

Differences Between Primary Care Physicians' and Oncologists' Knowledge, Attitudes and Practices Regarding the Care of Cancer Survivors

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BACKGROUND: The growing number of cancer survivors combined with a looming shortage of oncology specialists will require greater coordination of post-treatment care responsibilities between oncologists and primary care physicians (PCPs). However, data are limited regarding these physicians' views of cancer survivors' care.

OBJECTIVE: To compare PCPs and oncologists with regard to their knowledge, attitudes, and practices for follow-up care of breast and colon cancer survivors.

DESIGN AND SUBJECTS: Mailed questionnaires were completed by a nationally representative sample of 1,072 PCPs and 1,130 medical oncologists in 2009 (cooperation rate=65%). Sampling and non-response weights were used to calculate estimates to reflect practicing US PCPs and oncologists.

MAIN MEASURES: PCPs and oncologists reported their 1) preferred model for delivering cancer survivors' care; 2) assessment of PCPs' ability to perform follow-up care tasks; 3) confidence in their knowledge; and 4) cancer surveillance practices.

KEY RESULTS: Compared with PCPs, oncologists were less likely to believe PCPs had the skills to conduct appropriate testing for breast cancer recurrence (59% vs. 23%, $P<0.001$) or to care for late effects of breast cancer (75% vs. 38%, $P<0.001$). Only 40% of PCPs were very confident of their own knowledge of testing for recurrence. PCPs were more likely than oncologists to endorse routine use of non-recommended blood and imaging tests for detecting cancer recurrence, with both groups departing substantially from guideline recommendations.

CONCLUSION: There are significant differences in PCPs' and oncologists' knowledge, attitudes, and practices with respect to care of cancer survivors. Improving cancer survivors' care may require more effective communication between these two groups to increase PCPs' confidence in their knowledge, and must also address oncologists' attitudes regarding PCPs' ability to care for cancer survivors.

KEY WORDS: cancer care; cancer survivorship; physician survey; physician attitudes.

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INTRODUCTION

One in three persons experiences cancer during their lifetime, and nearly 12 million Americans are cancer survivors¹. Optimal cancer survivor care requires surveillance for recurrence or progression and second cancers, caring for long-term and late medical effects of cancer or its treatment, providing psychosocial support, and managing comorbid conditions². The rapidly increasing survivor population and looming shortages of both oncology specialists^{3,4} and primary care physicians (PCPs)^{5,6} present challenges to ensuring high quality follow-up care for cancer survivors^{7,8}. Prior research has shown that appropriate follow-up surveillance testing is associated with more frequent visits to oncologists^{9,10}. However, responsibility for follow-up care often falls to the PCP, since many survivors do not see an oncologist annually^{11,12}, and visits to oncologists decline sharply after five years post-treatment¹³. These trends may contribute to the considerable variability observed in the delivery of follow-up care^{10,12,14}.

There is growing consensus that inadequate follow-up care may be related to a fragmented health system that impedes

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communication and care coordination². Greater coordination of care between PCPs and oncologists has been shown to improve both the quality of and survivors' satisfaction with follow-up care¹⁵⁻²⁰. Various care delivery models may optimize coordination, including a "shared care" model involving greater PCP involvement, or use of specialty clinics led by oncology nurses or physician assistants^{4,21-23}. However, little is known about physician attitudes or other potential barriers to implementing these models. Prior physician surveys were either conducted outside the US²⁴⁻²⁷ or in selected samples from academic centers²⁸. There are also limited data on potential physician barriers reflecting US medical practices, such as deficits in knowledge and unfavorable attitudes towards shared care and other alternative models of cancer survivor care.

To address this gap, we conducted a large, nationally representative survey of 2,202 practicing US physicians regarding survivorship care—the Survey of Physician Attitudes Regarding the Care of Cancer Survivors (SPARCCS)—in 2009. SPARCCS was designed to examine and compare the attitudes, knowledge, roles, and usual practices of PCPs and oncologists regarding different components of follow-up care for breast and colon cancer survivors. The ultimate goal of SPARCCS was to obtain information for improving the quality of care for survivors.

In this report, we present the first in a series of results from SPARCCS describing US physicians' knowledge and attitudes toward improving follow-up cancer care. Our aims in this first report are to describe and compare PCPs' and oncologists': 1) preferred model of follow-up care; 2) perceptions of PCPs' skills in providing follow-up care; 3) confidence in knowledge of components of follow-up care; and 4) cancer surveillance practices.

METHODS

SPARCCS was co-sponsored by the National Cancer Institute (NCI) and the American Cancer Society (ACS). Approval for the study was obtained from NCI's IRB, and from the U.S. Office of Management and Budget.

Sample Design

We used the American Medical Association (AMA) Physician MasterFile to obtain a nationally representative sample of physicians^{29,30}. We used a stratified sampling strategy within relevant physician specialties (hematology/oncology, family medicine, general internal medicine, and obstetrics/gynecology, including gynecology-only physicians). Within each stratum, the frame was sorted by the following AMA variables: census region, metropolitan status, age category, sex, and "mail undeliverable" status to achieve even coverage of these variables within the sample. To be eligible for the survey, physicians were required to practice in a non-federal setting, be under 76 years of age, and spend 20% or more of their professional time caring for patients. Furthermore, oncologists had to provide care for breast or colon cancer patients within the prior year, and PCPs had to work in an office-based

practice. Eligibility was determined from the AMA Masterfile and responses to screener telephone calls or the questionnaire.

Recruitment

Screener telephone calls were placed to the offices of sampled physicians to verify eligibility for survey participation and contact information. Physicians whose office address and specialty could not be confirmed were classified as non-locatable. Of the 5,275 physicians in the initial sample, 20% were ineligible, 9% were non-locatable, and 1% refused to participate.

The remaining 3,596 physicians received the SPARCCS questionnaires by mail, with a \$50 incentive check and telephone follow-up of non-respondents. The survey was fielded from March through December, 2009. Non-responders received up to four mailings: three to the office and one to the physician's home address. Reminder telephone calls were placed after the 3rd and 4th mailings.

Figure 1 shows the disposition of the survey sample. The combined screener and survey response rates were calculated using the American Association of Public Opinion Research's standard methods³¹. The weighted survey response rate that excludes non-locatable physicians was 65.1% (also defined as the "cooperation" rate). The survey's absolute weighted response rate using the AAPOR RR₃ formula, which incorporates un-screened physicians with unknown eligibility, was 57.6%.

Survey Instrument and Measures

We focused on breast and colon cancer because of the availability of evidence-based guidelines for surveillance of recurrent cancer^{32,33}, high prevalence of survivors, and long survival periods. Separate questionnaires were developed for oncologists and for PCPs. The questionnaires contained identical as well as specialty-specific items covering several content domains and constructs to facilitate comparisons across groups. Most survey items were adapted from previously developed surveys of physicians relating to cancer-focused health care^{15,26,34-37}. Several new items were developed by the investigators. The questionnaires were revised based on the results of cognitive testing in a convenience sample of nine PCPs and nine oncologists. The full survey instruments are available as [supplementary material online at](#).

For the current analysis, we used three main survey questions, described below.

Models of Follow-up Care. We asked physicians to identify their preferred model for providing follow-up care using a single item. The response options included 1) PCPs having primary responsibility; 2) oncologists having primary responsibility; 3) oncologists and PCPs sharing responsibility (shared care model); 4) specialized survivorship clinics led by physicians, or 5) survivorship clinics led by oncology nurses, certified nurse practitioners, or physician assistants.

Perceived Skills of PCPs, and Confidence in Knowledge. Separate items asked oncologists and PCPs whether they

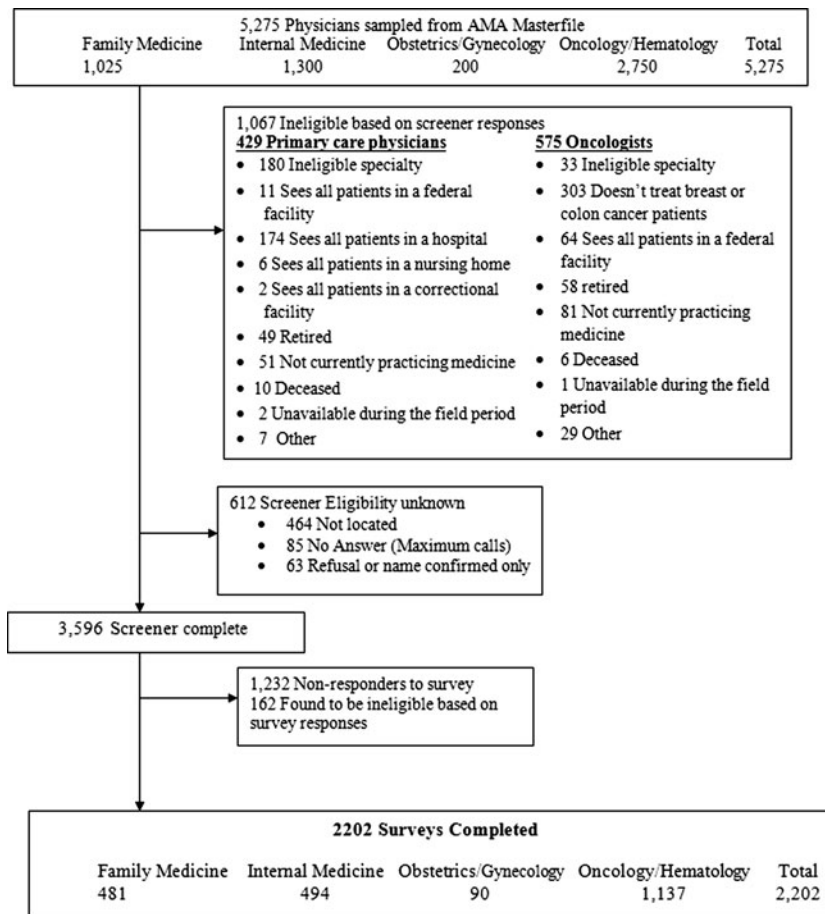


Figure 1. Sample flow diagram for the 2009 Survey of Physician Attitudes Regarding the Care of Cancer Survivors (SPARCCS).

agreed or disagreed with statements regarding PCPs' skills relating to 1) initiating screening and diagnostic evaluations to detect recurrent cancer, 2) caring for the effects of cancer or its treatment, and 3) providing psychosocial support for survivors. Another item asked about physicians' confidence in their own knowledge of the same three components of care. For the first item on perceived skills, a 5-point Likert response scale was used, and we grouped respondents into those who "strongly" or "somewhat" agreed or disagreed with each statement, excluding those who "neither agreed nor disagreed". For the item on confidence, a three-point scale was used, and we grouped responses as either "very confident" versus "somewhat" or "not at all" confident since very few respondents (<10%) were in the latter group.

Surveillance Care Practices. We used hypothetical clinical vignettes to assess surveillance practices because of their known validity for measuring physicians' actual behaviors³⁸⁻⁴⁰. Our vignette posed the following question: "There are different beliefs about appropriate cancer surveillance testing for survivors of breast cancer. How often do you believe the following cancer surveillance tests should be performed for a breast cancer survivor with the following characteristics: 55-year old woman, status post adjuvant chemotherapy for early stage breast cancer four years ago, currently asymptomatic, no evident disease, no significant co-morbidities, not on endocrine therapy

for her cancer?" A stage 3 colon cancer survivor with similar characteristics (except no mention of endocrine therapy) was a second vignette. For each vignette, respondents were asked how frequently various clinical, laboratory, or imaging tests should be performed using three pre-defined time intervals in addition to the response options "only if indicated", "never", "don't know" or other. We used professional guidelines from the American Society of Clinical Oncology^{32,33}, which are nearly identical to those of the National Comprehensive Cancer Network^{41,42}, to categorize each test as recommended or not. Physicians who endorsed use of a "non-recommended" surveillance test at any of the other pre-defined time intervals were considered to be routine users of the test.

Data Analysis

Estimates for the entire population of practicing PCPs and oncologists in the US that met our eligibility criteria were based upon weighted analysis that adjusted for under-coverage of the sampling proportions and for survey non-response. The SAS (Version 9.2) procedure "SurveyFreq" was used to incorporate jackknife replicate weights in the estimation of the weighted frequency distributions and to calculate associated 95% confidence limits. We used 2-sided chi-square tests to compare PCPs' and oncologists' responses. We calculated esti-

mates for each item excluding respondents who did not answer that particular item. Less than 1.5% of all respondents skipped the items asking about knowledge or perceptions, and 3.5% (n=79) skipped the item on preferred models of follow-up care.

RESULTS

Table 1 provides the demographic characteristics of the final survey sample of 1072 PCPs and 1130 oncologists. The final sample was heterogeneous with respect to multiple personal and practice setting characteristics, reflecting the spectrum of physicians in these specialties in the US health care system. To assess non-response bias, we compared the 2202 survey responders with the 2006 non-responders within each specialty stratum, finding no statistically significant differences on AMA Masterfile variables including age, gender, board certification, specialty, region, or US training (data not shown).

Models of Follow-up Care. Figure 2 compares PCPs' and oncologists' preferred model for follow-up care. Among PCPs, the shared care model was preferred by 38%, while 25% believed that oncologists should hold primary responsibility for follow-up care, and 10% preferred a PCP-led model. In contrast, oncologists most often preferred an oncologist-led model (57%), while only 16% chose a shared care model, and 2% a PCP-led model. Similar proportions of PCPs and oncologists (a total of 22% when summing the two options for specialized clinics) endorsed specialized survivorship care clinics overall. Among these physicians, oncologists were evenly divided between physician-led versus nurse or PA-led clinics, while PCPs favored physician-led clinics.

Perceived Skills and Knowledge of PCPs. Table 2 shows physicians' perceptions of PCPs' follow-up care skills. A majority (59%) of PCPs but only 23% of oncologists strongly or somewhat agreed that PCPs have the necessary skills to provide follow-up care related to the effects of breast cancer or its treatment. Similarly, 75% of PCPs, but only 38% of oncologists, agreed that PCPs have the skills necessary to initiate appropriate screening or diagnostic work-up to detect recurrent breast cancer. Only 8% of oncologists but 51% of PCPs believed that PCPs are better able than oncologists to provide psychosocial support for breast cancer survivors (all $P < 0.001$). Physicians' perceptions of PCP skills in providing colon cancer survivor care were virtually identical to those for breast cancer.

Figure 3 shows physicians' confidence in their knowledge about various components of follow-up care for breast cancer survivors. While 85% of oncologists were "very confident" about appropriate tests for detecting recurrent disease, only 40% of PCPs expressed this level of confidence ($P < 0.001$). A large difference was found in reported confidence in caring for late physical effects of cancer, with 23% of PCPs and 77% of oncologists expressing high confidence in their knowledge. While still statistically significant ($P < 0.001$), the smallest difference in confidence between practitioner groups was observed in caring for psychosocial effects of cancer, with 41% of PCPs and 51% of oncologists reporting being "very confident"

Table 1. Characteristics of Physicians Respondents

	Primary Care Physicians (n= 1072, weighted N =140,353)	Oncologists (n=1130, weighted N=7950)		
	Weighted Column %	Weighted Column %		
Age				
< 40 years old	22	30		
40–49 years old	33	29		
50–59 years old	31	25		
60+ years old	14	16		
Gender				
Female	35	27		
Male	65	73		
Race-Ethnicity				
Hispanic	7	4		
Asian	15	28		
Black or African-American	5	2		
White	70	63		
Other	3	3		
US Trained				
Yes	76	64		
No	24	36		
Boarded				
Yes	82	90		
No	18	10		
Specialty				
Family Medicine	43%	NA		
Internal Medicine	37%			
Ob/Gyn	20%			
Breast or colon cancer patients treated per week *			Breast	Colon
0			2	4
1–5	NA		12	23
5–20			51	61
20+			34	12
Breast or colon cancer patients treated in the last 12 months *			Breast	Colon
0			2	5
1–5			21	37
5–20			40	38
20+			29	12
In a month percent of time spent in providing patient care				
Less than 50 %			5	10
51–90 %			44	58
More than 90 %			51	32
Percentage of patients uninsured *				
<=5%			62	67
6–25%			29	21
26–100%			5	4
Main practice location *				
Full- or part-owner of a physician practice or employee of practice			66	56
Employee of a large medical group or health care system or HMO			17	11
Employee of a hospital or clinic			16	30

*Frequencies do not always add to 100% due to missing values

in their knowledge of caring for these effects. Results for colon cancer were comparable to those presented in Figure 2.

Surveillance Care Practices. We used clinical vignettes describing characteristics of two hypothetical cancer survivors at 4-years post- diagnosis to elicit physicians' recommended use

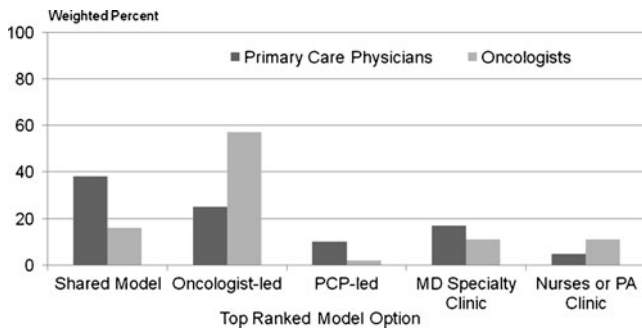


Figure 2. Preferred model For cancer follow-up care: Dark bars=primary care physicians; lighter bars=Oncologists. Y-Axis shows percent (weighted) of physicians responding with their top ranked preference among the following 5 options for models for the delivery of cancer survivors' care: 1. PCPs and oncologists share responsibility; 2. Medical Oncologists have primary responsibility; 3. PCPs have primary responsibility; 4. Specialized clinics led by physicians who focus on survivor care; 5. Specialized clinics led by Oncology Nurses, Certified Registered Nurse Practitioners, or Physician Assistants. Five percent (5%) of PCPs and 3% of oncologists endorsed more than 1 option as their top preferred model, and are not included in the figure. Chi-sq. test of difference in preference by physician group was $P < 0.001$.

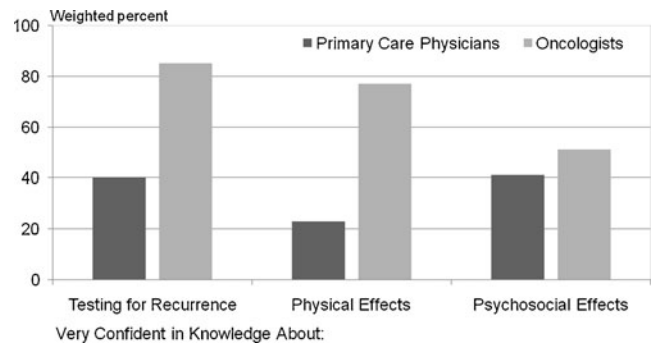


Figure 3. Confidence in knowledge about breast cancer follow-up care components. Dark bars=primary care physicians; lighter bars=Oncologists. Y-Axis shows percent (weighted) of physicians responding that they were "very confident" versus "not at all confident" or "somewhat confident" to the following question: How confident do you feel about your knowledge of the following aspects of cancer-related follow-up care for breast cancer survivors? a. Appropriate surveillance testing to detect recurrent cancer; b. long-term and late physical adverse effects of cancer and cancer treatment; c. the potential adverse psychosocial outcomes of cancer or its treatment. Fewer than 2% responded "Don't Know" and are excluded from the figure. Chi-sq. tests of differences by physician group for each of the 3 components were all $P < 0.001$.

of multiple tests and exams for detecting recurrent cancer. When asked about recommended intervals for performing physical exams for 4-year breast cancer survivors, 72% of oncologists recommended 6-month intervals, and 20% recommended yearly intervals. In contrast, 40% of PCPs recommended 6-month

intervals, and 53% recommended annual exams ($P < 0.001$). Both oncologists' and PCPs' recommended intervals for colon cancer survivors were nearly identical to these estimates.

Table 2. Perceptions of PCP's¹ Skills Regarding Follow-Up Cancer Care

	Primary Care Physicians (n=1072)	Oncologists (n=1130)
	Weighted % Who Either Strongly or Somewhat Agreed With Statement (95% CI's)	
For Breast Cancer Survivors		
PCPs have skills necessary to provide follow-up care related to the effects of cancer or its treatment	59 (56-62)	23 (21-26)
PCPs have skills necessary to initiate appropriate screening or diagnostic work-up to detect recurrent cancer	75 (72-77)	38 (35-41)
PCPs are better able than oncologists to provide psychosocial support	51 (48-54)	8 (6-10)
For Colon Cancer Survivors		
PCPs have skills necessary to provide follow-up care related to the effects of cancer or its treatment	58 (55-61)	24 (21-27)
PCPs have skills necessary to initiate appropriate screening or diagnostic work-up to detect recurrent cancer	74 (71-77)	38 (35-41)
PCPs are better able than oncologists to provide psychosocial support	51 (48-54)	8 (6-10)

Results are derived from Survey item #5 which asked: To what extent do you agree or disagree with the following statements regarding patients who have already completed active treatment for early stage breast or colon cancer? Response options were: strongly disagree, somewhat disagree, neither disagree nor agree, somewhat Agree, strongly agree. Statistical significance of chi-square tests for differences by physician groups were all $P < 0.001$

¹ Primary Care Physicians (PCPs)

Table 3 shows the percentage of physicians recommending different blood and imaging tests for detecting recurrent cancer. The gray-shaded areas show guideline-recommended tests for surveillance testing of cancer survivors; all other tests shown in the table are not guideline-recommended. With respect to the recommended tests, nearly all physicians endorsed annual mammograms for breast cancer, and a high percentage (over 80%) endorsed serum tumor markers for colon cancer. Guidelines recommend the use of CT scans annually for up to 3 years post-treatment for colon cancer survivors, but not beyond 3 years, and thus we did not consider CT scans as "recommended" for our hypothetical 4-year survivor. Only 10% of PCPs and 30% of oncologists recommended colonoscopy exams every 4-5 years, consistent with guidelines (both $P < 0.001$); while 90% of PCPs and 65% of oncologists recommended more frequent colonoscopy exams (every 1-3 years) than guidelines specify ($P < 0.001$).

More than two-thirds of all physicians departed substantially from guidelines in recommending routine blood tests for cancer survivors; the proportion of PCPs was only slightly higher than oncologists for most of these tests. Non-recommended imaging tests were endorsed by both physician groups much less frequently than were blood tests. Both physician groups demonstrated substantial overuse of chest X-rays and CT scans. PCPs were much more likely than oncologists to endorse non-guideline imaging tests such as chest X-rays, bone scans and MRI.

DISCUSSION

SPARCCS provides current nationally representative data comparing U.S. PCPs' and oncologists' knowledge, attitudes, and practices regarding the care of cancer survivors. The findings

Table 3. Percent of US Physicians Recommending Routine Use of Tests and Exams to Detect Recurrent Cancer

	Breast		Colon	
	Primary Care Physicians n=1072	Oncologists n= 1130	Primary Care Physicians n= 1072	Oncologists n= 1130
	Weighted % (95% CL's)	Weighted % (95% CL's)	Weighted % (95% CL's)	Weighted % (95% CL's)
Routine Blood Tests:				
Tumor Markers	51 (50-55)	31 (29-34)	82 (80-85)	89 (86-91)
Complete Blood Count (CBC)	79 (76-82)	69 (67-72)	89 (87-91)	83 (81-85)
Liver Function	79 (76-82)	66 (64-69)	88 (86-90)	83 (81-85)
Fecal Occult Blood			78 (76-81)	65 (62-68)
Imaging Tests:				
Annual Mammograms	99 (98-100)	99 (99-100)		
Any CT Scan	10 (8 – 12)	3 (2-5)	22 (19-24)	26 (23-29)
Any MRI	19 (16-21)	5 (3-6)		
Any Chest X-Ray	42 (39-45)	22 (20-25)	35 (32-38)	23 (20-25)
Any PET	8 (6-10)	1 (1-2)	9 (7-11)	3 (2-4)
Any Bone Scan	23 (20-26)	3 (2-4)	14 (12-16)	1 (1-2)
Colonoscopy 1-3 years			90 (88-92)	65 (62-68)
Colonoscopy 4-5 years			10 (8-11)	30 (27-32)

Hypothetical Vignettes depicting 4-year survivors for each cancer type were used to elicit physicians' recommended use of blood and imaging tests to detect recurrent cancer. Routine blood tests are defined as testing every 3-4 months, 6-months or annually. Gray-shaded areas indicate those tests or exams which were recommended by professional guidelines for follow-up care. Blacked-out areas represent tests that were not asked on the survey. Using chi-square tests, differences by physician group for annual mammograms were not statistically significant. All other tests of differences by physician groups were all $P < 0.001$, except for liver function tests for colon cancer ($P = 0.003$) and CT scan for colon cancer ($P = 0.03$).

reported in this paper have several important implications for health policy and research aimed at improving the care of cancer survivors. First, we found disagreement among PCPs and oncologists regarding the ideal model of care for cancer survivors (Fig. 1). While most oncologists favored an oncologist-led model, nearly half of PCPs favored a shared care model or one led by PCPs.

These results suggest an unfavorable view among oncologists regarding a central role for PCPs in caring for cancer survivors—an interpretation reinforced by our results showing oncologists' generally negative perceptions of PCPs' skills in caring for survivors. The results also reflect mixed views among PCPs about assuming increased responsibility for survivorship care. These findings are significant, because lack of receptiveness to PCP involvement in cancer survivors' care, especially among oncologists, could compromise efforts to promote shared care or PCP-led delivery models, which may be a key strategy to meet the care

needs of the many survivors who see only their PCP annually¹¹⁻¹³.

However, 22% of physicians in both groups endorsed the alternative model of specialty clinics either led by physicians, oncology nurses, or physician assistants, such as those already established by some cancer centers⁴³. With PCP shortages projected^{5,6} and likely to accelerate due to efforts to expand access to primary care under health care reform, this model may offer a more feasible and cost-efficient alternative to physician-led programs^{4,21-23}. Given the anticipated shortage of oncologists and growth in the cancer survivor population, there is a clear need for closer examination of the costs and effectiveness of such alternative delivery models for cancer survivor care. Our findings suggest that a sizable segment of physicians may be receptive to such models.

Consistent with their attitudes towards models of care, many PCPs reported uncertainty about their own skill levels and lack of

confidence in their knowledge of cancer survivor care. For example, less than 60% agreed that PCPs had the necessary skills to care for treatment effects in survivors of breast or colon cancer. Furthermore, less than half of PCPs felt very confident in their knowledge of testing for recurrence or caring for psychosocial effects of cancer, and only 23% felt very confident in their knowledge of caring for the late physical effects of cancer or its treatments (Fig. 3). Oncologists' opinions about PCP skills in these domains were more negative; far less than half of oncologists agreed that PCPs had the skills necessary to provide care for the late effects of cancer or initiate appropriate testing to detect recurrences.

Taken as a whole, these findings suggest significant attitudinal barriers among both PCPs and oncologists that could impede implementation of new delivery models in which PCPs assume greater responsibility for cancer survivor care. This approach is consonant with movement toward establishing patient-centered medical homes for all patients⁴⁴⁻⁴⁶. Successful implementation of this type of model, however, may first require directly addressing the unfavorable attitudes of many oncologists and some PCPs regarding PCPs' ability to care for cancer survivors.

Yet the problem is not merely one of overcoming unfavorable attitudes; our study also suggests that many PCPs—and even some oncologists—may lack critical knowledge or training to care for cancer survivors. The responses to the clinical vignettes reflect that both PCPs and oncologists deviate from guidelines by endorsing more testing, and at more frequent intervals, than the guidelines suggest (Table 3). Although both groups departed substantially from guidelines, PCPs diverge more substantially than do oncologists, consistent with our findings of deficits in confidence regarding their knowledge of follow-up care (Fig. 3). The observed systematic bias towards excessive use of non-recommended surveillance tests in both physician groups may contribute to increasing health care costs or iatrogenic harms among cancer survivors⁴⁷⁻⁴⁹. The reasons for physicians' overuse of follow-up blood and imaging tests remain to be elucidated, but may be due in part to the practice of defensive medicine, reimbursement incentives for office-based lab testing, or uncertainty regarding best care practices given the limited evidence base informing the development of clinical practice guidelines and areas of disagreement between the guidelines of different professional groups. Despite uncertainty regarding the validity of guidelines, our results suggest a need for broader training about appropriate post-treatment surveillance testing.

Interestingly, specialty differences in recommendations for clinic follow-up and physical examinations showed a different pattern than those observed for surveillance testing. Professional guidelines suggest performing physical exams every 6 months for colon cancer survivors and annually for breast cancer survivors. However, our results showed that physicians' recommended intervals for physical exams were nearly identical for the two survivor groups, with PCPs favoring annual and oncologists opting for 6-month intervals. Responses may reflect the care patterns and experiences most familiar to each of these practitioner groups, rather than lack of awareness of guidelines; for example, annual health examinations are a common practice among PCPs.

The current study has several strengths and limitations. SPARCCS is a large, nationally representative survey designed to obtain the perspectives of US-based PCPs and oncologists practicing in the full spectrum of health care delivery settings, and it builds upon prior physician surveys conducted in other countries or in smaller, less representative physician groups^{15,24,26,28,50}.

Our survey had a good response rate and no measurable response bias, and results are generalizable to US PCPs and oncologists. However, our limited focus on two common cancers may underestimate knowledge gaps, given that PCPs likely have lower awareness for rarer cancers, their treatments and long-term adverse effects. Finally, our analyses in this initial overview paper were descriptive, and did not assess the association between multiple physician characteristics or practice setting variables and our main outcomes; these more detailed analyses for each outcome will be addressed in future separate papers.

Our study suggests several key insights regarding implementation of the Institute of Medicine (IOM) recommendations to improve cancer survivor care⁴⁵. First, PCPs require more training and education to enhance their knowledge and confidence in providing quality follow-up cancer care⁴⁴. Succinct, explicit, patient-specific, actionable information in the form of 'survivorship care plans', as recommended by the IOM, might potentially address much of this concern and also help address any under-use of evidence-based surveillance testing⁴⁵. Such efforts should also ensure that PCPs are informed of follow-up care guidelines. A randomized controlled trial demonstrated that when PCPs are made aware of such guidelines, patient outcomes including complications, recurrence, and quality of life are similar to those of patients followed by oncologists⁵¹. Second, efforts to improve awareness and adherence to guidelines may reduce routine use of non-guideline surveillance testing among both PCPs and oncologists. However, it is unlikely that guideline adherence will occur without changes in coverage policies or reimbursement, informed by systematic research on the benefits and harms of such testing. Third, oncologists' willingness to share survivorship care responsibilities with PCPs or other allied health professionals must be further explored and negotiated. Finally, our results should be interpreted in light of prior research showing that survivors have a keen interest in their own follow-up care, and that greater communication about their expectations would likely enhance the quality of survivor care^{15,28,45,52}. Integrating survivors' perspectives and preferences will help providers, payers, policymakers, and researchers to develop and disseminate communication strategies such as survivorship care plans, and improved models of care that ensure survivors are no longer "lost in transition" between specialists and PCPs.

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