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ORIGINAL ARTICLE

Impact of Palliative Care Utilization among Kidney Cancer Patients in US Hospitals: A National-Scale Analysis

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Abstract

The objective of this study was to examine the characteristics and utilization patterns of palliative care among the kidney cancer patients using a large-scale representative population-based sample. We retrospectively analyzed National Inpatient Sample hospitalization data from January 2020 to December 2020 to explore disparities in delivering palliative care to deceased kidney cancer patients and assess its impact on healthcare usage, focusing on hospital costs and length of stay (LoS). We used ICD-10 CM codes (International Classification of Diseases-classifying diagnoses and reasons for visits in all healthcare settings) to categorize the study population. We conducted univariable and multivariable linear and logistic regression analyses to calculate coefficients and odds ratios, considering relevant variables and addressing potential confounding factors. We studied 1437 deceased kidney cancer patients, with 53.9% receiving palliative care. Those receiving palliative care had lower total costs ($99,804 vs. $1,34,731) and a shorter LoS (7.19 days vs. 7.66 days), compared to those who didn't. No significant difference was discovered in LoS. Private insurance, higher income, and female patients were more likely to receive palliative care. Race, hospital teaching status, and hospital size showed no significant differences. This study revealed insights into palliative care use among deceased kidney cancer patients, with cost-saving benefits evident. Disparities showed that individuals with private insurance and higher income more likely accessed palliative care, and females received it more often than males. Physicians and policymakers must consider these findings for equitable resource allocation and improved access.

Keywords: disparities; kidney cancer; length of stay; palliative care; total costs

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Introduction

Palliative care services have been extended from terminal cancer care to other terminal diseases to improve the symptom control and quality of life of patients with coordinated care of the patient and support for the family (1–3). A randomized control trial in 2007 concluded that in-home palliative care could significantly increase patient satisfaction while reducing the use of medical services and costs of medical care at the end of life, which includes a 33% decrease in overall cost, compared to standard treatment (4). When we looked into the service use analysis, significantly lower proportions of emergency department visits and hospitalization were discovered (4). The study demonstrated that care costs remained high at the end of life, especially in the last 2 years (5). In the United States, medicare expenditures surged at the end of life, and the cost for persons in the last year of life varied between 28.2% and 30.8% (6). Studies have supported the utilization of palliative care in patients with malignancy with improved quality of life and symptom intensity (7, 8). Considering the benefits and cost-saving evidence of palliative care, inpatients and outpatients with advanced cancer were recommended to have early dedicated palliative care services (9).

Despite the fact that the effectiveness of palliative care has been proved, recently, there have been more concerns regarding the inequities in the accessibility of palliative care resources, including geography, socioeconomic status, ethnocultural groups, and type of malignancy (10, 11). However, current evidence of actual significant inequalities is not sufficient. Some studies have failed to establish the relationship between the utilization of palliative care and the inequalities factors, but some have been successful in doing this (12–14). The methodologies of the research and data collection impact the results of the studies, and some inequality factors affect one another, which further obscure the effects (15). However, the study results facilitate possibly more efficient and equal delivery of palliative care services, which further improve cost, efficiency, and quality of life.

The type of malignancy, including solid tumors and hematologic malignancies, remains one of the factors affecting inequalities in palliative care. Despite a decrease in the mortality rate associated with kidney cancers in the United States, the American Cancer Society revealed that 14,890 patients lost their lives to kidney cancers in 2023 (16). A study conducted in 2022 concluded an increased proportion of palliative care utilization in end-stage renal cell carcinoma (RCC) from 2004 to 2014 using the National Cancer Database (NCDB) (17). However, disease-specific outcomes had not been concluded in this study. In the current research, we tried to confirm the association between different confounding factors and palliative care and its impact on healthcare usage, particularly hospital costs and length of stay (LoS), which can provide more clues and evidence for the future policy of palliative care services.

Materials and Methods

This retrospective study employed data extracted from the National Inpatient Sample (NIS), sponsored by the Agency for Healthcare Research and Quality (AHRQ) and constitutes part of the Healthcare Cost and Utilization Project (HCUP) (18). The NIS database represents an approximate 20% stratified sample of discharges across nearly 1000 US hospitals in the 50 states of the United States. Notably, the NIS database is the largest publicly available all-payer inpatient care database in the United States. For this analysis, we used the 2020 NIS database that includes hospitalization from January 1, 2020 to December 31, 2020. Furthermore, since the NIS data are de-identified, this study was exempt from requiring Institutional Review Board (IRB) approval.

Study Population

Using International Classification of Disease, Tenth Edition, Clinical Modification (ICD-10 CM) codes, we identified hospitalizations involving all adult patients (aged ≥18 years) with kidney cancer (ICD-10 codes C64, C65, Z85.52, and Z85.528) as their principal or secondary diagnosis. To identify deceased patients among these, we utilized the NIS variable "DIED." We subsequently categorized the deceased patients into two groups: those who received palliative care (ICD-10 code Z51.5) and those who did not.

Outcomes of Interest

Our areas of focus included LoS, total hospitalization costs, and the odds of receiving palliative care regarding gender, race, insurance status, median household income, hospital location, size, and teaching status. The LoS was determined using the NIS variable "LOS," and total hospitalization costs were assessed using the variable "TOTCHG."

Statistical Analysis

All analyses were conducted using appropriate stratifying, clustering, and weighing samples provided by the HCUP regulations (19). Statistical analysis was performed using STATA, version 17 (Stata Corp LLC, College Station, TX). We performed univariable logistic regression analysis to calculate unadjusted odds ratios. Subsequently, we conducted multivariable logistic regression analysis to account for potential confounding effects and calculated adjusted odds ratios. For a multivariable regression model, a comprehensive range of factors was considered to account for potential confounders, including age, gender, race, zip code-based income quartile, hospital region, hospital teaching status, hospital division, hospital bed size, insurance status, and the Charlson comorbidity index score (20). In multivariable regression analysis, we included only those variables that displayed an association with the outcome of interest in the univariable regression analysis with a significance level of $P < 0.2$. Proportions were compared using the Fisher's exact test for categorical variables, and continuous variables were compared using the Student's *t*-test. All P-values were two-sided, and the significance level was set at $P < 0.05$, indicating statistical significance.

Results

We identified 41,855 hospitalizations involving patients with kidney cancer. Of these hospitalizations, the present study focused on 1437 patients who died in the hospital, constituting the study population. The baseline characteristics of these patients are outlined in Table 1. The group with palliative care utilization had a mean age of 72.0 years (median 72.0 years), while the group without palliative care utilization had a mean age of 72.4 years (median 74.0 years), contributing to an overall mean age of 72.2 years (median 73.0 years) for deceased patients with kidney cancer. The deceased kidney cancer patients consisted of 966 (67.2%) males and 471 (32.7%) females. Our study population comprised 70.5% (1011) white patients, 14% (201) black patients, and 8.9% (129) Hispanic patients. The differences in race among the patients who utilized palliative care versus those who did not utilize palliative care was not statistically significant ($P = 0.380$). A large proportion of our patients received insurance coverage through Medicare (71.29%), while 20.74% had private insurance and 6.49% had Medicaid; 1.48% of our patients were uninsured. There was a statistically significant difference ($P < 0.001$) in the census divisions of the patients we studied were located. In all, 76.1% of the patients we analyzed were hospitalized in urban teaching hospitals, among which a statistically significant ($P = 0.023$) larger proportion utilized palliative care (610 out of 1092 patients).

Table 2 provides the cost of hospitalization and LoS among our study population. The mean crude cost of hospitalization among patients who did not utilize palliative care was \$134,731, which was remarkably higher than the mean hospital costs for patients who utilized palliative care. Of note, patients who received palliative care had a statistically significant mean reduction of \$31,040 (95% CI: -\$49,856 to –\$12,223, $P < 0.001$) in their hospital costs, compared to those who did not receive palliative care. On average, patients who utilized palliative care were hospitalized for 7.19 days, compared to a 7.66-day LoS among patients who did not utilize palliative care. The difference between the adjusted LoS among these two groups was –0.18 days and was not determined to be statistically significant (95% CI -1.18 to 0.8 days, $P = 0.727$).

The adjusted odds of receiving palliative care in diseased kidney cancer patients according to multivariate logistic regression are illustrated in Table 3. Interestingly, increased odds of receiving palliative care were exhibited among females (aOR = 1.46, 95% CI: 1.14–1.86, $P = 0.003$), and among patients with private insurance (aOR = 1.64, 95% CI: 1.19–2.27, $P = 0.003$). Similarly, patients located in the Mid Atlantic (aOR = 0.36, 95% CI: 0.20–0.65, $P = 0.001$), East South Central (aOR = 0.38, 95% CI: 0.18–0.80, $P = 0.012$), and West South Central (aOR = 0.39, 95% CI: 0.21–0.74, $P = 0.004$) census divisions demonstrated increased odds of receiving palliative care, compared to the patients in the New England census division. When grouped according to median household income, patients in the highest quartile (76th–100th percentile income) demonstrated increased odds of receiving palliative care (aOR = 1.43, 95% CI: 1.00–2.06, $P = 0.049$). Regarding race, hospital teaching status, and hospital size, no significant variations were noted in patients who received palliative treatment, compared to those who did not.

Discussion

This retrospective study demonstrated an increase in palliative care services and a clear correlation between reduced healthcare utilization and deceased patients with kidney cancer who received palliative care. Data was analyzed from a large-scale NIS dataset from January 2020 to December 2020. Additionally, we identified several patient characteristics of those receiving palliative care in the study group.

According to the Centre to Advance Palliative Care (CAPC), the proportion of hospitals with a palliative care program has more than tripled since 2000 (21). With the rise in cancer and other chronic illnesses, combined with an increase in life expectancy, the demand for palliative care services continue to rise around the world. Our findings demonstrated that palliative care use increased during the study periods, which was consistent with earlier research on palliative care utilization in other chronic conditions. For example, a prior study discovered a 0.8–6.6% increase in all alcohol-associated end-stage liver disease hospitalized patients between 2007 and 2014 (22). Another retrospective study that implemented NIS determined that between 2005 and 2014, the proportion of patients with chronic obstructive pulmonary disease (COPD) receiving palliative care increased from 8.5% to 57.2% (23). Similar findings were observed in investigations involving cancer patients, and as observed in the present study which discovered that 53.9% of deceased kidney cancer patients received palliative treatment during their hospital stay from January 2020 to December 2020.

The present study also analyzed data on the characteristics of the patients who received palliative care and how it was related to efficient healthcare utilization. An integrative review of end-of-life experiences in patients of low socioeconomic status revealed that these patients had decreased access to palliative care services as well as increased utilization of acute care, compared to patients of higher household income (24). As evident in our study, patients from the highest median household income group (76th–100th percentile) had the highest odds of receiving palliative care (aOR = 1.43,

Table 1: Baseline characteristics of diseased kidney cancer patients.

	Palliative care utilized	No Palliative care utilized	Total diseased patients	P-value
Number	774	663	1437	
Mean age	72.0 years	72.4 years	72.2 years	
Median age	72 years	74 years	73 years	
Gender				P = 0.019
Male	499 (64.4%)	466 (70.4%)	965 (67.2%)	
Female	276 (35.5%)	195 (29.5%)	471 (32.7%)	
Race				P = 0.380
White	552 (71.4%)	459 (69.3%)	1011 (70.5%)	
Black	99 (12.8%)	102 (15.4%)	201 (14.0%)	
Hispanic	69 (8.9%)	60 (9.0%)	129 (8.9%)	
Asian or Pacific Islander	19 (2.5%)	14 (2.1%)	33 (2.3%)	
Native American	10 (1.3%)	2 (0.4%)	12 (0.9%)	
Others	22 (2.9%)	23 (3.5%)	45 (3.1%)	
Median household income				P = 0.008
0– 25th percentile	213 (27.6%)	221 (33.4%)	434 (30.3%)	
26th– 50th percentile	195 (25.3%)	181 (27.4%)	376 (26.5%)	
51st– 75th percentile	168 (21.8%)	133 (20.1%)	301 (21.0%)	
76th– 100th percentile	194 (25.1%)	122 (18.5%)	316 (22.0%)	
Insurance status				P < 0.001
Medicare	530 (68.53%)	493 (74.38%)	1023 (71.29%)	
Medicaid	51 (6.57%)	43 (6.41%)	94 (6.49%)	
Private insurance	182 (23.50%)	117 (17.66%)	299 (20.74%)	
No insurance	11 (1.40%)	10 (1.56%)	21 (1.48%)	
Charlson comorbidity index score				P = 0.084
0	12 (1.55%)	16 (2.41%)	28 (1.95%)	
1	25 (3.23%)	18 (2.71%)	43 (2.99%)	
2	48 (6.20%)	49 (7.39%)	97 (6.75%)	
3 or more	689 (89.02%)	580 (87.48%)	1269 (88.31%)	
Admission type				P = 0.151
Non-elective	714 (92.3%)	598 (90.3%)	1312 (91.4%)	
Elective	58 (7.6%)	63 (9.6%)	121 (8.5%)	

(*continues*)

Table 1: Continued.

	Palliative care utilized	No Palliative care utilized	Total diseased patients	P-value
Census division				P < 0.001
New England	60 (7.8%)	25 (3.9%)	86 (6.0%)	
Middle Atlantic	89 (11.6%)	116 (17.5%)	205 (14.4%)	
East North Central	136 (17.7%)	92 (14.0%)	228 (16.0%)	
West North Central	74 (9.6%)	43 (6.6%)	117 (8.2%)	
South Atlantic	142 (18.4%)	124 (18.8%)	266 (18.6%)	
East South Central	31 (4.1%)	47 (7.2%)	78 (5.5%)	
West South Central	70 (9.1%)	92 (14.0%)	162 (11.4%)	
Mountain	50 (6.5%)	35 (5.4%)	85 (6.0%)	
Pacific	113 (14.7%)	80 (12.2%)	193 (13.5%)	
Hospital bed size				P = 0.272
Small	147 (19.1%)	116 (17.6%)	263 (18.4%)	
Medium	197 (25.5%)	194 (29.4%)	391 (27.3%)	
Large	428 (55.3%)	350 (52.9%)	778 (54.2%)	
Hospital location/teaching status				P = 0.023
Rural	46 (6.0%)	57 (8.6%)	103 (7.2%)	
Urban nonteaching	116 (15.0%)	122 (18.5%)	238 (16.6%)	
Urban teaching	610 (78.9%)	482 (72.8%)	1092 (76.1%)	

Table 2: Total costs and length of stay.

	Mean	95% Confidence interval (95% CI)	
Crude total costs			
No palliative care utilized	$134,731	$119,209–150,252	
Palliative care utilized	$99,804	$89,613–109,995	
Adjusted total costs	**Coefficient**	**95% CI**	
No palliative care utilized	Reference	Reference	Reference
Palliative care utilized	-$31,040	–$49,856 to –$12, 223	P < 0.001
Crude length of stay	**Mean**	**95% CI**	
No palliative care utilized	7.66 days	6.91–8.40 days	
Palliative care utilized	7.19 days	6.58–7.80 days	
Adjusted length of stay	**Coefficient**	**95% CI**	**P-value**
No palliative care utilized	Reference	Reference	Reference
Palliative care utilized	–0.18 days	–1.18–0.8 days	P = 0.727

Table 3: Adjusted odds of receiving palliative care in diseased kidney cancer patients.

	Odds ratio	95% Confidence interval (95% CI)	P-value
Gender			
Male	Reference	Reference	Reference
Female	1.46	1.14–1.86	0.003
Race			
White	Reference	Reference	Reference
Black	0.91	0.64–1.30	0.621
Hispanic	1.02	0.67–1.57	0.900
Asian or Pacific Islander	1.05	0.53–2.09	0.880
Native American	2.33	0.54–10.10	0.255
Others	0.93	0.48–1.77	0.833
Insurance status			
Medicare	Reference	Reference	Reference
Medicaid	1.34	0.80–2.25	0.250
Private insurance	1.64	1.19–2.27	0.003
No insurance	0.88	0.33–2.36	0.807
Census division			
New England	Reference	Reference	Reference
Middle Atlantic	0.36	0.20–0.65	0.001
East North Central	0.83	0.46–1.49	0.545
West North Central	0.85	0.45–1.61	0.638
South Atlantic	0.59	0.33–1.05	0.073
East South Central	0.38	0.18–0.80	0.012
West South Central	0.39	0.21–0.74	0.004
Mountain	0.76	0.39–1.46	0.414
Pacific	0.68	0.38–1.24	0.219
Hospital location/teaching status			
Rural	Reference	Reference	Reference
Urban nonteaching	1.15	0.67–1.96	0.603
Urban teaching	1.45	0.90–2.31	0.118

(*continues*)

Table 3: Continued.

	Odds ratio	95% Confidence interval (95% CI)	P-value
Hospital bed size			
Small	Reference	Reference	Reference
Medium	0.75	0.52–1.09	0.139
Large	0.99	0.72–1.36	0.996
Median household income			
0–25th percentile	Reference	Reference	Reference
26th–50th percentile	1.07	0.90–1.14	0.656
51st–75th percentile	1.05	1.03–1.32	0.756
76th–100th percentile	1.43	1.00–2.06	0.049

95% CI: 1.00–2.06, P = 0.049). In addition, patients with private insurance had significantly higher odds of receiving palliative care (aOR= 1.64, 95% CI: 1.19–2.27, P = 0.003).

In a study conducted by Saaed and colleagues comprising 383 patients with metastatic disease, it was discovered that females were three times more likely than males to explore palliative treatment. According to the study, this could be tied to the societal stereotype of males being tough and invulnerable (25). As a result, gender norms impact perceptions of many males and females of how they should act in the face of illness, thereby influencing the treatment they receive. Findings of the present study demonstrated that female patients had a higher significant likelihood of obtaining palliative care (aOR = 1.46, 95% CI: 1.14–1.86, P = 0.003). On the other hand, it is important that healthcare policymakers promote equity and access to palliative care services, as this prevents redundant treatments at the end of a patient's life.

In the present study, although there was no significant difference in adjusted LoS, there was a significant reduction in total hospital costs, compared to those without palliative care (mean reduction of \$31,040; 95% CI: -\$49,856 to -\$12,223, P < 0.001). Notably, factors, such as race, hospital size, and teaching status, had no significant difference in terms of palliative care utilization in our research.

Disparities in medical knowledge are also believed to reflect unequal access to healthcare programs. Each state is not equally benefiting from the growing availability of palliative care services nationwide. According to the present study, states that are part of the Middle Atlantic census divisions (such as New Jersey and Maryland) and the West South Central census division (such as Arkansas and Texas) had significantly higher odds in utilization of palliative care among deceased kidney cancer patients (26).

The strength of the present investigation was the use of NIS data, which included all age categories, races, and many different socioeconomic statuses, reflecting a larger population; hence, the findings of this study could be extrapolated to all patients with kidney cancer in the United States.

Limitations

Owing to the cross-sectional disposition of our data, it's important to note that our findings revealed associations, rather than establishing causal relationships with the events under investigation. Additionally, we acknowledge that our analyses relied on retrospective registry data. This introduced the potential for selection bias because of the likelihood of selective reporting and the use of ICD codes to define the patient cohort. This factor should be considered when interpreting the results of this study and their implications for clinical practice.

A major limitation of this study was its focus solely on the utilization of palliative care within inpatient settings for hospitalized kidney cancer patients. Furthermore, our dataset lacked essential details, such as laboratory values, treatment strategies, and cause of death analyses. Additionally, because of the dataset's limitations, we were unable to determine the timing of palliative care delivery or calculate the mean duration of its utilization during a hospital stay. This could be a critical issue, particularly for seriously ill kidney cancer patients.

While it's important to acknowledge the possibility of coding errors and documentation variations within the NIS database, it has undergone extensive validation and has been widely used in research endeavors. Our study, which analyzed a substantial sample from this database, encompassed a diverse population from various regions across the United States and included data from numerous medical centers.

Conclusion

The present study offers valuable insights into the utilization patterns and characteristics linked to palliative care among deceased kidney patients. The results indicate that receiving palliative care is connected with notably reduced total costs, suggesting potential cost-saving advantages in healthcare utilization. However, no significant discrepancy was detected in the adjusted LoS for patients receiving palliative care, compared to those who did not receive palliative care.

Moreover, the study highlights disparities in accessing palliative care, indicating that individuals with private insurance and higher median household income are more likely to receive this care. Additionally, female patients demonstrated higher odds of receiving palliative care compared to male patients. Importantly, no significant differences were observed in terms of receiving palliative care concerning factors such as race, hospital teaching status, and hospital size.

Policymakers and physicians should consider these findings to enhance the allocation of resources and to promote equitable access to palliative care services. Further research and efforts in implementation are warranted to better access and improve the delivery of palliative care for kidney cancer patients.

Conflict of interest

The authors declared no potential conflict of interest with respect to research, authorship, and/or publication of this article.

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