Evaluating the Contribution of Patient-Provider Communication and Cancer Diagnosis to Racial Disparities in End-of-Life Care Among Medicare Beneficiaries

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BACKGROUND: The quality of end-of-life (EOL) care in the USA remains suboptimal, with significant variations in care by race and across disease subgroups. Patient-provider communication may contribute to racial and disease-specific variations in EOL care outcomes.

OBJECTIVE: We examined racial disparities in EOL care, by disease group (cancer vs. non-cancer), and assessed whether racial differences in patient-provider communication accounted for observed disparities.

DESIGN: Retrospective cohort study using the 2001–2015 Surveillance, Epidemiology, and End Results - Consumer Assessment of Healthcare Providers and Systems data linked with Medicare claims (SEER-CAHPS). We employed stratified propensity score matching and modified Poisson regression analyses, adjusting for clinical and demographic characteristics

PARTICIPANTS: Black and White Medicare beneficiaries 65 years or older with cancer (*N*=2000) or without cancer (*N*=11,524).

MAIN MEASURES: End-of-life care measures included hospice use, inpatient hospitalizations, intensive care unit (ICU) stays, and emergency department (ED) visits, during the 90 days prior to death.

KEY RESULTS: When considering all conditions together (cancer + non-cancer), Black beneficiaries were 26% less likely than their Whites counterparts to enroll in hospice (adjusted risk ratio [ARR]: 0.74, 95%CI: 0.66–0.83). Among beneficiaries without cancer, Black beneficiaries had a 32% lower likelihood of enrolling in hospice (ARR: 0.68, 95%CI: 0.59–0.79). There was no racial difference in hospice enrollment among cancer patients. Black beneficiaries were also at increased risk for ED use (ARR: 1.12, 95%CI: 1.01–1.26). Patient-provider communication did not explain racial disparities in hospice or ED use. There were no racial differences in hospitalizations or ICU admissions.

CONCLUSION: We observed racial disparities in hospice use and ED visits in the 90 days prior to death among Medicare beneficiaries; however, hospice disparities were largely driven by patients without cancer. Condition-specific differences in palliative care integration at the end-of-life may partly account for variations in EOL care disparities across disease groups.

KEY WORDS: end-of-life care; racial disparities; patient-provider communication.

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BACKGROUND

End-of-life (EOL) care is one of the nation's most pressing health care challenges. Approximately 25% of Medicare expenditures occur in the last year of life.[1] Moreover, patients with chronic illnesses (e.g., heart failure, cancer) in the last two years of life account for 32% of Medicare expenditures.[2] Indicators of low-quality EOL care include in-hospital death, lack of hospice use, emergency department visits, and stays in the intensive care unit near the EOL.[3] Yet, the quality of EOL care remains suboptimal and racially inequitable. For example, compared with White patients, Blacks are less likely to enter hospice, but more likely to be hospitalized, admitted to the emergency department (ED), and have an in-hospital death at the EOL.[4–11] Such EOL care disparities are concerning given their impact on patients' quality of life and overall costs of care. As the aging population grows in diversity, it is especially important for health systems to work towards identifying and addressing barriers to equitable EOL care.

Variations in EOL care have also been documented across disease subgroups. One recent EOL care study among veterans revealed that nearly 50% of patients with end-stage renal disease (ESRD), heart failure, or frailty received palliative care consultations relative to 73.5% of cancer patients.[12]

Additionally, approximately 33% of ESRD, heart failure, and frail patients died in the intensive care unit (ICU), compared with only 13.4% of cancer patients. One possible explanation for these findings is that compared with non-cancer patients at the EOL, cancer patients, and potentially their providers, may be more open to discussing and pursuing EOL palliative care options (e.g., hospice) due to a shared understanding and acceptance of the patient's terminal state.[13–15]

Little is known regarding whether racial gaps in EOL care differ among patients with cancer and those without cancer; however, one study of nursing home care reported no racial disparity in hospice use among Black and White residents with cancer; yet, among residents without cancer as principal cause of death, Blacks were less likely than Whites to use hospice.[16] These findings suggest that the impact of a cancer diagnosis on EOL care decision-making may be especially pronounced among Blacks. However, generalizability of these findings remains unclear as this study was limited to Medicare-Medicaid dual-eligibles in Florida.

Furthermore, some research suggests that racial differences in patient-provider communication may contribute to disparities in EOL care.[17–19] For example, one recent study reported that providers exhibited worse non-verbal communication (e.g., eye contact) when caring for Blacks relative to Whites at the EOL.[17] However, this study employed observer ratings of provider communication style and did not evaluate patient-perspectives regarding patient-provider communication. Other studies have assessed patient perspectives on patient-provider communication at the EOL, but have typically focused on racial differences in patient preferences for EOL care discussions and the frequency of these discussions, instead of racial differences in the quality of patient-provider communication at the EOL.[18, 20] Moreover, no study has evaluated the mediating effect of patient-provider communication on racial disparities in EOL care by disease group.

Thus, the objectives of this study were three-fold. First, we examined racial disparities in EOL care among Medicare beneficiaries with and without cancer. Second, we examined whether the magnitude of EOL care disparities differed among beneficiaries with cancer vs. beneficiaries without cancer. Lastly, we examined whether patient-provider communication accounted for disparities in EOL care.

METHODS

Data

We leveraged the population-based SEER-CAHPS linked dataset,[21, 22] which combines Consumer Assessment of Healthcare Providers and Systems (CAHPS) patient experience surveys (2001–2005, 2007–2015), Medicare enrollment and claims data (2003–2015), and Surveillance, Epidemiology, and End Results (SEER) cancer registry data (2003–2015).

Study Population

We identified beneficiaries with and without cancer with dates of death recorded in Medicare. We limited the study to beneficiaries, aged 65 or older at death, who were continuously enrolled in fee-for-service Medicare Parts A and B (i.e., no HMO) for the 12 months prior to death. The cancer cohort included patients diagnosed with a first primary lung, colorectal, prostate, or breast (females) cancer between 2003 and 2015. We excluded beneficiaries who completed their most recent CAHPS survey more than two years before death. Given the small number of Hispanic/Latino and Asian beneficiaries, we limited analyses to those self-identified as non-Hispanic White or Black. The final full-unmatched cohort consisted of 2000 beneficiaries with cancer and 11,524 beneficiaries without cancer (Appendix Table A1). The University of North Carolina Institutional Review Board approved this study.

Outcomes: End-of-Life (EOL) Care Measures

We identified four measures of EOL care feasibly measured using administrative data.[3] For each outcome, we used claims to create a binary measure of any utilization during the 90 days prior to death.

Hospice Care. We defined a patient as receiving hospice services if we found any claim from the hospice setting or with hospice care codes (HCPCS Q5000-Q5001 or Revenue Center 0650-0659).

Inpatient Hospitalizations. We defined a patient as receiving inpatient care if the patient had a claim for an (acute care) hospital admission.

ICU Admissions. We defined ICU stays as a hospital admission with an indicator of ICU service (Revenue Center codes 02x).

ED Visits. We defined ED visits as outpatient hospital claims with revenue center codes 0450-0459 or 0981 that did not result in a hospital admission. If a hospital admission occurred on the same date as an emergency room claim, we treated that day as an inpatient hospitalization and not an ED visit.

Independent Variable

Our independent variable of primary interest was self-reported patient race (non-Hispanic White vs. non-Hispanic Black) in the CAHPS survey.

Mediating Variable

The Medicare CAHPS survey[23, 24] includes four items to assess patient experiences with provider communication

(Appendix Table A2).[22] These items were combined to form a composite measure, with a range of 0 to 100. The composite measure has been validated elsewhere.[25–27] Consistent with prior studies, the distribution of composite scores was negatively skewed, with 40.5% of beneficiaries exhibiting a provider communication composite score of 100. Based on prior research, we recoded the provider communication measure into a binary measure of "excellent" (score of 100) or "not excellent."[28, 29]

Covariates

Cancer and Non-cancer Cohorts. We used the CAHPS survey nearest to death to capture race, gender, education, smoking status, and whether a proxy responded to the survey. Age and Medicaid dual-eligible status (i.e., state buy-in) were obtained from Medicare enrollment data at year of death. From census data, we captured ZIP code–level poverty (percentage of the population living below federal poverty level). Poverty levels for patients who died before 2008 were set to the 2000 census, while the poverty levels for patients who died in 2008 and later were set to 2010 census data.[30] We assessed patient health status in the last year of life using claims-based measures of health conditions—the Kablunde modification of the Charlson comorbidity index[27] supplemented with condition algorithms developed by the Chronic Conditions Warehouse (CCW) (all conditions listed in Appendix Table A3).[31] Of note, age, education, health status, proxy help, and Medicaid enrollment are designated as standard CAHPS case-mix variables.[32]

Cancer-Specific Covariates. Additionally, for the cancer cohort, we included American Joint Committee on Cancer tumor stage at diagnosis and tumor grade (Gleason score for prostate cancers) from the SEER registry.

Statistical Analyses

To isolate the effect of race on EOL care measures, separate from other demographic characteristics, we estimated propensity scores for each patient, predicting Black race as a function of the demographic and clinical covariates listed in Table 1 (see Appendix Table A3 for covariates included in each cohort).[33] First, we employed propensity score matching across the "full" cohort of cancer and non-cancer cases to create comparable cohorts of Black and White beneficiaries. Next, we used a "stratified" approach for propensity score matching,[33] generating a separate set of propensity scores for Blacks and Whites in the cancer cohort and a separate set of propensity scores for Blacks and Whites in the non-cancer cohort. For both the stratified and full cohorts, we employed a 1:5 match ratio using the Greedy matching algorithm.[34] Each Black beneficiary was matched to at least one White beneficiary in both the full and stratified approaches. Balance of covariates was evaluated using standardized adjusted mean differences (SAMD), with SAMD <10% indicating acceptable balance. The full matched cohort included 927 beneficiaries (168 Black; 759 White) with cancer and 4779 beneficiaries (879 Black; 3900 White) without cancer.

For each propensity score matched cohort, we assessed racial disparities in EOL care by estimating modified Poisson regression models[35] predicting each EOL care measure as a function of race. To determine whether the magnitude of racial disparities in EOL care varied by cancer disease status, we compared race estimates obtained from the separate cancer and non-cancer cohort analyses. Next we adjusted for provider communication in each set of models to evaluate the mediating effect of patient-provider communication on EOL care disparities. Consistent with the Institute of Medicine (IOM) report, *Unequal Treatment*, which defines racial/ethnic disparities in health care as differences in treatment provided to members of different racial/ethnic groups that is not justified by health condition or the patient's treatment preference,[36] we did not adjust for socioeconomic status (SES) in our propensity score models or primary set of modified Poisson regression models (i.e., independent effect of race on care).[37, 38] The IOM definition suggests that adjusting for SES may attenuate the estimated independent effect of race. However, we accounted for SES (education, dual-eligible status, and census-level poverty) in a secondary set of modified Poisson regression models evaluating the residual direct effect of race on care (i.e., race effect after adjustment for socioeconomic status).[32] All analyses were conducted using SAS software version 9.4.

RESULTS

Demographic, socioeconomic, and clinical characteristics for the propensity score matched cohort are presented in Table 1 (characteristics for the unmatched cohort are included in Appendix Tables A4 and A5). Among the full matched cohort, the majority of beneficiaries were White (81.9%), male (59.0%), had at least a high school degree (65.9%), lived above the federal poverty level (78.8%), and reported two or more comorbidities on average (58.6%). After propensity score matching, we observed no statistically significant racial differences in demographic and clinical characteristics; however, racial differences in socioeconomic status remained, as per the IOM model (Table 1). Among the full matched cohort, a higher proportion of Blacks (compared with Whites) were Medicaid dual-eligible (44.4% vs. 17.6%, $p<0.001$), lived in poverty (46.1% vs. 15.7%, $p<0.001$), and did not complete college (69.1% vs. 47.5%, $p<0.001$). Similar racial patterns were observed in the stratified matched cohorts.

Table 2 shows overall patterns and racial variations in EOL care in the last 90 days of life, by cancer status, among the full and stratified matched cohorts. Among the full matched cohort, roughly a third of beneficiaries enrolled in hospice care

Table 1 Demographic, Socioeconomic, and Clinical Characteristics of Propensity Score Matched Analytic Cohorts by Cancer Status and Race

	Full matched				Cancer matched				Non-cancer matched			
	Total *N* (%)	White *N* (%)	Black *N* (%)	*p*-value	Total *N* (%)	White *N* (%)	Black *N* (%)	*p*-value	Total *N* (%)	White *N* (%)	Black *N* (%)	*p*-value
Overall	5789 (100.0)	4742 (100.0)	1047 (100.0)		927 (100.0)	759 (100.0)	168 (100.0)		4779 (100.0)	3900 (100.0)	879 (100.0)	
Demographic characteristics												
Sex												
Female	2373 (41.0)	1957 (41.3)	416 (39.7)	0.36	456 (49.2)	373 (49.1)	83 (49.4)	0.95	1907 (39.9)	1574 (40.4)	333 (37.9)	0.18
Age group at death												
65 to 74	1585 (27.4)	1277 (26.9)	308 (29.4)	0.24	290 (31.3)	235 (31.0)	55 (32.7)	0.84	1264 (26.4)	1011 (25.9)	253 (28.8)	0.17
75 to 84	2199 (38.0)	1807 (38.1)	392 (37.4)		416 (44.9)	344 (45.3)	72 (42.9)		1750 (36.6)	1430 (36.7)	320 (36.4)	
85+	2005 (34.6)	1658 (35.0)	347 (33.1)		221 (23.8)	180 (23.7)	41 (24.4)		1765 (36.9)	1459 (37.4)	306 (34.8)	
Socioeconomic characteristics (not included in propensity score models)												
Education												
High school graduate	3816 (65.9)	3325 (70.1)	491 (46.9)	**<.001**	632 (68.2)	552 (72.7)	80 (47.6)	**<.001**	3124 (65.4)	2714 (69.6)	410 (46.6)	**<.001**
Some college or college graduate	1968 (34.0)	1731 (36.5)	237 (22.6)	**<.001**	320 (34.5)	287 (37.8)	33 (19.6)	**<.001**	1609 (33.7)	1406 (36.1)	203 (23.1)	**<.001**
College graduate	846 (14.6)	759 (16.0)	87 (8.3)	**<.001**	151 (16.3)	132 (17.4)	19 (11.3)	0.05	693 (14.5)	626 (16.1)	67 (7.6)	**<.001**
Poverty indicators												
State buy-in	1301 (22.5)	836 (17.6)	465 (44.4)	**<0.001**	193 (20.8)	128 (16.9)	65 (38.7)	**<0.001**	1145 (24.0)	745 (19.1)	400 (45.5)	**<0.001**
% living below FPL (census tract)	1226 (21.2)	743 (15.7)	483 (46.1)	**<.001**	204 (22.0)	130 (17.1)	74 (44.0)	**<.001**	1019 (21.3)	610 (15.6)	409 (46.5)	**<.001**
Clinical characteristics												
Current smoker												
Yes	733 (12.7)	592 (12.5)	141 (13.5)	0.39	194 (20.9)	158 (20.8)	36 (21.4)	0.86	548 (11.5)	443 (11.4)	105 (11.9)	0.6221
Charlson Index												
0	1484 (25.6)	1234 (26.0)	250 (23.9)	0.11	201 (21.7)	167 (22.0)	34 (20.2)	0.84	1230 (25.7)	1014 (26.0)	216 (24.6)	0.21
1	913 (15.8)	760 (16.0)	153 (14.6)		192 (20.7)	158 (20.8)	34 (20.2)		713 (14.9)	594 (15.2)	119 (13.5)	
2+	3392 (58.6)	2748 (58.0)	644 (61.5)		534 (57.6)	434 (57.2)	100 (59.5)		2836 (59.3)	2292 (58.8)	544 (61.9)	
Frailty (Faurot)												
0%–<10%	1242 (21.5)	1030 (21.7)	212 (20.2)	0.55	219 (23.6)	181 (23.8)	38 (22.6)	0.54	978 (20.5)	804 (20.6)	174 (19.8)	0.71
10%–<20%	866 (15.0)	711 (15.0)	155 (14.8)		146 (15.7)	122 (16.1)	24 (14.3)		729 (15.3)	598 (15.3)	131 (14.9)	
20%–<50%	1076 (18.6)	887 (18.7)	189 (18.1)		226 (24.4)	189 (24.9)	37 (22.0)		868 (18.2)	715 (18.3)	153 (17.4)	
50% +	2605 (45.0)	2114 (44.6)	491 (46.9)		336 (36.2)	267 (35.2)	69 (41.1)		2204 (46.1)	1783 (45.7)	421 (47.9)	
Primary cancer site												
Non-cancer	4935 (85.2)	4056 (85.5)	879 (84.0)	0.50				0.98	4779 (100.0)	3900 (100.0)	879 (100.0)	N/A
Breast	134 (2.3)	105 (2.2)	29 (2.8)		154 (16.6)	125 (16.5)	29 (17.3)					
Colorectal	185 (3.2)	152 (3.2)	33 (3.2)		189 (20.4)	156 (20.6)	33 (19.6)					
Lung	402 (6.9)	326 (6.9)	76 (7.3)		425 (45.8)	349 (46.0)	76 (45.2)					
Prostate	133 (2.3)	103 (2.2)	30 (2.9)		159 (17.2)	129 (17.0)	30 (17.9)					
Stage at cancer diagnosis												

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Table 1. (continued)

	Full matched				Cancer matched				Non-cancer matched			
	Total *N* (%)	White *N* (%)	Black *N* (%)	*p*-value	Total *N* (%)	White *N* (%)	Black *N* (%)	*p*-value	Total *N* (%)	White *N* (%)	Black *N* (%)	*p*-value
Non-cancer	4935 (85.2)	4056 (85.5)	879 (84.0)	0.72				0.99	4779 (100.0)	3900 (100.0)	879 (100.0)	N/A
1	52 (0.9)	40 (0.8)	12 (1.1)		60 (6.5)	48 (6.3)	12 (7.1)					
2	139 (2.4)	113 (2.4)	26 (2.5)		142 (15.3)	116 (15.3)	26 (15.5)					
3	141 (2.4)	108 (2.3)	33 (3.2)		192 (20.7)	159 (20.9)	33 (19.6)					
4	282 (4.9)	230 (4.9)	52 (5.0)		286 (30.9)	234 (30.8)	52 (31.0)					
9	240 (4.1)	195 (4.1)	45 (4.3)		247 (26.6)	202 (26.6)	45 (26.8)					
Comorbidities												
Acute myocardial infarction	848 (14.6)	690 (14.6)	158 (15.1)	0.65	137 (14.8)	112 (14.8)	25 (14.9)	0.97	694 (14.5)	562 (14.4)	132 (15.0)	0.64
Heart failure	2193 (37.9)	1785 (37.6)	408 (39.0)	0.42	304 (32.8)	247 (32.5)	57 (33.9)	0.73	1854 (38.8)	1504 (38.6)	350 (39.8)	0.49
Peripheral vascular disease	911 (15.7)	734 (15.5)	177 (16.9)	0.25	134 (14.5)	108 (14.2)	26 (15.5)	0.68	755 (15.8)	604 (15.5)	151 (17.2)	0.21
Cerebrovascular disease	1234 (21.3)	1001 (21.1)	233 (22.3)	0.41	143 (15.4)	119 (15.7)	24 (14.3)	0.65	1066 (22.3)	857 (22.0)	209 (23.8)	0.25
COPD	1657 (28.6)	1348 (28.4)	309 (29.5)	0.48	364 (39.3)	295 (38.9)	69 (41.1)	0.60	1267 (26.5)	1028 (26.4)	239 (27.2)	0.61
Dementia	409 (7.1)	334 (7.0)	75 (7.2)	0.89	47 (5.1)	§	§	0.85	366 (7.7)	301 (7.7)	65 (7.4)	0.74
Paralysis	246 (4.2)	200 (4.2)	46 (4.4)	0.80	26 (2.8)	§	§	0.71	217 (4.5)	175 (4.5)	42 (4.8)	0.71
Diabetes	2119 (36.6)	1705 (36.0)	414 (39.5)	**0.03**	346 (37.3)	278 (36.6)	68 (40.5)	0.35	1751 (36.6)	1405 (36.0)	346 (39.4)	0.06
Liver disease	147 (2.5)	127 (2.7)	20 (1.9)	0.15	15 (1.6)	§	§	0.63	118 (2.5)	101 (2.6)	17 (1.9)	0.26
Peptic ulcer disease	189 (3.3)	150 (3.2)	39 (3.7)	0.35	36 (3.9)	§	§	0.51	133 (2.8)	103 (2.6)	30 (3.4)	0.21
Rheumatologic disease	214 (3.7)	175 (3.7)	39 (3.7)	0.96	37 (4.0)	§	§	0.76	177 (3.7)	144 (3.7)	33 (3.8)	0.93
Renal disease	1693 (29.2)	1350 (28.5)	343 (32.8)	**0.006**	192 (20.7)	156 (20.6)	36 (21.4)	0.80	1489 (31.2)	1182 (30.3)	307 (34.9)	**0.008**
Cause of death												
Unknown	4935 (85.2)	4056 (85.5)	879 (84.0)	0.42				0.97	4779 (100.0)	3900 (100.0)	879 (100.0)	N/A
Cancer	565 (9.8)	453 (9.6)	112 (10.7)		617 (66.6)	505 (66.5)	112 (66.7)					
Non-cancer	289 (5.0)	233 (4.9)	56 (5.3)		310 (33.4)	254 (33.5)	56 (33.3)					
Year of survey												
2001–2004	1912 (33.0)	1555 (32.8)	357 (34.1)	0.26	175 (18.9)	146 (19.2)	29 (17.3)	0.12	1701 (35.6)	1372 (35.2%)	329 (37.4)	0.44
2007–2010	2299 (39.7)	1873 (39.5)	426 (40.7)		442 (47.7)	350 (46.1)	92 (54.8)		1851 (38.7)	1518 (38.9%)	333 (37.9)	
2011–2015	1578 (27.3)	1314 (27.7)	264 (25.2)		310 (33.4)	263 (34.7)	47 (28.0)		1227 (25.7)	1010 (25.9%)	217 (24.7)	
Days from diagnosis to death												
N/A	4935 (85.2)	4056 (85.5)	879 (84.0)	0.85				0.86	4779 (100.0)	3900 (100.0)	879 (100.0)	N/A
0 to 180 (6 m)	281 (4.9)	226 (4.8)	55 (5.3)		295 (31.8)	240 (31.6)	55 (32.7)					
181 to 365 (12 m)	113 (2.0)	94 (2.0)	19 (1.8)		123 (13.3)	104 (13.7)	19 (11.3)					
366 to 730 (24 m)	136 (2.3)	109 (2.3)	27 (2.6)		141 (15.2)	114 (15.0)	27 (16.1)					
731+ (>24 m)	324 (5.6)	257 (5.4)	67 (6.4)		368 (39.7)	301 (39.7)	67 (39.9)					
Days from survey to death												
0–183 (or received within 30 days of death)	1129 (19.5)	939 (19.8)	190 (18.2)	0.71	219 (23.6)	179 (23.6)	40 (23.8)	0.71	891 (18.6)	741 (19.0)	150 (17.1)	0.68
183–365	1376 (23.8)	1114 (23.5)	262 (25.0)		228 (24.6)	190 (25.0)	38 (22.6)		1154 (24.1)	930 (23.8)	224 (25.5)	
366–547			290 (27.7)		270 (29.1)	224 (29.5)	46 (27.4)			1076 (27.6)	244 (27.8)	

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Table 1. (continued)

	Full matched				Cancer matched				Non-cancer matched			
	Total *N* (%)	White *N* (%)	Black *N* (%)	*p*-value	Total *N* (%)	White *N* (%)	Black *N* (%)	*p*-value	Total *N* (%)	White *N* (%)	Black *N* (%)	*p*-value
	1599 (27.6)	1309 (27.6)							1320 (27.6)			
546–730	1685 (29.1)	1380 (29.1)	305 (29.1)		210 (22.7)	166 (21.9)	44 (26.2)		1414 (29.6)	1153 (29.6)	261 (29.7)	
Use of proxy for survey												
Yes	2330 (40.2)	1900 (40.1)	430 (41.1)	0.55	270 (29.1)	216 (28.5)	54 (32.1)	0.34	2020 (42.3)	1643 (42.1)	377 (42.9)	0.68
Patient provider communication												
Not excellent	3396 (58.7)	2764 (58.3)	632 (60.4)	0.22	521 (56.2)	425 (56.0)	96 (57.1)	0.79	2831 (59.2)	2294 (58.8)	537 (61.1)	0.22
Excellent	2393 (41.3)	1978 (41.7)	415 (39.6)		406 (43.8)	334 (44.0)	72 (42.9)		1948 (40.8)	1606 (41.2)	342 (38.9)	

Bolded values indicate statistical significance at p<.05; FPL, federal poverty level
[§]Suppressed due to small samples (<11) to protect identity

Table 2 End-of-Life Care Outcomes by Cancer Status and Race

	Full matched				Cancer matched				Non-cancer matched			
	Total *N* (%)	White *N* (%)	Black *N* (%)	*p*-value	Total *N* (%)	White *N* (%)	Black *N* (%)	*p*-value	Total *N* (%)	White *N* (%)	Black *N* (%)	*p*-value
Overall	5789 (100.0)	4742 (100.0)	1047 (100.0)		927 (100.0)	759 (100.0)	168 (100.0)	.	4779 (100.0)	3900 (100.0)	879 (100.0)	
End-of-life care outcomes												
In hospice care 90 days prior to death												
Yes	1793 (31.0)	1542 (32.5)	251 (24.0)	**<0.001**	528 (57.0)	441 (58.1)	87 (51.8)	0.13	1235 (25.8)	1071 (27.5)	164 (18.7)	**<0.001**
Hospitalization 90 days prior to death												
Yes	3264 (56.4)	2652 (55.9)	612 (58.5)	0.14	614 (66.2)	495 (65.2)	119 (70.8)	0.16	2579 (54.0)	2086 (53.5)	493 (56.1)	0.16
Inpatient ICU admission 90 days prior to death												
Yes	1680 (29.0)	1357 (28.6)	323 (30.9)	0.15	276 (29.8)	223 (29.4)	53 (31.5)	0.58	1395 (29.2)	1124 (28.8)	271 (30.8)	0.24
Emergency department visit 90 days prior to death												
Yes	1433 (24.8)	1148 (24.2)	285 (27.2)	**0.04**	268 (28.9)	210 (27.7)	58 (34.5)	0.08	1124 (23.5)	897 (23.0)	227 (25.8)	0.07

Bolded values indicate statistical significance at p<.05; ICU, intensive care unit

(31.0%); yet, most patients had an inpatient hospital admission (56.4%). Fewer patients had an inpatient ICU admission (29.0%) or ED visit (24.8%).

In terms of racial disparity findings from the primary set of modified Poisson regression models, Black beneficiaries in the full matched cohort were 26% less likely than their White counterparts to enroll in hospice (Fig. 1, Panel A; adjusted risk ratio [ARR]: 0.74, 95%CI: 0.66–0.83). Among beneficiaries with cancer, there was a non-statistically significant trend towards lower hospice use among Blacks compared with Whites (ARR: 0.89, 95%CI: 0.76–1.04). However, among beneficiaries without cancer, Black beneficiaries had a 32% lower likelihood of enrolling in hospice (ARR: 0.68, 95%CI: 0.59–0.79). Additional adjustment for provider communication did not account for racial disparities in hospice care (Fig. 1, Panel A). Further adjustment for socioeconomic factors partially accounted for the racial disparity in hospice care among beneficiaries without cancer (ARR: 0.75, 95%CI: 0.64–0.87).

There were no racial differences in hospitalizations (ARR: 1.05, 95%CI: 0.99–1.11) or ICU admissions (ARR: 1.08, 95%: 0.97–1.19) in both the full and stratified analyses (Fig. 1, Panels B and C).

Compared with Whites in the full matched cohort, Black beneficiaries had a 12% increased risk of ED use (Fig. 1, Panel D; ARR: 1.12, 95%CI: 1.01–1.26). Provider communication did not explain disparities in ED use; however, the association between race and ED use was fully explained by socioeconomic factors (ARR: 1.02, 95%CI: 0.91–1.15). Disparities in ED use were not observed in stratified analyses.

DISCUSSION

We examined racial disparities in EOL care among Medicare beneficiaries with and without cancer. We observed disparities in hospice use and ED visits; however, hospice-related disparities were moderated by cancer history, with disparities being most pronounced among beneficiaries without cancer. We observed no disparities in ICU use and hospitalizations. Racial differences in socioeconomic status partly accounted for observed disparities in hospice use, and fully accounted for disparities in ED visits. Finally, patient-provider communication did not explain observed racial disparities in EOL care.

Disparities in EOL care are well-documented; however, to our knowledge, this is the first study to examine variations in the magnitude of EOL care disparities by disease group in a large cohort of Medicare beneficiaries across the USA. In this study, Black beneficiaries were 26% less likely to use hospice and 12% more likely to visit the ED in the last 90 days of life compared with their White counterparts. Interestingly, the magnitude of observed disparities in EOL care was larger

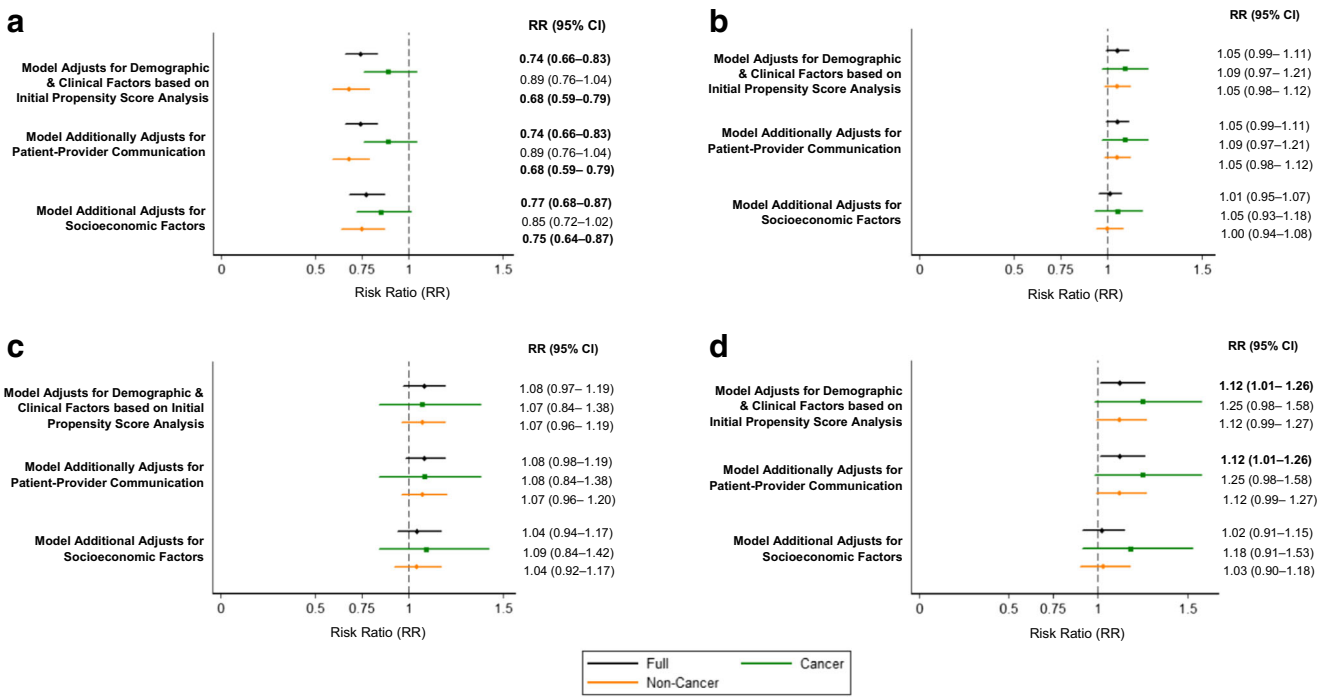

Figure 1 Association between race and end-of-life care outcomes. Note: All models compare Blacks to Whites (reference group) and adjusts for demographic and clinical characteristics. Bolded values indicate statistical significance at $p<.05$. CI, confidence interval; ED, emergency department; ICU, intensive care unit. (Panel A) Adjusted risk ratio (95%CI) for association of race with hospice care. (Panel B) Adjusted risk ratio (95%CI) for association of race with hospitalization. (Panel C) Adjusted risk ratio (95%CI) for association of race with ICU admission. (Panel D) Adjusted risk ratio (95%CI) for association of race with use of ED.

within the non-cancer cohort relative to the cancer cohort in adjusted analyses.

One possible explanation for our findings relates to the concept of clinical uncertainty. In the 2003 IOM report, Unequal Treatment, the IOM committee discussed the contribution of clinical uncertainty to racial disparities in clinical decision-making.[39] Specifically, the committee reported that clinical uncertainty is common in medicine, and that when faced with clinical uncertainty, clinicians make care decisions based on a combination of "priors" (i.e., observables about patients, such as race, age, gender) and "signals" (i.e., new information gathered during the clinical encounter through communicating with patients). During the clinical decision-making process, clinicians must balance a combination of priors and signals in arriving at conclusions regarding a patient's health status, prognosis, and potential treatment options. In cases where the signal is very noisy, such as when patient-provider communication is poor, clinicians will rely more heavily on priors to inform decision-making. Research suggests that this noisy signal-induced reliance on priors is more common among clinicians treating patients of color, due to lack of racial and cultural concordance between the patient and clinicians.[40,41] However, this greater reliance on priors creates room for the introduction of stereotypes (e.g., Blacks are less likely to prefer hospice) that can bias clinicians' discussion and decision to pursue palliative care options with patients of color at the EOL (e.g., fewer referrals to palliative care specialists), resulting in a self-fulfilling prophecy of lower utilization of palliative care among patients of color nearing death (see Fig. 2).

While not addressed in the IOM report, it is possible that the degree of clinical uncertainty and prior/signal balancing process differs across disease groups.[42] Cancer is the second leading cause of death in the USA and the most common diagnosis among patients receiving palliative care at the EOL (27%).[43] This high prevalence of cancer patients receiving palliative care at the EOL, coupled with broader patient and clinician awareness regarding cancer mortality risk, may impact the clinical decision-making process two-fold. First, clinicians may be more inclined to engage in palliative care discussions and pursue palliative care options with cancer patients relative to patients without cancer, regardless of race, due in part to less clinical uncertainty regarding mortality risk from cancer. Thus, knowledge of a cancer diagnosis may interrupt a provider's stereotype-driven proclivity to refrain from having EOL palliative care discussions with patients of color. Second, cancer patients may have more opportunities to discuss EOL palliative care options with their providers and may become more receptive to EOL palliative care than their non-cancer counterparts. This normalization of palliative care among cancer patients at the EOL may have a greater effect on Black patients, who have historically had less exposure to palliative care, thereby potentially mitigating some of the racial gap in EOL care among cancer patients. Future research should explore variations in clinical uncertainty and palliative

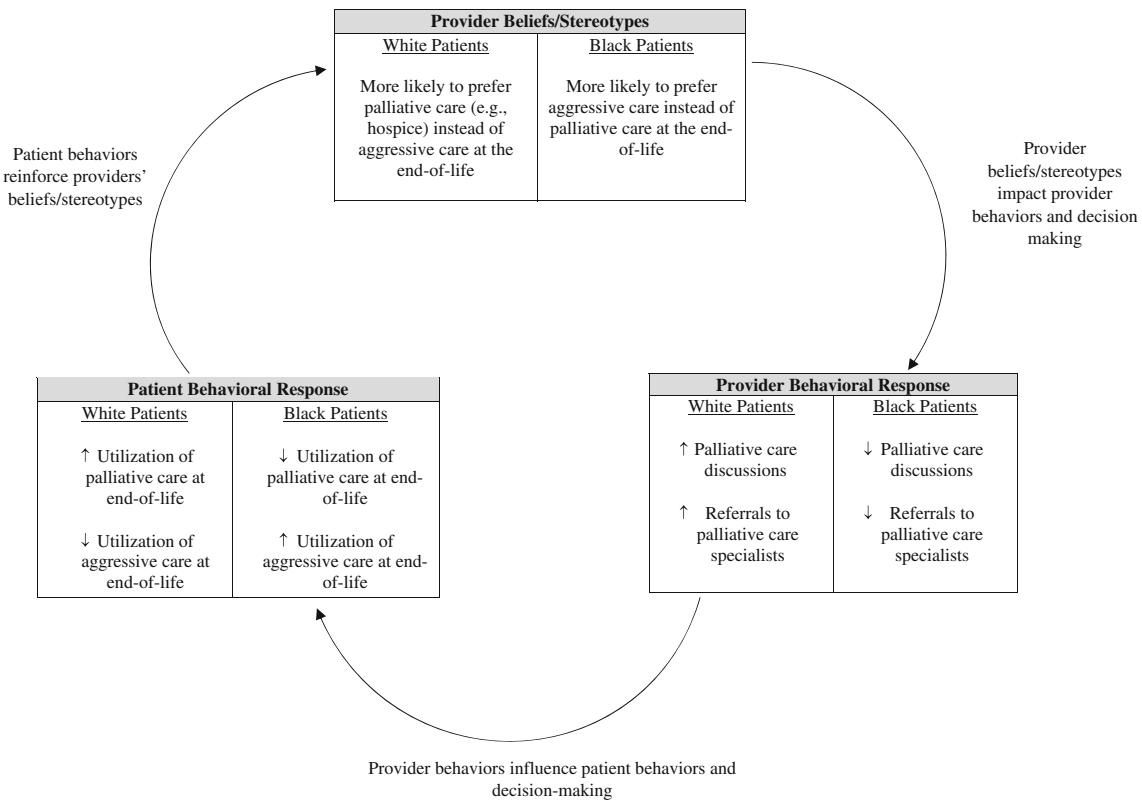

Figure 2 Impact of clinical uncertainty and provider bias on racial disparities in palliative care decision-making at the end-of-life.

care delivery across different medical specialties (e.g., oncology vs. cardiology) and whether such variations explain racial disparities in EOL care.

A secondary aim of this study was to examine the potential mediating effect of patient-provider communication on racial disparities in EOL care. We found that patient-provider communication measure did not attenuate disparities in EOL care. These findings are in contrast to evidence from prior studies that have highlighted the importance of communication in EOL care[44,45], as well as other research that has documented racial disparities in patient-provider communication.[46–48] It is possible that our observation of a null mediation effect may be due to the nature of the non-EOL care specific focus of the CAHPS provider communication measure. With the advent of Medicare reimbursement for advance care planning conversations in 2016,[49] future research should examine racial patterns in both the frequency and quality/content of these conversations and their impact on racial disparities in EOL care.

Limitations of this study include our focus on Black and White Medicare beneficiaries, aged 65 and older, with breast, colon, rectal, lung, and prostate cancers. Thus, our findings may not generalize to other racial/ethnic groups, other cancer types, or persons younger than age 65. Secondly, SEER-CAHPS participants may differ from the broader population of Medicare beneficiaries. Finally, as described earlier, our patient-provider communication measure was not specific to EOL care experiences and was ascertained within two years before death, which may have limited our ability to assess its mediating role in EOL care disparities. Still, to our knowledge, this is the first study examining variations in EOL care disparities among Medicare beneficiaries with and without cancer and is therefore an important contribution to the literature.

CONCLUSION

To conclude, we observed racial disparities in EOL care among Medicare beneficiaries with and without cancer. Such disparities were more common in beneficiaries without cancer vs. those with cancer, but were not explained by racial disparities in provider communication. Overall, our findings suggest that disparities in EOL care are modifiable, and that future research should explore differences in palliative care delivery in oncology and non-oncology settings in order to identify system-level strategies that promote equity in EOL care.

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Authors' Contribution *Dr. Cleo A. Samuel-Ryals and Ms. Sharon Peacock Hinton had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.*

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Acquisition, analysis, or interpretation of data: Samuel-Ryals, Mbah, Peacock-Hinton, Cross, Reeve Dusetzina
Drafting of the manuscript: Samuel-Ryals, Mbah, Peacock-Hinton, Cross
Critical revision of the manuscript for important intellectual content: All authors
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