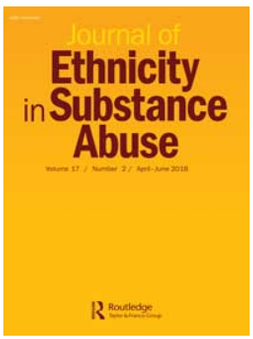

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Racial and ethnic disparities in substance use disorders and outcomes in elderly prostate cancer patients

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ABSTRACT

Substance use among cancer patients is an important psychosocial comorbidity. Currently, there is a paucity of information regarding racial disparity in substance use among cancer patients. The objective of this study was to analyze racial and ethnic disparity in prevalence of substance use and its effects on outcomes in Medicare elderly with advanced prostate cancer using Surveillance, Epidemiology, and End Results (SEER)-Medicare linked data. We used ICD-9 diagnosis codes to identify substance use disorder. Outcomes were health service use, cost, and mortality. Prevalence of substance use varied among White, African American, and Hispanic patients with advanced-stage prostate cancer. Racial and ethnic disparity existed in the association between substance use and outcomes. A multidisciplinary coordinated care approach is essential to address racial and ethnic disparities in substance use among prostate cancer patients and to achieve optimal clinical management and improved outcomes of care.

KEYWORDS

Elderly; Medicare; prostate cancer; race and ethnicity; substance use

Introduction

Substance use is a complex psychosocial comorbidity that remains to be fully explored among cancer patients (Bruera et al., 1995; Chang, Meadows, Jones, Antin, & Orav, 2010; Choflet et al., 2015; Passik, Portenoy, & Ricketts, 1998; Parsons et al., 2008; Polednak, 2007). Knowledge of patients' substance use is essential, as both current and lifetime use can affect treatment and outcomes of care (Breslow, Chen, Graubard, & Mukamal, 2011; Chang et al., 2010; Chang et al., 2013; Chhatre, Metzger, Malkowicz, Woody, & Jayadevappa, 2014; Choflet et al., 2015; Danker et al., 2011; Genther & Gourin, 2012; Glare et al., 2003; Kugaya et al., 2000; Modesto-Lowe, Girard, & Chaplin, 2012; Neuenschwander, Pedersena, Krasnika, & Tønnesenb, 2002; Parsons et al., 2008; Wu et al., 2013). Prior research indicates that alcohol use is associated with higher mortality among patients with lung cancer (Breslow et al., 2011; Neuenschwander et al., 2002), head and neck cancer (Chang et al., 2013), colorectal cancer (Breslow et al., 2011), and esophageal cancer (Wu et al., 2013). Length of hospitalization and cost of care were higher among head and neck

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cancer patients who abused alcohol (Genther & Gourin, 2012). Laryngectomized patients with alcohol dependence had multiple impaired outcomes such as higher anxiety, difficulty in coping with illness, greater psychosocial care needs, shortness of breath, diarrhea, and poorer emotional functioning level (Danker et al., 2011). Use of cocaine was associated with higher mortality among persons with myelogenous leukemia (Chang et al., 2010). One study of elderly advanced-stage prostate cancer patients showed that the prevalence of substance use (alcoholic psychosis, drug psychoses, alcohol dependence, drug dependence, and nondependent use of drugs) was 10.6% in this cohort. Substance use was associated with higher health service use, cost of care, and mortality (Chhatre et al., 2014).

Prostate cancer is the most prevalent cancer among men in the United States. The incidence of prostate cancer increases with age, and the exponential growth in the number of people aged 65 and older in the coming years has important implications for the burden of prostate cancer. Racial and ethnic disparity in the incidence, stage, pattern of care, and outcomes in prostate cancer has been well documented (American Cancer Society, 2015; Chhatre, Malkowicz, Schwartz, & Jayadevappa, 2015; Fiscella, Franks, Gold, & Clancy, 2000; Freeman et al., 2002; Hoffman et al., 2001; Institute of Medicine, 2001; Jayadevappa, Bloom, Fomberstein, Wein, & Malkowicz, 2005; Jayadevappa, Chhatre, Johnson, & Malkowicz, 2011a, 2011b; Jayadevappa, Chhatre, Weiner, Bloom, & Malkowicz, 2005; Jayadevappa, Johnson, Chhatre, Wein, & Malkowicz, 2007; Jayadevappa, Malkowicz, Chhatre, Gallo, & Schwartz, 2010; Moarlow, Halpern, Pavluck, Ward, & Chen, 2010; Smedley & Nelson, 2002). However, there is a paucity of information regarding racial and ethnic disparities in substance use prevalence among prostate cancer patients and its implications for outcomes of care. The objective of this article was to analyze the racial and ethnic disparity in substance use prevalence and associated outcomes in elderly fee-for-service Medicare patients with advanced prostate cancer.

Methods

In this section, we first describe the Surveillance, Epidemiology, and End Results (SEER)-Medicare data, followed by selection of study cohort. We then present a description of outcomes and covariates and discuss the analytical plan.

Data

The SEER-Medicare data are the linkage of two large population-based sources of data and provide detailed information about Medicare beneficiaries with cancer. The SEER program of the National Cancer Institute collects data

on cancer incidence, treatment, and mortality from 16 SEER sites and encompasses 26% of the population of the United States. Of persons aged 65 years and older diagnosed with cancer and enrolled in SEER registries, 93% have a match in Medicare enrollment records (Warren, Klabunde, Schrag, Bach, & Riley, 2002).

Study cohort

For this retrospective study, we used SEER-Medicare linked data to create a cohort of White, African American, and Hispanic men aged 66 years or older and diagnosed with advanced-stage prostate cancer between 2001 and 2004. The local institutional review board approved the study. Advanced-stage prostate cancer cases were identified from the SEER Patient Entitlement and Diagnosis Summary file (PEDSF) by selecting regional or distant codes for the variable "Summary stage 2000" (Adamo, Dickie, & Ruhl, 2013).

We excluded men who were younger than 66 years at the time of diagnosis to ensure availability of claims in the period prior to prostate cancer diagnosis, which are necessary to determine prediagnosis comorbidity. The substance use disorder group was identified as those with at least one inpatient or outpatient claim for any of the following International Classification of Diseases (ICD), 9th Edition codes: 291.xx (alcoholic psychosis and related); 292.xx (drug psychoses and related); 303.xx (alcohol dependence syndrome); 304.xx (drug dependence); and 305.xx (nondependent use of drugs).

Outcomes

Primary outcomes were health services use, cost of care, and mortality. The SEER-Medicare linked data consist of claims for inpatient hospitalization, outpatient hospital visits (including emergency room, or ER, visits), physician or provider services, durable medical equipment, home health services, skilled nursing facility, and hospice care. We operationalized *health service use* as number of inpatient hospitalizations, number of outpatient hospital visits, and number of emergency room visits. We defined *cost of care* as reimbursements received from Medicare. Total cost of care was the sum of reimbursements for inpatient hospitalizations, outpatient hospital visits, physician or provider services, durable medical equipment, home health services, and hospice care.

We used all-cause mortality data reported both by SEER and by Medicare and prostate cancer–specific mortality data reported by SEER. For SEER reported mortality, we constructed date of death using the SEER month and year of death. SEER does not report day of death, and therefore we assigned the middle of the month (i.e., 15) as the day of death. Similarly,

we constructed SEER date of diagnosis by using middle of the month (i.e., 15) as the day of diagnosis and SEER month and year of diagnosis. We coded a patient as *deceased* if SEER and/or Medicare reported so. Time to death was the time between prostate cancer diagnosis and death. Patients who were alive at the end of 5-year follow-up were censored.

Covariates

Sociodemographic characteristics, disease severity, medical comorbidity, and prostate cancer treatment type were the covariates used to adjust our measures of association. Elixhauser comorbidity index was calculated using Medicare inpatient claims for the 1-year period prior to prostate cancer diagnosis. Procedure codes were used to identify the following exclusive categories of prostate cancer treatments from Medicare claims: surgery, radiation therapy, multimodal therapy, and no treatment or watchful waiting.

Statistical analysis

For each racial and ethnic group (White, African American, and Hispanic) elderly with advanced-stage prostate cancer, we first tested for differences in the demographic and clinical characteristics of patients with and without substance use disorder, using t tests and χ^2 tests. The type of treatment for prostate cancer may affect outcomes; however, in our assessment of the relationship of substance use disorder with outcomes, treatment assignments are nonrandom. To minimize the bias due to type of prostate cancer treatment, we used propensity score analysis. Using multinomial logistic regression, we estimated for each patient the propensity of receiving a particular prostate cancer treatment as a function of demographic and clinical characteristics. We compared the t statistics for these covariates before and after adjusting with propensity score in order to observe the extent of matching of the different prostate cancer treatment groups. For assessing differences in health service use, we used negative binomial models. In these models, the dependent variables were count data on number of total inpatient hospitalizations, outpatient hospital visits, or ER visits. For analyzing the association of substance use disorder with cost of care, we used a two-part model. The first part of the model consisted of a logistic regression to predict the odds of incurring any cost. The second part of the model consisted of generalized linear model (GLM) with log-link and gamma distribution variance function and was restricted for those who had nonzero costs. To analyze the association between substance use disorder and mortality, we used Cox regression models. All models were adjusted for sociodemographic variables, clinical variables, and propensity score. *All* analysis was conducted separately for each

racial and ethnic group. We used Statistical Analysis System (SAS), Version 9.4 (SAS Institute, Cary, NC, USA) for data analysis.

Results

We identified 11,335 White, 1,696 African American, and 1,246 Hispanic fee-for-service Medicare patients aged ≥66 years who were diagnosed with advanced-stage prostate cancer between 2001 and 2004. Table 1 shows the comparison of demographic and clinical attributes between those with and without substance use disorder for each racial and ethnic group. African Americans had the highest proportion of substance use disorder (15.7%) compared to Whites (9.9%) and Hispanics (9.3%). The mean age of patients with substance use diagnosis was 72.6 years ($SD = 5.8$) whereas the mean age of those without substance use diagnosis was 74.6 years ($SD = 6.9$). In Table 2, we present the unadjusted health service use, costs, and mortality outcomes across substance use and no–substance use groups. Association between substance use and outcomes (health service use, cost, and mortality) is presented in Table 3.

Comparison of demographic and clinical attributes

As presented in Table 1, among all racial and ethnic groups, those with substance use disorder were younger than those without (White: 72.6 ± 5.8 vs. 74.6 ± 7.0 years; African American: 71.95 ± 5.3 vs. 74.7 ± 7.1 years; Hispanic: 71.8 ± 5.0 years vs. 73.2 ± 6.1 years). For all racial and ethnic groups, a smaller proportion of those with substance use disorder were married, compared to those without substance use disorder (White: 64% vs. 73%; African American: 43% vs. 53%; Hispanic: 53% vs. 73%). In addition, a higher proportion of patients with substance use disorder from all racial and ethnic groups had one or more comorbidities compared to those without a substance use disorder (White: 19% vs. 10%; African American: 26% vs. 15%; Hispanic: 21% vs. 8%). Among all racial and ethnic groups, a smaller proportion of those with substance use had mono therapy treatment, compared to those without a substance use disorder.

Health service use, costs, and mortality

Unadjusted comparisons showed that for all three racial and ethnic groups, a higher proportion of those with substance use disorder had utilized inpatient, outpatient, and emergency room services (Table 2). Compared to White and Hispanic patients with substance use, a higher proportion of African American patients with substance use reported four or more inpatient visits and four or more outpatient visits. On the other hand, a higher proportion

Table 1. Comparison of socio-demographic and clinical characteristics (n = 14,277).

	White			African American			Hispanic		
	With a SUD *n* = 1127	Without a SUD *n* = 10208	*p* value	With a SUD *n* = 266	Without a SUD *n* = 1430	*p* value	With a SUD *n* = 116	Without a SUD *n* = 1130	*p* value
Age in years (mean ±std)	72.6 ± 5.8	74.6 ± 6.9	<.0001	71.9 ± 5.3	74.7 ± 7.1	<.0001	71.8 ± 4.9	73.2 ± 6.1	<.0001
Marital status			<.0001			.0216			<.0001
Married	705 (62.6)	7460 (73.0)		114 (42.9)	758 (53.0)		61 (52.6)	820 (72.6)	
Single/Other	422 (37.4)	2748 (27.0)		152 (57.1)	672 (47.0)		55 (47.4)	310 (27.4)	
Geographic area			<.0001			.2104			.021
Metro	871 (77.3)	8791 (86.1)		233 (87.6)	1315 (91.9)		94 (81.1)	1084 (95.9)	
Non-metro	256 (22.7)	1417 (13.9)		33 (12.4)	115 (8.1)		22 (18.9)	46 (4.1)	
Comorbidity			<.0001			.0004			.0002
0	915 (81.2)	9192 (90.1)		196 (73.7)	1211 (84.7)		92 (79.3)	1043 (92.3)	
≥	212 (18.8)	1017 (9.9)		70 (26.30)	219 (15.3)		24 (20.7)	87 (7.7)	
Grade			.1449			.0187			.5561
Moderately differentiated	336 (29.8)	3396 (33.3)		81 (30.5)	410 (28.7)		47 (40.5)	436 (38.6)	
Poorly differentiated	594 (52.7)	5217 (51.1)		144 (54.1)	719 (50.3)		48 (41.4)	533 (41.2)	
Other	175 (17.5)	1595 (15.6)		41 (15.4)	301 (21.1)		21(18.1)	161 (14.3)	
Treatment			<.0001			<.0001			.1094
Mono therapy (Surgery/ Rad)	279 (24.8)	3137 (30.7)		62 (23.3)	389 (27.2)		33 (28.4)	401 (35.5)	
Multimodal	721 (63.9)	5065 (49.6)		165 (62.0)	592 (41.4)		69 (59.5)	472 (41.8)	
No tx/watchful waiting	127 (11.3)	200 (19.7)		39 (14.7)	449 (31.4)		14 (12.1)	257 (22.7)	

SUD: Substance use disorder.

Table 2. Unadjusted, health service use, costs and mortality outcomes.

	White		African American		Hispanic	
	With a SUD n = 1127	Without a SUD n = 10208	With a SUD n = 266	Without a SUD n = 1430	With a SUD n = 116	Without a SUD n = 1130
Any health service use n (%)						
Inpatient hospitalizations						
0	162 (14.4)	3941 (38.6)	49 (18.4)	613 (42.9)	24 (20.7)	574 (50.8)
1–3	654 (58.0)	4993 (48.9)	134 (50.4)	593 (41.5)	60 (51.7)	442 (39.1)
≥4	311 (27.6)	1274 (12.5)	83 (31.2)	224 (15.7)	32 (27.6)	114 (10.1)
Outpatient hospital visits						
0	368 (32.7)	5605 (54.9)	75 (28.2)	809 (56.6)	30 (25.9)	731 (64.7)
1–3	378 (33.5)	2605 (25.5)	86 (32.3)	309 (21.6)	42 (37.9)	246 (21.8)
≥4	381 (33.8)	1998 (19.6)	105 (39.5)	312 (21.8)	44 (36.2)	153 (13.5)
ER visits						
0	330 (29.3)	4747 (46.5)	90 (33.8)	804 (56.2)	43 (37.1)	635 (56.2)
1–3	233 (20.7)	1684 (16.5)	63 (23.7)	269 (18.8)	25 (21.6)	167 (14.8)
≥4	564 (50.0)	3777 (37.0)	113 (42.5)	357 (24.9)	48 (41.4)	328 (29.0)
Costs in $ mean±standard deviation						
Total cost	75236 ± 68559	45299 ± 43623	67821 ± 57012	40450 ± 36126	61187 ± 79954	37764 ± 80388
Mortality (%)						
Five year all-cause	483 (42.9)	4152 (40.7)	1342 (53.4)	745 (52.1)	55 (47.4)	423 (37.4)
Prostate cancer specific	299 (26.5)	2836 (27.8)	83 (31.2)	534 (37.3)	33 (28.5)	268 (23.7)

SUD: Substance use disorder.

Table 3. Association between substance use disorder and outcomes.

	Health service use			Total cost (two-part model)		Mortality	
	Hospitalizations OR (95% CI)	Outpatient visits OR (95% CI)	ER visits OR (95% CI)	Part 1 OR (95% CI)	Part 2 OR (95% CI)	All-cause HR (95% CI)	PCa-specific HR (95% CI)
			White				
Substance use disorder	1.74 (1.62, 1.86)	1.76 (1.56, 1.98)	1.33 (1.18, 1.50)	4.21 (3.18, 5.58)	1.33 (1.24, 1.43)	1.13 (1.03, 1.26)	1.05 (0.93, 1.19)
			African American				
Substance use disorder	1.63 (1.38, 1.94)	2.00 (1.56, 2.55)	1.78 (1.34, 2.37)	3.32 (2.04, 5.39)	1.27 (1.07,1.50)	1.00 (0.83, 1.21)	0.81 (0.63, 1.03)
			Hispanic				
Substance use disorder	1.78 (1.39, 2.29)	2.38 (1.63, 3.46)	1.95 (1.26, 3.00)	9.08 (3.59, 22.9)	1.14 (0.89, 1.47)	1.34 (1.00, 1.79)	1.30 (0.89,1.89)

PCa: Prostate cancer.

of White patients with substance use had four or more emergency room visits compared to their African American and Hispanic counterparts. For all racial and ethnic groups, mean cost of care was higher for the substance use group compared to those without substance use, highest being for the Whites with substance use. Mortality was comparable between those with and without substance use for White and African American patients. For Hispanic patients, both all-cause and prostate cancer–specific mortality was higher for the substance use disorder group compared to those without substance use disorder.

Association between substance use disorder and health service use

Inpatient hospitalizations

For all racial and ethnic groups, substance use disorder was associated with more inpatient visits, after adjusting for sociodemographic attributes, clinical attributes, and propensity score (Table 3). Among the three racial and ethnic groups, Hispanic patients with substance use disorder had the most inpatient visits (odds ration [OR] = 1.78; 95% confidence interval [CI] = 1.39–2.29) compared to African American and White patients with substance use disorder.

Outpatient hospital visits

Similar to inpatient usage, for all racial and ethnic groups, substance use disorder was associated with higher outpatient visits, after adjusting for sociodemographic attributes, clinical attributes, and propensity score. Among the three racial and ethnic groups, Hispanic patients with substance use disorder had the most outpatient visits (OR = 2.38; 95% CI = 1.63–3.46) compared to White and African American patients with substance use disorder.

ER visits

Patterns similar to hospitalization and outpatient usage were observed for ER visits. Hispanic patients with substance use had the most ER visits (OR = 1.95; 95% CI = 1.26–3.00).

Association between substance use disorder and cost of care

Table 3 also presents results of two-part models for cost of care. Part 1 consists of logistic models in which the binary dependent variable was cost incurred (yes/no). For all racial and ethnic groups, those with substance use disorder had higher odds of incurring any cost, compared to those without substance use. In particular, Hispanics had the highest odds of incurring any cost (OR = 9.09, 95% CI = 3.59, 22.59), compared to Whites (OR = 4.21, 95% CI = 3.18, 5.58) and African Americans (OR = 3.32, 95% CI = 2.04, 5.39).

Part 2 consists of generalized linear models with log-link and gamma distribution for those with nonzero costs. For all racial and ethnic groups, costs were higher for those with substance use disorder compared to those without. Compared to those without a substance use disorder, White patients with substance use had 33% higher costs; African American patients with substance use had 27% higher costs; and Hispanic patients with substance use had 14% higher costs.

Association between substance use disorder and mortality

All-cause mortality

As presented in Table 3, compared to those without substance use, White patients with substance use had a higher hazard of all-cause mortality (hazard ration [HR] = 1.13; 95% CI = 1.03–1.26).

Prostate cancer–specific mortality

For all racial and ethnic groups, prostate cancer–specific mortality was not associated with substance use.

Discussion

We observed differential prevalence of substance use disorder across race and ethnicity in our cohort of elderly fee-for-service Medicare patients with advanced prostate cancer. The prevalence of substance use disorder was higher in African American elderly with advanced-stage prostate cancer compared to their White and Hispanic counterparts. However, the adjusted models showed that Hispanics with substance use had higher health service use compared to African American and White patients. While the odds of incurring any cost were higher for Hispanic patients with substance use, among those who incurred any cost, the cost associated with substance use was higher for White patients than for African American or Hispanic patients. Among White patients, substance use disorder was associated with higher all-cause mortality.

To our knowledge, ours is the first study to use a large-scale administrative database to analyze the racial and ethnic disparity in substance use among older advanced-stage prostate cancer patients. We observed that for each racial and ethnic group, those with substance use diagnosis had more impaired outcomes compared to those without substance use. Our results regarding overall association between substance use and outcomes (health service use, cost of care, and mortality) are in concordance with prior studies. Among patients with head and neck cancer, alcohol use and alcohol withdrawal were associated with significantly longer length of hospitalization and higher costs of care (Genther & Gourin, 2012). In our study, substance

use was associated with higher hazard of mortality for White elderly with prostate cancer. Earlier studies have found an association between mortality and substances such as alcohol, cocaine, and areca nut among cancer patients. For example, lifetime cocaine use was associated with a six-fold risk of mortality in patients with myelogenous luekemia (Chang et al., 2010). Mortality for multiple cancers, including lung cancer and colorectal cancer, was associated with quantity and frequency of drinking (Breslow et al., 2011). Use of substances (alcohol, areca, and tobacco) was reported to have poorer prognosis of survival for patients with esophageal squamous cell carcinoma (Wu et al., 2013).

Although we did not analyze psychological or medical complications, it is important to note that research indicates an association between substance use and impaired psychological and medical outcomes among cancer patients. In a study of patients who underwent head and neck cancer ablative surgery followed by microsurgical free tissue transfer, those with alcohol withdrawal syndrome were more likely to develop non-flap-related complications, especially respiratory problems (Chang et al., 2013). A multicenter, cross-sectional study of patients undergoing laryngectomy concluded that those with alcohol dependence had elevated anxiety, difficulty in coping with illness, increased psychosocial care needs, fatigue, shortness of breath, diarrhea, and impaired emotional functioning level compared to those without alcohol dependence (Danker et al., 2011). Among lung cancer patients undergoing curative resection, preoperative alcohol consumption was associated with higher postoperative mortality resulting from complications compared to those who did not report preoperative alcohol use (Neuenschwander et al., 2002).

We note the following limitations of our study. Our study sample consisted of fee-for-service White, African American, and Hispanic Medicare enrollees aged 66 years and older who resided in a SEER region. Elderly with Medicare advantage or Part C and those younger than 65 (except for those eligible for Medicare due to Social Security Disability Insurance benefits) are not included in the SEER-Medicare linked database. Medicare Advantage plan is a type of Medicare health plan offered by a private company that has contracted with Medicare and is not required to report service utilization data or administrative claims. A majority of the Medicare Advantage plans are health maintenance organizations (HMOs) (Rivlin & Daniel, 2015; Cubanski & Neuman, 2010), and these usually have healthier patients (Rivlin & Daniel, 2015). On the other hand, younger Medicare-eligible patients are disabled and are in poorer health (Cubanski & Neuman, 2010). The interaction of prostate cancer and substance use diagnosis may be different for these subgroups and therefore may limit the generalizability of our results. Furthermore, while the age and sex distribution for persons $\geq$ 66 years is comparable to that of older adults in the United States, SEER regions have a higher proportion of non-White persons. In addition, mortality rates derived from SEER data may not be representative of the

national cancer mortality rates (Warren et al., 2002). Although administrative data have become a useful and important source of information for research on public health and health services, these data are subject to error (Virning & McBean, 2001). Our operationalization of the term *substance use disorder* excluded "surrogate" alcohol disorders. Last, it is possible that substance use disorders are underreported in the Medicare claims. This can lead to conservative estimates of the prevalence of substance use disorder across racial and ethnic groups and associated disparity in outcomes.

In conclusion, racial and ethnic disparity exists in the prevalence of substance use disorder and its effects on outcomes among Medicare elderly prostate cancer patients. Substance use among cancer patients can affect management and outcomes of care. Age is a risk factor for prostate cancer, and substance use has been reported to be growing among elderly. It is expected that the number of older Americans (those aged 50+ years) with a substance use disorder will double from 2.8 million in 2002–2006 to 5.7 million in 2020 (Wu & Blazer, 2011). A study of the national Drug Survey on Drug Use and Health observed that at-risk and binge drinking were frequently reported by middle-aged and elderly adults nationwide. The study concluded that these findings had important implications for public health concern and that screening for alcohol as well as other substances among middle-aged and older adults is necessary (Blazer & Wu, 2009). Analysis of the Treatment Episode Data between 1998 and 2008 indicated that the proportion of older adults seeking substance abuse treatment for the first time is on the rise (Arndt, Clayton, & Schultz, 2011). In addition, substance use can complicate the treatment of pain experienced by many cancer patients, including those with advanced-stage prostate cancer (Choflet et al., 2015; Green, Montague, & Hart-Johnson, 2009; Modesto-Lowe et al., 2012; Parsons et al., 2008; Starr, Rogak, & Passik, 2010; Whitcomb, Kirsh, & Passik, 2002). Racial disparities in cancer-related pain were observed (Cleeland, Gonin, Baez, Loehrer, & Pandya, 1997; Green et al., 2009). Non-White cancer patients were reported to have higher pain symptoms, more consistent pain, and lower health-related quality of life compared to Whites (Cleeland et al., 1997; Green et al., 2009). Our results show that race and ethnicity adds another dimension to the already challenging interaction of prostate cancer, age, comorbidities, and substance use disorder. Therefore, a multidisciplinary coordinated care approach that is sensitive to the interplay of these multiple factors, including race and ethnicity, is essential to achieve optimal clinical management and improved outcomes among all prostate cancer patients.

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