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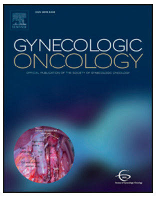

Hospice utilization in advanced cervical malignancies: An analysis of the National Inpatient Sample

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HIGHLIGHTS

- Admissions of Asian patients, in rural hospitals, with fewer comorbidities, and shorter stays had less hospice disposition.
- Those younger, and in the South and West were more often discharged to hospice compared to reference groups.
- Age, region, and Elixhauser score had a significant effect on univariate analysis of disposition outcome.
- Hospital location (rural vs. urban) and teaching status also had univariate significance.
- Primary payer, admission type, and hospital bedsize had no significant impact on disposition.

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ABSTRACT

Objective. Hospice services improve quality of life and outcomes for patients and caretakers, compared to inpatient mortality. This study identifies factors that exert the strongest influence on end-of-life care modalities in patients with cervical cancer.

Methods. Admissions with a diagnosis of cervical cancer that were discharged to hospice or died in-hospital were identified in the National Inpatient Sample years 2007–2011, excluding admissions coded for hysterectomy. Logistic regression models were used to examine differences in age, race, length of stay, primary payer, hospital region, admission type, hospital bedsize, hospital teaching status, income quartile, and Elixhauser comorbidity index score between the groups.

Results. 2073 admissions with a diagnosis of cervical cancer resulting in hospice discharge (n = 1290) or inpatient death (n = 783) were identified. Age (P = 0.01), hospital region (P = 0.01), length of hospitalization (P < 0.01), Elixhauser comorbidity index score (P = 0.03), and urban vs. rural location (P = 0.01) had a significant impact on disposition in univariate analysis. Admissions of patients categorized as Asian/Pacific Islander (OR = 2.24, 95% CI 1.11–4.49), hospitalizations lasting 0–3 days (OR = 1.57, 95% CI 1.21–2.03), and admissions in rural areas (OR = 1.62, 95% CI 1.12–2.36) had higher rates of in-hospital death compared to the reference groups. Patients aged 18–45 years (OR = 0.69, 95% CI 0.52–0.90) and those treated in the South (OR 0.59, 95% CI 0.45–0.77) and West (OR = 0.50, 95% CI 0.30–0.81) had lower odds ratios of inpatient mortality.

Conclusion. Modalities of care in terminal cervical cancer vary among sociodemographic and clinical factors. This data underscores the continued push for improved end-of-life care among cervical cancer patients and can guide clinicians in appropriate targeted counseling to increase utilization of hospice resources.

1. Introduction

The incidence of cervical malignancy in the United States has been declining for the past several decades due to the widespread adoption of the Papanicolaou test and human papillomavirus (HPV) DNA testing [1]. More recently, the prevalence of high-risk HPV subtypes responsible for the majority of cervical malignancies has decreased in areas of high

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vaccine coverage [2]. However, cervical cancer remains the most common cause of gynecologic cancer death worldwide, and the third most common in the United States with 4170 projected deaths attributed to this disease in 2018 [3]. Recurrent disease, in particular, is typically poorly responsive to the available treatment modalities, and carries a high mortality rate [1].

Since the development of the modern hospice system in the mid-20th century, extensive literature in end-of-life care has definitively demonstrated the benefit of hospice care for patients with advanced malignancy. Improvements in mood and quality of life in patients receiving palliative care have been thoroughly described [4,5]. These effects also extend to the patient's caretakers, with surveys showing reductions in caretaker distress when palliative care services are involved in the care of patients with terminal disease [4,5]. Additionally, there is a greater benefit when such services are implemented earlier in the disease course [5], as earlier referral is associated with increased hospice utilization and fewer aggressive and invasive end-of-life measures. However, studies specific to gynecologic oncology demonstrate that providers in this field widely underutilize hospice resources [6] despite similar benefits [7,8]. Referrals to hospice care generally occur very late in the disease course [9,10]; reviews of hospice usage among gynecologic cancer patients find that patients often enroll in hospice services only in the final month of life [9,11,12]. Unfortunately, the aggressive management that terminal but non-hospice gynecologic oncology patients undergo is associated with significant healthcare expenditure [13,14], often with little clinical benefit.

Despite an increased focus on healthcare disparities in recent years, the disproportionate disease burden of cervical cancer in minority women in the United States has persisted [15] and these disparities are apparent in the treatment course of these patients; analysis of treatment data suggests that gynecologic cancer patients from minority groups may undergo different care patterns given the same pathology and stage [16]. In this cross-sectional study, we seek to further the study of these inequalities and analyze the patterns of hospice usage among cervical cancer patients through the use of the National Inpatient Sample (NIS) database in an effort to identify factors that exert the strongest influence on end-of-life care modalities.

2. Materials and methods

2.1. Data source

All data was extracted from the NIS years 2007–2011, a database produced by the Healthcare Cost and Utilization Project (HCUP), which represents the largest publicly available all-payer inpatient care database in the United States. The sampling protocol from the NIS during these years contains all admissions from a random selection of 1000 hospitals within nine geographic regions. Due to the de-identified nature of the database, this study was exempt from review by the Institutional Review Board (IRB).

From years 2007–2011, discharge data in the NIS was coded with specificity, allowing us to distinguish hospice discharge from discharge to other inpatient facilities or transfer to a skilled nursing facility. Prior to and following these years, coding of disposition was more generalized, grouping hospice with other long-term healthcare facilities. Diagnoses pertinent to each admission and procedures performed during the admission are specified using International Classification of Disease codes; during the years of interest, codes from the 9th edition (ICD-9) were used. Per admission, the number of diagnosis and procedure codes allotted is variable by year. Prior to 2010, 20 diagnosis codes and procedure codes are available; in years 2010 and 2011, there are 25 diagnosis codes and 25 procedure codes.

The Elixhauser comorbidity index is a set of 30 comorbidities based on ICD-9 codes that have been externally validated for prediction of 30-day readmission and in-hospital mortality. All comorbidities are noted as present or absent, and are derived from the ICD-9 codes that are provided with each observation in the NIS using software available from the HCUP.

2.2. Study design

Inclusion criteria for this study were any admissions in the NIS years 2007–2011 with a diagnosis of cervical cancer that were also coded with either an in-hospital death or discharge to hospice. Both home and inpatient hospice facilities qualified for the latter discharge category. ICD-9 codes were used to identify admissions associated with cervical cancer. Admissions including a procedure code for hysterectomy of any modality were excluded. Demographic and clinical data considered included each patient's age, race, Elixhauser comorbidity score, length of stay, and admission type. Details of the treatment hospital including hospital bed size, regional location in the United States, rural vs. urban setting, and hospital teaching status were also noted. Quartile classification of the median income in the patient's ZIP code compared to annual national statistics as well as primary payer for the admission were used as socioeconomic indicators. The qualifications for small, medium, or large hospital bed size in the NIS were determined on a sliding scale dependent on each hospital's regional location and teaching status [17].

The primary goal of this investigation was to identify factors with a significant effect on disposition, and secondarily, to describe the differences in disposition among different socioeconomic, ethnic, and regional groups. References used in the multivariate regression included hospitalization length 4–7 days, white ethnicity, median income quartile, location in the northeastern United States, ages 46–60 years, emergency admission, Medicaid as a primary payer, and treatment in large, urban and teaching hospitals.

A normal linear regression was used to evaluate for collinearity. Due to possible non-linear distributions, age was separated into categories of 18–45 years, 45–60 years, and 61+ years, and length of hospitalization into 0–3 days, 4–7 days, and 8+ days. Logistic regression models were created, using the data in the study sample to model inpatient morality compared to hospice discharge. Elixhauser comorbidity index was evaluated as a continuous variable. All P values were two-sided with P value < 0.05 considered to suggest a significant difference between the two study groups. Statistical analysis was performed using IBM SPSS V23.0.

3. Results

Of the 2073 total admissions meeting inclusion criteria in the NIS years 2007–2011, 783 (37.8%) resulted in in-hospital death, and 1290 (62.2%) in hospice discharge. The distribution of disposition outcome across the assessed variables is demonstrated in Table 1.

Per increased in Elixhauser comorbidity score, the odds ratio (OR) of hospital death decreased by a factor of 0.85 ($P = 0.03$). Age ($P = 0.01$), Elixhauser comorbidity score ($P = 0.03$), length of stay ($P < 0.01$), hospital region ($P = 0.01$), and urban vs. rural location ($P = 0.01$) were found to have a significant impact on the regression model (Table 2). All other variables were not significant in the univariate analysis.

In the multivariate analysis of outcome distribution between demographic groups, patients of Asian/Pacific Islander ethnicity ($P = 0.02$), those treated in rural area hospitals ($P = 0.01$), and those with a length of stay 0–3 days ($P = 0.01$) more often died in the hospital. Compared to those treated in the Northeast, patients in the South ($P < 0.01$), West ($P < 0.01$), and in rural hospitals were more likely to be discharged to hospice ($P = 0.01$), along with patients aged 18–45 years ($P = 0.01$) when compared to those aged 45–60 years. Other comparisons between demographic groups and the specified reference groups did not yield a statistically significant difference (Table 2).

4. Discussion

This study aims to identify shortcomings in hospice utilization by demonstrating socioeconomic, demographic, and clinical factors that

Table 1
Patient demographics and disposition.

Demographic variable	In-hospital death		Hospice discharge		Total
	N	%	N	%	
Race					
White	405	38.8	640	61.2	1045
Black	184	39.1	286	60.9	470
Hispanic	121	49.0	126	51.0	247
Asian/Pacific Islander	43	71.7	17	28.3	60
Native American	4	23.5	13	76.5	17
Other	27	50.0	27	50.0	54
Age (years)					
18–45	183	32.7	376	67.3	559
46–60	352	42.5	477	57.5	829
61+	375	43.7	483	56.3	858
Length of stay (days)					
0–3	361	44.0	460	56.0	821
4–7	217	33.9	424	66.1	641
8+	330	42.1	453	57.9	783
Elixhauser score					
0–2	398	41.2	569	58.8	967
3–5	358	35.3	655	64.7	1013
6–9	26	18.8	112	81.2	138
Region					
Northeast	187	47.1	210	52.9	397
Midwest	162	35.1	300	64.9	462
South	374	33.8	731	66.2	1105
West	182	65.5	96	34.5	278
Hospital bedsize					
Small	93	41.0	134	59.0	227
Medium	203	44.6	252	55.4	455
Large	612	39.4	943	60.6	1555
Admission type					
Emergency	485	36.7	838	63.3	1323
Urgent	175	36.3	307	63.7	482
Elective	103	35.5	187	64.5	290
Expected primary payer					
Medicare	260	40.4	383	59.6	643
Medicaid	268	38.8	423	61.2	691
Private	260	42.0	359	58.0	619
Self-pay	58	45.7	69	54.3	127
No charge	5	31.3	11	68.8	16
Other	53	37.9	87	62.1	140
Rural vs. urban location					
Rural	109	43.1	144	56.9	253
Urban	800	40.1	1193	59.9	1993
Teaching status					
Non-teaching hospital	386	39.9	582	60.1	968
Teaching hospital	523	40.9	755	59.1	1278
Median income quartile (%ile)					
0–25	328	39.5	502	60.5	830
26–50	216	37.4	362	62.6	578
51–75	177	40.0	266	60.0	443
56–100	159	48.5	169	51.5	328

Table 2
Odds ratios of inpatient death.

Demographic variable	Or of in-hospital death	95% CI	Univariate P value	Multivariate P value
Race			0.32	
White	Reference	Reference		Reference
Black	1.05	0.81–1.36		0.71
Hispanic	1.10	0.78–1.54		0.60
Asian/PI	2.24	1.11–4.49		0.02
Native American	0.84	0.21–3.34		0.80
Other	1.33	0.68–2.59		0.41
Age (years)			0.01	
18–45	0.69	0.52–0.90		0.01
46–60	Reference	Reference		Reference
61+	1.06	0.81–1.40		0.66
Length of stay (days)			<0.01	
0–3	1.57	1.21–2.03		<0.01
4–7	Reference	Reference		Reference
8+	1.21	0.93–1.58		0.17
Elixhauser score			0.03	
+1	0.85	0.45–0.9		0.03
Region			<0.01	
Northeast	Reference	Reference		Reference
Midwest	0.749	0.53–1.01		0.09
South	0.587	0.45–0.77		<0.01
West	0.496	0.30–0.81		<0.01
Hospital bedsize			0.94	
Small	0.95	0.67–1.34		0.91
Medium	1.07	0.82–1.38		0.77
Large	Reference	Reference		References
Admission type			0.89	
Emergency	Reference	Reference		Reference
Urgent	0.95	0.73–1.24		0.72
Elective	0.88	0.65–1.21		0.44
Expected primary payer			0.30	
Medicare	1.02	0.74–1.42		0.89
Medicaid	Reference	Reference		Reference
Private insurance	1.27	0.96–1.69		0.09
Self-pay	1.50	0.96–2.37		0.08
No charge	1.63	0.52–5.16		0.40
Other	1.23	0.78–1.95		0.36
Rural vs. urban location			0.01	
Rural	1.62	1.12–2.36		0.01
Urban	Reference	Reference		References
Teaching status			0.19	
Non-teaching hospital	0.86	0.68–1.08		0.19
Teaching hospital	Reference	Reference		References
Median income quartile (%ile			0.49	
0–25	1.12	0.86–1.46		0.42
26–50	Reference	Reference		Reference
51–75	0.98	0.72–1.34		0.91
56–100	1.24	0.88–1.75		0.21

are associated with in-hospital death compared to hospice discharge in cervical cancer patients. The results suggest that the characteristics with the greatest influence on end-of-life care setting in cervical cancer patients are differences in age, length of stay, geographic region, comorbidity load, and urban versus rural location. However, in these analyses it is important to note that coordination between multiple providers, insurance, caretakers, and the patient must take place before successful initiation of palliative care; failure to obtain these services may reflect shortcomings at any of these levels, such as inadequate referral by healthcare providers, the refusal of patients or caretakers to accept a referral, or logistic delays in transfer of care.

With most cases diagnosed between 35 and 44 years of age, cervical cancer affects a significantly younger population compared to most other gynecologic malignancies. Though age is a common factor that has been investigated by surveys of hospice usage in the general population as well as specifically among cancer patients, review of hospice literature demonstrates a preponderance of data in the geriatric population and few studies focusing on patients in the age range most affected by cervical cancer. As the interaction of age and end-of-life care in this population remains poorly described, our description of increased hospice enrollment in the relatively younger population represents a finding not previously noted in the literature. Additionally, these trends may reflect the changing attitudes toward palliative care in recent decades, in parallel with the promotion and awareness of hospice and palliative care services as a national and international healthcare goal.

Although it stands to reason that patients with a higher comorbidity load or greater number of concurrent chronic medical conditions may be more often referred for palliative services as per our analysis, Legler et al. found that in hospice patients with advanced cancer, an increased Charlson comorbidity score is associated with increased rates of hospital readmission and inpatient death, likely due to the limitations of some hospice facilities in managing the medical needs of these patients [21]. These findings underscore the complex interactions that guide the end-of-life care for many patients; while referral to palliative care services is a crucial step, statistics that focus purely on enrollment may belie the course of these patients, emphasizing that continued exploration and optimization of care patterns within the hospice system is necessary.

The findings that geographic region and urban vs. rural setting are associated with differences in hospice usage in cervical cancer patients fall in line with current literature on broader hospice usage patterns across the country. While this study suggests that patients with limited life expectancy treated in rural hospitals do not as often receive hospice care, the geographic distribution in hospice resources must be considered. Madigan et al. in 2009 noted that the distribution of end-of-life providers is significantly sparser in rural counties than in urban ones [18]. Similarly, Hui et al. found that while 98% of mostly urban NCI-designated cancer centers areas had integrated palliative care programs, only 78% of non-designated programs had comparable services [19]. Though palliative care services are expanding in most regions in the United States, clear state-by-state access inequalities persist [20]. Given these discrepancies, further study is necessary to elucidate whether the contrast in hospice utilization between practice settings and regions is due to availability, clinical or demographic factors, or differences in overall beliefs and attitudes regarding palliative care services among varying patient populations.

Although there was less hospice usage among Asian/Pacific Islander patients compared to white patients in this study, we failed to find a significant effect of race on disposition in the univariate regression model, likely due to the small number of Asian/Pacific Islander patients represented in the study population. Our findings of inequitable distribution of outcome among demographic groups are concordant with the well-cited larger body of literature demonstrating disparities in end-of-life care. Among others, Taylor et al. in 2017 demonstrated that ovarian cancer patients in minority groups were less likely to enroll and die in hospice [23]. Though our study did not demonstrate statistical differences between other racial groups, previous investigations into hospice usage have noted low rates of hospice usage in black patients, including Dillon et al. in 2016 describing a demographic disparity in cost and quality of end-of-life care with underuse of hospice services by black patients [22]. Similarly, Margolis et al. in 2017 found that black race was associated with increased high-intensity care among uterine cancer patients in the last month of life [13]. The reasons for discrepancy in our study are unclear but may be partially accounted for by our investigation of a specific disease site, presenting an opportunity for further study into these patterns.

Between ethnicities, further studies in end-of-life care patterns demonstrate that the reasons for low enrollment rates are disparate. LoPresti et al. in a review of hospice usage in minority cancer patients noted that while all minority groups had lower hospice enrollment compared to white patients in various studies, Asian/Pacific Islander patients consistently demonstrated the lowest rates. Furthermore, the review suggested that barriers to enrollment varied between Hispanic, black, and Asian/Pacific Islander patients, with religiosity, lack of familiarity regarding hospice services, language differences, distrust of the medical system, and preferential reliance on family care differentially cited between the groups [24].

Compared to other minority groups in the United States, the Asian-American population is comprised of a large proportion of first-generation immigrants; according to the Pew Research Center, 73% of Asian-Americans adults in 2017 were born outside the country [25]. Thus, investigations into sociologic and cultural trends of hospice usage must consider international beliefs and practices. A cross-sectional survey of physician-perceived attitudes toward end-of-life care in Korea, Taiwan, and Japan demonstrated that a majority of respondents in these three countries perceived a reluctance of family members to discuss end-of-life issues, and suggested that this attitude may be affected in part by superstitious belief that verbalizing the possibility of imminent death may bring these events to fruition [26]. Differences in cultural attitudes are reflected as well in comparison of Asian and Western attitudes toward control of cancer pain, with fatalist attitudes more often cited as a barrier to palliative pain control in a meta-analysis [27]. In light of these sociologic barriers, cultural-specific interventions, education, and outreach must play a key role in increasing utilization of end-of-life services in cervical cancer patients of Asian descent.

The inclusion of length of stay as a variable in the regression model gives insight into the hospital courses of the patients in the study sample. The correlation of inpatient mortality with shorter admissions logically suggests that these admissions represent patients with acute unexpected life-threatening medical complications resulting in mortality before hospice referrals or transfers can be arranged. However, accounting for this variable in the regression model also allows us to control for the effect of hospitalization length when evaluating other variables.

As with any study conducted using a large multi-institutional database, limitations of our analysis include possible errors in data entry. Additionally, as ICD-9 codes are broad categories that do not differentiate between disease stages, allowing circumstances such as acute unexpected medical complications and death due to progressing end-stage disease during a medical hospitalization to be grouped under the same category. Due to the change in coding of disposition across years of the NIS, our data inquiry was limited to specific years, which precluded analysis of trends over longer periods of time. Additionally, as data points are representative of admissions, and not individual patients, multiple visits by the same patients would be coded as separate data points.

However, the strength of this analysis is the statistical power of a large sample size. This lessens the statistical influence of possible coding errors in the database. The availability of a national database allows us to evaluate larger trends in outcomes, independent of the local and personal practices that might be demonstrated in the analysis of smaller study groups. Additionally, while previous studies have investigated the demographics of hospice usage in gynecologic malignancy, no direct comparison between hospice usage and in-hospital mortality have been performed in this population and specifically for cervical cancer patients.

Although the crucial role of hospice services in gynecologic and other oncologic fields is well-accepted, with organizations such as the American Society of Clinical Oncology (ASCO) releasing publications promoting the routine integration of palliative services into comprehensive oncology care, there remains significant opportunity for improvement in implementation of these services; the identification of deficiencies in hospice utilization is not only of interest for descriptive purposes, but also as a guide for clinicians. By recognizing the portion of the population with lowest utilization, healthcare providers can further direct their counseling to patients underserved by end of life care. To further this goal, additional investigations can be performed to elucidate the reasons behind these care patterns, and to develop targeted interventions to lessen these disparities.

Conflict of interest statement

None of the authors of this study have conflicts of interest to disclose.

Author contribution statement

All authors contributed equally to this study.

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