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Examining the Association between Healthcare Utilization and Clinical Characteristics among Cancer Patients in a Safety Net Health System

Tori Knox-Rice, BA¹, Lei Xuan, PhD², Hanna Wadsworth, BA¹, Ethan A. Halm, MD, MPH³, Ramona L. Rhodes, MD, MPH⁴

¹Department of Psychiatry, University of Texas (UT) Southwestern Medical Center, Dallas, Texas

²Department of Clinical Services, University of Texas (UT) Southwestern Medical Center, Dallas, Texas

³Division of General Internal Medicine, University of Texas (UT) Southwestern Medical Center, Dallas, Texas

⁴Division of Geriatric Medicine, University of Texas (UT) Southwestern Medical Center, Dallas, Texas

Abstract

Objective—The goal of this study was to examine the association between available patient and clinical characteristics and healthcare utilization in a cohort of breast, lung, and colorectal cancer patients within a safety-net hospital system.

Methods—Data for 979 breast, lung, and colorectal cancer patients admitted to a large, urban hospital for the year 2010 were extracted from the electronic medical record (EMR). Univariate and multivariate logistic regression analyses were performed to examine the association between relevant independent variables that were able to be captured from the EMR in discrete fields, emergency room (ER) utilization, and hospitalizations among members of the cohort. Spearman correlation coefficients to test the correlations between nonsteroidal anti-inflammatory drug and opioid prescriptions and healthcare utilization were also calculated.

Results—Of the 979 patients, 22% were 65 years and older, 43% were non-Hispanic black, 42% had Medicare, and 56% had colorectal cancer. Patient and clinical characteristics that were associated with increased ER utilization, included Hispanic ethnicity (adjusted odds ratio; AOR: 2.21, 95% confidence interval; CI: 1.52–3.21), non-Hispanic black race (AOR: 2.01, 95% CI: 1.43–2.82), and referral to palliative care (AOR: 2.15, 95% CI: 1.36–3.41). Referral to palliative care (AOR: 3.84, 95% CI: 1.47–10.0), low albumin (AOR: 2.42, 95% CI: 1.20–4.89), and presence of metastases (AOR: 1.98, 95% CI: 1.29–3.06) were associated with greater odds of hospitalization. Number of opioids prescribed strongly correlated with number of hospitalizations

Address correspondence to: Ramona L. Rhodes, MD, MPH, Division of Geriatric Medicine, Department of Internal Medicine, University of Texas (UT) Southwestern Medical Center, 5323 Harry Hines Boulevard, Dallas, TX 75390-8889, ramona.rhodes@utsouthwestern.edu.

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(ρ correlation=0.74). Only 10.6% of patients had been referred to outpatient palliative care during the study period.

Conclusions—Some patient and clinical characteristics associated with increased ER visits and hospitalizations in this cohort include race/ethnicity, palliative care referral, markers of advanced disease, and number opioids prescribed. Increasing knowledge of palliative care and access to palliative care among the underserved should be a focus of future research.

Keywords

cancer; healthcare utilization; palliative care; safety net

Introduction

CANCER PATIENTS often present with chronic pain and other symptoms as a result of side effects related to their treatment and disease progression. Management of symptoms in this population is essential for positive outcomes.¹ Despite the current concern related to the opioid epidemic, opioids continue to be an effective analgesic for treatment of acute and terminal cancer-related pain. Opioids are currently viewed as the primary intervention in the treatment of moderate and severe pain related to cancer diagnoses.¹ As pain intensifies, the number of prescribed opioids may also increase. The precise use of opioids has made a major impact on the management of pain in patients with advanced cancer, yet pain is often poorly managed.² Optimal management of pain has been recognized to improve quality of life.³ Poorly controlled pain and other symptoms have been tied to increased numbers of emergency department visits in cancer populations.⁴

Palliative care offers relief from physical, psychological, and spiritual suffering in patients with chronic and serious illness. It is considered care that emphasizes treating the “whole” person. Evidence supporting earlier palliative care interventions in the oncology population continues to grow.⁵ Realizing the importance of pain and symptom management in this population, we set out to examine the association among certain available patient and clinical characteristics and healthcare utilization (defined as emergency room [ER] visits and hospitalizations) in this population. We hypothesized that indicators of need for pain management (number of prescriptions for opioids and nonsteroidal anti-inflammatory drugs [NSAIDs]) would be significant predictors of healthcare utilization.

Methods

This study examined the association between patient and clinical characteristics and subsequent hospitalizations or ER visits in a cohort of breast, lung, and colorectal cancer patients. These patients were hospitalized at Parkland Hospital from January 2010 to December 2010. Data were initially collected via an electronic medical record (EMR) review for a larger clinical study,^{6,7} in which patients were identified from the EMR by ICD-9 codes. The investigators relied on data that could be extracted from discrete fields within the EMR; consequently, data on stage of disease were not available. Available variables included, presence of metastatic disease (also identified by ICD-9 code), albumin level (as a marker of poor prognosis if <2.5 gm/dL), documentation of palliative care

referrals/consult orders, age, gender, race/ethnicity, insurance status, number of prescriptions for NSAIDs and opioids, marital status, and cancer type. ER use and hospitalizations were analyzed as separate dichotomized variables (“yes” or “no”). The number of prescriptions for NSAIDs and opioids were separate continuous variables.

Descriptive statistics were used to identify baseline characteristics of the sample. Simple logistic regression was used to identify patient and clinical characteristics that were associated with inpatient hospitalizations and ER visits among the cohort. Multivariable analyses were performed by entering possible predictors of inpatient hospitalization and ER visits into two separate stepwise multivariate logistic regression models, with variables remaining in each model at an alpha level of $p < 0.20$. An alpha level of $p < 0.05$ was considered statistically significant. All analyses were conducted using SAS version 9.4 (SAS Institute, Inc. 2015, Cary, NC). To further test the hypothesis that NSAID and opioid prescriptions were associated with increased healthcare utilization, Spearman correlation coefficients (ρ) were calculated.

Results

In this sample of 979 breast, lung, and colorectal cancer patients, 21.5% were 65 years of age or older, 45.7% were male, and 43.3% were non-Hispanic black. More than half (56.2%) had colorectal cancer, while 23.0% had lung cancer, and 20.8% had breast cancer. In this sample 42.1% had Medicare, 17.2% had Medicaid, and 35.6% were not insured or were considered self-pay. Approximately 10.6% were referred to palliative care during the study period (Table 1).

Patient and clinical predictors of ER visits

On univariate analysis, non-Hispanic black (odds ratio [OR]: 1.95, 95% confidence interval [CI]: 1.40–2.72) and Hispanic (OR: 2.07, 95% CI: 1.44–2.98) patients were more likely to be seen in the ER than non-Hispanic white patients. Patients who were referred to palliative care (OR: 2.90, 95% CI: 1.90–4.42) or had documented metastatic disease (OR: 1.67, 95% CI: 1.29–2.17) were also more likely to have ER visits. Patients who were considered charity/self-pay (OR: 1.39, 95% CI: 1.04–1.87) or Medicaid (OR: 1.71, 95% CI: 1.19–2.47) had greater odds of going to the ER than those who had Medicare. Finally, patients who had documented orders or prescriptions for NSAIDs (OR: 1.18, 95% CI: 1.05–1.33) or opioids (OR: 1.04, 95% CI: 1.02–1.05) were slightly more likely to have ER visits. The multivariate analysis yielded similar findings. Non-Hispanic blacks (AOR: 2.01, 95% CI: 1.43–2.82) and Hispanics (AOR: 2.21, 95% CI: 1.52–3.21) were more likely to be seen in the ER than non-Hispanic whites. Those referred to palliative care also had greater odds of being seen in the ER (AOR: 2.15, 95% CI: 1.36–3.41), as did patients with metastases (AOR: 1.33, 95% CI: 1.0–1.76). While patients who had been prescribed opioids (AOR: 1.02, 95% CI: 1.01–1.04) had only slightly greater odds of being seen in the ER, NSAIDs prescribed was no longer a statistically significant predictor (Table 2). There were no real correlations between NSAID prescriptions and opioid prescriptions and ER utilization ($\rho = 0.15$ and $\rho = 0.18$, respectively).

Patient and clinical predictors of hospitalization

On univariate analysis, certain patient and clinical factors were associated with greater odds of hospitalization. Male patients had greater odds of hospitalization (OR: 1.48, 95% CI: 1.15–1.92). Patients who had breast cancer (OR: 1.54, 95% CI: 1.11–2.13) and lung cancer (OR: 4.28, 95% CI: 2.97–6.16) were more likely to be hospitalized than those with colon cancer. Patients with low albumin (OR: 11.01, 95% CI: 6.14–19.74), documented metastases (OR: 3.52, 95% CI: 2.70–4.59), or who had been referred to palliative care (OR: 14.59, 95% CI: 6.33–33.62) were also more likely to be hospitalized. Finally, patients who had been prescribed NSAIDs (OR: 2.76, 95% CI: 2.05–3.72) and opioids (OR: 1.42, 95% CI: 1.35–1.49) were more likely to be hospitalized. On multivariate analysis, patients who were 65 and older (AOR: 1.79, 95% CI: 1.16–2.75) or male (AOR: 1.65, 95% CI: 1.10–2.46) were more likely to be hospitalized. Lung cancer patients were more likely to be hospitalized than colon cancer patients (AOR: 1.96, 95% CI: 1.14–3.36). Patients with low albumin (AOR: 2.42, 95% CI: 1.20–4.89), metastatic disease (AOR: 1.98, 95% CI: 1.29–3.06), and patients referred to palliative care (AOR: 3.84, 95% CI: 1.47–10.00) were more likely to be hospitalized. Patients who had been prescribed opioids (AOR: 1.38, 95% CI: 1.38–1.45) were more likely to be hospitalized (Table 3). There was weak correlation between number of NSAID prescriptions and number of hospitalizations ($\rho=0.39$) and strong correlation between the number of opioid prescriptions and number of hospitalizations ($\rho=0.74$).

Discussion, Limitations, and Future Directions

Several patient and clinical characteristics demonstrated greater odds of ER visits and hospitalizations. Hispanic patients, non-Hispanic black patients, patients who had been referred to palliative care, and those with documentation of metastatic disease were more likely to go to the ER for treatment. Patients who were 65 and older, male, had documentation of metastatic disease, low albumin, had been referred to palliative care, or had lung cancer were more likely to be hospitalized. Patients who were prescribed opioids were more likely to be hospitalized, and additional analysis showed that opioid prescribing appeared to have a strong correlation with being hospitalized. We believe these findings may support our initial hypothesis. Further considerations include that only 10.6% of patients were referred to palliative care in this cohort. These findings could point to the importance of pain management and palliative care consultation in this population.

Evidence in support of early palliative care involvement has built a strong base, with studies showing that those who receive earlier intervention from palliative care have lower rates of hospitalizations.^{5,8} For patients with advanced cancer, palliative care has been shown to improve health outcomes, positively impact quality of life,^{5,7} reduce rates of depression,^{5,7} decrease racial/ethnic disparities in hospice enrollment,⁹ and result in better overall survival rates.⁵ Similarly, data have shown that palliative care is associated with lower healthcare utilization at the end-of-life.¹⁰

Patients with a lower socioeconomic status (SES) have disproportionately higher cancer death rates, and often present with additional medical conditions when compared with those with higher SES.⁹ These statistics demonstrate that safety-net hospital systems, which aid low-income patients with limited or no health insurance, may have great need for palliative

care services to alleviate the effects of cancer. Despite the benefits, palliative services continue to be underutilized.¹¹ A primary contributor to the limited use of palliative services within an economically disadvantaged population may be the under-referring of individuals to palliative care services.⁹ This was observed within this study; the number of patients who received an outpatient palliative care referral was relatively small (10.6%).

There are some limitations to this preliminary look at healthcare utilization and its predictors. Data collection occurred within one hospital system; consequently, results may not be generalizable to other populations. Although metastatic disease was controlled for, inclusion criteria were not based on stage or progression of disease. Stage and progression may impact trends in prescribing, and is a possible area of focus for future research. Our analyses were limited to variables that were able to be captured in discreet fields in the EMR; consequently, other potential confounders were not able to be measured. Finally, although a small number of patients within this study received palliative care referrals, our analyses did not capture whether referrals resulted in enrollment into services or completed referrals. To fully determine whether opiate prescription burden is reflective of the need for pain management, and to test the impact of palliative care services in cancer pain and subsequent hospitalization and/or ER visits, future studies should focus on palliative care by identifying those being directly managed by the service. Despite these limitations, this study adds to a body of literature that evaluates palliative care in underserved populations. Finally, this research illuminates the need to design and implement interventions that address healthcare utilization challenges that may arise in this population.

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Table 1.

Baseline Characteristics of the Sample

<i>Patient characteristics</i>	<i>N=979 (%)</i>
Age 65	210 (21.5)
Gender, male	447 (45.7)
Race/ethnicity	
Non-Hispanic white	252 (25.7)
Non-Hispanic black	424 (43.3)
Hispanic	260 (26.6)
Other	43 (4.4)
Marital status	
Married	290 (29.6)
Single	344 (35.1)
Widowed	110 (11.2)
Divorced/separated	207 (21.1)
Other	27 (2.8)
Insurance status	
Medicare	412 (42.1)
Medicaid	168 (17.2)
Charity/self-pay	348 (35.6)
Commercial/other	51 (5.2)
Cancer type	
Colorectal	550 (56.2)
Lung	225 (23.0)
Breast	204 (20.8)
Metastatic disease	548 (56.0)
Low albumin (<2.5 mg/dL)	159 (16.2)
No. of opioids prescribed (median, IQR) ^a	3 (0–9)
No. of NSAIDS prescribed (median, IQR) ^b	0 (0–0)
Referred to outpatient palliative care	104 (10.6)
Died during study period	298 (30.4)

^aMean (SD): 6.7 (9.0).^bMean (SD): 0.4 (1.1).

NSAIDS, nonsteroidal anti-inflammatory drugs; SD, standard deviation.

Table 2.**Patient and Clinical Predictors of Emergency Room Visits**

	OR (95% CI)	AOR^a (95% CI)
Age 65 and older	0.74 (0.54–1.02)	0.80 (0.58–1.12)
Race/ethnicity		
Non-Hispanic white	Ref	Ref
Non-Hispanic black	1.95 (1.40–2.72)	2.01 (1.43–2.82)
Other	1.18 (0.59–2.37)	1.22 (0.60–2.49)
Hispanic	2.07 (1.44–2.98)	2.21 (1.52–3.21)
Referred to palliative care	2.90 (1.90–4.42)	2.15 (1.36–3.41)
Presence of metastatic disease	1.67 (1.29–2.17)	1.33 (1.00–1.76)
No. of opioids prescribed	1.04 (1.02–1.05)	1.02 (1.01–1.04)

Bold values indicate those findings that are statistically significant.

^a Adjusted for age, race/ethnicity, referral to palliative care, presence of metastatic disease, and number of opioids prescribed.

AOR, adjusted odds ratio; CI, confidence interval; OR, odds ratio.

Table 3.**Patient and Clinical Predictors of Hospitalization**

Patient and clinical characteristics	OR (95% CI)	AOR^a (95% CI)
Age 65 and older	1.07 (0.79–1.46)	1.79 (1.16–2.75)
Male	1.48 (1.15–1.92)	1.65 (1.10–2.46)
Race/ethnicity		
Non-Hispanic white	Ref	Ref
Non-Hispanic black	1.07 (0.78–1.46)	1.33 (0.86–2.07)
Other	0.44 (0.23–0.87)	0.52 (0.20–1.38)
Hispanic	1.04 (0.73–1.48)	1.50 (0.92–2.44)
Insurance status		
Medicare	Ref	Ref
Medicaid	1.49 (1.03–2.15)	0.66 (0.38–1.17)
Charity/self-pay	1.38 (1.03–1.84)	1.05 (0.69–1.60)
Commercial	1.54 (0.85–2.81)	1.46 (0.68–3.14)
Type of cancer		
Colon	Ref	Ref
Breast	1.54 (1.11–2.13)	1.64 (0.95–2.84)
Lung	4.28 (2.97–6.16)	1.96 (1.14–3.36)
Albumin <2.5gm/dL	11.01 (6.14–19.74)	2.42 (1.20–4.89)
Presence of metastatic disease	3.52 (2.70–4.59)	1.98 (1.29–3.06)
Referred to palliative care	14.59 (6.33–33.62)	3.84 (1.47–10.00)
No. of opioids prescribed	1.42 (1.35–1.49)	1.38 (1.31–1.45)

^a Adjusted for age, gender, race/ethnicity, marital status, insurance status, cancer type, low albumin, presence of metastatic disease, referral to palliative care, number of opioids prescribed.