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Association of Expanded VA Hospice Care With Aggressive Care and Cost for Veterans With Advanced Lung Cancer

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IMPORTANCE Medicare hospice beneficiaries discontinue disease-modifying treatments because the hospice benefit limits access. While veterans have concurrent access to hospice care and Veterans Affairs (VA) Medical Center (VAMC)-provided treatments, the association of this with changes in treatment and costs of veterans' end-of-life care is unknown.

OBJECTIVE To determine whether increasing availability of hospice care, without restrictions on disease-modifying treatments, is associated with reduced aggressive treatments and medical care costs at the end of life.

DESIGN, SETTING, AND PARTICIPANTS A modified difference-in-difference study design, using facility fixed effects, compared patient outcomes during years with relatively high vs lower hospice use. This study evaluated 13 085 veterans newly diagnosed with stage IV non–small cell lung cancer (NSCLC) from 113 VAMCs with a minimum of 5 veterans diagnosed with stage IV NSCLC per year, between 2006 and 2012. Data analyses were conducted between January 2017 and July 2018.

EXPOSURES Using VA inpatient, outpatient, pharmacy claims, and similar Medicare data, we created VAMC-level annual aggregates of all patients who died of cancer for hospice use, cancer treatment, and/or concurrent receipt of both in the last month of life, dividing all VAMC years into quintiles of exposure to hospice availability.

MAIN OUTCOMES AND MEASURES Receipt of aggressive treatments (2 or more hospital admissions within 30 days, tube feeding, mechanical ventilation, intensive care unit [ICU] admission) and total costs in the first 6 months after diagnosis.

RESULTS Of the 13 085 veterans included in the study, 12 858 (98%) were men; 10 531 (81%) were white, and 5949 (46%) were older than 65 years. Veterans with NSCLC treated in a VAMC in the top hospice quintile (79% hospice users), relative to the bottom quintile (55% hospice users), were more than twice as likely to have concurrent cancer treatment after initiating hospice care (adjusted odds ratio [AOR], 2.28; 95% CI, 1.67-3.31). Nonetheless, for veterans with NSCLC seen in VAMCs in the top hospice quintile, the AOR of receiving aggressive treatment in the 6 months after diagnosis was 0.66 (95% CI, 0.53-0.81), and the AOR of ICU use was 0.78 (95% CI, 0.62-0.99) relative to patients seen in VAMCs in the bottom hospice quintile. The 6-month costs were lower by an estimated $266 (95% CI, −$358 to −$164) per day for the high-quintile group vs the low-quintile group. There was no survival difference.

CONCLUSIONS AND RELEVANCE Increasing the availability of hospice care without restricting treatment access for veterans with advanced lung cancer was associated with less aggressive medical treatment and significantly lower costs while still providing cancer treatment.

Editorial

Supplemental content

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Aggressive end-of-life (EOL) care is prevalent for persons with advanced cancer.[1] In a recent study of patients with stage IV lung and colorectal cancer, 22% received chemotherapy in the last month of life despite knowing that treatment was unlikely to cure them.[2] Aggressive treatment at the EOL is also associated with poorer quality of life.[3-7]

While hospice care has been available in some Veterans Affairs Medical Centers (VAMCs) for decades, in 2009 the Department of Veterans Affairs (VA) launched the Comprehensive End-of-Life Care Initiative to improve quality EOL care by better honoring veterans' preferences through improved access to hospice and palliative services.[8] Palliative care service programs were introduced in many VAMCs, with some introduced before 2009, but most introduced afterwards. These programs contributed to the increased use of hospice by veterans who could receive hospice care concurrently with antineoplastic and other disease-modifying treatments (ie, *concurrent care*). This policy is unique to the VA; Medicare beneficiaries treated elsewhere are essentially forced to make the terrible choice of receiving either the Medicare hospice benefit or active cancer treatment.[9] Medicare pays hospice care providers per diem, and the hospice care clinician must pay for any treatment related to a patient's terminal diagnosis (including inpatient hospital costs), unless the patient is discharged from hospice, which is an audit flag.[1] While coverage restrictions are more ambiguous among private insurers, they generally follow Medicare's policy.[10]

Multiple randomized clinical trials have shown that patients with terminal cancer benefit from receiving concurrent care.[11-13] In 1 trial of patients with metastatic non–small cell lung cancer (NSCLC), palliative care offered near diagnosis was found to improve quality of life and mood compared with standard oncology care.[13] In addition, those patients who received early palliative care experienced both less aggressive care and improved overall survival, at no additional cost.[12] Similar results were found in a trial of patients with late-stage cancer.[14] Positive results have also been found in studies of patients with cancer receiving hospice care.[15,16] In a matched cohort study of Medicare beneficiaries with poor-prognosis cancers, patients receiving hospice had lower rates of hospitalization, intensive care unit (ICU) admission, and invasive procedures at the EOL compared with patients who did not receive hospice. In addition, patients who received hospice had lower costs during the last year of life.[15]

To test the generalizability of these smaller studies undertaken in specialized settings, we examined the association between access to hospice and receipt of aggressive treatment for veterans newly diagnosed with advanced NSCLC. Specifically, we investigated if current policy, which allows veterans to access cancer treatment concurrently with hospice, was associated with a change in veterans' EOL care and associated health care costs.

Key Points

Question Is increased availability of hospice for veterans associated with reduced aggressive treatments and medical care costs at the end of life?

Findings In this cohort study of 13 085 veterans, those with newly diagnosed end-stage lung cancer treated at Veterans Affairs Medical Centers (VAMCs) with the most expansion in hospice use had a significantly greater likelihood of receiving chemotherapy or radiation therapy after hospice enrollment but a lower likelihood of having aggressive treatment or intensive care unit use, compared with similar veterans treated in VAMCs with low hospice growth.

Meaning Increasing hospice availability without restricting treatment access for veterans with advanced lung cancer was associated with less aggressive medical treatment and significantly lower medical costs while still enabling veterans to receive cancer treatment.

Methods

Data Sources

This retrospective observational study used data from the VA patient treatment files, VA tumor registry, the National Patient Care Database, and Fee Basis files containing information on VA-purchased services for veterans. Data from the VA were merged with Medicare inpatient, outpatient, skilled nursing, and hospice claims. The study was approved by the VA Central Institutional Review Board, waiving patient written consent for deidentified data.

Patient Sample

Our sample included any veteran who used the VA or Fee-Basis care and received a stage IV NSCLC diagnosis from January 1, 2006, to June 30, 2012, and died between January 1, 2006, and December 31, 2012, based on the VA tumor registry. The vital status mini file was used to confirm dates of death.

Exposure to Hospice

Our research group previously reported increases in access to hospice care as measured by the proportion of all patients who died of cancer per calendar year who had used hospice, whether VA provided or purchased, or Medicare reimbursed, resulting in a hospice exposure measure per VAMC-year between 2006 and 2012.[2] Owing to data limitations, we could not reliably identify instances of palliative consultations or services during the study period and had to rely on indicators of hospice use. Concurrent care is not possible without hospice, so increases in the availability of hospice corresponded to receipt of concurrent care (ie, chemotherapy or radiation therapy received while receiving hospice care from a Medicare provider or in a VA facility). We assigned each VAMC-year to a quintile of hospice exposure (ie, percentage of patients who died of cancer in each VAMC who received hospice care) from the highest rate to the lowest rate. We assumed that the greater the use of hospice care in the last 6 months of life, the greater the likelihood that a newly diagnosed veteran with stage IV NSCLC was exposed to EOL treatment patterns influenced by palliative and hospice care in that VAMC in that year. Under this assumption, increased hospice availability, given the VA policy allowing concurrent cancer treatment, translates into increased potential for veterans to receive concurrent care. This contextual definition of exposure to hospice, and therefore

concurrent care, overcomes the selection bias inherent in comparing individuals who do and do not receive hospice care. We assigned veterans to the VAMC that provided over 70% of their medical care between NSCLC diagnosis and death. To minimize statistical instability of exposure effect estimates, each VAMC had to have at least 5 veterans diagnosed with NSCLC per year; this excluded 397 veterans from 65 facilities.

Data

A daily record of medical treatment was created for all veterans with NSCLC spanning from diagnosis to death. We focus on 2 outcome observation periods: (1) the 6 months after diagnosis (excluding the first week after diagnosis as a peridiagnostic period) and (2) the last month of life. During each observation period, we tracked health care use and costs. For inpatient VA and Medicare stays, we estimated daily costs by prorating the total costs over the length of stay. Costs of VA health care were estimated from the Health Economics Resource Center (HERC) Average Cost data.[17-19] We used reimbursements from the VA Fee Basis files and Medicare reimbursements to estimate non-VA costs. Data analyses were conducted between January 2017 and July 2018.

Outcomes

We calculated the percentage of veterans with advanced NSCLC with an ICU admission, experiencing aggressive care, or experiencing concurrent care in the 2 outcome observation periods (ie, 6 months after diagnosis and the last month of life). Aggressive care was defined as an ICU admission, receipt of a feeding tube or mechanical ventilation, or 2 or more inpatient admissions within 30 days of one another.[20] Concurrent care was defined as receiving radiation therapy or chemotherapy after initiation of hospice care. We also estimated health care costs per day alive and survival within 6 months of diagnosis. Total daily cost was used in the primary analysis. Secondary analyses considered type of cost (ie, inpatient, outpatient) and payer (VA or Medicare).

Covariates

Demographic variables were used to describe the sample. To adjust for differences in the demographic and clinical characteristics of the population of patients with stage IV NSCLC treated across different VAMCs over time, we adjusted for veterans' hospital use in the year prior to diagnosis, their use of Medicare services preceding diagnosis, VA priority status (benefit entitlements with or without a copay), and comorbidities at the time of diagnosis, based on the Elixhauser Index applied to prediagnosis hospitalizations.

Analysis

We used logistic regression analysis to compare treatment in a VAMC-year classified in the lowest hospice exposure quintile (HEQ) with treatment in the next 4 quintiles, for the odds of experiencing each outcome. We used the same approach to estimate the association of hospice exposure with the odds of veterans' surviving 180 days after diagnosis. All models were adjusted for all covariates, year of diagnosis, and facility fixed effects.

Our cost analyses regressed total daily costs on VAMC-level exposure, while controlling for the same covariates. We compared generalized linear models, ordinary least squares, and semi-log regression models on model fit using Hosmer and Lemeshow deciles.[21] A modified Park test was used to guide our selection of distribution and link functions in the generalized linear models.[22,23] We corrected the standard errors for repeated sampling within person. Since costs in the first week post diagnosis were highly heterogeneous, we analyzed costs in days 8 through 180, and in these analyses, ordinary least squares provided the best fitting model. Statistical analyses were performed using SAS 9.3 and Stata statistical software.

Results

The study sample included 13 085 patients with stage IV NSCLC served by 113 VAMCs between 2006 and 2012. **Table 1** summarizes the demographic and clinical characteristics of the sample. Almost half were younger than 65 years; almost all (12 858) were male; and 10 531 were white. Half (51%) were Medicare eligible, and 51% were eligible for VA services owing to service-connected conditions. Less than half (5768; 44%) had been hospitalized in the year prior to their NSCLC diagnosis. Cardiovascular comorbidities and chronic obstructive pulmonary disease were prevalent.

Table 2 details the unadjusted rates of the utilization-based outcome measures by VAMC HEQ. During the first 6 months after diagnosis, or until they died, 2816 (21.5%) veterans were admitted to an ICU, and 4188 (32%) experienced aggressive care. Veterans treated in the highest HEQ (vs the lowest) had lower rates of ICU use (19.3% vs 24.9%) and aggressive medical care (28.3% vs 35.5%). There was a monotonic increase in the receipt of hospice and concurrent care from the lowest HEQ (7.4%) to the highest (17.5%). Radiation therapy after hospice initiation was more common than was chemotherapy, but both were more common in VAMC-years with greater hospice exposure.

The **Figure** presents the adjusted odds ratios (AORs) and 95% confidence intervals (CIs) of the contrast of outcomes experienced by veterans in the lowest HEQ relative to the other quintiles. Veterans treated in the highest-HEQ VAMCs were about one-third as likely to experience aggressive treatments in the 6 months after diagnosis compared with veterans treated in the lowest quintile (AOR, 0.66; 95% CI, 0.53-.81). Veterans in the highest HEQ were 22% less likely to be admitted to an ICU compared with those treated in the lowest-quintile VAMCs (AOR, 0.78; 95% CI, 0.62-.99). Despite of the lower rates of hospital and aggressive care, receipt of concurrent care and chemotherapy or radiation therapy after hospice initiation among veterans in the highest HEQ was more than twice as common (AOR, 2.28; 95% CI, 1.67-3.11) compared with veterans in the lowest HEQ. We observed no statistically significant differences in the odds of survival to 180 days post-diagnosis.

In sensitivity analyses, we tested the outcome of VAMC-year HEQ on receipt of aggressive medical treatment in the last

Table 1. Characteristics of Veterans With Stage IV NSCLC Diagnosed Between 2006 and 2012

Characteristic	Patients, No. (%) (n = 13 085)
Age, y	
<65	5949 (45.5)
65-74	3756 (28.7)
75-84	2852 (21.8)
>84	528 (4.0)
Sex	
Male	12 858 (98.3)
Female	227 (1.7)
Race	
White	10 531 (80.5)
Black	2480 (19.0)
Other	74 (0.6)
Hospitalized in the year prior to diagnosis	
No	7317 (55.9)
Yes	5768 (44.1)
Medicare-funded care	
No	6313 (48.3)
Yes	6772 (51.8)
VA priority group status[a]	
1: Veterans with service-connected disabilities rated >50% disabling	2146 (16.4)
5: Low income nonservice connected and noncompensable service connected veterans rated 0% disabled	6375 (48.7)
8C: Nonservice connected veterans continuously enrolled since January 16, 2003	1357 (10.4)
Other	3207 (24.5)
VAMC facility hospice quintile	
0 (Lowest use rate)	2334 (17.8)
1	2687 (20.5)
2	2767 (21.2)
3	2881 (22.0)
4 (Highest use rate)	2416 (18.5)
Diagnosis year	
2006	2137 (16.3)
2007	2226 (17.0)
2008	2119 (16.2)
2009	2179 (16.7)
2010	1936 (14.8)
2011	1596 (12.2)
2012	892 (6.8)
Comorbidities	
Myocardial infarction	535 (4.1)
Congestive heart failure	1326 (10.1)
Peripheral vascular disease	724 (5.5)
Cerebrovascular disease	699 (5.3)
COPD	5670 (43.3)
Dementia	51 (0.4)
Diabetes	2605 (19.9)

Abbreviations: COPD, chronic obstructive pulmonary disease; NSCLC, non–small cell lung cancer; VA, Department of Veterans Affairs; VAMC, Veterans Affairs Medical Center.

[a] Veterans are assigned a priority group by the Department of Veterans Affairs to determine their level of assistance.

month of life. For the more than 13 000 veterans who died with stage IV NSCLC, we found that being treated in the highest (vs lowest) HEQ VAMC was associated with a 0.55 (95% CI, 0.42-0.73) reduced AOR of experiencing aggressive care (eTable 1 in the Supplement). Furthermore, as detailed in eTable 1, the risk of ICU admission in the last month of life was significantly lower for veterans in the top 2 HEQs than for veterans in the lowest HEQ.

We tested the association of hospice exposure with total medical care costs incurred per patient day alive. As can be seen in **Table 3**, which presents the estimated differences between each quintile and the lowest HEQ, veterans served in the top 2 HEQs had significantly lower total medical care costs per day alive than was the case for veterans served in the lowest HEQ. Between days 8 through 30 after diagnosis, we found that veterans treated in the highest-quintile facilities incurred an estimated $266 lower cost (95% CI, −$366 to −$166) per day less than those served in VAMCs in the lowest HEQ. This significant difference in estimated costs decreased over time, averaged over those veterans surviving to 4 months and beyond. At 100 days after diagnosis, more than 40% of the patients had died, but there was still a significant savings per day among veterans served at the highest-quintile facilities (95% CI, −$329 to −$148). Between 7 through 180 days, we continued to find sizeable differences in medical care costs as a function of HEQ; patients seen at facilities with the highest HEQ had an associated savings of $187.25 per day compared with patients seen at the sites with the lowest HEQ.

Analyses of savings by cost component revealed that almost all of the differences in total costs were attributable to VA inpatient cost savings, since there was no statistically significant difference in outpatient costs, including VA and Medicare hospice services, as a function of VAMC HEQ (eTable 2 in the Supplement).

Discussion

We examined the association of expanded access to hospice care for veterans between 2006 and 2012 with the likelihood that veterans with stage IV NSCLC would experience aggressive medical care. Veterans served by VAMCs with higher HEQ were significantly less likely to undergo aggressive care and ICU admissions in the 6 months after diagnosis. Moreover, their mean daily total medical care costs were significantly lower than were those of veterans served in low-HEQ VAMCs. These outcomes were observed despite the fact that veterans in high-HEQ VAMCs were twice as likely to receive concurrent care, that is, chemotherapy or radiation therapy after initiating hospice services. Findings suggest that concurrent care, the availability of hospice without having to forgo active treatment, reduces the likelihood that veterans undergo aggressive EOL treatment and produces a net savings in medical care costs.

Since the introduction of the Medicare hospice benefit, hospice use at the EOL has continued to increase, particularly among patients with cancer. Nonetheless, the percentage of hospice recipients enrolled in hospice for 7 days or less has

Table 2. Characteristics of Care For Veterans in the First 6 Months After Diagnosis

Characteristic	Patients, No. (%) (n = 13 085)					
	Facility Hospice Quintile[a]					
	0	1	2	3	4	Total
ICU admission	580 (24.9)	581 (21.6)	619 (22.4)	570 (19.8)	466 (19.3)	2816 (21.5)
Any aggressive treatment[b]	829 (35.5)	864 (32.2)	922 (33.3)	859 (29.8)	684 (28.3)	4188 (32.0)
Any chemotherapy use	1727 (74.0)	2045 (76.1)	2060 (74.5)	2120 (73.6)	1793 (74.2)	9745 (74.5)
Concurrent care (radiation therapy or chemotherapy after hospice initiation)	172 (7.4)	238 (8.9)	289 (10.4)	444 (15.4)	425 (17.5)	1568 (12.0)
Chemotherapy after hospice initiation	62 (2.8)	92 (3.5)	107 (4.0)	163 (5.8)	154 (6.6)	578 (4.6)
Radiation therapy after hospice initiation	127 (5.6)	176 (6.7)	215 (8.1)	350 (12.5)	340 (14.7)	1208 (9.6)
Hospice use[c]	1268 (54.3)	1644 (61.2)	1824 (65.9)	2121 (73.6)	1910 (79.06)	8767 (67.0)
Hospice length of stay among users, median, days	18.0	18.0	19.0	18.0	17.0	18.0

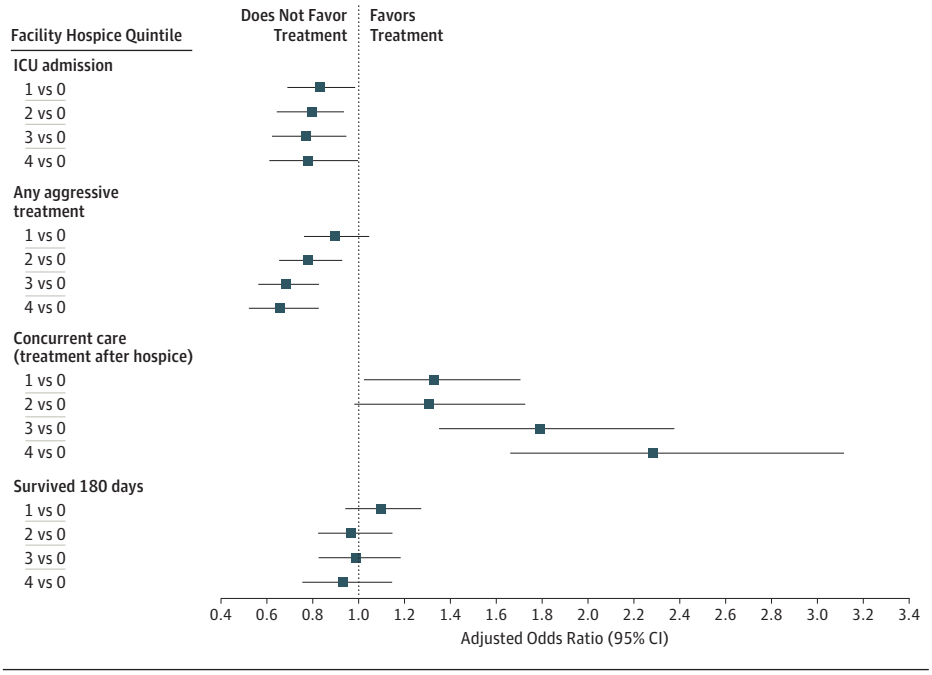
Abbreviation: ICU, intensive care unit.

[a] Facility Hospice Quintiles: 0 is the lowest use rate, and 4 is the highest use rate.

[b] Two or more hospitalizations within 30 d, ICU admission, percutaneous endoscopic gastrostomy, or mechanical ventilation.

[c] Hospice use is either Medicare- or Veterans Affairs Medical Center–used service.

Figure. Likelihood of an ICU Admission, Receiving Aggressive Care, Receiving Chemotherapy, and Surviving 180 Days in the 6 Months After Diagnosis



Aggressive care is defined by 2 or more hospitalizations within 30 days, ICU admission, percutaneous endoscopic gastrostomy, or mechanical ventilation. Number of patients (n = 13 085) was adjusted for age, sex, race, hospitalization in the past year, Veterans Affairs' priority status, Medicare status, continuous diagnosis year, and Charlson comorbidities; with facility fixed effects. ICU indicates intensive care unit.

remained around 30% despite many efforts to encourage earlier entry into hospice.[3] Some suggest that the terrible choice inherent in Medicare's requirement to essentially give up further disease-modifying treatment is 1 reason that many patients enter hospice so late.[4,5] Studies of palliative care for patients with cancer provided before hospice, including at the time of diagnosis with late-stage disease, have repeatedly revealed improved patient outcomes, including earlier hospice referral and lower costs relative to usual care.[6,7]

Over the last decade, the VA has invested heavily in expanding the availability of hospice care by increasing VAMC-based hospice beds and purchasing services from community hospices.[23] This investment has contributed to high rates of hospice use; over 70% among veterans.[8,9] Indeed, Medicare-enrolled veterans are more likely to use hospice than are general Medicare beneficiaries.[24] This VA policy enables the concurrent receipt of hospice care and disease-modifying treatment, and the present study suggests that as hospice use increased, there was an associated increase in the concurrent receipt of radiation therapy and chemotherapy and hospice care.[2] Consistent with our finding of greater concurrent care among veterans in high HEQs, we found that nearly 75% of patients with newly diagnosed stage IV NSCLC received chemotherapy in the first 6 months after diagnosis or until death, but even in the highest HEQ VAMCs, only 6% of patients received chemotherapy after hospice initiation. Since VA policies do not

Table 3. Total VA and Medicare Costs in 6 Months After Diagnosis

Hospice Exposure Quintiles	Costs Saved, Mean (95% CI) $/d				
	7-30 d	7-60 d	7-100 d	7-150 d	7-180 d
0 Lowest (46%)					
1 (56%)	−45.70 (−130.06 to 38.65)	−50.59 (−131.97 to 30.79)	−37.92 (−116.89 to 41.05)	−26.99 (−104.62 to 50.64)	−23.37 (−100.51 to 53.77)
2 (63%)	−124.00 (−210.83 to −37.17)[a]	−125.00 (−208.17 to −41.84)[a]	−108.42 (−188.91 to −27.93)[a]	−87.62 (−166.61 to −8.63)[b]	−78.65 (−157.08 to −0.23)[b]
3 (69%)	−162.46 (−253.18 to −71.74)[c]	−161.07 (−247.14 to −74.99)[c]	−132.98 (−216.04 to −49.92)[a]	−104.12* (−185.51 to −22.73)	−92.38 (−173.14 to −11.62)[b]
4 Highest (77%)	−265.69 (−365.57 to −165.81)[c]	−272.79 (−366.72 to −178.86)[c]	−238.89 (−329.28 to −148.50)[c]	−202.32 (−290.78 to −113.87)[c]	−187.25 (−274.96 to −99.55)[c]
Constant[d]	314.42 (27.65 to 601.20)[b]	448.56 (197.09 to 700.03)[c]	438.03 (198.01 to 678.04)[c]	455.34 (217.80 to 692.88)[c]	480.02 (243.06 to 716.98)[c]
Mean cost per patient-day alive, unadjusted, $	505.4	451.8	410.8	378.9	365.0
Patient-days alive, No.	289 535	612 432	957 252	1 289 602	1 452 014
Persons	13 267	13 267	13 267	13 267	13 267

Abbreviations: NSCLC, non-small cell lung cancer; VA, Veterans Affairs; VAMC, VA Medical Center.

[a] $P < .01$.

[b] $P < .05$.

[c] $P < .001$.

[d] The constant is the expected value of the dependent variable when all covariates are set to 0.

prohibit concurrent care, treatments for this small number of patients choosing this option did not impede hospice enrollment for them or other veterans.

Our research group recently reported that aggressive care at EOL is associated with less positive family evaluations of care.[25] This is consistent with earlier research suggesting that dying in an ICU is perceived negatively and is often regretted by family members.[26] Our finding that veterans treated in the highest HEQ VAMCs were nearly half as likely to experience aggressive treatment or 40% less likely to be in an ICU than were veterans treated in the lowest HEQ VAMCs suggests that investment in hospice is associated with improved patients' experiences from the perspective of surviving family members. This finding is consistent with other research on similar patient populations examining the effects of palliative care after diagnosis.[2,5,12]

In light of the large reductions in inpatient care, it is not surprising that investment in hospice is associated with large reductions in health care costs. Indeed, our findings suggest that there was a substitution of hospice care for acute hospitalizations and days in the ICU, a signature proposition on which the original Medicare hospice benefit was predicated.[11] While the proportion of veterans with cancer using hospice increased in high-HEQ medical centers, consistent with earlier research, the median length of stay among users did not.[2] As has been observed previously, the cost advantage of hospice care evaporates as hospice length of stay increases.[26]

Many have argued that the implicit Medicare requirement to forgo disease treatment on hospice enrollment should be eliminated to allow for concurrent care. This might be reasonable in a health system like the VA that is both clinically and fiscally responsible for veterans' care. However, under the Medicare fee-for-service system, hospitals, physicians, and postacute care clinicians operate under different reimbursement policies and compete to offer and be reimbursed for services. In the absence of a uniform incentive for health care providers to be clinically and fiscally responsible for patients' care, it is unlikely that the lower costs per patient day associated with treatment in a VAMC, which experienced greater hospice exposure than we observed, could be obtained. The costs of aggressive services are higher under Medicare,[5,27,28] and many individuals with multiple chronic conditions experience uncoordinated care, which prevents generalization of our findings to the Medicare fee-for-service system.[29] Whether such an option is possible under Medicare Advantage remains to be seen, since presently these plans are able to refer patients to hospice without having to pay for their hospice services.[30] Nonetheless, successful demonstrations among commercially insured managed care plans suggest that controlled concurrent care is viable.[31]

Limitations

Our study has several limitations. First, we acknowledge that those VAMC's with higher HEQ likely differed in other respects from those with less access to hospice. Nonetheless, owing to VAMC fixed effects, our attribution of the outcome of changes controls for VAMC attributes and culture and thus examines the effect of investment changes relying on a difference-in-difference design. While this does not yield evidence as strong as a randomized clinical trial, it is much stronger than merely comparing before and after changes. Also, by relying only on utilization records and claims data, we could not ascertain whether veterans died of NSCLC, although the stage IV status at diagnosis makes that very likely.

Conclusions

We believe that this study offers a health system-level replication of the small randomized clinical trials of early concur-

rent care that also examined patients diagnosed with late-stage cancer.[7] As such, our results are very encouraging for those advocating concurrent care to allow for comprehensive EOL care earlier in the disease course, thereby reducing aggressive care at EOL. The substantial reduction in health care costs suggests that the investment in hospice care that the VA made paid off and probably continues to pay off without restricting veterans' access to irradiation and chemotherapy. Whether this finding can be exported to Medicare is unclear, but the prospects are probably better under Accountable Care Organizations or Medicare Advantage plans than under Medicare fee-for-service care.

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Author Contributions: Dr Mor had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.
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Conflict of Interest Disclosures: Dr Mor is on the volunteer board of a nonprofit hospice in Rhode Island and is paid to chair the Independent Quality Committee that reviews the performance of HCR-ManorCare, a postacute care company that owns and operates nursing facilities and Heartland Hospice. Dr Shreve directs the VA's palliative and hospice care program within the Geriatrics and Extended Care service of the Veteran's Health Administration. No other disclosures are reported.

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