

PATTERNS AND CAUSES OF END-OF-LIFE HOSPITAL ADMISSIONS: NOVEL INSIGHTS FROM A TERTIARY CARE CENTER IN RIYADH, SAUDI ARABIA

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Abstract

Background

Hospital admissions at the end of life are a significant aspect of palliative care, often triggered by acute symptoms or gaps in care delivery. Understanding the patterns and causes of such admissions is essential for optimizing symptom management, minimizing unnecessary hospitalizations, and enhancing advance care planning. While studies from Canada, England, and Japan have highlighted common end-of-life admission triggers such as dyspnea, pain, and gastrointestinal symptoms, data from Saudi Arabia remain limited.

Methods

This retrospective cohort study analyzed end-of-life hospital admissions at a tertiary care center in Riyadh, Saudi Arabia, from January 2022 to March 2024. The study included 586 patients aged over 16 years with advanced malignancies who expired during their hospital stay. Data were extracted from electronic medical records and analyzed using SPSS version 30.0. Variables included demographics, cancer diagnosis, admission reasons, and length of stay. Associations between cancer types and admission diagnoses were evaluated using Chi-Square tests.

Results

The cohort included 586 patients (52.2% male), with a mean age of 66.82 ± 15.81 years. Most patients (81.5%) had stage IV cancer, with gastrointestinal malignancies being the most common (51.2%). The primary reasons for admission were deterioration of performance status (28.8%), gastrointestinal symptoms (21%), and respiratory causes (16.6%), including pneumonia (86.3%). Altered consciousness was noted in 13.3% of cases, and pain and sepsis were common among other causes. Length of stay averaged 21.64 ± 15 days, with 6.7% of patients dying within 48 hours of admission. Significant associations were observed between cancer types and specific admission diagnoses, such as malignant bowel obstruction in colorectal cancer ($p < 0.01$) and pneumonia in gastrointestinal malignancies ($p < 0.01$).

Discussion

This study provides the first regional insights into end-of-life hospital admissions, emphasizing functional decline, gastrointestinal complications, and respiratory issues as predominant reasons. These findings align with international data and underscore the need for targeted interventions, including symptom-focused care, advance care planning, and telehealth integration to reduce

hospitalizations. Future research should focus on evaluating community-based palliative care models and their impact on reducing distressing end-of-life admissions in Saudi Arabia.

Conclusion

End-of-life hospital admissions in Riyadh reflect global patterns, driven by advanced cancer-related complications. Enhancing symptom management and care coordination can improve patient outcomes and reduce healthcare burdens.

Background

Hospital admissions near the end of life are common in palliative care, often driven by acute symptomatic crises or systemic gaps in care. Understanding the reasons and patterns of these admissions is essential for improving symptom management, enhancing advance care planning, and reducing unnecessary hospitalizations. (Abel et al., 2009)

In a study conducted in Ontario, Canada, among 91,561 cancer patients who died between 2002 and 2005, 76,759 patients visited the emergency department (ED) within the final six months of life. The primary reasons included abdominal pain (11%), dyspnea (10%), and fatigue or malaise (8%). Lung cancer accounted for 22% of cases (Barbera et al., 2010). Another study from England, involving 793 cancer patients who died during the last six months of 2007, found that 78.7% were emergency admissions. The most frequent symptoms were pain (48.3%), breathlessness (40.9%), anorexia (40.4%), and nausea/vomiting (33.8%), with 82% of patients having advanced-stage disease (Gao et al., 2010).

Further research highlights specific reasons of emergency admissions among palliative care patients. For example, in the United Kingdom, fever (24%) was the most common reason for hospital admission among patients under palliative care. Other cancer-related symptoms included pain (48%), dyspnea (33%), fatigue or malaise (15%), and gastrointestinal symptoms such as nausea or vomiting (16%). Of these patients, 6% died within 72 hours of admission, and the majority of these admissions were directly related to malignancies (Yang et al., 2023).

In Japan, older age, male gender, and advanced cancer stages were associated with frequent ED visits near the end of life. Dyspnea (30%) and pain (20%) were the most commonly reported symptoms leading to ED admissions (Yamaguchi et al., 2020). These findings underscore the importance of addressing acute symptoms and ensuring effective advance care planning to reduce distressing end-of-life hospitalizations.

This study examines the patterns and reasons for hospital admissions in a tertiary care center in Riyadh, Saudi Arabia. By analyzing common symptoms, associated diagnoses, and patient demographics, it seeks to identify opportunities for improving the quality of palliative care and minimizing unnecessary hospitalizations.

Methods and settings:

This was a retrospective cohort study conducted in a tertiary care hospital in Riyadh, Saudi Arabia. All patients aged over 16 years, managed under the palliative care department with confirmed advanced solid or hematological malignancy, and who expired in the hospital were included. The study spanned 2 years and 3 months, from January 1, 2022, to March 31, 2024, during which 11,903 patients were admitted under oncology care.

Cases were identified through electronic medical records, and data extraction was performed using a standardized sheet. Main variables included age, sex, background clinical features (primary malignancy diagnosis and stage), admission diagnosis (obtained from admission notes), and length of stay. To determine the reasons and patterns of admissions under palliative care, all patients admitted or transferred to palliative care during their terminal admission were included, without sampling.

Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS), version 30.0. Descriptive statistics were employed to summarize the data. Quantitative variables were presented as mean $\pm$ standard deviation (SD), while qualitative variables were expressed as frequencies and percentages. Associations between categorical variables were assessed using the Chi-Square Test. Adjusted residuals were analyzed to identify specific cells with significant deviations from expected counts, with values exceeding ± 1.96 indicating statistical significance ($p < 0.05$).

Results:

Demographics and Primary Cancer Diagnosis

The study included 586 patients, of whom 306 (52.2%) were male. The age of the patients ranged from 16 to 107 years, with a mean age of 66.82 ± 15.81 years (Table 1).

Of the 586 patients, 81.5% ($n=466$) were diagnosed with stage IV cancer. Gastrointestinal (GI) cancers were the most common, comprising 51.2% ($n=300$) of cases, followed by breast cancer (10.1%, $n=59$), genitourinary cancers (8.5%, $n=50$), gynecological cancers (6.3%, $n=37$), and lung cancer (5.5%, $n=32$). Less frequent categories included brain and nervous system cancers (4.6%, $n=27$), connective tissue and head and neck cancers (each 3.9%, $n=23$), hematological malignancies (2.9%, $n=17$), and skin cancers (0.7%, $n=4$). Unknown or double primary origins accounted for 2.4% ($n=14$). Detailed cancer diagnoses detailed in Table 2.

Terminal Admission

Admission Diagnoses

The primary reasons for the last admission of palliative care patients were documented as follows: deterioration in performance status was the most common, accounting for 28.8% ($n=169$) of cases. Gastrointestinal symptoms were reported in 21% ($n=123$) of cases. Altered level of consciousness was noted in 13.3% ($n=78$) of admissions, while respiratory reasons accounted for 16.6% ($n=97$). Anemia was observed in 1.5% ($n=9$) of cases. Other causes constituted 18.8% ($n=110$) of the total admissions.

The length of stay ranged from 1 to 361 days, with a mean of 21.64 ± 15 days. A total of 39 patients (6.7%) died within 48 hours of admission, while 125 patients (21.3%) had a stay of 30 days or longer. (Table 3)

Respiratory Reasons

Among the respiratory reasons for admission, pneumonia accounted for 86.3% (n=69) of cases, followed by pulmonary embolism at 8.8% (n=7) and pleural effusion at 6.3% (n=5).

Gastrointestinal Reasons

Among the gastrointestinal reasons for admission, vomiting was the most frequent, accounting for 36.2% of cases within this category. Malignant bowel obstruction (MBO) followed at 23.4%, with jaundice representing 17.0% of cases. Upper gastrointestinal bleeding (UGIB) accounted for 12.8%, diarrhea for 6.4%, and dysphagia for 4.3%. These cases collectively represented 8% (n=47) of all admissions.

Other Reasons of Admission

For other reasons of admission, pain was the most frequent, representing 26.4% (n=29) of the cases within this category. Sepsis or urinary tract infections (UTIs) accounted for 17.3% (n=19), while ascites and seizure or neurological complications were each observed in 10% (n=11). Acute kidney injury (AKI) or electrolyte disturbances were noted in 6.4% (n=7), while elective respite admission accounted for 5.5% (n=6). Details of the other reasons for admission are presented in Chart 1 for clarity and proportional distribution.

Associations Between Malignancy Types and Admission Reasons

The analysis identified distinct associations between specific malignancies and their primary reasons for admission. Gastrointestinal (GI) symptoms were strongly associated with GI malignancy (n=84, $p < 0.01$) and colorectal malignancy presenting as malignant bowel obstruction (n=6, $p < 0.01$). Dysphagia was significant in patients with thyroid cancer (n= 1, $p < 0.01$). In contrast, GI symptoms were negatively associated with musculoskeletal malignancies (n=1, $p < 0.05$), lung cancer (n=0, $p < 0.01$), and brain malignancy (n=1, $p < 0.05$). Respiratory symptoms, including pneumonia, demonstrated significant associations with tongue cancer (n=1, $p < 0.01$) and skin cancer (n=2, $p < 0.05$), while pneumonia showed a negative association with GI malignancies (n=23, $p < 0.01$). Hepatic encephalopathy was strongly linked to liver cancer ($p < 0.01$), and jaundice was significantly associated with cholangiocarcinoma (n=5, $p < 0.01$). Diarrhea was significantly associated with bladder malignancy (n=1, $p < 0.05$), pulmonary embolism was also observed in bladder malignancy cases (n=1, $p < 0.05$). Neurological symptoms, particularly seizures, were predominantly observed in brain cancer (n=6, $p < 0.01$). Associations between malignancy types and admission reasons listed in Table 4.

Urinary and renal symptoms were notable in colorectal cancer with urine retention (n=3, $p < 0.05$) and in neuroendocrine and prostate malignancies with electrolyte imbalance and acute kidney injury (n= 2 and 1, respectively, $p < 0.01$). Investigative recalls were strongly associated with lymphoma and squamous cell carcinoma (n= 4 and 1, respectively, $p < 0.01$) and also significantly linked to nasopharyngeal cancer (n=1, $p < 0.05$). Additionally, wound infections were strongly associated with squamous cell carcinoma (n=1, $p < 0.01$). Device malfunctions demonstrated significant associations with cholangiocarcinoma (n=2, $p < 0.05$) and strong links to thyroid malignancy and squamous cell carcinoma (n=1 for both, $p < 0.01$).

Discussion

A total of 586 patients were included, with a mean age of 66.82 years (± 15.81), ranging from 16 to 107 years, and a slight male predominance (52.2%). These demographics are consistent with those reported in other studies, where mean ages ranged from 66 to 68 years, and males constituted 52–55% of cohorts (Coym et al., 2020; Neuss et al., 2023; van der Padt-Pruijsten et al., 2022).

The majority (81.5%) of patients were diagnosed with stage IV cancer, consistent with Coym et al. (2020), where 87% of patients had advanced-stage disease. Gastrointestinal cancers were the most common diagnosis in this cohort (51.2%), followed by breast cancer (10.1%) and genitourinary cancers (8.5%). Across studies, gastrointestinal cancers accounted for 20.5–51.2% of diagnoses (van der Padt-Pruijsten et al., 2022; Coym et al., 2020), while lung cancers were reported in 22.6–36% of cases (Neuss et al., 2023; van der Padt-Pruijsten et al., 2022). Breast cancer was consistent across studies, accounting for 8–16.4% of cases (Neuss et al., 2023; van der Padt-Pruijsten et al., 2022).

Deteriorated physical condition accounted for 28.8% of admissions in this cohort, closely paralleling findings on deteriorating functional status reported by Jones et al. (2013), where similar declines were observed in 31% of patients. Coym et al. (2020) reported that 83% of patients experienced a deteriorated physical condition, with impaired mobility being a significant factor.

Gastrointestinal symptoms represented 21% of admissions, with vomiting (36.2%) and malignant bowel obstruction (23.4%) as leading causes. These findings slightly higher than the 15–17.5% reported by Neuss et al. (2023) and Coym et al. (2020) and closely aligning with 22.7% reported by van der Padt-Pruijsten et al. (2022). The higher gastrointestinal symptom burden observed in our study may be attributed to the higher proportion of gastrointestinal malignancies.

Respiratory reasons accounted for 16.6% of admissions in this cohort, primarily due to pneumonia (86.3%), pulmonary embolism (8.8%), and pleural effusion (6.3%). Coym et al. (2020) reported respiratory complications, including pneumonia, in 12.3% of cases at admission, with dyspnea being present in 40.7% of patients. In the Sussex study (Yang et al., 2023), respiratory symptoms were common, with 28% of patients admitted due to dyspnea or respiratory infections. **Similarly, dyspnea was a leading symptom in van der Padt-Pruijsten et al. (2022), accounting for 38.6% of admissions.**

Altered level of consciousness was documented in 13.3% of admissions in this study. Comparable findings were reported by Coym et al. (2020), where disorientation and cognitive decline occurred in 12.8% of patients, and Schenker et al. (2019), who observed neurological symptoms, including altered consciousness, in 10% of cases.

Sepsis, pain, and neurological complications were categorized under “other reasons for admission” in this study, comprising significant proportions of this category. Sepsis accounted for 17.3% of cases within “other reasons,” corresponding to 3.2% of all admissions, significantly lower than findings from Yang et al. (2023), where fever accounted for 24% of ambulance callouts, and Coym et al. (2020), where infections represented 15% of admissions. Pain was documented in 26% of the “other reasons” category, equating to 4.9% of all admissions, a lower proportion compared to Yang et al. (2023), where pain was reported in 22% of ambulance callouts, and Neuss et al. (2023), where 25% of patients were admitted for severe pain. **In van der Padt-Pruijsten et al. (2022), pain accounted for 33.3% of symptomatic reason for admission.** Neurological complications, including seizures, constituted 10% of the “other reasons” group, consistent with Schenker et al. (2019), who observed neurological symptoms, such as altered consciousness and seizures, in 12% of patients.

In our study, 6.7% of patients died within 48 hours of admission, comparable to the 5% at 72 hours of admission reported by Yang et al. (2023). Mean length of admission before death was similar between our study and **Van der Padt-Pruijsten et al. (2022), both at 21 days.**

This study is the first in the region to investigate terminal admission diagnoses. Understanding the reasons for palliative care admissions is critical for improving care delivery and supporting families through end-of-life. Identifying primary factors, such as functional decline, gastrointestinal complications, and respiratory issues, enables targeted interventions and proactive management. Additionally, telehealth interventions have demonstrated potential in reducing hospital admissions by offering remote symptom monitoring and timely management, particularly for patients in geographically underserved areas (Hancock et al., 2019). Specialist community palliative care teams (SCPCTs), as emphasized by Adam et al. (2022), further enhance these efforts by providing home-based care and advance care planning, which minimize unnecessary hospitalizations. Strengthening caregiver education and integrating telehealth into community-based support systems are essential strategies to improve patient outcomes, optimize healthcare resources, and ensure a holistic approach to palliative care delivery. Future research is needed to evaluate these interventions to better inform clinical practice.

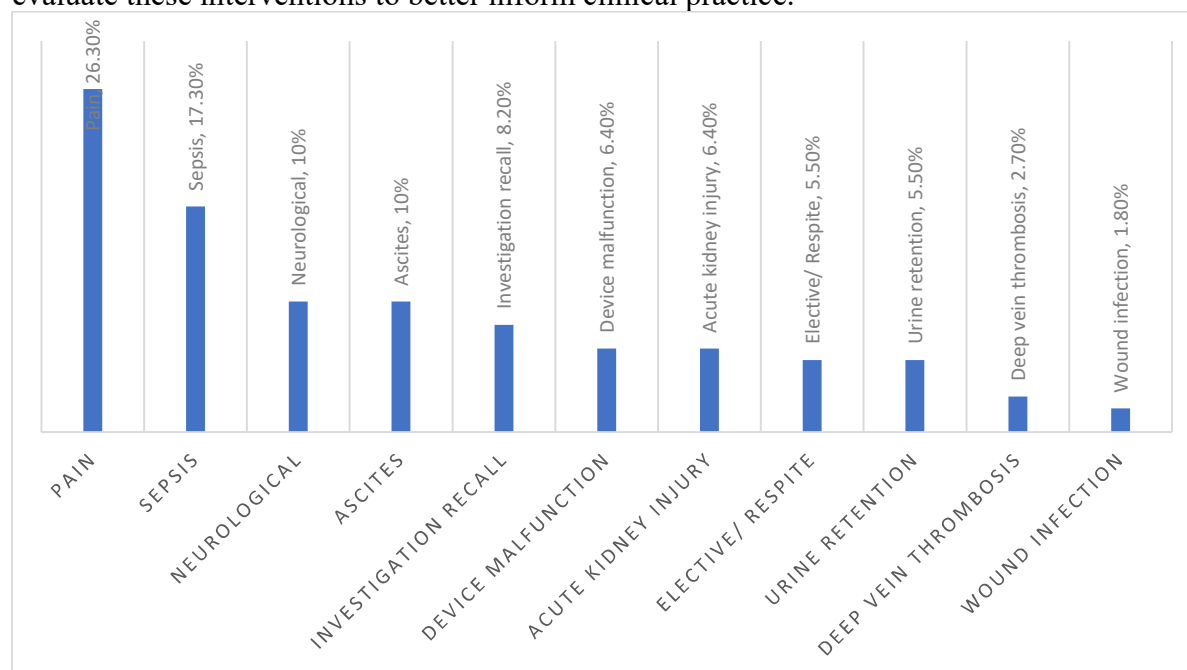


Chart 1: Other Reasons of Admission

Table 1: Demographics of The Study Population

Characteristics	# (%)
Sample size	586 (100)
Sex	
Male	306 (52.2)
Female	280(47.8)
Age	
<65	235 (40.1)
≥65	351 (59.9)

Age at presentation (years)

Mean $\pm$ SD 66.82 $\pm$ 15.8

Range 16-107

Cancer- Stage IV

466 (79.5)

Cancer- Other stages

120 (20.5)

SD, standard deviation

Table 2: Type of primary cancer

	N	%
Breast Cancer	59	10.1
Colorectal Cancer	105	17.9
Liver Cancer	66	11.3
Pancreatic Cancer	54	9.2
Gastric Cancer	17	2.9
Sarcoma	23	3.9
Endometrial Cancer	16	2.7
Ovarian Cancer	14	2.4
Brain Cancer	26	4.4
Esophageal Cancer	8	1.4
Cholangiocarcinoma	44	7.5
Bladder Cancer	16	2.7
Prostate Cancer	20	3.4
Cervical Cancer	6	1.0
Renal Cell Carcinoma	14	2.4
Thyroid Cancer	12	2.0
Lung Cancer	32	5.5
Neuroendocrine Tumor	5	.9
Nasopharyngeal Cancer	4	.7
Squamous Cell Carcinoma	5	.9
Lymphoma	12	2.0
Leukemia	5	.9
Neuroblastoma	1	.2
Intestinal Cancer	1	.2
Unknown Primary	11	1.9
Double Primary	3	.5
Melanoma	4	.7
Laryngeal Cancer	1	.2
Tongue Cancer	1	.2
Cancer of the vulva	1	.2
Total	586	100.0

Table 3: Reasons for Admission and Length of Stay

Reasons for Admission	# (%)
Deterioration of Performance	169 (28.8)
GIT symptoms	123 (21)
Altered level of consciousness	78 (13.3)
Respiratory reasons	97(16.6)
Anemia	9 (1.5)
Others	110 (18.8)
Length of Stay (Days)	
Mean $\pm$ SD	21.64 $\pm$ 15
Range	1-361
Admissions <48hrs	39 (6.7)
Admissions $\geq$ 30 days	125 (21.3)

Table 4: Distribution of Clinical Presentations Across Cancer Types

Primary Malignancy	Deterioration of performance	GIT symptoms	Altered Level of Consciousness	Anemia and Blood Loss	Respiratory symptoms	Others
	Count (P-value)					
Breast	17 (1)	8 (0.135)	5 (0.230)	0 (0.317)	15 (0.057)	14 (0.317)
GI	82 (0.424)	84 (<0.001)	45 (0.32)	7 (0.11)	32 (<0.001)	50 (0.194)
Musculoskeletal	10 (0.11)	1 (0.046)	0 (0.057)	0 (0.549)	5 (0.484)	7 (0.134)
GYN	10 (0.764)	12 (0.072)	2 (0.134)	0 (0.424)	9 (0.194)	4 (0.194)
Brain and CNS	7 (0.764)	1 (0.021)	6 (0.162)	0 (0.484)	5 (0.764)	8 (0.134)
Genitourinary	19 (0.134)	11 (0.841)	7 (0.841)	0 (0.368)	8 (0.92)	5 (0.089)
Head and neck	8 (0.549)	1 (0.046)	2 (0.484)	0 (0.549)	5 (0.484)	7 (0.134)
Lung	10 (0.764)	0 (0.003)	4 (0.92)	0 (0.484)	11 (0.005)	7 (0.617)
Hematological	3 (0.317)	2 (0.368)	3 (0.617)	1 (0.134)	2 (0.617)	6 (0.072)
Unknown primary	1 (0.134)	3 (0.617)	3 (0.162)	0 (0.689)	3 (0.317)	1 (0.424)
Double primary	2 (0.162)	0 (0.368)	0 (0.484)	0 (0.841)	0 (0.424)	1 (0.549)
Skin	0 (0.194)	0 (0.317)	1 (0.484)	1 (<0.001)	2 (0.072)	0 (0.317)

Total	169	123	78	9	97	110
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GI, Gastrointestinal; GYN, gynecological; CNS, central nervous system

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DECLARATIONS

ETHICAL CONSIDERATION

This study was approved by the Institutional Review Board at King Abdullah International Medical Research Center (KAIMRC) and the ethics committee at the Ministry of National Guard-Health Affairs under the approval number IRB: NRR24-011-6. The requirement for written informed consent was waived by the KAIMRC ethics committee due to the retrospective nature of the study. All methods were conducted in accordance with relevant guidelines, including the “Declaration of Helsinki” and the “Saudi Arabian Law of Ethics on Living Creatures.” Data was securely stored and was accessible only to the primary investigator and co-investigators. No identification of correspondents was included in the dataset.

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