

The Role of Primary Care Physicians in Cancer Care

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BACKGROUND: The demand for oncology services in the United States (US) is increasing, whereas a shortage of oncologists looms. There is the need for a better understanding of the involvement of primary care physicians (PCPs) in cancer care.

OBJECTIVE: To characterize the role of PCPs in cancer care, compare it with that of oncologists, and identify factors explaining greater PCP involvement in cancer care.

DESIGN: National survey of physicians caring for cancer patients conducted by the Cancer Care Outcomes Research and Surveillance Consortium.

PARTICIPANTS: 1694 PCPs; 1621 oncologists.

MEASUREMENTS: Questionnaires mailed during 2005 and 2006 examined the participation of physicians in 12 aspects of care for cancer patients.

MAIN RESULTS: Over 90% of PCPs fulfilled general medical care roles for patients with cancer such as managing comorbid conditions, chronic pain, or depression; establishing do-not-resuscitate status; and referring patients to hospice. Oncologists were less involved in these roles. Determining the treatment preferences of individual patients and deciding on the use of surgery were the only cancer care roles in which $\geq 50\%$ of PCPs participated. Twenty-two percent of PCPs reported no direct involvement in cancer care roles while 19% reported heavy involvement. PCPs who were aged ≥ 50 years, were internists or geriatricians, taught medical students, saw more cancer patients, or experienced referral barriers fulfilled more roles. Rural practice location was not associated with greater PCP involvement in cancer care.

CONCLUSIONS: PCPs across the US have an active role in cancer patient management. Determining the optimal interface between PCPs and oncologists in delivering and coordinating cancer care is an important area for future research.

KEY WORDS: primary care; cancer; treatment; practice patterns; health care delivery.

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INTRODUCTION

Cancer is the second leading cause of death in the United States (US), accounting for nearly one-quarter of all deaths annually.¹ An estimated 1.4 million new cancer cases were diagnosed in 2007.² Despite efforts at prevention and early detection, the cancer burden is expected to increase, driven by the growing and aging US population. There is concern about the adequacy of the US oncology workforce to meet the needs of cancer patients and survivors in the future.^{3,4} A recent study estimated a 48% increase in the demand for oncology services, accompanied by a shortage of 2500 to 4000 oncologists, over the next 15 years.³ Increasing the role of primary care physicians (PCPs) in cancer care has been proposed as one means of addressing this shortfall,³ despite projections of a looming PCP shortage.⁵

Cancer care generally requires the technical knowledge and skills of specialty physicians such as medical oncologists, surgeons, and radiation oncologists. Nevertheless, PCPs may play an essential role because they are often the initial point of contact for patients in obtaining screening or evaluating symptoms, and they may make referrals, coordinate care, and manage symptoms or comorbid conditions. A role for PCPs in counseling cancer patients about treatment options and monitoring treatment progress and side effects also has been conceptualized.⁶ There is, though, little in the published literature about the actual involvement of PCPs in caring for cancer patients, aside from studies of follow-up care for cancer survivors.⁷⁻¹¹ Two qualitative studies found that cancer patients wanted their PCPs to be engaged in their care, although the extent to which this actually occurred varied.^{12,13}

The growth of the cancer patient and survivor populations in the US along with the anticipated shortages of oncologists heighten the need for better information about participation of PCPs in cancer care. In this analysis, we used data from a national study to characterize the role of PCPs in cancer care, comparing it with that of cancer specialists. We also explored factors that might explain more extensive PCP involvement in cancer care, including the hypotheses that PCPs who report

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more barriers to referring their cancer patients or who are located in rural areas will assume a larger role.

METHODS

Study Design

Data for this study were collected through the Cancer Care Outcomes Research and Surveillance Consortium (CanCORS) initiative, a national study of the care and outcomes experienced by over 10,000 patients diagnosed with lung or colorectal cancer between 2003 and 2005.^{14,15} CanCORS data collection procedures were approved by the human subjects committees at participating institutions. Details on study design and procedures have been published previously.¹⁴ This analysis used data from the survey of patients' physicians.¹⁶

We surveyed 6871 physicians named by CanCORS patients as filling one or more key roles in their care. Surveys were mailed from July 2004 through March 2007, with 97% of surveys mailed between January 2005 and May 2006. The survey's participation rate, among physicians whose contact information could be verified (88.8%), was 61.0%. For this analysis, we excluded physicians with a specialty type other than primary care, surgery, or oncology (n=584), or who were very recent medical school graduates and likely to still be in training (n=137). Item nonresponse was less than 3% of observations for most variables; multiple imputation was used to impute missing data for most survey items.^{17,18}

Survey Instrument

To understand the physician's role in providing various types of care to patients with lung and colorectal cancer, respondents were asked how each of the following services are usually provided to their patients: 1) establishing goals for cancer treatment and prognosis; 2) assessing patient preferences for cancer treatment; 3) determining the first treatment modality; deciding on possible use of 4) surgery, 5) radiotherapy, and 6) chemotherapy; 7) discussing possible participation in clinical trials; 8) managing noncancer related comorbidities; 9) evaluating and treating depression; 10) establishing do-not-resuscitate (DNR) status; 11) referring to hospice; and 12) prescribing opiates for chronic pain management. Response options were: a) "I provide this care myself without much input from another clinician"; b) "I co-manage or decide jointly on this care with another clinician"; c) "I refer patients to another clinician for this care"; or d) "I am not involved in this care." We defined services 1 through 7 as *cancer care* roles, and services 8 through 12 as *general medical care* roles.

We also asked about barriers to referring cancer patients to the provider of their choice for more specialized care. These were: 1) restrictions on selection of providers imposed by health plans or the physician's medical group/organization; 2) preauthorization requirements of the patient's insurance; 3) patient lack of ability to pay for services; 4) lack of surgical subspecialists; and 5) excessive patient travel time. Respondents rated each using a 5-point Likert scale, with 1 indicating that the factor was "always" a barrier and 5 indicating that the factor was "never" a barrier.

The survey provided information on demographic and practice characteristics for respondents. Instruments are available at: <http://www.cancors.org/public>.

Measures

We categorized physicians based on their primary specialty: PCPs (internal medicine, family medicine, general practice, or geriatrics) and cancer specialists (medical oncology, radiation oncology, or surgery).

For each role, we considered physicians to participate if they responded, "I provide this care myself" and "I co-manage or decide jointly on this care with another clinician" and not to participate if they responded, "I refer patients to another clinician for this care" or "I am not involved in this care." To characterize the number of cancer care roles fulfilled, we summed the number of roles in which the physician reported participating; this measure ranged from 0 (performs no cancer care roles) to 7 (performs all roles). We used a similar approach to develop a measure of the number of general medical care roles fulfilled. We also created a measure of the total number of roles fulfilled, which included the cancer care and general medical care roles; this measure ranged from 0 (performs no roles) to 12 (performs all roles).

To measure the extent to which PCPs experience barriers to referring their cancer patients, we created a dichotomous variable for each type of referral barrier in which responses of "always", "usually", and "sometimes" were categorized as 1 and "rarely" and "never" were categorized as 0, and summed the five dichotomous variables to create a single measure of the number of barriers.

The zip code of the physician's primary practice location was mapped to RUCA2 codes¹⁹ to measure the extent of urbanicity or rurality of the practice location. These codes were categorized as urban, large rural, and small rural/isolated small rural.

Statistical Analysis

Descriptive statistics were used to summarize demographic and practice characteristics of physicians and to examine the number and distribution of roles by provider type. Ordered logistic regression was used to assess the association of personal and practice characteristics of PCPs with their care involvement. Two models were estimated. In the first, the number of cancer care roles fulfilled by the PCP was the dependent variable. In the second, the total number of roles (i.e., cancer care and general medical care) was the dependent variable. Because few PCPs fulfilled four or less total roles, we created a three-level dependent variable for the second model, categorizing 0 to 4 total roles as low, 5 to 8 roles as moderate, and 9 to 12 roles as high care involvement. We did not model characteristics of PCPs who fulfill general medical care roles for cancer patients because most PCPs reported fulfilling all or nearly all of these roles.

We also wanted to examine urban/rural differences in cancer care involvement. Because data from rural physicians were largely contributed by three study sites (i.e., Iowa, Alabama, and North Carolina), we repeated the modeling after restricting the cohort to these sites (n=576 PCPs), and included a variable for study site in addition to the urban/rural measure. All analyses were conducted with SAS software version 9.1.3 (SAS Institute, Cary, NC) and survey dataset version 1.6.1, finalized in March 2007.

RESULTS

Nearly half of the PCPs were younger than 50 years, and the majority were male, non-Hispanic white, internists, and US

Table 1. Characteristics of Participating Physicians and Their Practice Settings (N=3315)

	Primary care		Cancer specialist	
	n	%	n	%
Total	1694	51.1	1621	48.9
Physician Characteristics				
Age, years				
<40	324	19.1	290	17.9
40–49	502	29.6	486	29.9
50–54	358	21.1	270	16.7
55–59	274	16.2	272	16.8
60+	236	14.0	303	18.7
Sex				
Male	1270	75.0	1364	84.2
Female	424	25.0	257	15.8
Race/ethnicity				
Non-Hispanic white	1154	71.0	1128	73.3
Hispanic	47	2.9	66	4.3
Non-Hispanic black	62	3.8	44	2.8
Asian	338	20.8	281	18.3
Other	25	1.5	20	1.3
Specialty				
Internal medicine	1000	59.0		
Family medicine	634	37.4		
General practice	24	1.4		
Geriatrics	36	2.1		
Medical oncology			524	32.3
Radiation oncology			234	14.4
Surgery			863	53.3
Board certified				
Yes	1529	90.3	1512	93.3
No	165	9.7	109	6.7
International medical school graduate				
Yes	287	16.9	257	15.8
No	1407	83.1	1364	84.2
Teaches medical students and/or residents				
Yes	624	36.8	819	50.5
No	1070	63.2	802	49.5
Method of compensation				
Salary, not based on productivity	655	39.3	655	40.7
Salary, based on productivity	474	28.4	431	26.8
FFS exclusively	426	25.5	466	29.0
Capitation, with or without FFS	113	6.8	56	3.5
Participates in pay-for-performance				
Yes	929	54.8	727	44.8
No	765	45.2	894	55.2
% of patients enrolled in managed care (quartiles)				
0–20%	453	26.7	381	24.1
21–49%	264	15.6	325	20.6
50–78%	396	23.4	368	23.3
79–100%	581	34.3	356	22.5
No. of colorectal and/or lung cancer patients seen in the past year				
<5	987	58.9	52	3.3
5–9	390	23.2	6	0.4
10–19	208	12.4	106	6.7
>=20	92	5.5	1421	89.6
No. of referral barriers*				
0	716	42.3	510	31.5
1	314	18.5	300	18.5
2	249	14.7	293	18.1
3	231	13.6	265	16.3
4	99	5.8	161	9.9
5	85	5.0	92	5.7
Practice Setting Characteristics				
Practice type				
Office based, solo	342	20.5	195	12.2
Office based, single-specialty group	408	24.5	391	24.4
Office based, multi-specialty group	557	33.4	185	11.6

Table 1. (continued)

	Primary care		Cancer specialist	
	n	%	n	%
Office based, HMO	35	2.1	6	0.4
Office based, other	49	3.0	9	0.5
Hospital	232	13.9	792	49.5
Community health center	44	2.6	23	1.4
Practice size				
1–5 physicians	778	45.9	857	52.9
6–10 physicians	275	16.2	296	18.3
11–20 physicians	227	13.4	191	11.8
>20 physicians	414	24.4	277	17.0
Practice ownership				
Medical school/university	59	3.6	196	12.3
Government	206	12.5	100	6.3
Physician/physician-owned corporation	821	49.8	851	53.5
Hospital	163	9.9	149	9.4
HMO	284	17.2	209	13.1
Other	106	6.4	77	4.8
Don't know	10	0.6	9	0.6
Practice location				
Urban	1359	80.2	1418	87.5
Large rural	114	6.7	86	5.3
Small/isolated small rural	114	6.7	14	0.9
Unknown	107	6.3	103	6.3
CanCORS [†] study site				
Los Angeles county	408	24.1	372	22.9
Northern California (8 counties)	325	19.2	406	25.1
Iowa (state)	228	13.5	140	8.6
Alabama (state)	206	12.1	233	14.4
Veteran's Administration (10 hospitals)	193	11.4	149	12.0
HMO Cancer Research Network [‡]	192	11.3	126	7.8
North Carolina (22 counties)	142	8.4	195	9.2

FFS fee-for-service, HMO health maintenance organization.

* Referral barriers include: restrictions on selection of providers imposed by health plans or the physician's medical group/organization, pre-authorization requirements of the patient's insurance, patient lack of ability to pay for services, lack of surgical subspecialists, and excessive patient travel time.

[†] Cancer Care Outcomes Research and Surveillance Consortium.

[‡] A research consortium that includes Group Health Cooperative of Puget Sound, Harvard Pilgrim Health Care, Kaiser Permanente Northwest, and Kaiser Permanente Hawaii.

medical school graduates (Table 1). About 60% saw fewer than five colorectal or lung cancer patients in the past year and experienced one or no barriers to referring cancer patients for more specialized care. Over three-quarters practiced in urban settings. Compared with cancer specialists, PCPs were more often female and located in rural areas. They saw fewer cancer patients and reported fewer referral barriers than did cancer specialists.

PCPs reported considerable involvement in fulfilling general medical care roles for cancer patients (Fig. 1). Over 90% directly provided or co-managed the roles of managing comorbid conditions (98.2%), evaluating/treating depression (96.0%), establishing DNR status (95.0%), referring to hospice (94.7%), and prescribing opiates for cancer pain (91.2%). More PCPs directly provided than co-managed comorbid conditions and evaluating/treating depression, while the opposite was true for the other three roles. In contrast, cancer specialists were less involved in general medical care roles. Over 70% indicated that they referred patients to another provider for

management of comorbid conditions or were not involved in this care. Over 50% referred patients for or were not involved in depression evaluation/treatment. Higher proportions of cancer specialists directly provided or co-managed opiate prescription for pain management (69.8%), establishment of DNR status (82.2%), and referral to hospice (78.4%).

Compared with general medical care roles, PCPs reported less involvement in cancer care roles (Fig. 2). Assessing patient preferences for treatment (64.2%) and deciding on possible use of surgery (53.7%) were the only cancer care roles directly provided or co-managed by most PCPs. PCP involvement in other cancer care roles was more limited: establishing goals for treatment and prognosis (45.6%), deciding on possible use of radiotherapy (33.7%) or chemotherapy (30.2%), determining the first treatment modality (28.2%), and discussing possible participation in clinical trials (19.3%). Considerably more PCPs co-managed than directly performed cancer care roles. In contrast, over 90% of cancer specialists reported that they establish goals for treatment and prognosis, assess patients' treatment preferences, determine the first treatment modality, and decide on use of surgery. Somewhat fewer fulfilled the roles of deciding on use of radiotherapy (77.1%) or chemotherapy (74.1%) and discussing clinical trial participation (67.4%).

PCPs and cancer specialists differ in the number of general medical care roles, cancer care roles, and total roles fulfilled (Fig. 3). The mean number of general medical care roles fulfilled was 4.8 (SD=0.7) for PCPs and 3.0 (SD=1.5) for cancer specialists. The mean number of cancer care roles fulfilled was 2.7 (SD=2.3) for PCPs and 5.9 (SD=1.6) for cancer specialists. The mean number of total roles fulfilled was 7.5 (SD=2.6) for PCPs and 8.9 (SD=2.6) for cancer specialists.

Characteristics associated with fulfilling a greater number of cancer care roles among PCPs in adjusted analyses are shown in Table 2. PCPs aged 50 years and older fulfilled more

cancer care roles than those less than 40 years. Internists and geriatricians reported more cancer care involvement than did family physicians and general practitioners. PCPs engaged in teaching fulfilled more cancer care roles than others, as did those who saw more cancer patients or reported more barriers to referring cancer patients to specialists. In contrast, PCPs who were of Hispanic (vs. white) race/ethnicity, international medical school graduates (vs. US medical school graduates), or in a government-owned practice setting (vs. physician-owned practice setting) fulfilled fewer cancer care roles. Rural practice location was not associated with the number of cancer care roles fulfilled by PCPs.

The ordered logistic regression model assessing characteristics of PCPs who fulfill more total roles (general and cancer care) showed very similar results (Table 2), with two exceptions: PCPs who were of Hispanic (vs. white) race/ethnicity did not fulfill fewer roles overall, and those engaged in teaching did not fulfill more roles compared with nonteaching PCPs.

The subset modeling using data from the Iowa, Alabama, and North Carolina study sites revealed results similar to the main analysis (data not shown). Rural practice location was not associated with either the number of cancer care roles or the total number of roles fulfilled. PCPs in North Carolina fulfilled fewer cancer care roles (OR=0.62; 95% CI: 0.40–0.96) and PCPs in Alabama fulfilled more cancer care roles (OR=1.52; 95% CI: 1.01–2.27) than PCPs in Iowa, suggesting geographic variation in the cancer care practices of PCPs.

DISCUSSION

The critical role of PCPs in cancer screening and early detection is well established, and increasingly recognized in the follow-up care of cancer survivors.²⁰ However, despite the

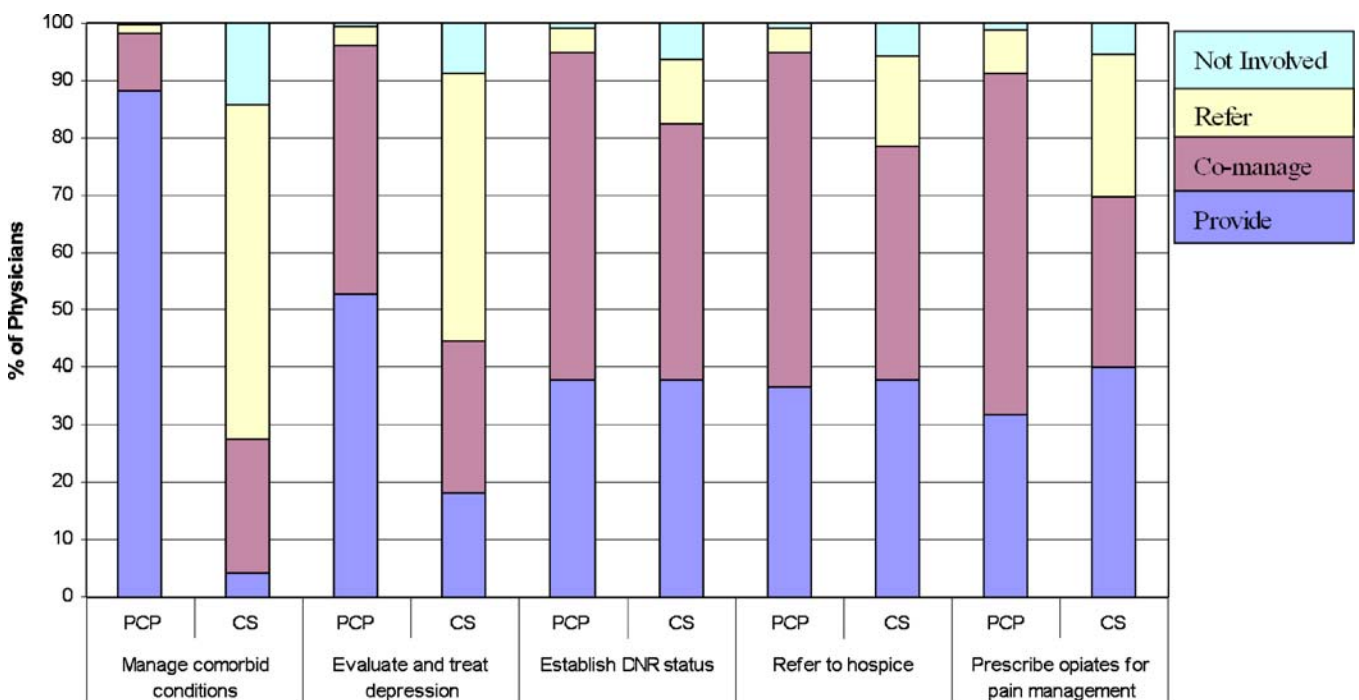


Figure 1. Involvement of primary care physicians (PCP) and cancer specialists (CS) in fulfilling general medical care roles for cancer patients (n=3315).

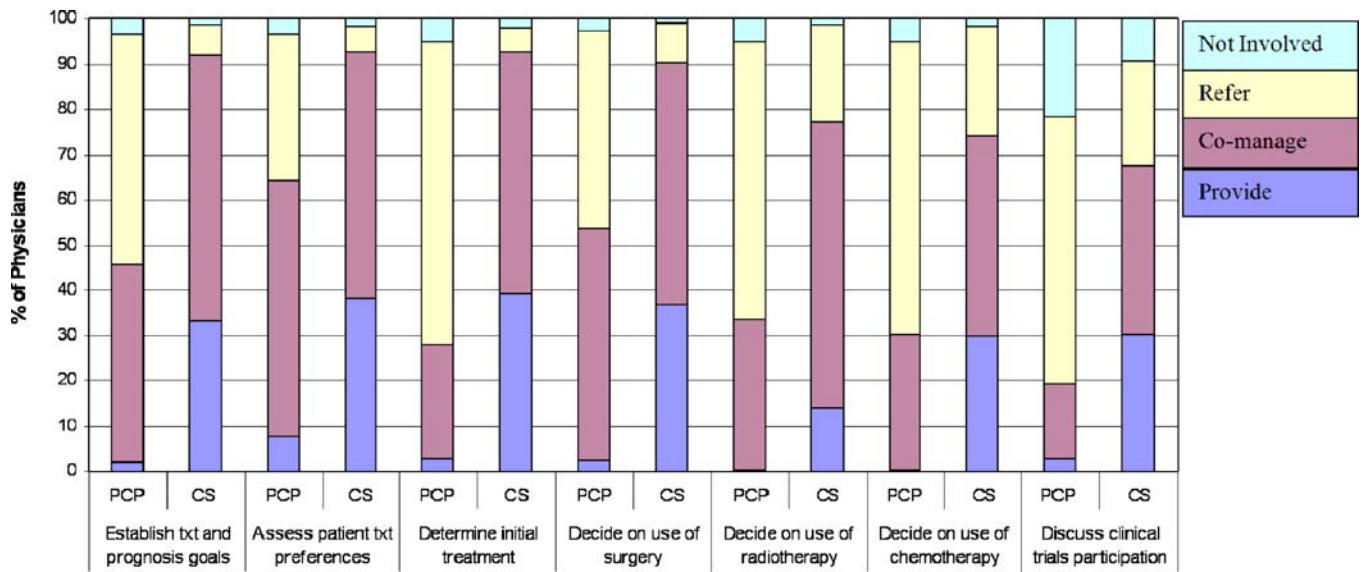


Figure 2. Involvement of primary care physicians (PCP) and cancer specialists (CS) in fulfilling cancer care roles for cancer patients (n=3315).

growing burden of cancer in the US, there is a paucity of information about PCP involvement in the active treatment phase of cancer care. This is the first large, population-based study to characterize the role of PCPs in cancer care and compare it with that of cancer specialists. Nearly all PCPs indicated that they were involved in fulfilling at least 1 of 12 roles related to the care of lung and colorectal cancer patients, and most were engaged in multiple roles. As PCPs more often fulfilled general medical care than cancer care roles, whereas cancer specialists more often fulfilled cancer care than general medical care roles, the role involvement of PCPs and cancer specialists in cancer care appears to be complementary.

Two general medical care roles were more often assumed by PCPs than by cancer specialists: managing comorbid conditions and evaluating/treating depression. Comorbid conditions and depression are common in cancer patients and survivors.²¹⁻²³ Careful management is important as cancer patients with these conditions experience worse outcomes.^{21,24,25} In one study, oncologists often failed to identify depression in cancer patients experiencing moderate to severe depressive symptoms.²⁶ By managing comorbid conditions and depression in cancer patients, PCPs provide a key aspect of care not assumed by many cancer specialists.

Of the seven cancer care roles we examined, over three-quarters of PCPs fulfilled at least one. Assessing patient preferences for treatment and deciding on possible use of surgery were the most common roles of PCPs. Assessing patient preferences is particularly important as patients vary in their treatment preferences as well as in how they wish to be involved in treatment decisions.²⁷ Lower anxiety and greater satisfaction among cancer patients whose preferred role in treatment decision-making was attained have been documented.²⁷

With the exception of managing comorbid conditions and evaluating/treating depression, PCP involvement in caring for cancer patients was largely in a co-management capacity. In contrast, cancer specialist involvement in general medical care

and cancer care roles was fairly evenly divided between direct provision and co-management for most roles. Given the frequency with which co-management roles were mentioned, it is possible that collaboration between PCPs and cancer specialists is occurring for several aspects of cancer care. It also may be that, in co-managing patients, the cancer specialist relies on other cancer specialists and not the PCP. Some work has shown that cancer survivors who see both a PCP and a cancer specialist more often receive recommended surveillance testing and preventive services,^{11,28,29} and that breast cancer patients who see both are more likely to be enrolled in hospice at the end of life.³⁰ A shared-care model involving PCPs and cancer specialists has been articulated for follow-up care of cancer survivors²⁰ but not specifically for the treatment phase of cancer care, although the importance of coordination in ensuring high-quality cancer care is increasingly recognized.³¹⁻³⁵ It is unclear whether the PCP or medical oncologist should be in charge of care coordination, or whether PCP involvement in the treatment phase of care leads to better patient outcomes.

We showed that the participation of PCPs in cancer care varied by several characteristics. PCPs who were at least 50 years of age fulfilled more roles compared with their younger counterparts. Those who reported seeing more cancer patients also fulfilled more roles, as did internists and geriatricians. Older physicians as well as internists and geriatricians may see an older patient population, which is at greater risk of being diagnosed with cancer. The finding that PCPs who were international medical school graduates fulfilled fewer roles than their US medical school graduates may reflect training differences and the fact that a high proportion of international medical school graduates attended medical schools in India and the Philippines,³⁶ where populations are younger and chronic diseases such as cancer less common than in the US.

Our analyses supported the hypothesis that PCPs experiencing more barriers to referring their cancer patients would fulfill more roles, but not our hypothesis that PCPs practicing

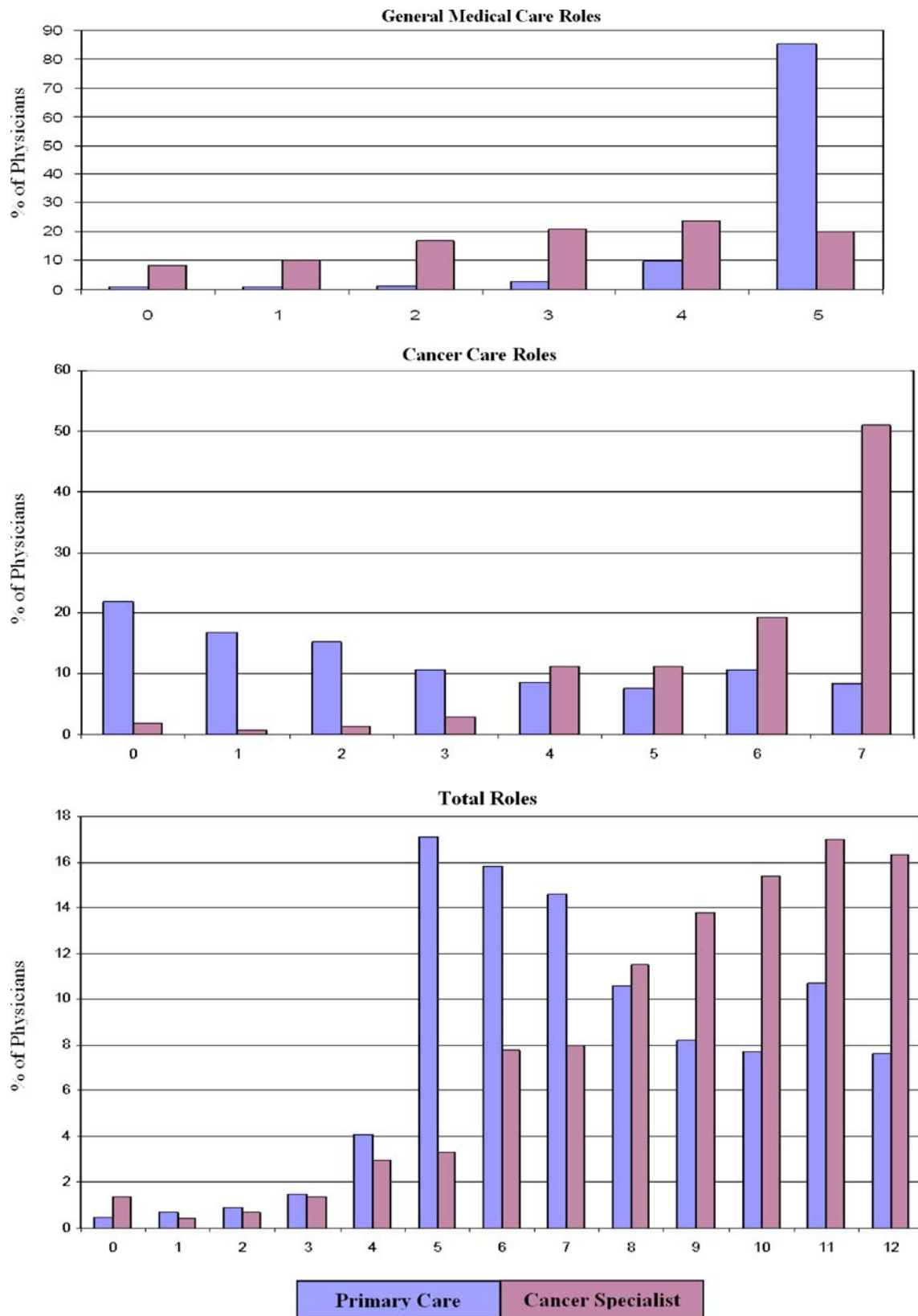


Figure 3. Number of General Medical Care Roles, Cancer Care Roles, and Total Roles Fulfilled by Primary Care Physicians and Cancer Specialists for Cancer Patients (n=3315).

Table 2. Ordered Logistic Regression Models of the Number of Cancer Care Roles and the Number of Total Roles Fulfilled by Primary Care Physicians (n=1694)

	Cancer care roles OR (95% CI)	Total roles* OR (95% CI)
Physician Characteristics		
Age, years		
<40	1.00	1.00
40–49	1.22 (0.95–1.58)	1.14 (0.85–1.54)
50–54	1.69 (1.28–2.24)	1.65 (1.19–2.27)
55–59	1.88 (1.38–2.55)	1.72 (1.20–2.45)
60+	1.98 (1.41–2.77)	1.57 (1.06–2.32)
Sex		
Male	1.00	1.00
Female	0.83 (0.67–1.03)	0.84 (0.65–1.07)
Race/ethnicity		
Non-Hispanic white	1.00	1.00
Hispanic	0.43 (0.25–0.74)	0.80 (0.43–1.50)
Non-Hispanic black	1.15 (0.73–1.82)	1.07 (0.63–1.81)
Asian	0.96 (0.75–1.23)	0.98 (0.74–1.31)
Other	1.71 (0.84–3.48)	2.32 (1.02–5.26)
Specialty		
Internal medicine/geriatrics	1.37 (1.13–1.68)	1.46 (1.17–1.84)
Family medicine/general practice	1.00	1.00
Board certified		
Yes	0.85 (0.61–1.18)	0.84 (0.58–1.23)
No	1.00	1.00
International medical school graduate		
Yes	0.64 (0.49–0.84)	0.72 (0.53–0.98)
No	1.00	1.00
Teaches medical students and/or residents		
Yes	1.39 (1.14–1.69)	1.22 (0.98–1.53)
No	1.00	1.00
Method of compensation		
Salary, not based on productivity	1.00	1.00
Salary, based on productivity	1.01 (0.78–1.30)	0.99 (0.72–1.35)
FFS exclusively	1.12 (0.83–1.49)	1.00 (0.71–1.40)
Capitation, with or without FFS	0.94 (0.61–1.45)	1.10 (0.66–1.84)
Participates in pay-for-performance		
Yes	0.85 (0.69–1.04)	0.87 (0.69–1.10)
No	1.00	1.00
% of patients enrolled in managed care (quartiles)		
0–20%	1.28 (0.97–1.70)	1.37 (0.99–1.90)
21–49%	0.99 (0.73–1.36)	1.01 (0.70–1.45)
50–78%	1.11 (0.84–1.45)	1.15 (0.84–1.58)
79–100%	1.00	1.00
No. of colorectal and/or lung cancer patients seen in the past year		
<5	1.00	1.00
5–9	1.53 (1.23–1.89)	1.53 (1.19–1.96)
10–19	1.49 (1.13–1.98)	1.52 (1.09–2.12)
≥20	1.75 (1.18–2.58)	1.69 (1.06–2.70)
No. of referral barriers [†]		
0	1.00	1.00
1	1.15 (0.90–1.47)	1.00 (0.75–1.32)
2	1.36 (1.04–1.78)	1.19 (0.87–1.61)
≥3	1.68 (1.33–2.12)	1.42 (1.08–1.86)
Practice Characteristics		
Practice type		
Office based, solo	1.35 (0.98–1.86)	1.22 (0.85–1.77)
Office based, single-specialty group	1.18 (0.90–1.54)	1.20 (0.88–1.64)
Office based, multi-specialty group	1.00	1.00

Table 2. (continued)

	Cancer care roles OR (95% CI)	Total roles* OR (95% CI)
Office based, HMO/other/community health center	1.04 (0.71–1.51)	1.08 (0.70–1.67)
Hospital	1.17 (0.83–1.67)	1.06 (0.71–1.58)
Practice size		
1–5 physicians	1.03 (0.75–1.39)	0.87 (0.61–1.23)
6–10 physicians	1.05 (0.78–1.41)	0.92 (0.65–1.29)
11–20 physicians	1.24 (0.91–1.69)	1.18 (0.83–1.67)
>20 physicians	1.00	1.00
Practice ownership		
Medical school/university	1.06 (0.63–1.77)	1.12 (0.62–2.02)
Government	0.60 (0.40–0.91)	0.51 (0.32–0.82)
Physician(s)/physician-owned corporation	1.00	1.00
Practice location		
A hospital	1.07 (0.77–1.49)	1.34 (0.92–1.94)
An HMO	0.74 (0.52–1.06)	0.64 (0.42–0.98)
Other/Don't know	0.67 (0.47–0.96)	0.75 (0.49–1.15)
Practice location		
Urban	1.00	1.00
Large rural	1.05 (0.74–1.50)	1.09 (0.72–1.65)
Small/isolated rural	1.23 (0.84–1.79)	1.27 (0.83–1.95)
Unknown	1.29 (0.90–1.84)	1.17 (0.77–1.77)

CI confidence interval, FFS fee-for-service, HMO health maintenance organization, OR odds ratio.

* Total roles categories: low involvement (0 to 4 roles); moderate involvement (5 to 8 roles); high involvement (9 or more roles).

† Referral barriers include: restrictions on selection of providers imposed by health plans or the physician's medical group/organization, pre-authorization requirements of the patient's insurance, patient lack of ability to pay for services, lack of surgical subspecialists, and excessive patient travel time.

in rural areas would fulfill more roles. Rural areas often lack healthcare resources, including cancer specialists.³⁷ Many cancer patients residing in rural areas travel long distances for specialized care, and rural PCPs may not have the time or ability to assume a larger role in their care. Our study may have lacked adequate sample size to detect differences between urban and rural PCPs in their cancer care involvement. The cancer care practice patterns of rural physicians is an understudied area that merits further research.

This study has several limitations. It is based on physician self-reports of their involvement in cancer care. The survey was specific to two types of cancer, lung and colorectal; physician activities in managing these cancers might differ from other cancer types. Participating physicians do not comprise a nationally-representative sample; they were selected because one or more CanCORS patients identified them as fulfilling a key role in their care. It is possible that participating physicians have more cancer care involvement than physicians who were not included in the study. We therefore do not know to what extent the survey responses are reflective of PCPs and cancer specialists as a whole or in the geographic regions represented.

Treatment of cancer patients often presents multiple, complex roles that must be fulfilled during the active treatment phase of care. This study fills a sizable gap in the literature by characterizing the role of PCPs during this phase. Results show that PCPs across the US are actively engaged in cancer care, particularly by managing comorbid conditions, evaluat-

ing/treating depression, prescribing opiates for pain management, and assessing patients' treatment preferences. In the face of limited primary care and oncology resources, determining the optimal interface between PCPs and oncologists in delivering and coordinating high-quality cancer care is an important area for future research.

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