90.00)	4 (10.00)	> 0.999*
Hematological tumors (*N* = 3454)					
Leukemia	909 (81.89)	201 (18.11)	555 (90.10)	61 (9.90)	< 0.001
Lymphoma	462 (87.17)	68 (12.83)	609 (98.38)	10 (1.62)	< 0.001
Multiple myeloma	278 (85.80)	46 (14.20)	245 (96.08)	10 (3.92)	< 0.001

*Fisher's exact test

ED, emergency department

risk of in-hospital mortality increased with delay in palliative care consultation (OR, 1.06 [95% CI, 1.05–1.07]; $P < 0.001$). We defined early palliative care consultation as a consultation occurring within the first 3 days after admission and late palliative care consultation as one occurring more than 3 days after admission. In our univariate analysis, late palliative care consultation was associated with significantly higher risk for in-hospital mortality than was early consultation (OR, 2.58 [95% CI, 2.14–3.11]; $P < 0.001$). We observed similar results of our multivariable analysis (OR, 1.05 [95% CI, 1.02–1.09]; $P < 0.001$) after controlling for patient age, sex, presenting chief complaint, cancer type, LOS, ICU stay, and admission type. Patients admitted to the ICU had almost six times the odds of dying in the hospital than did patients not in the ICU (OR, 5.80 [95% CI, 4.56–7.39]; $P < 0.001$). Hematological tumors, prolonged hospital stays, and ED admission also increased the risk of in-hospital mortality.

As for the patients' chief complaints, respiratory, neurological, fatigue, and weakness, were significantly associated with risk of in-hospital mortality (Table 3).

Discussion

We found that of the 15,939 unique medical oncology patients admitted to MD Anderson during the study period, similar percentages were admitted through the ED or admitted directly. However, the in-hospital mortality rate for the patients

Table 2 Length of stay for cancer patients admitted to the hospital

Discharge status	Cancer type	Admission type	Median LOS, days (IQR)	*P*	Median LOS, h (IQR)	*P*
Dead	Solid tumor	ED	9 (5–15)	0.319	210 (115–365)	0.440
		Direct	11 (4–17)		248 (104–421)	
	Hematological tumor	ED	16 (8–32)	< 0.001	384 (196–763)	< 0.001
		Direct	28 (14–54)		662 (338–1295)	
Alive	Solid tumor	ED	4 (2–8)	< 0.001	110 (68–195)	< 0.001
		Direct	4 (2–6)		95 (55–152)	
	Hematological tumor	ED	5 (3–9)	< 0.001	123 (70–222)	< 0.001
		Direct	6 (4–19)		142 (89–451)	

ED, emergency department; *IQR*, interquartile range; *LOS*, length of stay

Table 3 Association of patient- and admission-related factors with in-hospital mortality risk

Variable	Univariable		Multivariable	
	OR (95% CI)	*P*	OR (95% CI)	*P*
Age				
< 60 years	Reference			
≥ 60 years	1.26 (1.06–1.50)	0.008	1.23 (1.01–1.5)	0.042
Sex				
Female	Reference			
Male	1.22 (1.03–1.45)	0.022	1.11 (0.92–1.35)	0.284
Cancer type				
Solid tumor	Reference			
Hematological tumor	2.66 (2.12–3.34)	< 0.001	1.73 (1.31–2.28)	< 0.001
LOS, days	1.04 (1.03–1.04)	< 0.001	1.02 (1.01–1.02)	< 0.001
Palliative care timing				
Early consult	Reference			
Late consult	2.58 (2.14–3.11)	< 0.001	1.48 (1.17–1.86)	< 0.001
ICU stay				
No	Reference			
Yes	7.78 (6.22–9.76)	< 0.001	5.80 (4.56–7.39)	< 0.001
Admission type				
Direct	Reference			
ED	1.72 (1.28–2.36)	< 0.001	1.70 (1.18–2.49)	0.005
Chief complaint				
Respiratory	2.49 (1.94–3.19)	< 0.001	2.52 (1.9–3.36)	< 0.001
Neurological	1.67 (1.17–2.37)	0.004	1.57 (1.05–2.32)	0.025
Fatigue and weakness	1.48 (1.04–2.08)	0.026	1.53 (1.04–2.24)	0.029
Fever and infections	1.60 (1.12–2.26)	0.009	1.05 (0.69–1.59)	0.821
Pain	0.69 (0.54–0.88)	0.003	0.81 (0.62–1.07)	0.145
Other complaints	Reference			

CI, confidence interval; *ED*, emergency department; *ICU*, intensive care unit; *LOS*, length of stay; *OR*, odds ratio

admitted through the ED was considerably higher than that for patients admitted directly, and hospital LOS for patients who died was significantly higher than for those discharged alive. Therefore, oncologists and other clinicians caring for patients with advanced cancer and a poor prognosis should address goals of care and consider palliative care consultation shortly after ED admission. Similarly, limited palliative care resources should be directed to patients admitted through the ED.

We found that early palliative care consultation (within 3 days) after hospital admission is associated with lower risk for hospital death, compared with patients having a late consultation. This finding is important, since the majority of terminally ill patients prefers to die at home [17]. Moreover, early palliative care consultation will help optimize symptom control and ensure participation of the cancer patient in communication regarding important end-of-life issues. Ideally, this consultation should be started in the out-patient setting and long before ED arrival [18]. However, as advanced cancer patients continue to receive therapy, they will continue to come to the ED. Before making important decisions such as admission to the ICU, some communication should occur between ED physicians and medical oncologists. The impact of such an approach on patient satisfaction and resource utilization should be studied prospectively.

We believe that many patients, who were admitted through the ED and had late palliative care consultation and DNR discussion, had advanced cancer at the time they presented to ED [19, 20], and the goals of care or Do-Not-Resuscitate (DNR) order were not addressed because of a busy ED, lack of training of ED physicians, or unknown response to investigational therapy in patients with advance cancer. However, fewer patients may have early cancer and deteriorated after admission from ED and required PC consultation despite optimal management. A recent study on elderly patients showed that patients who had early DNR are less likely to die in the hospital and have a shorter hospital LOS [21]. Further

research should evaluate the role of DNR and the timing of palliative care consultation in patients with advanced cancer, controlling for age and recent cancer therapy.

In the present study, we examined multiple predictors of in-hospital mortality. We found that presenting in the ED with dyspnea, altered mental status, and weakness/fatigue was associated with increased risk for in-hospital mortality. Multiple studies have shown that dyspnea is associated with shorter survival in patients with advanced cancer [22–24]. The findings were in accordance with those we reported previously, demonstrating that patients admitted through the ED with dyspnea and altered mental status had higher rates of ICU admission and in-hospital mortality [25]. The persistence of this finding at a different time is of interest. Altered mental status may be due to delirium, which is known to be associated with increased hospital death [19, 26]. However, in the absence of systematic assessment for delirium, we are not certain about this assumption. Weakness/fatigue may be a marker of poor performance status, which also is known to be associated with increased in-hospital death [27, 28]. The association of these three conditions with mortality should be explored in further studies.

In addition, we found that patients who died in the hospital had prolonged hospitalization irrespective of whether they were admitted through the ED or directly. Another study that explored the effects of initiating a palliative care consultation in the ED on inpatient LOS found that patients with life-limiting illnesses seen by the palliative care team in the ED had decreased inpatient LOS after ED admission due to increased mortality rates [12].

In the present study, we also found that the median LOS was markedly higher in patients with hematological tumors than in those with solid tumors (6 days [IQR, 3–16 days] and 4 days [IQR, 2–7 days], respectively). Furthermore, the median LOS was markedly higher in patients admitted through the ED than in those admitted directly, which agrees with our report that patients who died in the hospital had longer LOS than did those who were discharged alive [25].

To the best of our knowledge, this study is the first to (1) compare the mortality outcomes of patients admitted through the ED with those of patients admitted directly to the hospital and (2) evaluate the association of early and late palliative care consultation on in-hospital mortality. This information will be of interest to oncologists, palliative care leaders, and hospital administrators seeking to improve the quality of cancer care, and to manage limited space and resources in cancer hospitals.

Our study is limited by its retrospective nature and focus on a single comprehensive cancer center; the findings may not be generalizable to smaller cancer centers or community hospitals. Models of emergency or acute cancer care delivery are variable in the USA and UK for acutely unwell patients [29]. Internationally, excellent reviews, and some interesting models of integrating PC and oncology were prescribed. [18, 30–32] Identifying low-risk cancer patients such as those with low-risk febrile neutropenia and providing outpatient management [33], or providing supportive care in the outpatient setting will likely reduce ED visits by cancer patients, allowing more time for ED physicians to provide better care for more sick cancer patients including goals of care discussion.

Another limitation of our study is lack of information on whether the patients had advanced, progressive, or limited disease and whether their treatment goals were cure or palliation. However, limiting the cohort to the last admission for patients with multiple admissions reduce the number of patients treated with curative intent. In addition, we used only the chief presenting symptoms to assess ED admission; many of our patients had multiple symptoms that could have been secondary or, in a large number of patients, multiple primary. Future studies should consider including some physiological and comorbidity scores to better define patients at risk of hospital mortality and direct limited PC resources for early intervention to improve quality of cancer care and possibly prevent hospital death.

Similar to other investigators [34], we recommend targeting significant clinical problems and specific cancer populations to improve the delivery of quality cancer care and to potentially avoid some ED visits and hospitalizations.

In conclusion, this study highlights the likelihood of benefit for early palliative care in patients with advanced cancer admitted through the ED feeling acutely unwell with symptoms of dyspnea, altered mental status, and fatigue/weakness. Collaboration between oncologists, ED physicians, and palliative care providers is needed to help in early palliative care involvement, prevent futile care, and possibly improve the quality of and satisfaction with care for patients and their family members. Such an approach will likely reduce ICU admissions, shorten length of stay, and reduce resource utilization.

Acknowledgments The authors acknowledge the scientific publication department at MD Anderson for editorial support.

Author contributions Conception and design

Imad El Majzoub, Aiham Qdaisat, Patrick S. Chaftari, Sai-Ching J. Yeung, Rasha D Sawaya, Maria Teresa Cruz Carreras, Hussna Abunafeesa, and Ahmed F. Elsayem

Provision of study materials or patients

Imad El Majzoub, Ahmed F. Elsayem, and Sai-Ching J. Yeung

Collection and assembly of data

Imad El Majzoub, Aiham Qdaisat, Ahmed F. Elsayem, and Patrick S. Chaftari

Data analysis and interpretation

Imad El Majzoub, Aiham Qdaisat, Patrick S. Chaftari, Sai-Ching J. Yeung Rasha D Sawaya, Mazen Jizzini, Maria Teresa Cruz Carreras, Hussna Abunafeesa, and Ahmed F. Elsayem

Manuscript writing

Imad El Majzoub, Aiham Qdaisat, Hussna Abunafeesa, Patrick S. Chaftari, Sai-Ching J. Yeung Rasha D Sawaya Mazen Jizzini, Maria Teresa Cruz Carreras, and Ahmed F. Elsayem

Final approval of manuscript

All authors

Dr. Elsayem have full control of the primary data, which may be accessed by the journal if requested.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflicts of interest.

References

1. Barbera L, Seow H, Sutradhar R, Chu A, Burge F, Fassbender K, McGrail K, Lawson B, Liu Y, Pataky R, Potapov A (2015) Quality indicators of end-of-life care in pwith cancer: what rate is right? J Oncol Pract 11:e279–e287
2. Teno JM, Gozalo PL, Bynum JP et al (2013) Change in end-of-life care for Medicare beneficiaries: site of death, place of care, and health care transitions in 2000, 2005, and 2009. JAMA 309:470–477
3. Earle CC, Landrum MB, Souza JM, Neville BA, Weeks JC, Ayanian JZ (2008) Aggressiveness of cancer care near the end of life: is it a quality-of-care issue? J Clin Oncol 26:3860–3866
4. (2015) Dying in America: improving quality and honoring individual preferences near the end of life. Mil Med 180:365–367
5. Rivera DR, Gallicchio L, Brown J, Liu B, Kyriacou DN, Shelburne N (2017) Trends in adult cancer-related emergency department utilization: an analysis of data from the nationwide emergency department sample. JAMA Oncol 3:e172450
6. Keating NL, Landrum MB, Huskamp HA, Kouri EM, Prigerson HG, Schrag D, Maciejewski PK, Hornbrook MC, Haggstrom DA (2016) Dartmouth atlas area-level estimates of end-of-life expenditures: how well do they reflect expenditures for prospectively identified advanced lung cancer patients? Health Serv Res 51:1584–1594
7. Weissman DE, Meier DE (2009) Center to advance palliative care inpatient unit operational metrics: consensus recommendations. J Palliat Med 12:21–25
8. Weissman DE, Meier DE (2011) Identifying patients in need of a palliative care assessment in the hospital setting: a consensus report from the center to advance palliative care. J Palliat Med 14:17–23
9. Elsayem AF, Merriman KW, Gonzalez CE, Yeung SCJ, Chaftari PS, Reyes-Gibby C, Todd KH (2016) Presenting symptoms in the emergency department as predictors of intensive care unit admissions and hospital mortality in a comprehensive cancer center. J Oncol Pract 12:e554–e563
10. Morita T, Tsunoda J, Inoue S, Chihara S (1999) The palliative prognostic index: a scoring system for survival prediction of terminally ill cancer patients. Support Care Cancer 7:128–133
11. Temel JS, Greer JA, Muzikansky A, Gallagher ER, Admane S, Jackson VA, Dahlin CM, Blinderman CD, Jacobsen J, Pirl WF, Billings JA, Lynch TJ (2010) Early palliative care for patients with metastatic non-small-cell lung cancer. N Engl J Med 363:733–742
12. Hui D, Elsayem A, De la Cruz M et al (2010) Availability and integration of palliative care at US cancer centers. Jama 303:1054–1061
13. Grudzen CR, Richardson LD, Johnson PN, Hu M, Wang B, Ortiz JM, Kistler EA, Chen A, Morrison RS (2016) Emergency department-initiated palliative care in advanced cancer: a randomized clinical trial. JAMA Oncol 2:591
14. Reyes-Ortiz CA, Williams C, Westphal C (2015) Comparison of early versus late palliative care consultation in end-of-life care for the hospitalized frail elderly patients. Am J Hosp Palliat Care 32:516–520
15. Grudzen CR, Hwang U, Cohen JA, Fischman M, Morrison RS (2012) Characteristics of emergency department patients who receive a palliative care consultation. J Palliat Med 15:396–399
16. Higuchi M, Luna J, Blinderman C, Salmasian H, Vawdrey D, Adelman RD (2018) Hospital-wide impact of early palliative care interventions on direct costs and length of stay. J Pain Symptom Manag 55:674–675
17. Tang ST, McCorkle R (2001) Determinants of place of death for terminal cancer patients. Cancer Investig 19:165–180
18. Hui D, Bruera E (2016) Integrating palliative care into the trajectory of cancer care. Nat Rev Clin Oncol 13:159–171
19. Elsayem AF, Bruera E, Valentine A, Warneke CL, Wood GL, Yeung SCJ, Page VD, Silvestre J, Brock PA, Todd KH (2017) Advance directives, hospitalization, and survival among advanced cancer patients with delirium presenting to the emergency department: a prospective study. Oncologist 22:1368–1373
20. Elsayem AF, Bruera E, Valentine AD, Warneke CL, Yeung SCJ, Page VD, Wood GL, Silvestre J, Holmes HM, Brock PA, Todd KH (2016) Delirium frequency among advanced cancer patients presenting to an emergency department: a prospective, randomized, observational study. Cancer 122:2918–2924
21. Patel K, Sinvani L, Patel V, Kozikowski A, Smilios C, Akerman M, Kiszko K, Maiti S, Hajizadeh N, Wolf-Klein G, Pekmezaris R (2018) Do-not-resuscitate orders in older adults during hospitalization: a propensity score-matched analysis. J Am Geriatr Soc 66:924–929
22. Ban W, Lee JM, Ha JH, Yeo CD, Kang HH, Rhee CK, Moon HS, Lee SH (2016) Dyspnea as a prognostic factor in patients with non-small cell lung cancer. Yonsei Med J 57:1063–1069
23. Stevens JP, Baker K, Howell MD, Banzett RB (2016) Prevalence and predictive value of dyspnea ratings in hospitalized patients: pilot studies. PLoS One 11:e0152601
24. Ripamonti C (1999) Management of dyspnea in advanced cancer patients. Support Care Cancer 7:233–243
25. Brody H (2010) Medicine's ethical responsibility for health care reform–the top five list. N Engl J Med 362:283–285
26. Mehta RD, Roth AJ (2015) Psychiatric considerations in the oncology setting. CA Cancer J Clin 65:300–314
27. Wang XS, Woodruff JF (2015) Cancer-related and treatment-related fatigue. Gynecol Oncol 136:446–452
28. Curt GA (2000) Impact of fatigue on quality of life in oncology patients. Semin Hematol 37:14–17
29. Knight T, Ahn S, Rice TW, Cooksley T (2017) Acute oncology care: a narrative review of the acute management of neutropenic sepsis and immune-related toxicities of checkpoint inhibitors. Eur J Intern Med 45:59–65
30. Siouta N, Van Beek K, van der Eerden ME et al (2016) Integrated palliative care in Europe: a qualitative systematic literature review of empirically-tested models in cancer and chronic disease. BMC Palliat Care 15:56
31. Hannon B, Zimmermann C, Knaul FM, Powell RA, Mwangi-Powell FN, Rodin G (2016) Provision of palliative care in low- and middle-income countries: overcoming obstacles for effective treatment delivery. J Clin Oncol 34:62–68
32. Kotronoulas G, Papadopoulou C, Simpson MF, McPhelim J, Mack L, Maguire R (2018) Using patient-reported outcome measures to deliver enhanced supportive care to people with lung cancer: feasibility and acceptability of a nurse-led consultation model. Support Care Cancer 26:3729–3737
33. Cooksley T, Campbell G, Al-Sayed T et al (2018) A novel approach to improving ambulatory outpatient management of low risk febrile neutropenia: an enhanced supportive care (ESC) clinic. Support Care Cancer 26:2937–2940
34. Wu FM, Newman JM, Lasher A, Brody AA (2013) Effects of initiating palliative care consultation in the emergency department on inpatient length of stay. J Palliat Med 16:1362–1367