Variations in Oncologist Recommendations for Chemotherapy for Stage IV Lung Cancer: What Is the Role of Performance Status?

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BACKGROUND AND QUESTION ASKED: Clinical guidelines recommend chemotherapy for patients with stage IV non–small-cell lung cancer (NSCLC) who have good to fair performance status, but not poor performance status. However, there is growing concern about use of chemotherapy in patients who are less likely to benefit. What are the rates of oncologists' self-reported likelihood to recommend chemotherapy for patients with stage IV NSCLC by performance status and symptoms, and how do recommendations vary by physician and practice characteristics?

SUMMARY ANSWER: Nearly all oncologists reported that they would recommend chemotherapy for patients with good performance status, and approximately half reported they would recommend it for patients with poor performance status. Oncologists in multispecialty medical groups, hospital-based practices, and cancer center–based practices were less likely to make such recommendations.

WHAT WE DID: We surveyed medical oncologists involved in the care of a population-based cohort of patients with lung cancer from the Cancer Care Outcomes Research and Surveillance study. Oncologists were queried about their likelihood to recommend chemotherapy for patients with stage IV lung cancer with varying performance status (Eastern Cooperative Oncology Group performance status 0 [good] v 3 [poor]) and presence or absence of tumor-related pain. Repeated measures logistic regression was used to estimate the independent associations of patients' performance status and symptoms, and oncologists' demographic and practice characteristics with chemotherapy recommendations.

WHAT WE FOUND: Nearly all oncologists (adjusted rates, 97% to 99%) reported that they would recommend chemotherapy for patients with good performance status, and approximately half (adjusted rate, 38% to 53%) reported they would recommend chemotherapy for patients with poor performance status ($P < .001$; Fig). Compared with patient factors, physician and practice characteristics were less strongly associated with chemotherapy recommendations in adjusted analyses.

BIAS, CONFOUNDING FACTORS, AND DRAWBACKS: Findings are based on self-reported recommendations, not actual behavior. It is uncertain whether oncologists would have responded differently if performance status had been specified as being secondary to the cancer, its symptoms, or other comorbidities. Actual treatment recommendations would likely be influenced by patient preferences, which were not provided as part of the clinical scenarios. Finally, oncologists in this study were surveyed in 2006 to 2008; responses might differ among oncologists surveyed more recently.

REAL-LIFE IMPLICATIONS: Approximately half of all patients with NSCLC are diagnosed with stage IV disease. A substantial proportion of these present with poor performance status. Evidence indicates that chemotherapy can prolong survival by a median of 8 to 12 weeks in patients with stage IV NSCLC and good performance status compared with best supportive care alone, and—for much of the past decade—guidelines have recommended its use in patients with good performance status. We found strong consensus among oncologists in recommending chemotherapy in patients with advanced NSCLC and good performance status, but substantial variability in

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recommending chemotherapy for patients with poor performance status, with nearly half of oncologists recommending chemotherapy. This finding is notable given that guidelines do not recommend chemotherapy use in such patients. The relatively high rate of chemotherapy recommendations for patients with poor performance status despite the unfavorable risk–benefit profile highlights the need for ongoing work to define high-value care in oncology, and to implement and evaluate strategies to align incentives for such care. [JOP](#)

FIG. Likelihood of physicians recommending chemotherapy for a 55-year-old patient with stage IV non–small-cell lung cancer with varying levels of functional status and pain. PS, performance status.

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Abstract

Purpose

Chemotherapy prolongs survival in patients with advanced non-small-cell lung cancer. However, few studies have included patients with poor performance status. This study examined rates of oncologists' recommendations for chemotherapy by patient performance status and symptoms and how physician characteristics influence chemotherapy recommendations.

Methods

We surveyed medical oncologists involved in the care of a population-based cohort of patients with lung cancer from the CanCORS (Cancer Care Outcomes Research and Surveillance) study. Physicians were queried about their likelihood to recommend chemotherapy to patients with stage IV lung cancer with varying performance status (Eastern Cooperative Oncology Group performance status 0 [good] v 3 [poor]) and presence or absence of tumor-related pain. Repeated measures logistic regression was used to estimate the independent associations of patients' performance status and symptoms and physicians' demographic and practice characteristics with chemotherapy recommendations.

Results

Nearly all physicians (adjusted rate, 97% to 99%) recommended chemotherapy for patients with good performance status, and approximately half (adjusted rate, 38% to 53%) recommended chemotherapy for patients with poor performance status ($P < .001$). Compared with patient factors, physician and practice characteristics were less strongly associated with chemotherapy recommendations in adjusted analyses.

Conclusion

Strong consensus among oncologists exists for chemotherapy in patients with advanced non-small-cell lung cancer and good performance status. However, the relatively high rate of chemotherapy recommendations for patients with poor performance status despite the unfavorable risk-benefit profile highlights the need for ongoing work to define high-value care in oncology and to implement and evaluate strategies to align incentives for such care.

ASSOCIATED CONTENT

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INTRODUCTION

Lung cancer remains the leading cause of cancer-related mortality in the United States. In 2009, there were more than 219,000 new cases of lung cancer diagnosed, and more than half were stage IV at diagnosis.¹ Metastatic non-small-cell lung cancer (NSCLC) remains incurable; however, chemotherapy has been shown to improve survival by approximately 2 to 3 months in randomized clinical trials²⁻⁵ and routine practice⁶ and may improve quality of life in patients with good performance status.⁷⁻¹⁰ National Comprehensive Cancer Network guidelines recommend chemotherapy for patients with good to fair performance status (Eastern Cooperative Oncology Group [ECOG] 0 to 2) but not poor performance status (ECOG 3 to 4).¹¹ American Society of Clinical Oncology (ASCO) guidelines state that chemotherapy prolongs survival and is appropriate for selected patients with stage IV NSCLC.¹²

Despite accumulated evidence from numerous trials and meta-analyses and guideline recommendations, studies have found physician beliefs and attitudes about treatment for advanced NSCLC vary within and across specialties and are inconsistent with published evidence.¹³⁻¹⁶ A survey of American Academy of Chest Physicians members also found substantial variations and deviations from guidelines in respondents' beliefs about treatment for patients with stage IV NSCLC.¹⁷

These studies of physicians' beliefs and treatment recommendations for lung cancer have examined few correlates of physician self-reported treatment recommendations other than physician training and experience with patients with lung cancer.^{14,16} To better understand factors associated with physicians' recommendations for chemotherapy for stage IV NSCLC, we surveyed medical oncologists caring for patients with lung cancer. Our objectives were to examine rates of physicians' recommendations for chemotherapy, and whether these vary by patients' performance status and symptoms, and how physician and practice characteristics influence oncologists' reports of recommendations for chemotherapy.

METHODS

Study Design

Data for this study were collected by the CanCORS (Cancer Care Outcomes Research and Surveillance) Consortium^{18,19} as part of a multiregional study of care in a population-based

cohort of approximately 10,000 patients diagnosed with lung or colorectal cancer during 2003 to 2005 in Northern California, Los Angeles County, North Carolina, Iowa, or Alabama or who received care in one of five large health maintenance organizations or 15 Veterans Affairs (VA) health care system study sites. Data collection included patient interviews, medical record abstractions, and physician surveys. The study was approved by the human subjects committees at all participating institutions. This analysis used only physician survey data.

Study Population

We surveyed physicians named by patients participating in the CanCORS study during 2006 to 2008. Details regarding the physician survey methods have been published elsewhere.²⁰

Of 6,871 physicians for whom contact information was verified, 4,188 (61.0%) responded. After restricting the sample to physicians who identified themselves as medical oncologists ($n = 578$) who saw at least one patient with lung cancer in the past year ($n = 536$) and excluding physicians who did not respond to all items about lung cancer treatment recommendations ($n = 5$) or who were still in training ($n = 63$), our final sample included 468 physicians.

Survey Instrument

To understand the influence of patient performance status and symptoms on physicians' chemotherapy recommendations, we asked each physician to respond to the following scenarios: How likely are you to recommend chemotherapy for the following patients? A 55-year-old man with stage IV NSCLC who (1) continues to work and perform usual activities and has no symptoms (ie, ECOG performance status 0); (2) continues to work and perform his usual activities but has abdominal pain because of liver metastasis, which often keeps him up at night (ie, ECOG performance status 0 and pain); (3) spends more than 50% of his time in bed because of severe fatigue but has no other symptoms (ie, ECOG performance status 3); or (4) spends more than 50% of his time in bed because of severe fatigue and also has abdominal pain because of liver metastasis, which often keeps him up at night (ie, ECOG performance status 3 and pain). Physicians responded using a 4-point Likert scale, where 1 is very unlikely, 2 is somewhat unlikely, 3 is somewhat likely, and 4 is very likely. Physicians also provided information about personal and practice characteristics, including specialty, age, sex, race/ethnicity, board certification, US or Canadian medical

graduate, teaching involvement, practice setting type, percentage of patients in managed care, number of patients with lung cancer cared for in the last month, influence of administering chemotherapy on income (medical oncologists only), attendance at tumor board, clinical trial participation, and Community Clinical Oncology Program–affiliated practice or National Cancer Institute–designated cancer center (Table 1).

Statistical Analysis

Item nonresponse was less than 2% to 3% for most variables, and we used multiple imputation for missing data.²¹ We categorized oncologists' recommendations for chemotherapy as very or somewhat likely to recommend versus very or somewhat unlikely to recommend. We dichotomized because the response options were not linear; however, sensitivity analyses treating the Likert scale as ordinal produced similar findings (data not shown).

We created a summed score of the number of recommendations for chemotherapy across the four scenarios (ie, good performance status, no symptoms; good performance status with pain; poor performance status, no symptoms; and poor performance status with pain) to create a single variable reflecting the number of scenarios for which each physician recommended treatment. The distribution ranged from 0 to 4, with a mean of 2.88 (standard deviation, 0.88) and a median of 3; a higher score indicated higher frequency of recommending chemotherapy. We compared the number of recommendations for chemotherapy by physician and practice characteristics using bivariate Kruskal-Wallis and rank sum tests.

We used repeated measures logistic regression with generalized estimating equations²² to estimate the independent effect of physician and practice characteristics associated with recommending chemotherapy. The dependent variable (recommendation for chemotherapy) included one observation per physician for each of the four scenarios, which varied by patient performance status and symptoms. Independent variables included patient characteristics (good v poor performance status; presence v absence of pain) and all physician variables with *P* less than .10 on bivariate testing. Because we were primarily interested in the joint effects of patient performance status and symptoms on recommendations, we included a term for their interaction in the model. We calculated adjusted rates of the outcome of interest (treatment recommendation). Analyses adjusted SEs for correlation of recommendations within physicians. In a

second model, we included variables reflecting oncologists' perceived effects of chemotherapy on survival and quality of life to assess whether physicians' beliefs accounted for any of the associations we observed.

RESULTS

Most medical oncologists were age 50 years or older (54%), men (77%), and engaged in teaching (50%; Table 1). Most oncologists believed that chemotherapy would substantially or somewhat increase both survival (93%) and quality of life (80%) in a newly diagnosed 55-year-old patient with stage IV lung cancer who was otherwise healthy with no symptoms.

Oncologists' recommendations for chemotherapy varied substantially by patient performance status and less so by presence of pain (Fig 1). Most oncologists were very likely to recommend chemotherapy for a 55-year-old man with stage IV lung cancer and good performance status, with or without pain (98.9% and 97.4%, respectively). Fewer oncologists were very or somewhat likely to recommend chemotherapy for a 55-year-old man with poor performance status and no pain (53.0%), even fewer if he also had pain (38.2%).

The mean number (of the four scenarios) for which oncologists were very or somewhat likely to recommend chemotherapy was 2.88 (standard deviation, 0.88). Unadjusted associations are listed in Table 1.

In adjusted analyses, the patient's performance status was strongly associated with the likelihood of chemotherapy recommendation (Table 2). Although nearly all physicians recommended chemotherapy for the 55-year-old patient with good performance status and no pain (adjusted proportion, 97%) or with pain (99%), fewer recommended chemotherapy for the patient with poor performance status and no pain (53%) or with poor performance status and pain (38%; *P* < .001). Oncologists in office-based multispecialty group and hospital settings were less likely to recommend chemotherapy than oncologists in solo practice. We found a similar pattern in the adjusted analysis restricted to the poor performance status scenarios only (Appendix Table A1, online only).

In a second model, summarized in Table 2, we included variables representing beliefs regarding the effects of chemotherapy on survival and quality of life to assess whether such beliefs further explained any of the observed associations. In this model, beliefs that chemotherapy somewhat or substantially increased survival and somewhat or substantially improved quality of life were not associated with greater likelihood of chemotherapy recommendation. The effect sizes

Table 1. Physician and Practice Characteristics Associated With Recommendations for Chemotherapy

Characteristic	Physicians (%)	Mean (SD) No. of Four Scenarios in Which Chemotherapy Was Recommended	P*
Total	100	2.88 (0.88)	
Physician age, years			.89
< 40	19.2	2.82 (.89)	
40-49	27.2	2.87 (.90)	
50-54	20.0	2.90 (.87)	
55-59	19.2	2.94 (.87)	
≥ 60	14.4	2.81 (.89)	
US medical graduate			.30
Yes	77.7	2.85 (.89)	
No	22.3	2.96 (.85)	
Sex			.37
Male	77.1	2.86 (.89)	
Female	22.9	2.93 (.85)	
Race/ethnicity			.46
Non-Hispanic white	67.3	2.87 (.91)	
Hispanic	3.7	2.65 (.79)	
Non-Hispanic black	2.2	3.00 (.94)	
Asian	24.8	2.87 (.83)	
Other	2.0	3.33 (1.00)	
Board certified in specialty			.84
Yes	91.9	2.88 (.88)	
No	8.1	2.92 (.88)	
Teaching, days per month			.76
None	50.4	2.88 (.90)	
1-5	30.8	2.90 (.87)	
≥ 6	18.8	2.83 (.88)	
Practice setting			< .001
Office based, solo	11.2	3.29 (.78)	
Office based, single-specialty group	38.2	2.97 (.89)	
Office based, multispecialty group	21.0	2.70 (.89)	
Office based, other/unknown	1.3	3.00 (1.10)	
Hospital	28.3	2.72 (.85)	
No. of patients with lung cancer seen in previous month			.03
0-6	27.6	2.87 (.92)	
7-10	23.9	2.73 (.84)	
11-20	24.9	2.86 (.85)	
≥ 21	23.6	3.07 (.90)	
Proportion of patients in managed care, %			.15
0-20	33.7	2.91 (.88)	
21-40	24.1	2.99 (.89)	
41-70	19.3	2.96 (.95)	
71-100	22.9	2.73 (.84)	

(continued on following page)

Table 1. Physician and Practice Characteristics Associated With Recommendations for Chemotherapy (continued)

Characteristic	Physicians (%)	Mean (SD) No. of Four Scenarios in Which Chemotherapy Was Recommended	P*
Income change resulting from administering chemotherapy			.56
Likely to increase	29.2	2.89 (.93)	
Not likely to increase	70.8	2.86 (.86)	
Practice part of CCOP			.40
Yes	34.6	2.82 (.89)	
No	65.4	2.90 (.88)	
Practice at NCI cancer center			.006
Yes	17.3	2.61 (.90)	
No	82.7	2.93 (.87)	
Attend tumor board meetings			.17
Weekly	68.4	2.82 (.87)	
Monthly	20.9	2.96 (.91)	
Quarterly or less frequently	10.7	3.02 (.88)	
Enroll patients in clinical trials			.17
Yes	88.2	2.85 (.87)	
No	11.8	3.04 (.94)	
Study site			.03
Cancer Research Network	8.1	2.82 (.83)	
Northern California†	26.3	2.82 (.87)	
Los Angeles County	24.6	3.08 (.90)	
Alabama	10.5	3.02 (.90)	
Iowa	11.5	2.78 (.88)	
North Carolina	11.3	2.75 (.90)	
VA hospital	7.7	2.61 (.80)	
Physician beliefs about chemotherapy effects in stage IV NSCLC			.18
Perceived effect on survival			
Substantially or somewhat decreases	0.7	2.00 (2.0)	
No effect	5.9	2.63 (.88)	
Substantially or somewhat increases	93.4	2.90 (.87)	
Perceived effect on QOL			.27
Substantially or somewhat decreases	14.6	2.72 (.90)	
No effect	5.0	2.78 (1.13)	
Substantially or somewhat increases	80.4	2.91 (.86)	

Abbreviations: CCOP, Community Clinical Oncology Program; NCI, National Cancer Institute; NSCLC, non–small-cell lung cancer; QOL, quality of life; SD, standard deviation; VA, Veterans Affairs.

*On the basis of Wilcoxon rank sum test for dichotomous variables and Kruskal-Wallis test for multilevel categorical variables.

†One of eight counties.

of other covariates did not change appreciably with the inclusion of the belief items.

DISCUSSION

Approximately half of all patients with NSCLC are diagnosed with stage IV disease, which is incurable. Strong evidence from

trials indicates that chemotherapy can prolong survival by a median of 8 to 12 weeks and improve quality of life in patients with stage IV NSCLC and good performance status compared with best supportive care alone.²⁻⁵ Guidelines have recommended its use in patients with good performance status for much of the past decade.^{12,23} We found high adjusted rates

FIG 1. Likelihood of physicians recommending chemotherapy for a 55-year-old patient with stage IV non–small-cell lung cancer with varying levels of functional status and pain. PS, performance status.

($\geq 97\%$) of recommendations for chemotherapy for patients with good performance status, indicating that oncologists generally agree with one another and with guidelines. This finding is in contrast to those of some previous studies, in which physicians expressed pessimism regarding the utility of chemotherapy in patients with late-stage NSCLC.^{13,14} This may be reflective of two phenomena. First, diffusion of trial evidence supporting use of chemotherapy in patients with late-stage disease and good performance status has likely increased. Second, prior studies that did not allow physicians to differentially assign ratings by performance status may have motivated them to average their ratings for patients with good and poor performance status.

A substantial proportion of patients with late-stage NSCLC present with poor performance status.²⁴ To date, definitive trial evidence is lacking regarding the risks and benefits of chemotherapy in these patients, but trends indicate a less favorable risk–benefit ratio than in patients with good performance status, and guidelines do not recommend treatment of these patients with chemotherapy outside of a clinical trial.^{11,12} In our study, we observed substantial variability in recommendations for chemotherapy for patients with poor performance status, with nearly half (38% to 53%) of oncologists recommending chemotherapy. This finding is notable, given that guidelines do not recommend chemotherapy use for patients with advanced NSCLC with poor performance

status. One possible explanation is that physicians may not be aware of the guidelines, which, if true, might point to the need for increased dissemination of guidelines. However, it is unlikely that this could be the sole explanation. Another explanation may be that physicians are aware of the guidelines but disagree with them because they are based on highly selected patient samples; physicians may believe that their patients will do better.²⁵ Consistent with guidelines, many physicians will not offer chemotherapy in clinical scenarios where effectiveness has not been demonstrated, especially if their own patients have experienced poor outcomes such as high levels of toxicity with chemotherapy in the past. However, our data suggest that an approximately equal number of physicians will offer therapy, perhaps generalizing trial results in patients with good performance status to others. Such an approach may be reinforced by past experiences with positive results; even those experiences representing outlier cases may leave powerful impressions about the value of treatment even in seemingly bleak circumstances. A trial of chemotherapy may be all the more likely when patients and families express a strong willingness to accept an increased risk of toxicity for the possibility of even modest marginal survival benefits.

Currently, a large proportion of patients commonly seen in real-world practice—those with poor performance status, comorbidities, or older age—are not eligible for most clinical

Table 2. Adjusted Rates of Physicians' Recommendations for Chemotherapy Across Four Scenarios

Variable	Model One		Model Two*	
	Adjusted Rate	P†	Adjusted Rate	P†
Scenario of 55-year-old patient		< .001		< .001
PS 0 or 1, no symptoms	0.97		0.97	
PS 0 or 1, with pain	0.99		0.99	
PS 3, no symptoms	0.53		0.53	
PS 3, with pain	0.38		0.38	
Practice setting		.03		.02
Office based, solo	0.81		0.82	
Office based, single-specialty group	0.73		0.72	
Office based, multispecialty group	0.69		0.69	
Office based, other/unknown	0.70		0.70	
Hospital	0.70		0.70	
Practice at cancer center		.007		.004
Yes	0.66		0.65	
No	0.73		0.73	
No. of patients with lung cancer seen in previous month		.01		.01
0-6	0.71		0.71	
7-10	0.68		0.68	
11-20	0.71		0.70	
≥ 21	0.78		0.78	
Study site		.32		.33
Cancer Research Network	0.71		0.71	
Northern California‡	0.71		0.71	
Los Angeles County	0.76		0.76	
Alabama	0.74		0.73	
Iowa	0.69		0.69	
North Carolina	0.71		0.70	
VA hospital	0.68		0.69	
Perceived effect of chemotherapy on survival				.06
Substantially or somewhat decreases			0.51	
No effect			0.64	
Substantially or somewhat increases			0.73	
Perceived effect of chemotherapy on QOL				.49
Substantially or somewhat decreases			0.69	
No effect			0.72	
Substantially or somewhat increases			0.72	

Abbreviations: PS, performance status; QOL, quality of life; VA, Veterans Affairs.

*Model two includes oncologists' perceptions about benefits of chemotherapy on survival and QOL.

†Using logistic regression with generalized estimating equations to control for all other variables in the table.

‡One of eight counties.

trials.²⁶ Among patients at one large cancer center, for example, 70% would not have been eligible for major clinical trials, 35% because of poor performance status.^{24,27} Physicians must make judgments about the generalizability of clinical trial results and the applicability of guidelines to their own patients. Current guidelines generally extend clinical trial

results to the elderly even as they do not recommend generalizing to patients with poor performance status (ECOG 3 or 4).^{11,12} This inconsistent approach likely represents the difference in anticipated benefit when extrapolating from available clinical trial data. Meta-analyses and subgroup analyses suggest that the benefit of chemotherapy in older

patients with NSCLC is of a magnitude similar to that in younger patients, although there may be a greater risk of toxicity.²⁸

In contrast, performance status is a key predictor of survival,²⁹ so even with the same relative benefit, the absolute benefit in survival declines with worse performance status.^{30,31} Although the improvement in survival with platinum-based doublet therapy for patients with excellent performance status (ECOG 0 or 1) is approximately 2 to 3 months, it is only 1 to 2 months in patients with fair performance status (ECOG 2)^{30,31} and is almost certainly less (ie, weeks) for patients with poor performance status. However, such patients would still experience at least as much toxicity and negative impact on quality of life as patients with better performance status. Such patients may benefit more from a shift toward palliative and supportive interventions.³²

On the basis of the results of this analysis, it did not seem as though physicians' likelihood of recommending chemotherapy was primarily motivated by the goal of palliation of symptoms, in either the good or poor performance status scenarios. In fact, our findings indicate that presence of pain was associated with lower rates of recommending chemotherapy. This result may be an indication that oncologists may have varied in their interpretation of the significance of the presence of pain. Some may have viewed presence of pain as a marker for greater frailty and lower likelihood of the patient withstanding treatment. By stratifying vignettes by performance status as well as symptoms, our study improves on prior work examining approaches to chemotherapy recommendations for NSCLC, providing greater clinical detail for respondents to consider in their decision making about chemotherapy recommendations.

We did not observe differences in recommendations for chemotherapy on the basis of oncologists' self-reported methods of compensation or the proportions of managed care patients in their practices. However, we did observe that oncologists practicing in solo practices and those practicing in settings other than cancer centers were more likely than other oncologists to recommend chemotherapy. This finding is consistent with the fact that many oncologists in these settings derive at least some income from the administration of chemotherapy.

These findings contribute to a body of evidence highlighting critical concerns over quality and value in cancer care. Prior work has raised significant questions about oncologists' communication with patients about the goals of chemotherapy

and end-of-life decision making,^{33,34} and other work has underscored the potential for devastating financial impact of cancer and its treatment.^{35,36} Inadequate communication about the potential physical and financial harms of chemotherapy may contribute to patterns of recommendations consistent with those we observed in this study. Sustained efforts are needed to raise awareness among physicians and patients about the limitations and potential harms of chemotherapy, even when planned with palliative intent,³⁷ and about the availability and benefits of palliative and supportive care interventions. Improved training for clinicians in the conduct of meaningful goals-of-care discussions also has the potential to improve care for patients with advanced-stage cancers.^{32,38}

Numerous initiatives are under way to define, measure, and enhance value in cancer care.³⁹ ASCO has presented its bold new framework to assess the value of cancer treatment options and is in the process of collecting community comments.⁴⁰ Disseminating messages to raise awareness about practices already known to be of high value has been another approach. As part of the Choosing Wisely campaign of the American Board of Internal Medicine Foundation, ASCO identified chemotherapy for patients with advanced solid tumors and poor performance status as one of several costly procedures with limited evidence of benefits outweighing burdens that should be questioned.⁴¹ Other approaches seek to use evidence-based care management and/or approaches that realign financial incentives to enhance quality. Insurers are experimenting with new models of delivering and paying for oncology care, such as the Oncology Care Model and clinical pathways models, in the hope of enhancing quality care and reducing unnecessary costs.⁴² Use of clinical pathways for selected patients with NSCLC has been found to be associated with lower costs, with no difference in overall 12-month survival.⁴³

Strengths of this study include a large, geographically diverse sample of oncologists from multiple practice settings who care for patients with lung cancer. However, this study has limitations. First, our findings are based on self-reported recommendations for chemotherapy rather than actual behavior. Second, we cannot know with certainty whether physician respondents had a shared understanding of the performance status constructs represented in our scenarios or if they would have responded differently if performance status had been specified as being secondary to the cancer, its symptoms, or other comorbidities. Physicians may also have

varied in their interpretations of the significance of symptoms (ie, pain) in reaching their decisions. This may partly explain the variation we observed in recommendations for patients with poor performance status. Oncologists' attitudes and behaviors likely also vary by patient preferences, which were not provided to them as part of the clinical scenarios. Without explicit information about patient preferences, oncologists may have relied on their most prevalent and most striking prior experiences with patient and family expectations and preferences. Collapsing the four response options into two categories somewhat oversimplifies the detail regarding the range of responses. However, in ordered logistic regression analyses, findings were similar. Finally, the oncologists in our study were surveyed in 2006 to 2008; it is possible that responses might have differed if they had been surveyed more recently.

In conclusion, analyses of this survey of oncologists caring for patients with NSCLC indicated overwhelming agreement in favor of recommending chemotherapy for patients with stage IV NSCLC with good performance status regardless of whether they had cancer-related pain, representing a convergence of opinion consistent with current clinical guidelines. However, the relatively high rate of chemotherapy recommendations for patients with poor performance status, for whom the risk–benefit profile is unfavorable, highlights the urgent need for the measurement and dissemination of information defining high-quality and high-value care in oncology, not only for patients well represented in clinical trials but also for more heterogeneous patient subgroups for whom decisions are less clear, and strategies to align incentives to support the delivery of such care, particularly as prices continue to soar for chemotherapy and targeted oncology therapies. **JOP**

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AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

Variations in Oncologist Recommendations for Chemotherapy for Stage IV Lung Cancer: What Is the Role of Performance Status?

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Appendix

Table A1. Adjusted Rates of Physicians' Recommendations for Chemotherapy for Patients With Poor PS (PS 3) in Model One

Variable	Adjusted Rate	P*
Overall		< .001
Scenario of 55-year-old patient by symptoms		
No pain (ref)	0.53	—
Pain	0.38	< .001
Practice setting		.035
Office based, solo (ref)	0.63	—
Office based, single-specialty group	0.47	.019
Office based, multispecialty group	0.40	.002
Office based, other/unknown	0.42	.235
Hospital	0.41	.004
Practice at cancer center		.005
Yes	0.33	.005
No (ref)	0.48	—
No. of patients with lung cancer seen in previous month		.010
0-6 (ref)	0.44	—
7-10	0.38	.270
11-20	0.43	.840
≥ 21	0.57	.024
Study site		.336
Cancer Research Network	0.44	.230
Northern California	0.44	.081
Los Angeles County (ref)	0.53	—
Alabama	0.49	.526
Iowa	0.39	.047
North Carolina	0.44	.167
VA hospital	0.37	.063

Abbreviations: PS, performance status; VA, Veterans Affairs.

*Using logistic regression with generalized estimating equations to control for all other variables in the table.