

Medical Oncologists' Perceptions of Financial Incentives in Cancer Care

Jennifer L. Malin, Jane C. Weeks, Arnold L. Potosky, Mark C. Hornbrook, and Nancy L. Keating

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A B S T R A C T

Purpose

The cost of cancer care continues to increase at an unprecedented rate. Concerns have been raised about financial incentives associated with the chemotherapy concession in oncology practices and their impact on treatment recommendations.

Methods

The objective of this study was to measure the physician-reported effects of prescribing chemotherapy or growth factors or making referrals to other cancer specialists, hospice, or hospital admissions on medical oncologists' income. US medical oncologists involved in the care of a population-based cohort of patients with lung or colorectal cancer from the Cancer Care Outcomes Research and Surveillance (CanCORS) study were surveyed regarding their perceptions of the impact of prescribing practices or referrals on their income.

Results

Although most oncologists reported that their incomes would be unaffected, compared with salaried oncologists, physicians in fee-for-service practice, and those paid a salary with productivity incentives were more likely to report that their income would increase from administering chemotherapy (odds ratios [ORs], 7.05 and 7.52, respectively; both $P < .001$) or administering growth factors (ORs, 5.60 and 6.03, respectively; both $P < .001$).

Conclusion

A substantial proportion of oncologists who are not paid a fixed salary report that their incomes increase when they administer chemotherapy and growth factors. Further research is needed to understand the impact of these financial incentives on both the quality and cost of care.

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INTRODUCTION

Since former President Nixon declared war on cancer four decades ago, the cost of treating cancer has increased dramatically as a result of new diagnostic and treatment technologies and pharmaceutical and biologic treatment innovations. The annual cost of cancer care in the United States exceeded \$124 billion in 2010 and is projected to be \$173 billion in 2020.¹

In addition to the rising cost of initial cancer treatment,² care is increasingly aggressive near the end of life, with greater use of chemotherapy just before death, more visits to the emergency department, more hospitalizations, and more admissions to the intensive care unit.³⁻⁵

Most oncology services are reimbursed as independent units, with separate payments for physician services, diagnostic testing, and chemotherapy administration.⁶ Thus, similar to most

US physicians, medical oncologists' compensation is generally based on their productivity—that is, the more services they provide, the more they bill, and the greater their own individual compensation.⁷ The practice of medical oncology involves the administration of chemotherapy and supportive medications, such as growth factors, which has led to many private practices having infusion centers in their offices. The chemotherapy concession is the source of approximately 65% of the revenue in a typical oncology practice dwarfing the income from evaluation and management.⁸ The delivery of chemotherapy in physicians' offices has potential advantages for patients because they may be able to receive treatment in their own community and not have to travel to a hospital for their cancer therapy. However, oncologists who administer chemotherapy in their offices have traditionally charged payers more than their cost for acquiring the drugs, so there is potential for financial

Jennifer L. Malin, Jonsson Comprehensive Cancer Center and David Geffen School of Medicine at University of California at Los Angeles and Greater Los Angeles VA Healthcare System, Los Angeles, CA; Jane C. Weeks, Dana-Farber Cancer Institute; Nancy L. Keating, Brigham and Women's Hospital and Harvard Medical School, Boston, MA; Arnold L. Potosky, Lombardi Comprehensive Cancer Center, Georgetown University Medical Center, Washington, DC; and Mark C. Hornbrook, Center for Health Research, Kaiser Permanente Northwest, Portland, OR.

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Corresponding author: Jennifer L. Malin, MD, PhD, WellPoint, 1 WellPoint Way, Thousand Oaks, CA 91362; e-mail: jennifer.malin@wellpoint.com.

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conflicts of interest to influence their prescribing behavior.^{6,9-12} Indeed, it has been suggested that the increased income to physicians from prescribing growth factors has contributed to their widespread adoption.¹³ Despite these anecdotes from the press, little is known about the actual impact of prescribing chemotherapy or growth factors on medical oncologists' income.

We used survey data from medical oncologists participating in the Cancer Care Outcomes Research and Surveillance (CanCORS) study¹⁴ to compare the perceived effects on personal income of administering chemotherapy and growth factors, referring patients to other cancer specialists, referring patients to hospice, and admitting patients to the hospital. In addition, we sought to understand how physician and practice characteristics influence physicians' perception that ordering any of these services would increase their income.

METHODS

Study Design

Data for this study were collected as part of a national study of variations in care and outcomes of care for patients with lung or colorectal cancer undertaken by the CanCORS Consortium.¹⁰ CanCORS examined care delivered to population-based cohorts totaling more than 10,000 patients initially diagnosed with lung or colorectal cancer in 2003 to 2005 living in Northern California, Los Angeles County, North Carolina, Iowa, or Alabama or who received care in one of five large health maintenance organizations (HMOs) or 15 Veterans Health Administration (VHA) study sites. Data were collected from patient interviews, medical record abstractions, physician surveys, and surveys of informal caregivers. The study was approved by the human subjects committees at all participating institutions; the investigators obtained informed consent from each participant or each participant's guardian. This analysis uses data only from physician surveys.

Study Population

We surveyed medical oncologists, surgeons, radiation oncologists, and primary care providers named by the patients participating in the CanCORS study as serving important roles in their cancer care from January 2005 through March 2007. Details regarding the physician survey methodology, including characterization of nonresponders, have been published previously.¹⁵ This study includes only the medical oncologists who participated in the survey. Of 908 physicians who provided (or discussed) chemotherapy for CanCORS participants for whom contact information was verified, 556 (61%) responded. We included physicians who reported medical oncology as their specialty ($n = 495$) and excluded respondents who did not respond to the items regarding the outcomes of interest ($n = 15$), resulting in a final study sample of 480.

Survey Instrument

To understand the physician-reported effects on their personal income of ordering various services or referring patients for various services, medical oncologists were asked "How, if at all, is your income most likely to change as a result of (a) referring more patients to other cancer specialists; (b) enrolling more patients in hospice; (c) admitting more patients to the hospital; (d) enrolling more patients in clinical trials; (e) prescribing/administering more chemotherapy; and (f) prescribing/administering more growth factor (eg, granulocyte colony-stimulating factor)." Response choices included: (1) Likely to increase, (2) Likely to decrease, (3) Not likely to change, and (4) Don't know. Physicians also provided information about personal and practice characteristics, including practice type (characterized as HMO, VHA/government, solo office, single-specialty office group, multispecialty office group, hospital), proportion of patients enrolled in managed care plans, proportion of patients reimbursed on a capitated or prepaid basis, dependence of salary on productivity (asked only of salaried physicians), and among nonsalaried physicians, type of base clinical income (exclusively fee-for-service, predominantly fee-for-service, equal mixture of fee-for-service and capitation, predominantly

capitation, and exclusively capitation). An analysis of factors influencing physicians' enrollment of patients in clinical trials has been published separately and is therefore not included here.¹⁶

Statistical Analysis

Overall, nonresponse to items was less than 2% to 3% for most variables. We used multiple imputation to impute missing data for these items.¹⁷ We dichotomized the response choices into income likely to increase and income not likely to increase, including in the latter category the responses "not likely to change," "likely to decrease," and "don't know."

Since only 1% of physicians reported that their income would be likely to increase with referrals to other cancer specialists or hospice and just 11% reported that income was associated with hospitalizations, these outcomes were not considered in subsequent analyses. We used χ^2 tests to assess the association of physician and practice characteristics and the dichotomized response regarding the effect on income of prescribing/administering more chemotherapy and prescribing/administering more growth factors. Specifically, we assessed age, sex, race/ethnicity, board certification, United States or Canadian medical school graduate, teaching involvement, practice type, percentage of patients in managed care, study site, practice at a National Cancer Institute (NCI)-designated cancer center, and physician base payment (salary not based on productivity, salary based on productivity, predominantly fee-for-service, or mixture of fee-for-service and capitation [with at least 50% capitation]). We used logistic regression to estimate the independent associations of physician and practice characteristics with physicians' perceptions that their income would be increased by administering chemotherapy or growth factors.

RESULTS

Just over half the respondents (52%) were age 50 years or older, 23% were female, 78% were graduates of US or Canadian medical schools, 92% were board certified, and 51% were engaged in teaching. Other characteristics of the physicians are delineated in Table 1.

Most medical oncologists reported that their income was unaffected by their prescribing of chemotherapy or growth factors or referrals to other cancer specialists, hospice, or hospital admissions (Fig 1). However, 27% indicated that their income would be increased by administering more chemotherapy, 25% by prescribing more growth factors, and 11% by admitting more patients to the hospital.

Although several factors were associated with a greater likelihood of reporting a positive association between income and the two outcomes of interest (Table 1), in multivariate analyses practice characteristics and physician payment models were most strongly associated with income (Table 2). After controlling for payment model and type of practice, the amount of time spent teaching and practicing at an NCI cancer center were no longer associated with increased income for any of the outcomes; however, graduates of US or Canadian medical schools were significantly more likely to report that prescribing growth factors increased their income compared with graduates of foreign medical schools (odds ratio [OR], 2.99; 95% CI, 1.39 to 6.44).

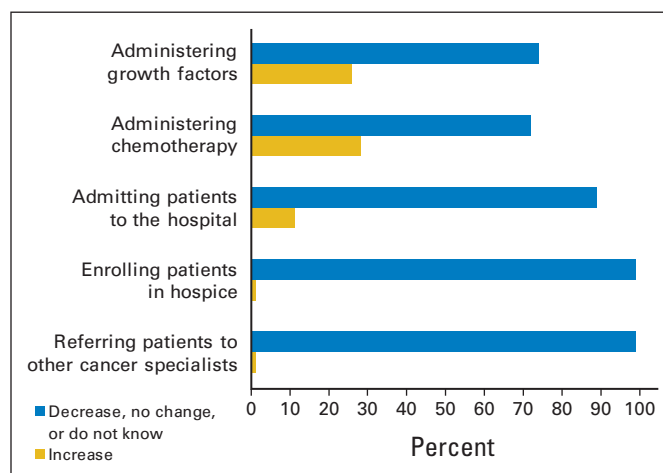
Compared with physicians who were paid a salary not based on productivity, the odds of oncologists reporting that their income would increase with administration of chemotherapy were 7.52 (95% CI, 3.29 to 17.23) for those with mostly fee-for-service payment, 7.05 (95% CI, 3.22 to 15.43) for those paid a salary based on productivity, and 7.03 (95% CI, 1.55 to 31.73) for those paid fee-for-service and capitation (with > 50% capitation). Physicians in solo and single-specialty group practice were significantly more likely to report increased income from ordering chemotherapy (OR, 9.90; 95% CI, 2.75

Table 1. Physician and Practice Characteristics Associated With Self-Report That Referrals or Prescribing Increases Income

Characteristic	No. of Physicians	Physicians Who Report an Increase in Income With Administering:			
		Growth Factor		Chemotherapy	
		%	P	%	P
Overall	480	25		27	
Physician characteristics					
Age, years			.11		.33
< 40	92	19	20	23	
40-49	135	28	30	31	
50-54	90	19	32	32	
55-59	89	19	19	21	
≥ 60	72	15	22	27	
Graduate of US or Canadian medical school			.08		.63
Yes	377	79	27	28	
No	102	21	19	25	
Sex			.03		.06
Male	367	76	28	29	
Female	113	24	18	20	
Race/ethnicity			.32		.31
Non-Hispanic white	316	66	26	28	
Asian	115	24	26	27	
Other	49	10	15	20	
Board certified in specialty			.11		.14
Yes	438	91	26	28	
No	40	8	15	18	
Teaching, days per month			< .001		< .001
None	229	48	36	37	
1-5	148	31	22	25	
6 or more	97	20	6	8	
Practice characteristics					
Type of practice			< .001		< .001
HMO	86	18	5	6	
VHA/government	46	10	2	4	
Office					
Solo	52	11	37	52	
Single-specialty group	166	35	49	46	
Multispecialty group	51	11	27	31	
Hospital	79	16	3	6	
Proportion of patients in managed care, %			< .001		< .001
≤ 90	372	78	30	32	
> 90	108	23	11	14	
Practice at NCI cancer center			< .001		.003
Yes	97	20	11	16	
No	371	77	29	31	
Physician base clinical payment model					
Salary not based on productivity	203	42	5	5	
Salary based on productivity	133	28	36	38	
All or mostly fee-for-service	122	25	46	51	
Fee-for-service with ≥ 50% capitation	10	2	38	46	

NOTE. No. of physicians missing data on specific characteristics: two, age; one, US medical school graduate; two, board certification; six, teaching status; 12, base clinical payment; 12, NCI cancer center.

Abbreviations: HMO, health maintenance organization; NCI, National Cancer Institute; VHA, Veterans Health Administration.

**Fig 1.** Impact of referrals and prescribing on medical oncologist income.

to 35.60 and OR, 7.18; 95% CI, 2.43 to 21.19, respectively) relative to oncologists in hospital-based practices, controlling for all other factors. Similarly, physicians paid on a fee-for-service basis or by salary based on productivity were more likely to report that their incomes increased from prescribing growth factors (OR, 5.60; 95% CI, 2.47 to 12.71 and OR, 6.03; 95% CI, 2.48 to 13.79, respectively). Compared with those in hospital-based practices, oncologists in solo and single-specialty practices were significantly more likely to report a positive association between their incomes and administration of growth factors (OR, 11.28; 95% CI, 2.08 to 61.30 and OR, 18.76; 95% CI, 4.00 to 87.93). Medical oncologists in HMOs or government health care facilities were not significantly more likely than hospital-based physicians to report a positive impact of administering chemotherapy or growth factors on personal income.

DISCUSSION

The results of this study highlight the financial incentives of physicians in the US health care system that may be contributing to rising cancer care costs. A substantial proportion of medical oncologists reported that their income would increase with administering more chemotherapy or growth factors. However, this finding varied tremendously across practice type and physician payment model. In all, 40% to 50% of physicians whose incomes were based on fee for service or who received a salary with productivity incentives indicated that their income increased when they prescribed chemotherapy or growth factors. Physicians in solo single-specialty practice were also much more likely to perceive income increases than physicians in other types of practice settings. These findings for payment model and practice type persisted, even after adjustment for other confounding physician and practice characteristics. The results of this study corroborate and extend the findings from a previous analysis we published¹⁸ that used data on the actual prescribing of growth factors for patients treated by physicians in this cohort. It showed that 96% of growth factor use in patients with lung and colorectal cancer occurred in situations in which the chemotherapy regimen did not put them at high risk of febrile neutropenia according to the guidelines and thus represented discretionary use of the therapy. Enrollment in an HMO was strongly associated with a lower adjusted odds of discretionary growth factor use, compared with patients not enrolled in an HMO.

Financial Incentives in Cancer Care

Table 2. Adjusted Odds of Physician Self-Report That Prescribing Growth Factors or Chemotherapy Increases Their Income (N = 480)

Characteristic	Administering Growth Factors			Administering Chemotherapy		
	OR	95% CI	P	OR	95% CI	P
Physician characteristics						
Age, years						
< 40	1.0			1.0		
40-49	1.09	0.48 to 2.52	.83	0.87	0.40 to 1.88	.72
50-54	1.41	0.58 to 3.47	.44	0.91	0.39 to 1.12	.83
55-59	0.41	0.16 to 1.07	.07	0.37	0.15 to 0.90	.03
≥ 60	0.48	0.18 to 1.29	.15	0.47	0.18 to 1.13	.09
Graduate of US or Canadian medical school						
No	1.0			1.0		
Yes	2.99	1.39 to 6.44	.005	1.47	0.74 to 2.94	.27
Sex						
Male	1.0			1.0		
Female	0.61	0.31 to 1.21	.15	0.69	0.37 to 1.31	.26
Race/ethnicity						
Non-Hispanic white	1.0			1.0		
Asian	1.49	0.73 to 3.04	.27	0.89	0.46 to 1.72	.73
Other	0.81	0.25 to 2.62	.72	0.71	0.25 to 2.08	.54
Board certified						
No	1.0			1.0		
Yes	2.03	0.65 to 6.34	.22	1.83	0.66 to 5.07	.24
Teaching, days per month						
None	1.0			1.0		
1-5	0.67	0.37 to 1.21	.19	0.82	0.47 to 1.44	.49
6 or more	0.37	0.12 to 1.10	.07	0.45	0.17 to 1.17	.10
Practice characteristics						
Type of practice						
Hospital	1.0			1.0		
HMO	2.40	0.38 to 15.38	.35	1.60	0.39 to 6.64	.52
VHA/government	2.28	0.18 to 29.00	.52	2.03	0.32 to 12.69	.45
Office						
Solo	11.28	2.08 to 61.30	.005	9.90	2.75 to 35.60	.004
Single-specialty group	18.76	4.00 to 87.93	.002	7.18	2.43 to 21.19	.004
Multispecialty group	8.31	1.62 to 42.63	.01	4.63	1.39 to 15.40	.01
Proportion of patients in managed care, %						
< 90	1.0			1.0		
90 or greater (top quartile)	1.07	0.46 to 2.47	.88	1.04	0.49 to 2.23	.92
Practice at NCI cancer center						
No	1.0			1.0		
Yes	0.58	0.25 to 1.37	.22	0.92	0.43 to 1.98	.84
Physician base clinical payment model						
Salary not based on productivity	1.0			1.0		
Salary based on productivity	5.60	2.47 to 12.71	< .001	7.05	3.22 to 15.43	< .001
All or mostly fee-for-service	6.03	2.48 to 13.79	< .001	7.52	3.29 to 17.23	< .001
Fee for service with ≥ 50% capitation	4.44	0.93 to 21.33	.06	7.03	1.55 to 31.73	.01

Abbreviations: HMO, health maintenance organization; NCI, National Cancer Institute; OR, odds ratio; VHA, Veterans Health Administration.

Interestingly, graduates of US and Canadian medical schools were significantly more likely to report financial incentives for prescribing growth factors than graduates of foreign medical schools, even after adjusting for other physician practice characteristics; however, this association was not present for administering chemotherapy. To the best of our knowledge, this difference in perceived financial incentives has not previously been described and the reasons for it are unclear. Some evidence suggests that international medical school graduates may be more likely than other physicians to care for underserved patients, practice in rural areas, and offer volunteer community health care services.¹⁹ Differences in cultural values may result in foreign med-

ical school graduates approaching their medical practice with less emphasis on financial success. Alternatively, graduates of international medical schools may have a lower debt burden when they enter into practice, and this may have an impact on their perception of the financial exigencies of practice.²⁰ This finding underscores the need for further research to elucidate the complex relationship between financial incentives, penalties, and provider behavior.

Because the United States struggles with how best to control health care costs, our results have important implications. Although physician services represent only 20% of health care costs, by ordering health care services, physicians' decisions are responsible for up to

90% of health care expenditures.^{21,22} With the predominance of the private practice model, most physicians are independent practitioners who bill third-party payers for their services. Although capitation and risk-sharing arrangements have been a heavily relied on approach to control health care costs, we found that few oncologists received a substantial portion of their compensation through capitation arrangements. Nevertheless, these physicians were also more likely than physicians paid by salary not based on productivity to report that their income increased from prescribing chemotherapy. Only salaried physicians without any productivity incentives appeared to be free of financial incentives to administer chemotherapy or growth factors. The fact that physicians who received more than half their income from capitated agreements still had financial incentives to prescribe chemotherapy and growth factors could indicate that pharmacy services are not usually included in risk-sharing arrangements, although it is important to note that only 11 physicians in our cohort reported substantial income from capitation. Capitation schemes that include cancer therapy have not been widely adopted because the high cost of cancer care makes risk-sharing too risky for small practices and because of concerns that such arrangements could lead to withholding of necessary care.^{23,24} These findings have important implications for accountable care organizations (ACOs), which involve risk-sharing arrangements between hospitals and physicians, currently being advocated as a potential solution to control Medicare costs.²⁵ Our study suggests that ACOs may have little impact on incentives to increase use of cancer services unless the ACO assumes full risk for cancer services and oncologists are reimbursed only for their clinical services or paid a salary.

Beyond a major overhaul of the US health care system, which would be required if all oncologists were to be salaried, how can the financial inducements to administer chemotherapy and supportive care therapies be decreased? Specialty pharmacy programs that provide cancer drugs to the oncologist's office for infusion, thereby eliminating the chemotherapy concession, are one potentially effective strategy, since they remove any financial incentive associated with administering chemotherapy and growth factors. In a recent pilot project, a managed care organization decreased injectable drug costs by 15% by purchasing drugs through a specialty pharmacy program and supplying the drugs to be infused instead of allowing physicians' offices to "buy and bill."²⁶ However, there are many challenges to successful implementation, including issues related to storage, administration, and concerns about waste if site-of-care laboratory testing indicates that the drug should not be given.²⁷ Another approach that has been proposed involves paying providers for episodes of care (eg, adjuvant therapy for stage III colon cancer) in which the payment would cover all costs of care, including chemotherapy and supportive care drugs.²⁸ The impact of this and other similar approaches on the cost and quality of cancer care is not yet known.

Our results should be viewed in light of several limitations. First, our findings are based on physician self-report of the impact of administering chemotherapy and growth factors on physician income. We do not know whether this accurately reflects the impact of these

services on their income, whether and how often oncologists are influenced by this incentive, or the magnitude of this effect. In the most recent National Oncology Benchmark Report,⁸ practices reported that, on average, 65% of their revenue was from administration of drugs, suggesting that these financial incentives can be substantial. One could argue that such incentives are not necessarily harmful and may in fact be of benefit if they result in more patients receiving high-quality, efficient care. However, as previously mentioned, 96% of growth factor use in the patients cared for by the same physicians included in our analysis was inappropriate according to the guideline recommendations at the time, suggesting that these financial incentives are contributing to waste in the health care system.¹⁴ Finally, it should be noted that we did not explore factors that could lead to a decrease in physicians' income. Because the amount that most payers will reimburse for drugs has substantially decreased over the last decade, some oncologists may find that reimbursements for some drugs may not cover their cost. Although only a few respondents to our survey reported that their income would decrease as a result of administering chemotherapy or prescribing growth factors, this may become more of a concern as cost containment efforts continue to exert pressure on reimbursement.

In conclusion, a substantial proportion of oncologists who are not paid a fixed salary report that their income increases when they administer chemotherapy and growth factors. New payments models are needed to counter or eliminate these incentives to decrease unnecessary care and ensure that health care resources are used most effectively.

AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

Although all authors completed the disclosure declaration, the following author(s) and/or an author's immediate family member(s) indicated a financial or other interest that is relevant to the subject matter under consideration in this article. Certain relationships marked with a "U" are those for which no compensation was received; those relationships marked with a "C" were compensated. For a detailed description of the disclosure categories, or for more information about ASCO's conflict of interest policy, please refer to the Author Disclosure Declaration and the Disclosures of Potential Conflicts of Interest section in Information for Contributors.

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AUTHOR CONTRIBUTIONS

Conception and design: All authors
Collection and assembly of data: Jennifer L. Malin, Jane C. Weeks, Mark C. Hornbrook, Nancy L. Keating
Data analysis and interpretation: All authors
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