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ORIGINAL REPORT

Underuse of Hospice Care by Medicaid-Insured Patients With Stage IV Lung Cancer in New York and California

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ABSTRACT

Purpose
Medicare patients with advanced cancer have low rates of hospice use. We sought to evaluate hospice use among patients in Medicaid, which insures younger and indigent patients, relative to those in Medicare.

Patients and Methods
Using linked patient-level data from California (CA) and New York (NY) state cancer registries, state Medicaid programs, NY Medicare, and CA Surveillance, Epidemiology, and End Results–Medicare data, we identified 4,797 CA Medicaid patients and 4,001 NY Medicaid patients ages 21 to 64 years, as well as 27,416 CA Medicare patients and 16,496 NY Medicare patients ages ≥ 65 years who were diagnosed with stage IV lung cancer between 2002 and 2006. We evaluated hospice use, timing of enrollment, and location of death (inpatient hospice; long-term care facility or skilled nursing facility; acute care facility; home with hospice; or home without hospice). We used multiple logistic regressions to evaluate clinical and sociodemographic factors associated with hospice use.

Results
Although 53% (CA) and 44% (NY) of Medicare patients ages ≥ 65 years used hospice, fewer than one third of Medicaid-insured patients ages 21 to 64 years enrolled in hospice after a diagnosis of stage IV lung cancer (CA, 32%; NY, 24%). A minority of Medicaid patient deaths (CA, 19%; NY, 14%) occurred at home with hospice. Most Medicaid patient deaths were either in acute-care facilities (CA, 28%; NY, 36%) or at home without hospice (CA, 39%; NY, 41%). Patient race/ethnicity was not associated with hospice use among Medicaid patients.

Conclusion
Given low rates of hospice use among Medicaid enrollees and considerable evidence of suffering at the end of life, opportunities to improve palliative care delivery should be prioritized.

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INTRODUCTION

Hospice care is widely considered an essential component of high quality end-of-life care[1,2]; services focus on pain and symptom management and attend to psychological and spiritual needs. But many patients with cancer begin using hospice services only in their last days of life, while others never enroll.[3-5] Previous articles have focused on elderly Medicare patients. Little is known about hospice use among patients in Medicaid, which cares for younger patients and the indigent. Medicaid-insured patients may be at risk for lower hospice use for several reasons. First, home hospice relies on support from family members, but patients living in poverty may lack family caregivers or the economic resources needed to allow family members to stay at home. Second, hospice providers may be less willing to visit homes in poor neighborhoods. Finally, compared with Medicare, the Medicaid population is younger and has higher proportions of minorities, groups with historically low rates of hospice use.[3,5-10]

We evaluated hospice use among Medicaid patients with newly diagnosed stage IV lung cancer in California (CA) and New York (NY) relative to elderly patients in Medicare. Lung cancer is the primary cause of cancer mortality among men and women in the United States. An estimated 150,000 Americans die of lung cancer each year,[11] with 30% of deaths in patients younger than 65 years.[12] Stage IV lung cancer is incurable. Patients have a median survival of 4 to 8 months and fewer than 20% live for 2 years.[13-15] Physicians caring for patients with lung cancer can therefore reliably anticipate the need to help patients plan for end-of-life care.

Patients with advanced lung cancer who have no connections to hospice risk seeking symptom relief in acute-care settings where systems are not optimal for palliative care delivery. Without hospice support, patients may be at greater risk for discomfort at the end of life. To characterize the landscape of terminal care for state Medicaid and Medicare enrollees, we also evaluated the use of hospice, hospice type, duration, and location of patient death.

PATIENTS AND METHODS

We identified patients enrolled in CA and NY Medicaid and/or Medicare plans at diagnosis with stage IV lung cancer and followed them prospectively until death, disenrollment, or our censoring date of December 31, 2007. For each state, hospice use was evaluated among Medicaid-insured patients ages 21 to 64 years at diagnosis and Medicare-insured patients 65 years and older, along with the setting of hospice-care delivery (home, inpatient, or within a skilled-nursing facility [SNF]), timing of enrollment, location of death, and factors associated with enrollment.

This study used links between CA and NY statewide tumor registries and their respective Medicaid and Medicare files. Links allowed us to assess cancer stage and vital status from tumor registries and enrollment and health care use from Medicaid and Medicare administrative data. Data from the states and health plans were analyzed in parallel in accordance with data use agreements from the CA and NY Departments of Health.

Tumor Registries

The CA Cancer Registry (CCR) participates in the North American Association of Central Cancer Registries and SEER (Surveillance, Epidemiology, and End Results) programs and meets their data quality standards.[16] The NY State Cancer Registry is part of the United States Centers for Disease Control and Prevention's National Program of Cancer Registries and has consistently achieved the highest certification from the North American Association of Central Cancer Registries.[17]

Linkage Procedure

For Medicaid patients ages 21 to 64 years in CA, records of incident cancer diagnoses from 2002 to 2006 from CCR were linked to Medicaid enrollment files from 2001 to 2007 using unique identifiers common to the two files. CCR submitted a finder file to Centers for Medicare and Medicaid Services, which provided a merged record indicating patients diagnosed with an incident cancer and enrolled in Medicaid for one or more months between 2001 and 2007. At CCR, records were encrypted and released to the research team. The Dana-Farber Cancer Institute internal review board (IRB) approved the CA data analysis; CCR did not require state IRB approval.

Methods for creation of the NY registry–Medicaid link have been previously reported.[18] Patients with incident cancer diagnoses from 2002 to 2006 were linked to Medicaid enrollment, eligibility, encounter, and claims files from 2001 to 2008 by a probabilistic matching algorithm using social security numbers; first, middle, and last names; date of birth; and gender. Data were linked to the state hospital discharge file (Statewide Planning and Research Cooperative System). The tumor registry merged, deidentified, and encrypted data. Linkage and analyses were approved by IRBs at Dana-Farber Cancer Institute and the New York State Department of Health.

In CA, Medicare patients ages 65 years and older at diagnosis were identified using SEER-Medicare data. NY is not included in SEER-Medicare, so NY Medicare data were obtained using an algorithm similar to that used by SEER-Medicare and in parallel to the Medicaid linkage process. The NY linkage procedure allowed for reliable identification of patients older than 65 years dually enrolled in Medicaid and Medicare. Because the CCR-Medicare and CCR-Medicaid linkages were not performed in parallel, dual enrollment status was not available for CA patients. However, the CA Medicare file includes a state buy-in variable, which indicates whether the state of CA paid Medicare premiums within the calendar year, a payment strategy primarily applicable to patients enrolled in Medicaid. We therefore used state buy-in for the year before diagnosis or after as a proxy for dual enrollment in Medicaid among CA Medicare patients older than 65 years.

Cohort Definition

We identified patients who were diagnosed with stage IV lung cancer of any pathologic subtype in the years 2002 to 2006 and excluded patients in hospice before diagnosis, with postmortem diagnoses, or without pathologic confirmation (patients ages 21-64 years: CA, n = 14,423; NY, n = 10,932; patients ages ≥ 65 years: CA, n = 27,447; NY, n = 17,120; Appendix Fig 1, [online-only]). Cohorts were then limited to patients enrolled in Medicaid (ages 21 to 64 years) or Medicare (ages ≥ 65 years) health plans or fee-for-service plans at any time from 6 months before diagnosis onward. Medicaid cohorts of patients ages 21 to 64 years included 4,797 patients from CA and 4,001 patients from NY. Medicare cohorts of patients ages at least 65 years included 27,416 patients from CA, 6,152 patients (22%) of whom had evidence of dual enrollment in Medicaid by virtue of state buy-in; and 16,496 patients from NY, 3,238 patients (20%) of whom were dually enrolled in Medicaid. The proportion enrolled during diagnosis month was 73% (CA) and 78% (NY) for Medicaid patients and 99.8% (CA) and 98.9% (NY) for Medicare patients. The proportion of all patients 21 to 64 years old with stage IV lung cancer reported to tumor registries between 2002 and 2006 enrolled in Medicaid was 33% (CA) and 37% (NY).

Hospice Use

Hospice use was established by the presence of any hospice encounter or claim for services in any hospice file. For patients enrolled in fee-for-service plans in both states, claims are submitted by providers for reimbursement. Managed care plans are generally paid using capitated payments. Nevertheless, NY and some plans in CA keep itemized records, called encounters, that rely on the same diagnosis and procedure coding schema as claims, but do not imply a request for payment. In our article, we use claim as an umbrella term encompassing both claims and encounters. The date of first hospice claim was considered the date of enrollment, which was used to evaluate days from diagnosis (based on registry diagnosis date) to enrollment and length of stay in hospice from enrollment until death or censoring. For NY patients 65 years and older dually enrolled in Medicare and Medicaid, hospice claims were evaluated in both programs. For CA patients 65 years and older with state buy-in, only Medicare claims were available and thus formed the basis of evaluation of hospice use.

We categorized the setting of hospice care delivery as home hospice, inpatient hospice in a hospice facility, inpatient hospice within a long-term care facility or SNF, or both inpatient and home hospice. For CA Medicaid patients, hospice procedure codes defined hospice type. For NY Medicaid patients, hospice type was identified using a combination of rate and place of service codes defined by the NY State Department of Health. For CA and NY Medicare patients, inpatient hospice in a hospice facility was ascertained based on presence of a hospital-based hospice claim. Inpatient hospice in long-term care facility/SNF was ascertained based on the presence of a hospice claim on any date concurrent with a long-term care facility/SNF claim. Home hospice was identified using service type codes, excluding codes concurrent with SNF claims. For both Medicaid and Medicare, hospice claims lacking inpatient hospice criteria were considered home hospice.

We evaluated location of death using place of service codes on all claims from the death date, including care in an inpatient hospice facility, long-term care facility/SNF, or acute-care facility (inpatient hospital or emergency room). Patients enrolled in hospice before death, but whose records lacked inpatient place of service codes on the death date, were categorized as dying in home hospice irrespective of the last home visit date. The location of death was considered to be home without hospice if no inpatient claims were recorded on the date of death and the patient was never enrolled in hospice.

Patient Characteristics

For each patient, we evaluated sex, age, race, ethnicity, marital status, and date of diagnosis. Comorbidity, expressed as Charlson score,[19] was estimated using the Klabunde method,[20] using inpatient and outpatient claims modified for cancer diagnosis; patients who did not have 13 months of claims antecedent to diagnosis were evaluated separately. Median income for ZIP code of residence was evaluated using ZIP code income data for the year 2000.

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Table 1. Characteristics of Patients With Stage IV Lung Cancer at Age 21-64 Years Enrolled in Medicaid or Older Than Age 65 Years Enrolled in Medicare

Characteristic	Medicaid-Enrolled Patients Age 21-64 Years at Diagnosis (%)		Medicare-Enrolled Patients Age ≥ 65 Years at Diagnosis (%)		Patients Age ≥ 65 Years at Diagnosis Enrolled in Both Programs (%)	
	CA (n = 4,797)	NY (n = 4,001)	All CA (n = 27,416)	All NY (n = 16,496)	CA (n = 6,152)	NY (n = 3,238)
Race*†‡§						
White	70	65	84	87	65	70
Black	18	29	6	10	12	22
Asian/other	12	6	9	3	23	8
Ethnicity*†‡§						
Hispanic	14	12	9	4	18	13
Not Hispanic	86	88	91	96	82	87
Age at diagnosis, years*‡						
≥ 85	n/a	n/a	10	9	9	9
75-84	n/a	n/a	42	41	40	38
65-74	n/a	n/a	48	50	51	53
55-64	59	54	n/a	n/a	n/a	n/a
45-54	33	35	n/a	n/a	n/a	n/a
21-44	8	11	n/a	n/a	n/a	n/a
Sex§						
Female	44	42	46	46	48	52
Male	56	58	54	54	52	48
Marital status*†‡§						
Married	33	30	53	50	38	29
Widowed	6	6	26	27	28	30
Single	63	61	20	20	32	38
Unknown	3	3	2	2	3	4
Median income for ZIP code of residence†‡¶						
Lowest quartile	35	40	21	24	37	45
2nd quartile	21	28	27	25	29	24
3rd quartile	26	19	26	25	20	18
Highest quartile	17	13	24	26	11	13
Comorbidity estimate*†‡§‖						
Less than 13 months of claims	47	33	4	5	5	3
0	43	41	71	78	56	56
1	7	11	12	10	16	14
≥ 2	4	16	14	8	23	27
Year of diagnosis*‡						
2002	9	16	20	17	18	16
2003	19	18	20	18	19	17
2004	21	23	20	22	20	21
2005	20	22	20	22	20	23
2006	21	21	20	22	22	23
Antecedent long-term care†‡§**	3	4	13	7	22	16
Enrolled in Medicaid or Medicare at diagnosis*†‡§	73	78	99.8	98.9	99.4	98.1
Continuity of enrollment*†‡§	Medicaid	Medicaid	Medicare	Medicare	Medicare or Medicaid	Medicare or Medicaid
Continuous††	69	64	96	94	95	98
> 50% enrollment‡‡	21	24	3	0	4	1
< 50% enrollment§§	10	12	1	6	1	1
Medicare insurance type‡						
Part A and B	n/a	n/a	92	94	87	95
FFS only			54	73	69	78
HMO only			35	19	15	13
FFS and HMO			3	2	3	4
Part A only, or Part B only, or discontinuous enrollment in part A and B	n/a	n/a	8	6	13	6
Dually enrolled in Medicaid and Medicare	n/a	23	n/a	20	100	100

(continued on following page)

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Table 1. Characteristics of Patients With Stage IV Lung Cancer at Age 21-64 Years Enrolled in Medicaid or Older Than Age 65 Years Enrolled in Medicare (continued)

Characteristic	Medicaid-Enrolled Patients Age 21-64 Years at Diagnosis (%)		Medicare-Enrolled Patients Age ≥ 65 Years at Diagnosis (%)		Patients Age ≥ 65 Years at Diagnosis Enrolled in Both Programs (%)	
	CA (n = 4,797)	NY (n = 4,001)	All CA (n = 27,416)	All NY (n = 16,496)	CA (n = 6,152)	NY (n = 3,238)
Geographic region*†‡§						
Very large metropolitan	42	49	39	32	47	54
Large urban/suburbs	28	11	30	23	26	13
Urban	16	18	17	23	15	15
Rural/not urban	14	22	13	22	12	18
Vital status*†‡§						
Died within 2 years of diagnosis	88	85	91	90	89	90
Died on or before Dec. 31, 2007¶¶	91	89	93	92	93	92

Abbreviations: CA, California; FFS, fee for service; HMO, health maintenance organization; n/a, not applicable; NY, New York.
*$P < .01$ CA Medicaid versus NY Medicaid.
†$P < .01$ CA Medicaid versus CA Medicare.
‡$P < .01$ CA Medicare versus NY Medicare.
§$P < .01$ NY Medicaid versus NY Medicare.
¶In CA, 572 patients ages ≥ 65 years (0.02%) could not be assigned a median ZIP code of residence.
‖Charlson score estimated by the Klabunde method using inpatient and outpatient claims, modified for cancer diagnosis. Score was not calculated for patients who did not have 13 continuous months of claims before diagnosis.
**Long-term care in the month of diagnosis or before.
††Continuously enrolled between the month of diagnosis and the month of death or censoring.
‡‡Enrolled more than 50% of the time but not continuously, between the month of diagnosis and the month of death or censoring.
§§Enrolled less than 50% of the time between the month of diagnosis and the month of death or censoring.
¶¶Death on or before December 31, 2007, indicates that the patient's date of death was covered by available data.

Analysis

We evaluated differences in patient characteristics and hospice use, first comparing patients by state and then within each state, using Fisher's exact test for two-category comparisons and χ^2 tests for multicategory comparisons. Differences in distributions of continuous variables were compared using two-tailed *t* tests or Wilcoxon two-sample tests. *P* values of less than .01 are listed in Tables 1 and 2. Exact values are available on request.

Cumulative incidence curves were used to depict hospice enrollment over the first 24 months after diagnosis, with censoring for death, disenrollment, and lack of available data. *P* values were calculated using the log-rank test.

Factors associated with hospice use were evaluated using logistic regression. Multivariable analyses included patient sex, age at diagnosis, race, ethnicity, marital status, comorbidity, year of diagnosis, antecedent long-term care enrollment, continuity of enrollment, and region, regardless of significance. Separate models were constructed for each cohort. To evaluate relative effects of age and insurance type, we pooled Medicaid patients ages 55 to 64 years with Medicare patients ages 65 to 74 years and compared hospice use by insurance type in each state. Given high rates of discontinuous enrollment among Medicaid patients, we performed the same analysis among patients 55 to 74 years old enrolled in Medicaid or Medicare during month of death.

Finally, we evaluated hospice use among patients continuously enrolled in Medicaid and calculated Cox proportional hazards ratios for factors associated with hospice use among Medicaid patients, with censoring for discontinuous enrollment. Findings from these analyses were similar to results of main analyses and are not presented in detail.

All analyses were performed using SAS, version 9.2 (SAS Institute, Cary, NC).

RESULTS

Cohort characteristics are listed in Table 1. More than 90% of patients died during the period, with 85% to 91% of deaths within 2 years of diagnosis.

Among Medicaid patients ages 21 to 64 years, 32% (CA) and 24% (NY) enrolled in hospice after a diagnosis of stage IV lung cancer. Hospice enrollment rates among Medicare patients ages 65 years or older were significantly higher (CA, 53%; NY, 44%; Table 2). Patients at least 65 years old who were dually enrolled in Medicare and Medicaid had significantly lower rates of hospice enrollment (CA, 40%; NY, 37%) than their counterparts in Medicare only (CA, 57%; NY, 45%). Among patients continuously enrolled in Medicaid, hospice use was not significantly different from that of all Medicaid patients (CA, 33%; NY, 27%). Median length of stay in hospice ranged from 14 to 22 days, with Medicaid patients staying in hospice about 1 week longer than Medicare patients (median enrollment, Medicaid: CA, 19 days; NY, 22 days before death *v* Medicare: CA, 15 days; NY, 15 days; $P < .01$).

Hospice enrollment among Medicaid patients varied little with race and ethnicity. For example, in CA, 33% of white Medicaid patients enrolled in hospice versus 32% of black patients. Variation by race was more pronounced among Medicare patients, for whom hospice enrollment in CA was 56% among white patients and 44% among black patients, and 45% among white patients versus 34% among black patients in NY.

Home hospice was the predominant model for hospice care delivery (Fig 1A), with younger Medicaid enrollees receiving services in home hospice (CA, 28%; NY, 20%), inpatient hospice (CA, 4%; NY, 9%), or SNFs (CA, 8%; NY, 0%), including patients who received hospice care in both home and inpatient/SNF settings (CA, 6%; NY, 5%). Medicare patients 65 years and older used home hospice (CA, 36%; NY, 36%), inpatient hospice (CA, 16%; NY, 8%), or SNF-based hospice (CA, 3%; NY, 3%), with limited overlap between home and inpatient/SNF hospice (CA, 2%; NY, 2%).

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Table 2. Hospice Enrollment and Length of Stay

Characteristic	Medicaid Patients Age 21-64 Years at Diagnosis		Medicare Patients Age ≥ 65 Years at Diagnosis		Dually Enrolled Patients Age ≥ 65 Years at Diagnosis	
	CA (n = 4,797)	NY (n = 4,001)	All CA (n = 27,416)	All NY (n = 16,496)	CA (n = 6,152)	NY (n = 3,238)
Patients ever in hospice*†‡§						
No. of patients	1,559	956	14,514	7,197	2,479	1,190
%	32	24	53	44	40	37
Patients in hospice continuously enrolled in Medicaid and/or Medicare, %*†‡§	33	27	55	45	42	37
Patients in hospice by Medicare insurance type, %‡						
Part A and B	n/a	n/a				
FFS only			49	43	41	36
HMO only			66	50	66	44
FFS and HMO			56	48	51	42
Part A only, or Part B only, or discontinuous enrollment in Part A and B	n/a	n/a	22	27	5	32
Patients in hospice by Medicaid eligibility category, %*						
No cash, nondisabled	24	22	n/a	n/a	n/a	n/a
No cash, disabled	26	24	n/a	n/a	n/a	n/a
Cash, nondisabled	34	19	n/a	n/a	n/a	n/a
Cash, disabled	34	30	n/a	n/a	n/a	n/a
Patients in hospice by race, %*†‡§						
White	33	26	56	45	46	40
Black	32	22	44	34	37	30
Asian/other	28	16	34	30	26	28
Patients in hospice by ethnicity, %*†‡§						
Hispanic	30	21	51	33	43	30
Not Hispanic	33	24	53	44	40	38
Days from diagnosis to first hospice enrollment*†‡§						
Mean	216	261	187	208	187	217
Median	137	182	92	122	95	125
IQR	53-300	80-359	31-255	40-291	29-261	37-301
Days in hospice from entry until death or censoring*‡§						
Mean	41	61	45	44	54	62
Median	19	22	15	15	19	21
IQR	6-46	6-61	5-44	5-42	6-54	7-59

Abbreviations: CA, California; FFS, fee for service; HMO, health maintenance organization; IQR, interquartile range; n/a, not available; NY, New York.
*$P < .01$ CA Medicaid versus NY Medicaid.
†$P < .01$ CA Medicaid versus CA Medicare.
‡$P < .01$ CA Medicare versus NY Medicare.
§$P < .01$ NY Medicaid versus NY Medicare.

Among patients who died during the study period and who were enrolled in Medicaid or Medicare during month of death, 28% of CA and 36% of NY Medicaid patients ages 21 to 64 years died in the acute-care setting, compared with 18% (CA) and 25% (NY) of Medicare patients ($P < .01$ for within-state comparisons) and 25% (CA) and 29% (NY) of dually eligible patients (Fig 1B). Among younger Medicaid patients, 19% (CA) and 14% (NY) died with home hospice in place, compared with 24% (CA) and 34% (NY) for Medicare patients ($P < .01$ for within-state comparisons). Figure 2 shows the cumulative incidence of hospice enrollment from diagnosis according to Medicaid/Medicare enrollment group.

In multivariable models (Table 3), race and ethnicity were not strong determinants of hospice use among Medicaid patients in contrast with Medicare patients. Discontinuous enrollment was significantly associated with lower hospice use in Medicare and Medicaid cohorts. In pooled analyses of Medicaid patients ages 55 to 64 years and Medicare patients ages 65 to 74 years (Table 4), Medicare patients had significantly higher odds of hospice use than those in Medicaid. Results were similar when we limited analyses to patients enrolled in Medicaid/Medicare in month of death.

When we limited CA and NY Medicaid cohorts to patients continuously enrolled between diagnosis and death or censoring, factors associated with hospice use were similar, as were findings from Cox models.

DISCUSSION

We evaluated hospice use among Medicaid-insured patients diagnosed with stage IV lung cancer before age 65 years in NY and CA, relative to elderly patients in Medicare. Fewer than one third of Medicaid patients received hospice services, even though 90% died during

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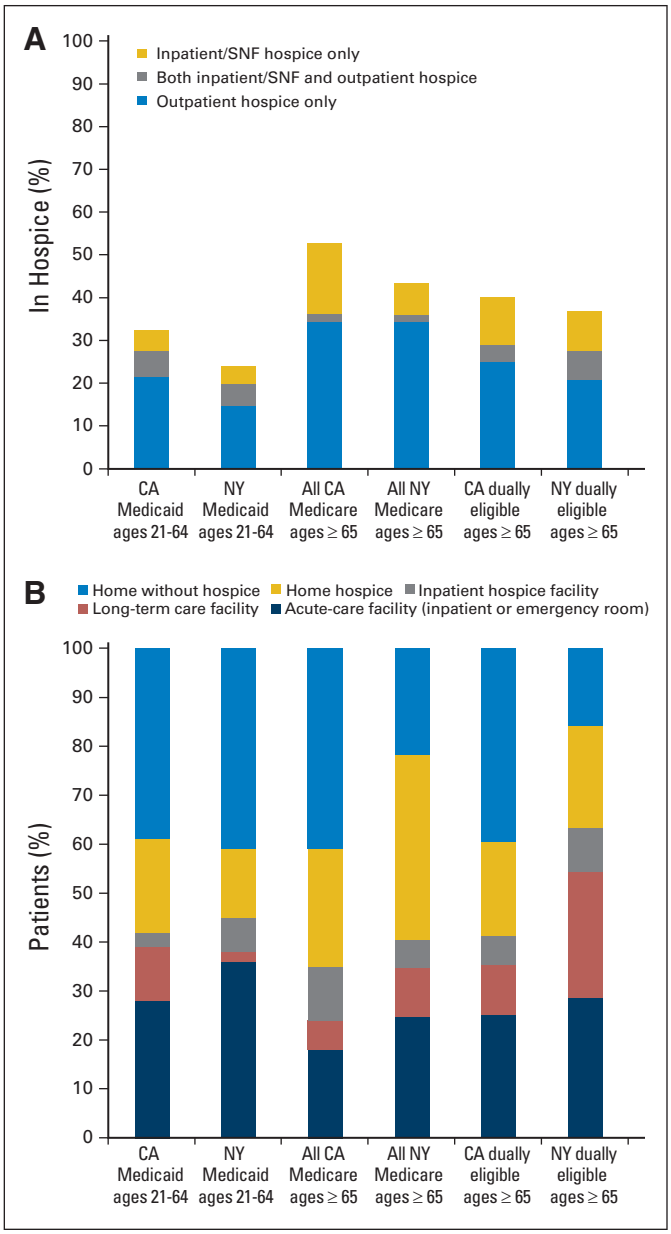

Fig 1. (A) Hospice utilization and type of hospice service. (B) Location of death. Patients were excluded if they were living during last available data or if they were not enrolled during the month of their deaths. CA, California; NY, New York; SNF, skilled nursing facility.

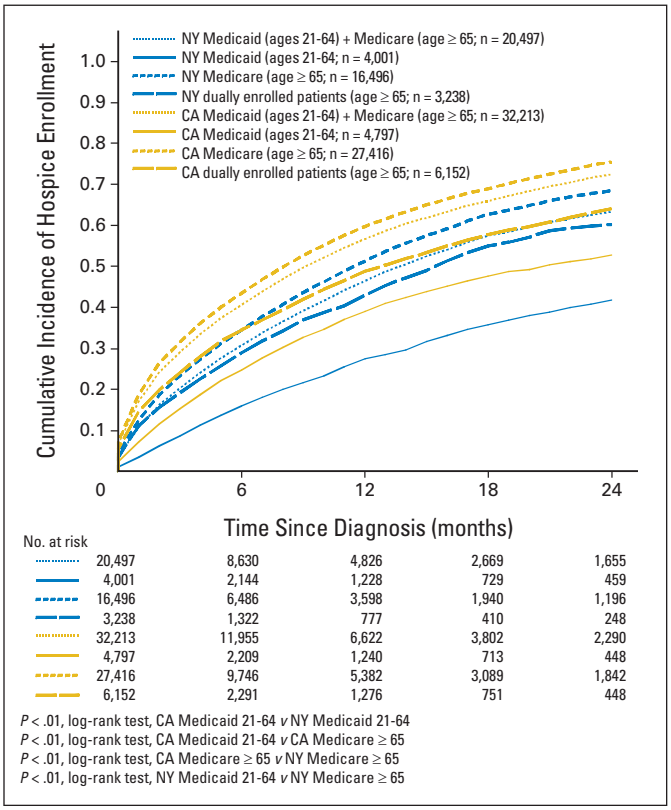

Fig 2. Cumulative incidence of hospice enrollment for patients with stage IV lung cancer among Medicaid and Medicare patients in California (CA) and New York (NY).

our study period. More Medicaid patients died in acute-care settings than at home with hospice, and an even greater proportion died at home without hospice in place. In NY, 77% of Medicaid patient deaths were either in acute-care settings or at home without hospice, notwithstanding hospice coverage by NY Medicaid.

In contrast, patients older than 65 years insured by Medicare (with or without Medicaid) in these same states used hospice services more frequently, with nearly half of patients enrolled in hospice. This is notable because previous articles suggest underuse of hospice in Medicare patients.[3-5]

There is no benchmark target rate for hospice use among patients with limited life expectancy. Decreased use among younger patients[8-10] and minorities[5-7] may reflect patient preferences. However, lung cancer imposes a considerable symptom burden at the end of life, and the high rate of acute terminal care substantiates this. Patients who die in inpatient settings have greater distress and poorer quality of life than those who die at home,[21-23] and their bereaved caregivers have worse mental health.[21] In contrast, hospice use is associated with better symptom control and quality of life near death.[21,22,24] We know little about quality of care among patients who die at home without hospice, but such patients may be susceptible to inadequate symptom management and more chaotic end-of-life care trajectories. Our findings therefore suggest opportunities to improve end-of-life care for Medicaid enrollees who have advanced cancer.

We cannot pinpoint the reasons that Medicaid patients enrolled in hospice less frequently than elderly Medicare patients. Although age is a known determinant of end-of-life care preferences,[8,10] our pooled analysis suggests that age does not fully explain observed differences. Hospice providers may be less available in neighborhoods where Medicaid enrollees reside. Or, Medicaid enrollees may lack able-bodied caregivers in the home, which is frequently a home hospice prerequisite. Medicaid enrollees are more likely to receive care in clinics with turnover and/or physicians-in-training. This may decrease continuity of patient-provider relationships and thwart advanced-care planning. While we cannot determine the relative influence of these issues, we have identified low rates of hospice use and high rates of inpatient terminal care, suggesting opportunities for improving end-of-life care quality.

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Table 3. Factors Associated With Hospice Use: Multivariable Models

	Medicaid Patients Age 21-64 Years at Diagnosis						Medicare Patients Age ≥ 65 Years at Diagnosis						Dual-Program Enrolled Patients					
	CA (n = 4,797)			NY (n = 4,001)			CA (n = 27,416)			NY (n = 16,496)			CA (n = 6,152)			NY (n = 3,238)		
Factor	Patients in Hospice (%)	OR	95% CI	Patients in Hospice	OR	95% CI	Patients in Hospice	OR	95% CI	Patients in Hospice	OR	95% CI	Patients in Hospice	OR	95% CI	Patients in Hospice	OR	95% CI
Sex																		
Female	34	Ref		25	Ref		56	Ref		46	Ref		44	Ref		40	Ref	
Male	31	0.85	0.75 to 0.97	23	0.97	0.84 to 1.13	50	0.79	0.75 to 0.84	42	0.86	0.81 to 0.92	37	0.78	0.70 to 0.88	34	0.83	0.71 to 0.98
Age at diagnosis, years																		
≥ 85	n/a			n/a			59	Ref		46	Ref		38	Ref		39	Ref	
75-84	n/a			n/a			56	0.87	0.80 to 0.95	46	0.98	0.87 to 1.10	42	1.08	0.89 to 1.32	37	0.90	0.69 to 1.19
65-74	n/a			n/a			49	0.68	0.63 to 0.75	42	0.83	0.74 to 0.93	40	0.94	0.77 to 1.15	36	0.90	0.68 to 1.19
55-64	32	0.90	0.72 to 1.13	23	0.90	0.71 to 1.16	n/a			n/a			n/a			n/a		
45-54	32	0.88	0.69 to 1.11	26	1.10	0.85 to 1.42	n/a			n/a			n/a			n/a		
21-44	35	Ref		24	Ref		n/a			n/a			n/a			n/a		
Race																		
White	33	Ref		26	Ref		56	Ref		45	Ref		46	Ref		40	Ref	
Black	32	0.88	0.74 to 1.05	22	0.91	0.75 to 1.11	44	0.70	0.63 to 0.77	34	0.63	0.57 to 0.70	37	0.80	0.67 to 0.96	30	0.86	0.70 to 1.05
Asian/other	28	0.80	0.65 to 0.99	16	0.82	0.55 to 1.20	34	0.42	0.38 to 0.46	30	0.52	0.42 to 0.64	26	0.40	0.34 to 0.47	28	0.77	0.56 to 1.05
Ethnicity																		
Hispanic	30	0.83	0.69 to 1.00	21	0.99	0.77 to 1.28	51	0.85	0.78 to 0.93	33	0.63	0.54 to 0.74	43	0.90	0.77 to 1.04	30	1.01	0.78 to 1.30
Not Hispanic	33	Ref		24	Ref		53	Ref		44	Ref		40	Ref		38	Ref	
Marital status																		
Married	29	Ref		21	Ref		53	Ref		44	Ref		38	Ref		36	Ref	
Widowed	30	0.96	0.72 to 1.26	25	1.14	0.82 to 1.58	57	1.05	0.98 to 1.12	48	1.14	1.06 to 1.23	44	1.03	0.89 to 1.19	43	1.17	0.95 to 1.45
Single	35	1.25	1.09 to 1.45	25	1.16	0.98 to 1.39	49	0.85	0.79 to 0.90	37	0.73	0.67 to 0.80	40	0.85	0.74 to 0.98	32	0.83	0.69 to 1.01
Unknown	29	0.93	0.62 to 1.37	24	1.20	0.75 to 1.86	51	0.93	0.78 to 1.11	43	0.95	0.78 to 1.17	36	0.81	0.57 to 1.14	37	1.03	0.68 to 1.54
Comorbidity estimate																		
Less than 13 months of claims	36	1.70	1.46 to 1.99	22	1.19	0.98 to 1.45	39	0.64	0.56 to 0.73	37	0.76	0.65 to 0.88	29	0.67	0.52 to 0.87	33	0.92	0.59 to 1.43
0	29	Ref		24	Ref		56	Ref		44	Ref		44	Ref		37	Ref	
1	31	1.08	0.83 to 1.39	27	1.12	0.86 to 1.44	49	0.80	0.74 to 0.86	46	1.08	0.98 to 1.20	38	0.79	0.68 to 0.92	41	1.04	0.83 to 1.30
≥ 2	32	1.11	0.80 to 1.52	25	1.10	0.87 to 1.38	44	0.67	0.62 to 0.73	46	0.89	0.81 to 0.99	36	0.72	0.62 to 0.82	34	0.83	0.69 to 1.01
Year of diagnosis																		
2002	31	Ref		24	Ref		53	Ref		44	Ref		36	Ref		31	Ref	
2003	32	1.05	0.86 to 1.29	24	1.03	0.80 to 1.33	54	1.08	1.00 to 1.16	45	1.05	0.95 to 1.16	42	1.25	1.06 to 1.49	36	1.29	0.99 to 1.69
2004	34	1.18	0.97 to 1.43	23	0.95	0.75 to 1.22	55	1.14	1.05 to 1.23	46	1.11	1.00 to 1.22	42	1.30	1.10 to 1.54	39	1.48	1.14 to 1.92
2005	35	1.17	0.97 to 1.43	26	1.05	0.82 to 1.35	53	1.10	1.02 to 1.19	42	0.94	0.85 to 1.04	41	1.28	1.07 to 1.52	39	1.57	1.22 to 2.03
2006	31	1.00	0.82 to 1.22	23	0.91	0.71 to 1.17	50	1.09	1.00 to 1.17	42	0.91	0.83 to 1.01	40	1.36	1.14 to 1.61	37	1.42	1.10 to 1.84
Antecedent long-term care																		
Yes	28	0.84	0.56 to 1.24	19	0.74	0.47 to 1.12	45	0.69	0.64 to 0.74	35	0.67	0.59 to 0.75	35	0.69	0.60 to 0.80	30	0.67	0.54 to 0.84
No	32	Ref		24	Ref		54	Ref		44	Ref		42	Ref		38	Ref	

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Table 3. Factors Associated With Hospice Use: Multivariable Models (continued)

	Medicaid Patients Age 21-64 Years at Diagnosis						Medicare Patients Age ≥ 65 Years at Diagnosis						Dual-Program Enrolled Patients					
	CA (n = 4,797)			NY (n = 4,001)			CA (n = 27,416)			NY (n = 16,496)			CA (n = 6,152)			NY (n = 3,238)		
Factor	Patients in Hospice (%)	OR	95% CI	Patients in Hospice	OR	95% CI	Patients in Hospice	OR	95% CI	Patients in Hospice	OR	95% CI	Patients in Hospice	OR	95% CI	Patients in Hospice	OR	95% CI
Continuity of enrollment																		
Continuous	33	Ref		27	Ref		55	Ref		46	Ref		42	Ref		37	Ref	
> 50% enrollment	35	0.82	0.69 to 0.98	20	0.62	0.50 to 0.76	10	0.09	0.07 to 0.12	21	0.35	0.13 to 0.78	9	0.13	0.08 to 0.20	20	0.50	0.14 to 1.43
< 50% enrollment	22	0.45	0.35 to 0.57	14	0.41	0.30 to 0.55	28	0.35	0.25 to 0.48	5	0.07	0.05 to 0.09	9	0.14	0.05 to 0.31	21	0.51	0.20 to 1.14
Region																		
Very large metropolitan	33	Ref		19	Ref		51	Ref		33	Ref		35	Ref		28	Ref	
Large urban/suburbs	32	0.91	0.78 to 1.06	22	1.20	0.89 to 1.62	55	1.09	1.02 to 1.15	44	1.60	1.46 to 1.74	44	1.37	1.20 to 1.56	37	1.17	0.89 to 1.53
Urban	33	0.93	0.77 to 1.11	35	2.21	1.79 to 2.72	53	0.99	0.92 to 1.06	53	2.36	2.16 to 2.57	45	1.24	1.06 to 1.46	50	2.35	1.88 to 2.94
Rural/not urban	32	0.88	0.72 to 1.07	27	1.57	1.26 to 1.96	53	1.02	0.94 to 1.10	50	2.06	1.89 to 2.24	48	1.47	1.23 to 1.76	51	2.55	2.05 to 3.17
Quartile of median income																		
1st quartile (highest)	29	Ref		23	Ref		55	Ref		46	Ref		37	Ref		36	Ref	
2nd quartile	32	1.17	0.93 to 1.47	24	0.98	0.73 to 1.31	55	1.05	0.97 to 1.12	45	0.97	0.89 to 1.06	43	1.25	1.10 to 1.43	36	0.89	0.74 to 1.08
3rd quartile	33	1.25	1.01 to 1.56	24	0.94	0.70 to 1.25	53	0.99	0.92 to 1.06	43	0.92	0.84 to 1.00	43	1.42	1.22 to 1.65	37	1.03	0.83 to 1.27
4th quartile (lowest)	33	1.25	1.02 to 1.54	25	0.99	0.75 to 1.33	48	0.83	0.77 to 0.90	41	0.82	0.75 to 0.90	39	1.28	1.05 to 1.55	44	1.51	1.14 to 2.00

Abbreviations: CA, California; n/a, not available; NY, New York; OR, odds ratio; Ref, reference.

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Table 4. Factors Associated With Hospice Use Among Patients 55-74 Years Old Who Are Insured by Medicaid or Medicare: Multivariable Logistic Regression Models

	Patients Aged 55-74 Years at Cancer Diagnosis Enrolled in Medicaid or Medicare						Patients Ages 55-74 Years at Cancer Diagnosis Enrolled in Medicaid/Medicare During Month of Death					
	CA (n = 15,973)			NY (n = 10,443)			CA (n = 14,563)			NY (n = 9,455)		
Factor	Patients in Hospice (%)	OR	95% CI	Patients in Hospice (%)	OR	95% CI	Patients in Hospice (%)	OR	95% CI	Patients in Hospice (%)	OR	95% CI
Insurance type												
Medicaid	32.2	Ref		22.5	Ref		35.7	Ref		24.7	Ref	
Dual	39.6	1.95	1.70 to 2.25	36.1	1.68	1.44 to 1.97	42.7	1.47	1.30 to 1.66	37.9	1.86	1.60 to 2.16
Medicare	52.3	2.59	2.32 to 2.90	42.9	1.86	1.62 to 2.15	56.2	2.09	1.87 to 2.34	45.5	2.54	2.25 to 2.87
Sex												
Female	49.4	Ref		40.0	Ref		54.4	Ref		43.6	Ref	
Male	43.8	0.83	0.77 to 0.90	35.7	0.84	0.77 to 0.91	46.7	0.74	0.69 to 0.79	38.2	0.80	0.74 to 0.87
Race												
White	48.7	Ref		40.0	Ref		52.4	Ref		42.9	Ref	
Black	38.4	0.57	0.51 to 0.64	27.6	0.90	0.78 to 1.04	41.0	0.75	0.67 to 0.85	29.9	0.57	0.50 to 0.64
Asian/other	33.2	0.45	0.35 to 0.58	23.1	0.76	0.58 to 0.99	38.1	0.62	0.54 to 0.70	27.5	0.51	0.39 to 0.66
Ethnicity												
Hispanic	44.1	0.62	0.52 to 0.74	27.8	1.04	0.86 to 1.26	47.4	0.93	0.83 to 1.04	30.5	0.63	0.52 to 0.75
Not Hispanic	46.5	Ref		38.3	Ref		50.3	Ref		41.2	Ref	
Marital status												
Married	47.3	Ref		39.4	Ref		51.5	Ref		42.5	Ref	
Widowed	49.6	1.19	1.06 to 1.32	43.6	1.09	0.97 to 1.23	53.4	1.03	0.93 to 1.14	46.2	1.16	1.03 to 1.30
Single	43.1	0.72	0.65 to 0.78	31.8	0.92	0.83 to 1.03	45.9	0.96	0.88 to 1.04	34.4	0.71	0.64 to 0.78
Unknown	41.8	0.75	0.57 to 0.98	32.8	0.92	0.69 to 1.21	46.8	0.91	0.72 to 1.15	35.6	0.75	0.56 to 0.99
Comorbidity estimate												
Less than 13 months of claims	37.5	0.65	0.57 to 0.73	29.8	1.01	0.88 to 1.17	42.3	0.82	0.73 to 0.92	34.1	0.71	0.62 to 0.81
0	49.8	Ref		39.6	Ref		53.6	Ref		42.2	Ref	
1	41.8	0.99	0.87 to 1.14	39.5	1.02	0.88 to 1.18	44.9	0.79	0.70 to 0.88	42.1	1.00	0.87 to 1.14
≥ 2	40.6	0.77	0.67 to 0.87	33.4	0.95	0.82 to 1.10	42.8	0.73	0.65 to 0.82	36.0	0.77	0.67 to 0.88
Year of diagnosis												
2002	46.5	Ref		38.5	Ref		47.9	Ref		40.0	Ref	
2003	47.8	1.06	0.93 to 1.20	39.8	1.08	0.94 to 1.23	49.4	1.08	0.97 to 1.20	41.5	1.06	0.93 to 1.21
2004	48.2	1.04	0.92 to 1.19	39.6	1.12	0.97 to 1.28	51.3	1.20	1.08 to 1.33	42.6	1.11	0.97 to 1.27
2005	45.7	0.93	0.82 to 1.06	36.9	1.01	0.88 to 1.16	50.5	1.15	1.04 to 1.28	40.4	1.01	0.89 to 1.16
2006	43.0	0.80	0.71 to 0.91	33.5	0.84	0.74 to 0.97	51.3	1.23	1.11 to 1.37	37.9	0.91	0.80 to 1.04
Antecedent long-term care												
Yes	41.2	0.75	0.61 to 0.91	31.3	0.79	0.63 to 0.97	42.2	0.78	0.68 to 0.89	32.7	0.70	0.57 to 0.86
No	46.7	Ref		37.9	Ref		50.7	Ref		40.9	Ref	
Continuity of enrollment												
Continuous	48.6	Ref		40.7	Ref		50.5	Ref		41.2	Ref	
> 50 enrollment	21.3	0.38	0.30 to 0.46	20.5	0.66	0.51 to 0.85	40.2	1.36	1.08 to 1.72	20.2	0.36	0.26 to 0.49
< 50 enrollment	24.1	0.14	0.11 to 0.19	8.9	0.15	0.11 to 0.19	33.7	1.01	0.71 to 1.43	26.2	0.51	0.33 to 0.78

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Table 4. Factors Associated With Hospice Use Among Patients 55-74 Years Old Who Are Insured by Medicaid or Medicare: Multivariable Logistic Regression Models (continued)

	Patients Aged 55-74 Years at Cancer Diagnosis Enrolled in Medicaid or Medicare						Patients Ages 55-74 Years at Cancer Diagnosis Enrolled in Medicaid/Medicare During Month of Death					
	CA (n = 15,973)			NY (n = 10,443)			CA (n = 14,563)			NY (n = 9,455)		
Factor	Patients in Hospice (%)	OR	95% CI	Patients in Hospice (%)	OR	95% CI	Patients in Hospice (%)	OR	95% CI	Patients in Hospice (%)	OR	95% CI
Region												
Very large metropolitan	44.9	Ref		26.4	Ref		48.9	Ref		28.8	Ref	
Large urban/suburbs	48.4	1.73	1.55 to 1.94	38.3	1.27	1.10 to 1.46	52.0	1.04	0.96 to 1.13	41.4	1.74	1.55 to 1.96
Urban	47.2	2.62	2.34 to 2.92	48.4	2.36	2.09 to 2.67	50.5	0.95	0.86 to 1.05	51.7	2.64	2.35 to 2.97
Rural/not urban	44.5	2.18	1.95 to 2.42	43.9	1.97	1.74 to 2.23	48.4	0.93	0.83 to 1.04	46.7	2.16	1.93 to 2.42
Median income quartile												
1st quartile (highest)	49.3	1.30	1.16 to 1.46	40.6	1.25	1.08 to 1.45	54.2	Ref		44.0	Ref	
2nd quartile	48.6	1.19	1.07 to 1.33	38.5	1.04	0.92 to 1.18	52.5	1.00	0.90 to 1.11	42.1	0.93	0.82 to 1.04
3rd quartile	46.5	1.14	1.02 to 1.27	37.4	0.97	0.86 to 1.09	50.2	0.97	0.87 to 1.07	40.1	0.85	0.76 to 0.96
4th quartile (lowest)	40.6	Ref		34.5	Ref		43.6	0.88	0.79 to 0.98	36.8	0.74	0.66 to 0.83

Abbreviations: CA, California; NY, New York; OR, odds ratio; Ref, reference.

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Our findings are notable for the lack of racial disparity evident among Medicaid patients. Previous studies in Medicare have found lower hospice utilization for nonwhite patients[3,5]; we found no such disparities in patients younger than 65 years enrolled in CA and NY Medicaid programs. This finding suggests that socioeconomic hardship rather than cultural preferences associated with race or ethnicity may account for racial disparities in the Medicare population.

We focused on two populous states, but do not know to what extent findings apply elsewhere. Although we could reliably ascertain NY patients ages 65 years and older with dual enrollment in Medicare and Medicaid and evaluate claims in both files, in CA we used a proxy variable for dual enrollment and evaluated claims in Medicare only. Nevertheless, results in the two states were similar, with lower hospice use among those dually enrolled than among those in Medicare only. Finally, we used claims to evaluate care without capturing patient and family experiences. Whether end-of-life care among patients who died without hospice was experienced as deficient is not known.

State Medicaid programs ensure access to care for the poor and include coverage of inpatient and outpatient hospice care. Yet we found that Medicaid-insured adults with advanced lung cancer have low rates of hospice utilization, a finding that raises concerns about the quality of end-of-life care that such patients receive. Although we do not know what rate of hospice use is ideal, most of these patients died in acute-care settings or at home without hospice. This finding, coupled with evidence that hospice is associated with better quality of life near death,[21,22,24] suggests that strategies to encourage and support hospice use for poor patients with limited life expectancy could be a straightforward strategy to improve cancer care.

AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

The author(s) indicated no potential conflicts of interest.

AUTHOR CONTRIBUTIONS

Conception and design: Jennifer W. Mack, Jane C. Weeks, Deborah Schrag
Provision of study materials or patients: Maria J. Schymura
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Data analysis and interpretation: Jennifer W. Mack, Kun Chen, Jane C. Weeks, Deborah Schrag
Manuscript writing: All authors
Final approval of manuscript: All authors

REFERENCES

1. National Comprehensive Cancer Network: Practice Guidelines in Oncology: Palliative care. http://www.nccn.org/professionals/physicians_gls/PDP/palliative.pdf

2. National Consensus Project for Quality Palliative Care: Clinical Practice Guidelines for Quality Palliative Care. http://www.nationalconsensusproject.org

3. McCarthy EP, Burns RB, Davis RB, et al: Barriers to hospice care among older patients dying with lung and colorectal cancer. J Clin Oncol 21:728-735, 2003

4. McCarthy EP, Burns RB, Ngo-Metzger Q, et al: Hospice use among Medicare managed care and fee-for-service patients dying with cancer. JAMA 289:2238-2245, 2003

5. Smith AK, Earle CC, McCarthy EP: Racial and ethnic differences in end-of-life care in fee-for-service Medicare beneficiaries with advanced cancer. J Am Geriatr Soc 57:153-158, 2009

6. Lepore MJ, Miller SC, Gozalo P: Hospice use among urban Black and White U.S. nursing home decedents in 2006. Gerontologist 51:251-260, 2011

7. Zheng NT, Mukamel DB, Caprio T, et al: Racial disparities in in-hospital death and hospice use among nursing home residents at the end of life. Med Care 49:992-998, 2011

8. Braga S, Miranda A, Fonseca R, et al: The aggressiveness of cancer care in the last three months of life: A retrospective single centre analysis. Psychooncology 16:863-868, 2007

9. Rose JH, O'Toole EE, Dawson NV, et al: Age differences in care practices and outcomes for hospitalized patients with cancer. J Am Geriatr Soc 48:S25-S32, 2000 (suppl 5)

10. Hamel MB, Lynn J, Teno JM, et al: Age-related differences in care preferences, treatment decisions, and clinical outcomes of seriously ill hospitalized adults: Lessons from SUPPORT. J Am Geriatr Soc 48:S176-S182, 2000 (suppl 5)

11. American Cancer Society: Cancer Facts and Figures, 2012. http://www.cancer.org/acs/groups/content/@epidemiologysurveilance/documents/document/acspc-031941.pdf

12. National Cancer Institute: Cancer Statistics. http://seer.cancer.gov/statfacts/html/lungb.html

13. Kato I, Severson RK, Schwartz AG: Conditional median survival of patients with advanced carcinoma: Surveillance, epidemiology, and end results data. Cancer 92:2211-2219, 2001

14. Blackstock AW, Herndon JE II, Paskett ED, et al: Outcomes among African-American/non-African-American patients with advanced non-small-cell lung carcinoma: Report from the Cancer and Leukemia Group B. J Natl Cancer Inst 94:284-290, 2002

15. Earle CC, Venditti LN, Neumann PJ, et al: Who gets chemotherapy for metastatic lung cancer? Chest 117:1239-1246, 2000

16. California Department of Health: California Cancer Registry, 2012. http://www.ccrcal.org/

17. New York State Department of Health: New York State Cancer Registry and Cancer Statistics, 2012. http://www.health.ny.gov/statistics/cancer/registry/

18. Boscoe FP, Schrag D, Chen K, et al: Building capacity to assess cancer care in the Medicaid population in New York State. Health Serv Res 46:805-820, 2011

19. Charlson ME, Pompei P, Ales KL, et al: A new method of classifying prognostic comorbidity in longitudinal studies: Development and validation. J Chronic Dis 40:373-383, 1987

20. Klabunde CN, Potosky AL, Legler JM, et al: Development of a comorbidity index using physician claims data. J Clin Epidemiol 53:1258-1267, 2000

21. Wright AA, Keating NL, Balboni TA, et al: Place of death: Correlations with quality of life of patients with cancer and predictors of bereaved caregivers' mental health. J Clin Oncol 28:4457-4464, 2010

22. Teno JM, Clarridge BR, Casey V, et al: Family perspectives on end-of-life care at the last place of care. JAMA 291:88-93, 2004

23. Zhang B, Nilsson ME, Prigerson HG: Factors important to patients' quality of life at the end of life. Arch Intern Med 172:1133-1142, 2012

24. Wright AA, Zhang B, Ray A, et al: Associations between end-of-life discussions, patient mental health, medical care near death, and caregiver bereavement adjustment. JAMA 300:1665-1673, 2008

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Appendix

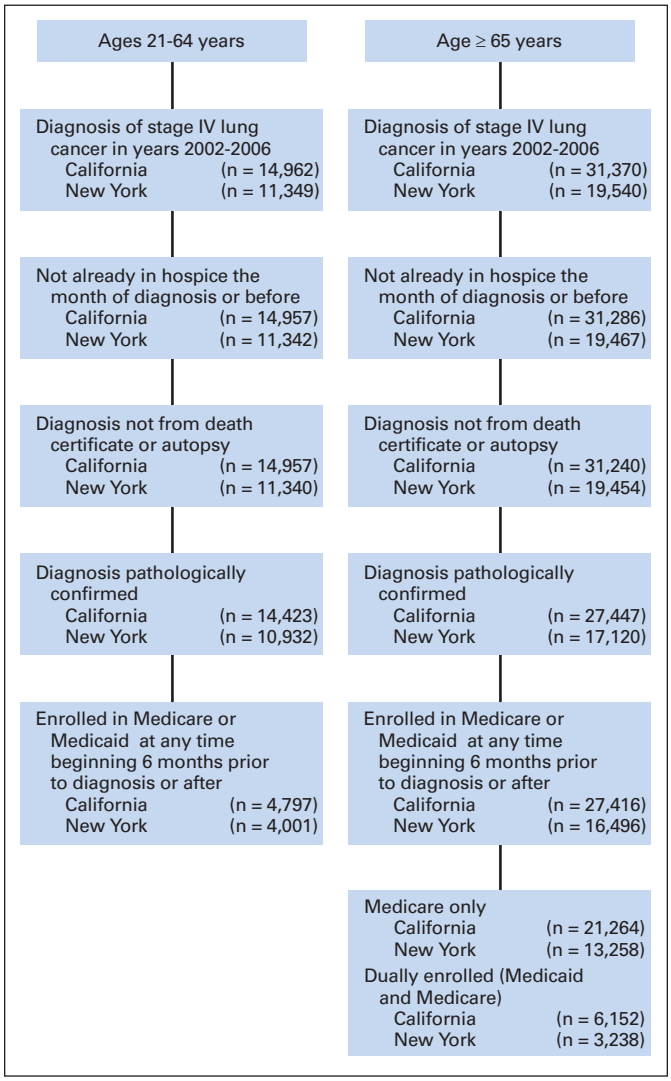

Fig A1. Cohort selection.

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