Association of Age, Gender, and Race with Intensity of End-of-Life Care for Medicare Beneficiaries with Cancer

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Abstract

Purpose: To measure intensity of end-of-life (EOL) care for Medicare cancer patients and variations in care by age, gender, and race.

Patients and Methods: This retrospective cohort analysis of Medicare claims (20% sample) examined 235,821 Medicare Parts A and B fee-for-service patients dying with poor-prognosis cancers between 2003 and 2007. Logistic regression models quantified associations between care intensity and age, gender, and race. Measures included hospitalizations, emergency department (ED) visits, intensive care unit (ICU) admissions, in-hospital deaths, late-life chemotherapy administration, overall and late hospice enrollment within six months of death.

Results: Within 30 days of death, 61.3% of patients were hospitalized, 10.2% were hospitalized more than once, 10.2% visited an ED more than once, 23.7% had ICU admissions, and 28.8% died in-hospital. Within two weeks of death, 6% received chemotherapy. In their final six months, 55.2% accessed hospice, 15.1% within three days of death. Older age (≥ 75 versus < 75) was associated with lower odds ratios (ORs) of 0.49 to 0.89 for aggressive care, and an OR of 0.92 (95% CI 0.89-0.95) for late hospice enrollment. Female gender was associated with lower ORs (0.82 to 0.86) for aggressive care, and an OR of 0.84 (95% CI 0.81-0.86) for late hospice enrollment. Black (versus nonblack) race was associated with higher ORs (1.08 to 1.38) for aggressive acute care, lower ORs for late chemotherapy, OR 0.76 (95% CI 0.71-0.81), and late hospice enrollment, OR 0.81 (95% CI 0.76-0.86).

Conclusions: Seniors dying with poor-prognosis cancer experience high-intensity care with rates varying by age, gender, and race.

Introduction

HIGH-QUALITY EOL cancer care focuses on palliation for effective symptom control and supportive services, including hospice care.¹ Although the value of limiting aggressive cancer therapy aimed at prolonging life and instituting palliative care has been acknowledged,¹⁻⁴ patients often experience burdensome treatments misaligned with their preferences.⁵⁻⁸

Using a range of methods, Earle and colleagues^{9,10} defined three domains of aggressive EOL cancer care observable in administrative data: (1) possible misuse of acute care, (2) overuse of chemotherapy, and (3) no or late access to hospice services. They derived benchmarks by assessing the perfor-

mance of all providers by Healthcare Service Area¹¹ and using the rate met by the top Healthcare Service Areas as an achievable standard.¹⁰ These measures were cited by the Agency for Healthcare Research and Quality in 2006¹² and endorsed by the National Quality Forum in 2009.¹

Many cancer-affected seniors receive overly aggressive EOL treatment, varying by geographic location and treating hospital.¹³ Less is known about the sociodemographic and disease-specific predictors of EOL care.²⁻⁴ To analyze quality gaps in EOL care among seniors, we used Earle and colleagues' benchmarks to measure the intensity of EOL care experienced by Medicare fee-for-service beneficiaries with poor-prognosis cancers, and examined variations by age, gender, and race.

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Methods

Cohort definition

Using the 20% Medicare Denominator file, we identified beneficiaries who died at between 66 and 99 years of age from 2003 to 2007 and were continuously enrolled in fee-for-service Medicare Parts A and B during the last six months of life. We included those dying with high-burden disease, defined as one inpatient or two outpatient (7 to 270 days apart) claims-based diagnoses of poor-prognosis cancers, as identified by Iezzoni and colleagues (Supplemental Information Appendix 1).¹⁴

Decedents were categorized as having 1 of 26 cancer types based on predominant poor-prognosis cancer diagnosis¹⁴ using modified Clinical Classification Software (CCS)¹⁵ (Supplemental Information Appendix 2). Patients whose predominant poor-prognosis cancer codes could not be determined were assigned to a specific category based on the predominant cancer diagnosis in the last six months of life, using a broader range of cancer ICD-9 codes (140 through 208).

Covariates

The Medicare Denominator file was used to determine age (dichotomized as ≥ 75 years or < 75 years), gender, and race (dichotomized as black/nonblack). Following Iezzoni's methods, patients were assigned up to eight noncancer chronic conditions based on ICD-9 codes present on one inpatient or two outpatient claims between six months and one month before death.¹⁴ Residential ZIP code was used to assign each patient to a Dartmouth Atlas Hospital Referral Region (HRR).¹⁶ HRRs represent tertiary care referral patterns used to measure geographic differences in health care utilization. Residential ZIP code was used to assign patients to quartiles of 2006 estimated median household income extrapolated from 2000 census data.^{17,18}

Outcome measures and statistical analysis

Outcome measures reflected Earle and colleagues' benchmarks.¹⁰ We used the Medicare MedPAR file to measure acute care facility use during the last 30 days of life; MedPAR, Outpatient, and Carrier/Supplier files to measure chemotherapy administration; and MedPAR and Outpatient files to measure ED use. From Medicare Hospice files, we measured hospice use and assessed late enrollment within three days of death.

Because our cohort represented seniors with poor-prognosis malignancies and anticipated limited response to late-life chemotherapy, we extended measures of late-life chemotherapy beyond the benchmark, analyzing intervals of 14 days (benchmark) and 30 days before death. Insufficient drug data details prohibited assessment of the second chemotherapy benchmark, namely, starting a new regimen within 30 days of death.¹⁰

We developed multivariable logistic regression models with the individual decedent as the unit of analysis to examine the association between age ≥ 75 years, female gender, and black race with cancer care events. Age < 75 years, male, and nonblack race served as reference groups. Final models were adjusted for age, gender, race, quartile of estimated median household income, cancer type, comorbidity count (0, 1, 2, 3 or more), and HRR (as a proxy measure of geographic care differences). Analyses were conducted using SAS (SAS version

9.2 for Windows; SAS Institute Inc., Cary, NC). Statistical tests were two-sided with significance defined as $p < 0.05$.

The Maine Medical Center Institutional Review Board (IRB) approved this study.

Results

Cohort description

Table 1 summarizes demographic and medical characteristics of the 235,821 cancer-affected decedents studied. The majority were ≥ 75 years of age. Almost one-third had lung cancer; 9.6% had a secondary malignancy. A total of 57.0% had at least one noncancer chronic condition; 12.5% had three or more.

Intensity of care among cohort members

In the last month of life, over 60% of cohort members were hospitalized. Rates of acute care substantially exceeded established benchmarks (Table 2). Six percent and 12.5% of patients received chemotherapy within two weeks and 30 days of death, respectively. Overall, 44.8% of cohort members died without hospice services. Of those using hospice, 15.1% enrolled within three days of death. The median hospice length of stay in the last six months of life was 14 days.

Variations in intensity of care by age, gender, and race

Table 2 demonstrates unadjusted variations in care by age, gender, and race compared with benchmarks. Table 3 summarizes fully adjusted subgroup variations in EOL care. In the last month of life, compared with the younger age group, those ≥ 75 years received less acute care as measured by multiple admissions, multiple ED visits, ICU admissions, and in-hospital deaths. Compared with men, in the last 30 days of life, women received less aggressive in-hospital care. Black patients received more aggressive acute care in the last month of life than nonblack patients.

Analysis of late-life chemotherapy receipt demonstrates similar rates of use in the two time intervals assessed within each subgroup (Table 3). Comparing chemotherapy across subgroups in the last 14 days of life, we found older patients less likely to receive chemotherapy than younger patients, OR 0.50 (95% CI 0.48-0.52); women less likely to receive chemotherapy than men, OR 0.84 (95% CI 0.81-0.87); and compared with nonblack patients, fewer black patients received chemotherapy, OR 0.76 (95% CI 0.71-0.81).

Examining hospice use by age, gender, and race (Table 3) during the last six months of life, older patients and women were less likely to die without hospice care than referent groups; OR 0.89 (95% CI, 0.87-0.90) and OR 0.84 (95% CI, 0.83-0.86), respectively. Black patients were more likely to die without hospice care than nonblack patients, OR 1.15 (95% CI 1.12-1.19). Late hospice enrollment was less common among older cohort members, OR 0.92 (95% CI 0.89-0.95) and women, OR 0.84 (95% CI 0.81-0.86). Despite lower overall hospice use, late enrollment was less common among black hospice patients compared with nonblack hospice patients, OR 0.81 (95% CI 0.76-0.86).

Discussion

Using established benchmarks, we examined intensity of EOL care among Medicare fee-for-service patients with poor-

TABLE 1. DEMOGRAPHIC AND MEDICAL CHARACTERISTICS OF FEE-FOR-SERVICE MEDICARE DECEDENTS WHO DIED WITH A HIGH BURDEN OF CANCER 2003-2007

Characteristic	Overall	%	Female %	Black race %	Age ≥75 %
n (%)	235,821 (100%)		114,643 (48.6%)	21,626 (9.2%)	154,104 (65%)
Age on date of death ^a					
65-74	81,717	34.7	32.56*	41.81*	-
75 and older	154,104	65.4	67.44*	58.19*	100.00
Female	114,643	48.6	100.00	50.1*	50.2*
Black race	21,626	9.2	9.45*	100.00	8.17*
Median estimated household income	\$46,635	-	\$46,864*	\$37,597*	\$47,136*
Quartile 1	\$38,242	-	\$38,329	\$30,395	\$38,614
Quartile 3	\$60,567	-	\$60,911	\$47,563	\$61,386
Cancer type					
Lung or bronchus	74,581	31.6	28.90*	29.11*	29.19*
Secondary malignancy ^b	22,695	9.6	11.10*	9.61*	9.98*
Hematologic	21,012	8.9	8.34*	6.36*	10.07*
Colon	18,994	8.1	8.46*	9.31*	8.26*
Pancreas	15,076	6.4	7.22*	7.07*	6.59*
Other cancer	83,463	35.4	35.98*	38.55*	35.91*
Chronic conditions					
Chronic pulmonary disease	74,489	31.6	28.96*	28.06*	29.97*
Coronary artery disease	57,014	24.2	19.30*	21.22*	25.64*
Congestive heart failure	47,468	20.1	20.08	22.53*	22.51*
Peripheral vascular disease	17,040	7.2	5.75*	7.35*	7.50*
Severe chronic liver disease	3,552	1.5	1.21*	1.23*	1.15*
Diabetes w/end-organ damage	7,649	3.2	3.02*	5.39*	2.98*
Chronic renal failure	18,625	7.9	6.29*	13.20*	8.49*
Dementia	17,444	7.4	8.31*	10.85*	9.73*
Number of other chronic conditions					
0	101,562	43.0	46.76*	42.18*	41.50*
1	66,758	28.3	27.91*	26.89*	28.01*
2	38,104	16.2	14.93*	16.71*	17.01*
3 or more	29,397	12.5	10.40*	14.22*	13.48*

*Significant differences observed within group (age, gender, race) at $p \leq .01$ using chi-square or t-tests where appropriate.

^aMean age=78 years: STD 7.2 years (women=79: STD=7.4; black race=77: STD 7.4; age 75 and older=82: STD 5.2).

^bSecondary malignancies specified by ICD-9 codes 196.0-199.1.

prognosis malignancies. The data reveal ongoing aggressive care with significant variations in care among age, gender, and race subgroups.

We found acute care use 1.7- to 5.9-fold higher than established benchmarks (Table 2). Because our study was limited to patients with poor-prognosis cancers, our findings cannot be compared directly with those from previous studies. Using Surveillance, Epidemiology, and End Results (SEER) data to retrospectively study lung, breast, and gastrointestinal cancer deaths from 1993-1996, Earle and colleagues found that 9.1% of patients were hospitalized more than once, 9.2% presented multiple times to an ED, 11.7% were admitted to the ICU in the final month, and 29.5% died in an acute care facility.⁴ This earlier study cohort was limited to 11 U.S. geographic regions included in the SEER program. Our results of a national cohort close to a decade later suggest an overall higher EOL care reliance on acute care facilities by Medicare beneficiaries with high-risk cancers.

Diminishing benefits of chemotherapy at EOL and increasing risk of treatment toxicities highlight the importance of late-life chemotherapy as a quality measure among seniors with poor-prognosis malignancies. The percent of cohort members receiving chemotherapy in the last two weeks of life (6.0%) fell below the national benchmark (<10%)

(Table 2). Although this finding may reflect diffusion and adoption of oncology care standards that explicitly label late chemotherapy as overly aggressive care,^{3,10,19} the observed rate may still be too high for the following reasons. First, our study population included only poor-prognosis patients with an expected limited response to systemic therapy. Chemotherapy use in this population is expected to be significantly lower than the general adult cancer population with a range of diagnoses, including those for whom systemic therapy may be effective. Second, we studied only individuals ≥65 years of age; many had noncancerous comorbid conditions expected to increase treatment toxicity and potentially limit the effectiveness of anticancer therapies.^{20,21} Third, because these Medicare claims do not capture all oral agents, our findings may underestimate overall chemotherapy use.

A SEER-Medicare claims database study of cancer deaths from 1993-1996 revealed rates of chemotherapy use during the last two weeks of life of 15.7%.⁴ Similarly, an examination of Massachusetts and California administrative databases of all Medicare patients dying of cancer in 1996 showed that 9% of cohort members received chemotherapy within 30 days of death.² Because these studies used more restricted databases and included cohort members with better-prognosis cancers

TABLE 2. CANCER CARE QUALITY BENCHMARKS AND UNADJUSTED CANCER CARE EVENT RATES OVERALL AND BY AGE, GENDER, AND RACE

Performance measure ^a	Benchmark ^b	Overall	<75 at death	≥75 at death	Male	Female	Black	Nonblack
n		235,821	81,717	154,104	121,178	114,643	21,626	214,195
>1 hospitalization in the last 30 days of life	<4%	10.2%	11.6%	9.5%	11.1%	9.3%	11.6%	10.1%
>1 ED visit in the last 30 days of life	<4%	10.2%	11.0%	9.8%	11.0%	9.4%	13.7%	9.9%
Admission to the ICU in the last 30 days of life	<4%	23.7%	25.6%	22.7%	25.5%	21.8%	27.2%	23.3%
Death in an acute care hospital	<17%	28.8%	32.0%	27.1%	30.3%	27.2%	33.9%	28.3%
Proportion receiving chemotherapy in the last 14 days of life	<10%	6.0%	8.8%	4.5%	6.6%	5.4%	4.9%	6.1%
Proportion receiving chemotherapy in the last 30 days of life	NA	12.5%	18.0%	9.5%	13.5%	11.3%	10.6%	12.6%
Lack of admission to hospice within the last 6 months of life	<45%	44.8%	46.5%	44.0%	47.0%	42.5%	49.6%	44.4%
Admission to hospice within 3 days of death ^c	<8%	15.1%	15.6%	14.9%	16.2%	14.0%	12.3%	15.4%

^aAll differences within groups (age, gender, race) were observed through chi-square test to be significant at $p \leq 0.001$.^bEarle et al., 2005.^cDenominator = hospice patients only.

ED, Emergency Department; ICU, Intensive Care Unit.

(e.g., breast cancer), it is difficult to compare our results with these findings.

Effective and timely hospice referral is relevant to those with poor-prognosis tumors for whom ongoing aggressive therapy may provide limited benefit and shorten survival.²² Overall, 44.8% of our cohort died without hospice services, and 15.1% of those using hospice enrolled within three days of death. Using Medicare data of 1996 cancer deaths, Virnig and colleagues²³ found 56.6% of cancer patients died without hospice care, though enrollment was greater among those with higher-risk disease (e.g., pancreatic cancer). The median hospice stay was 23 days, significantly longer than the median stay of 14 days found in our cohort. Earle and colleagues showed that 38.8% of a cohort of cancer patients dying between 1993 and 1996 were admitted to hospice, 17% within three days of death.⁴ Our findings suggest a trend toward greater use of hospice among cancer-affected Medicare beneficiaries. Nevertheless, almost half of the poor-prognosis cohort did not receive hospice services in the final six months of life, and late enrollments were relatively static, reflecting underuse.

We found significant differences in intensity of care among age, gender, and race subgroups. By comparing EOL care by age group, we showed that those ages ≥ 75 years received less aggressive management by all measures assessed. Others have described less-aggressive care among older cancer patients,^{3,4} including less late-life acute care and chemotherapy use, and greater use of hospice.

Compared to men, women were more likely to enroll in hospice and used less EOL acute care, chemotherapy, and had lower rates of in-hospital deaths. Furthermore, late enrollment in hospice was less likely among women. Despite previous recognition of age and gender differences in EOL care,^{3,4,24–27} reasons for these differences have not been fully elucidated.

We observed significant racial differences in EOL cancer care. For all but two measures (chemotherapy, late hospice enrollment), black patients received more aggressive care than nonblack patients: more ICU admissions, more in-hospital deaths, and fewer hospice enrollments. Our findings are consistent with data reported by the study to understand prognoses and preferences for outcomes and risks of treatments (SUPPORT) investigators over a decade ago showing that the likelihood of in-hospital death was greater among nonwhite Medicare beneficiaries having a range of diseases.⁸

Although EOL care intensity within age and gender subgroups was concordant across all benchmark indicators, our findings seemed discrepant when studying measures among black patients. Black patients received more aggressive acute care than nonblack patients, and less EOL hospice care, but were less likely to receive chemotherapy in the weeks before death. Furthermore, although overall hospice utilization was lower, black patients were less likely to enroll in hospice within three days of death. If aggressive care among black patients is a reflection of preference, it seems inconsistent that more intense use of acute care services would coincide with less use of chemotherapy and less late hospice enrollment. Although data are limited, Smith and colleagues reported similar findings related to racial differences in late-life chemotherapy use.²⁹ Furthermore, Earle and colleagues showed that although overall hospice use was lower, late enrollments were less frequent among black cancer decedents.⁴

TABLE 3. RESULTS OF MULTIVARIABLE LOGISTIC REGRESSION: ADJUSTED^a ODDS OF CANCER CARE EVENTS FOR AGE, GENDER, AND RACE SUBGROUPS

Performance measure	Age ≥ 75 vs. age < 75 OR (95% CI)	Female vs. male OR (95% CI)	Black vs. nonblack OR (95% CI)
> 1 hospitalization in the last 30 days of life	0.80 (0.78-0.82)	0.83 (0.81-0.86)	1.08 (1.03-1.14)
> 1 ED visit in the last 30 days of life	0.89 (0.87-0.92)	0.86 (0.84-0.88)	1.38 (1.32-1.45)
Admission to ICU in the last 30 days of life	0.85 (0.84-0.87)	0.82 (0.81-0.84)	1.15 (1.11-1.19)
Death in an acute care hospital	0.79 (0.77-0.80)	0.86 (0.85-0.88)	1.16 (1.13-1.20)
Proportion receiving chemotherapy in the last 14 days of life	0.50 (0.48-0.52)	0.84 (0.81-0.87)	0.76 (0.71-0.81)
Proportion receiving chemotherapy in the last 30 days of life	0.49 (0.47-0.50)	0.83 (0.81-0.85)	0.80 (0.76-0.84)
Lack of admission to hospice within the last 6 months of life	0.89 (0.87-0.90)	0.84 (0.83-0.86)	1.15 (1.12-1.19)
Admission to hospice within 3 days of death ^b	0.92 (0.89-0.95)	0.84 (0.81-0.86)	0.81 (0.76-0.86)

^aModels adjusted for age, sex, race, Hospital Referral Region (HRR), median household income quartile, comorbidity count, and cancer category. All models significant at $p \leq 0.001$.

^bDenominator=hospice patients only.

ED, Emergency Department; ICU, Intensive Care Unit; OR, Odds Ratio.

The discrepancy between higher acute care use and lower chemotherapy administration among black cohort members may reflect differences in access to care, particularly to medical oncologists. Previous work showed that lack of access to a medical oncologist results in reduced terminal chemotherapy use and that black race, likely acting as a proxy for socioeconomic status, is related to lower likelihood of evaluation by a medical oncologist as well as lower chemotherapy administration. Because ongoing chemotherapy often precludes individuals from enrolling in hospice, lower rates of terminal chemotherapy among black patients may result in earlier access to hospice services.^{31,32}

Some racial variation in care delivery, including EOL care, has been attributed to geographic distribution of black patients. In some settings, black patients are treated at different hospitals than white patients; some apparent racial differences in treatment are likely due to these distributions.³³⁻³⁷ We could not test a hospital effect, since not all cohort members received inpatient cancer care; however, we did test for a geographic effect by controlling for HRR in our models.

Societal, health system, physician, and patient factors are cited as reasons for aggressive EOL cancer care.³⁸ Importantly, our work indicates the need to engage cancer patients early in discussions about prognosis, treatment benefits, and adverse effects of cancer treatment.⁵ The preference among seriously ill seniors of all racial and ethnic backgrounds is generally for care focused on palliation, not life extension, with a strong preference to die at home.^{8,39} Although providing preference-based care that is grounded in effective decision support is one definition of quality, there has been a stark contrast between the care provided to cancer patients and their treatment preferences.^{5,40}

Limitations

Our retrospective analysis of a decedent cohort has several limitations. First, while Earle and colleagues' benchmarks date from a 2005 publication that employed a cohort from 1991-1996, we believe these benchmarks are the right metric to assess EOL care experienced more recently by cancer-affected seniors. The consideration of appropriate EOL care, the value of palliation especially for poor-prognosis cancer patients, and recognition of treatment shortcomings has increased

significantly over the past two decades.⁴¹⁻⁴⁴ As a consequence, hospice use has increased and palliative care teams are increasingly present in acute care settings. Given these developments, we would expect the treatment experience of a national cohort of 2003-2007 decedents would be less aggressive than that of earlier cohorts.

Second, while Medicare claims show good sensitivity and specificity for ascertainment of cancer cases, we do not have data on stage-of-disease beyond that reflected by the poor-prognosis ICD-9 codes linked with near-term death.^{14,45} It is possible but unlikely that some patients in our study were early in their course of disease and perhaps appropriate candidates for the aggressive therapy that we observed.

Third, while we identified our cohort using cancer diagnoses predictive of short-term death, we cannot be certain that our subjects died of cancer, because Medicare claims data do not include cause of death. However, each died with the diagnosis of poor-prognosis cancer; therefore, EOL care reflected the treatment of patients with high-risk cancers, whatever the cause of death. Study of decedent cohorts has been criticized by some as erroneously equating care before death with care of a dying patient.⁴⁶ On the other hand, decedent studies facilitate the study of all individuals in a given data set and permit comparison of care across regions, institutions, and time periods that cannot be readily accessed by prospective clinical studies.⁴⁷ By restricting our cohort to patients with high-risk cancer diagnoses, we selected patients for whom the limited benefit of aggressive treatment would likely be understood.

Fourth, these Medicare claims are only reliable for race/ethnicity classification of black/nonblack patients.⁴⁸ Refined claims-based definitions of race and ethnicity would be useful to examine EOL care differences more precisely. In addition, claims data did not allow us to measure socioeconomic status directly. Rather, we used census data to infer median household income levels based on ZIP code of residence. While this provides some measure of socioeconomic status, lack of direct measure for this characteristic is an important limitation of this study.

Fifth, this work includes only Medicare fee-for-service (FFS) beneficiaries. As our files have incomplete data on Medicare Advantage enrollees, we excluded beneficiaries in such programs who died within six months of enrollment.

Studies demonstrate that some Medicare Advantage patients might have higher rates of hospice use.^{23,42} Therefore, our hospice use measures may be biased (relative to all Medicare patients) if beneficiaries with advanced cancer disproportionately enroll in FFS or Medicare Advantage. However, we did not find evidence of this trend, and cannot estimate direction or magnitude of such bias. Moreover, the benchmarks used in this study were based on FFS patients.

Sixth, as our data do not contain all records for oral, self-administered chemotherapy, we may have underestimated rates of chemotherapy use by the total cohort. A review of the literature revealed no data or estimates on the proportion of all chemotherapy contributed by self-administered oral agents. It remains unknown if specific subgroups are more or less likely to use oral chemotherapy than referent groups. The lack of available data on overall and relative use of such chemotherapy, and the proportion of all oral agents captured in Medicare claims prohibits a robust quantification of the potential underestimation of chemotherapy use.

Conclusion

Overall, among seniors who die with poor-prognosis cancers, there is reliance on late-life, high-intensity care nationally, with rates that vary by age, gender, and race. These data reveal the need for interventions aimed at improving EOL cancer care quality unbiased by age, gender, and race.

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Author Disclosure Statement

No competing financial interests exist.

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