Published in final edited form as:
Cancer Epidemiol Biomarkers Prev. 2014 March ; 23(3): 481–489. doi:10.1158/1055-9965.EPI-13-0999.

Associations between cancer-related information seeking and receiving PET imaging for routine cancer surveillance—An analysis of longitudinal survey data

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Abstract

Background—Routine cancer surveillance with Positron Emission Tomography (PET) is not recommended for most patients who have completed curative treatment for cancer. Yet, recent trends suggest that PET is increasingly utilized for follow-up among cancer patients. This study investigates whether information seeking behaviors predicted self-reported utilization of PET for routine surveillance in colorectal, breast and prostate cancer patients.

Methods—We conducted annual surveys for three years in a cohort of Pennsylvania cancer survivors diagnosed with colorectal, breast, or prostate cancer in 2005. The outcome was self-reported PET receipt for routine surveillance among 944 patients diagnosed with non-metastatic disease (Stages 0-III). Predictors included cancer-related information seeking from non-medical sources and providers. Weighted multiple logistic regression analyses were performed.

Results—In this population, 11% of patients reported receiving at least one PET scan for routine follow-up in a 12-month period several years after diagnosis. Seeking cancer-related information from non-medical sources was associated with higher odds of subsequent reported PET use (odds ratio 3.7, 95% CI=1.1,12.1; p=0.032), after adjusting for potential confounders. Patient engagement with physicians regarding cancer-related information was not a significant predictor.

Conclusion—Overall reported PET utilization for routine surveillance of colorectal, breast and prostate cancer is low. However, we found a significant association with information seeking from non-medical sources but not from providers.

Impact—Exposure to cancer-related information through mass media and lay interpersonal sources may be driving inappropriate utilization of high cost advanced imaging procedures. These findings have important implications for cancer survivors, healthcare providers, and health policy.

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Conflict of Interest Statement: The authors have no conflicts to disclose.

Keywords

Information seeking; PET utilization; cancer surveillance; Pennsylvania

Introduction

The use of advanced medical imaging procedures has increased recently both in clinical practice (1,2)and in cancer care (3,4). Specifically, positron emission tomography (PET) scans among Medicare beneficiaries diagnosed with breast, colorectal, or prostate cancers rose by 54%, 42%, and 41% respectively annually between 1999 and 2006(4). Imaging costs per cancer patient outpaced growth of overall costs of cancer care by two to three times (4) and contributed disproportionately to growing medical costs (2). Increased use of advanced imaging procedures such as PET may result in unnecessary radiation exposure to patients when used in combination with CT, anxiety and morbidity associated with false-positive and false negative results (5–10), and additional costs and complications. Rarely, fluorodeoxyglucose may induce anallergic reaction (11,12).

Clinical guidelines do not recommend PET for post-treatment surveillance among asymptomatic cancer survivors because of a lack of evidence of benefit (with a few exceptions including patients diagnosed with sarcoma, cervical cancer, and multiple myeloma) (13–16). Identifying the predictors of routine PET receipt among cancer survivors may enhance understanding of the rising trend of PET utilization and potentially inform interventions or policies to stem the rise in inappropriate imaging procedures for cancer follow-up. Prior studies have found that individual-level factors associated with PET utilization among colon cancer survivors include cancer stage, age, marital status, and comorbidity (17). Greater availability of PET imaging equipment (18,19), improved diagnostic performance compared to existing modalities (20), patient demands for more testing (21), payment mechanisms and financial incentives in the U.S. healthcare system (22), and other structural factors are other predictors of advanced imaging utilization.

Exposure to cancer-related information may also influence use of PET imaging. The potential benefit of new medical technologies receives substantial attention in the lay media and may promote positive attitudes towards the role of imaging technology such as PET. Furthermore, some medical centers actively promote PET for monitoring cancer recurrence among colon or breast cancer patients in their advertising and information materials. One medical center web site claimed, “after surgery and other treatments, PET is an extremely important tool in monitoring whether any cancer cells have returned and if treatment should be re-started”(23). Research on direct-to-consumer advertising (DTCA) of prescription medications and testing suggests that similar promotional materials increase consumer demand (24–26). For example, DTCA of prescription drugs is associated with higher levels of drug use (27,28). A large-scale advertising campaign for hereditary breast and ovarian cancer (HBOC) genetic testing was associated with a 244% increase in BRCA gene testing referrals (29) and increased orders of HBOC genetic testing by providers (30).

Given the clinical importance of the rise of imaging utilization in cancer patients and the unexplored role of patient information engagement, this study tests the hypotheses that patient information seeking from non-medical sources and physician sources would predict PET use for routine post-treatment surveillance. The findings here may have important implications for cancer survivors, healthcare providers, and health policy in the practice of advanced imaging use for routine follow-up.

Materials and Methods

Data source

Data for this analysis were obtained from a longitudinal cohort study comprising three annual mailed surveys between 2006 and 2008among patients diagnosed with breast, prostate or colorectal cancers between January and December 2005 identified through the Pennsylvania Cancer Registry (PCR). Details of the study population and data collection procedure are described elsewhere (31).

A total of 2,013 participants completed the round 1 survey in the fall of2006 (American Association for Public Opinion Research (AAPOR) response rate 4 (RR4) was 64%)(32). This response rate accounted for the proportion of cases of unknown eligibility that were actually eligible and includes partial interviews as respondents. Of 1,758 respondents who agreed to be re-contacted, 1,293 (74%) completed the round 2 survey in the fall of 2007 and 1,128 (64%) completed the round 3 survey in the fall of 2008. Non-response in the third round was due to refusal to be re-contacted after round 1 (n=255) or round 2 (n=85), death during the study period (n=66), or no response after repeated mailing of the survey. Overall, 58% of the participants from round 1 completed the last survey at round 3 (excluding patients who were deceased in the intervening period). All study participants provided informed consent and our institutional review board approved this study.

Study sample

We focused on rounds 2 and 3 of the survey that included items on information seeking from various sources and receipt of PET scans for routine surveillance. Participants diagnosed with Stage IV disease (n=97) or informed by their doctors the cancer became metastatic (n=87) were excluded as they were not eligible for routine surveillance. The analyzed sample size was 944(84% of 1128 respondents from round 3). Compared to non-respondents, the analyzed sample was more likely to be white, married, diagnosed with breast cancer, and to have higher education. Subsequent analyses controlled for these characteristics to account for potential non-response bias.

Outcome Measure – Reported PET scans at round 3 (approximately 3 years after being diagnosed)

Respondents were asked “How often have you done the following things in the *past 12 months*, as part of your routine cancer follow-up? Do not include the times that you have done things because of a new symptom or health concern.” Response options ranged from ‘0 times’ to ‘5 or more times’ (*M*=0.14, *SD*=0.48). Due to the skewed distribution, responses were categorized as ‘No PET scans’ or ‘One or more PET scans’ within the last 12 months.

We note that other surveillance procedures were included in the questionnaires for all cancer types including doctor visits, physical examination, and CT/CAT scan. In addition, specific procedures were included for each group of cancer patients (i.e., mammogram, breast self-examination, CA15-3 or CA 27–29 blood test, and MRI for breast cancer; CEA blood test, colonoscopy or flexible sigmoidoscopy, and bone scan for colorectal cancer; and PSA blood test, rectal exam, and bone scan for prostate cancer). Analyses involving these other procedures were reported separately elsewhere because of cancer-specific surveillance guidelines (33,34).

Independent Variables – Information Seeking Measures

Prior research indicated that seeking information from physician or health professional sources is a distinct and complementary communication behavior from seeking information from sources other than one’s health care provider (35,36). Therefore, this study included

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two separate independent variables— information-seeking from non-clinician sources and patient-clinician information engagement.

Information seeking from non-medical sources at round 2—We utilized the information seeking from nonmedical sources measure as described in prior research (34,37). Participants were asked to think back to the past 12 months and to recall whether they actively sought information (yes/no) related to their cancer (the question specified "information about treatments but also about other topics") and quality-of-life issues. Participants further indicated seeking these two types of information from: (1)television or radio, (2)books, brochures or pamphlets, (3)newspapers or magazines, (4)the internet other than personal e-mail, (5)family members, friends, or co-workers, (6)other cancer patients, (7) face-to-face support groups, (8) online support groups, (9) telephone hotlines from the American Cancer Society, or (10) other sources. Responses from these 20 items were converted to Z-scores and averaged to form the seeking from non-medical sources scale (Cronbach's α=0.79, *M*=0.0, *SD*=0.5).

Patient-Clinician Information Engagement at round 2—We adapted the scale as described in earlier studies (33,38). Participants recalled whether they sought information (i.e., related to their cancer and quality-of-life issues) from treating physicians, other physicians, or health professionals. Two additional items asked if participants received suggestions from their treating physician to get information from other sources and if they discussed information from other sources with their treating physician. These six items were converted to Z-scores and averaged to form the patient-clinician information engagement scale (Cronbach's α=0.71, *M*=0.0, *SD*=0.6).

Control Variables

The analyses adjusted for demographic variables (i.e., age in years, gender, education level, ethnicity, and marital status), psychological variables (i.e., respondents' concern about how to reduce their chances of cancer recurrence and Lerman Cancer Worry scale measured at round 2)(39), and clinical characteristics (i.e., cancer type, American Joint Committee on Cancer/International Union Against Cancer TNM stage (40), type of treatment received, self-reported health status, receiving and following physicians' advice for tests to monitor one's cancer, and frequency of physician visits). We included the Lerman Cancer Worry scale as a confounder because an earlier analysis showed that worry was a significant predictor of subsequent patient-clinician information engagement; in contrast, the reverse relationship (patient-clinician information engagement or seeking from non-medical sources predicting subsequent worry) was non-significant (41). Because of the presence of gender-specific cancer types, we combined gender and cancer type into a single covariate such that four categories were controlled for in the analysis (female colorectal, male colorectal, breast, and prostate cancers). Although insurance coverage may be associated with utilization, the majority of the study population (96%) had some form of insurance. Therefore, this variable was not included as a confounder. We further adjusted for participants' prior reports of PET scans at round 2 to minimize the threat that underlying awareness, interest, or motivation to get tested with PET may be driving cancer survivors to both engage in information-seeking *and* receive PET scans at a later time point.

Analysis

We analyzed a series of logistic regression models predicting PET scans in round 3. First, Model 1 included only the patient-clinician information engagement and information seeking from non-medical sources variables. Next, Model 2 tests the associations between the seeking variables and PET scans over and above demographic, psychological and clinical variables. In Model 3, we further controlled for prior PET scan use in round 2 to adjust for the tendency for receiving routine PET scans. Analyses were conducted using the M*plus* statistical package version 6(42). Due to missing values for several predictor variables (ranging from 0–30%), we performed full information maximum likelihood (FIML) estimation. The majority of missing values was because of 110 patients who did not participate in round 2 but completed the round 3 survey. The FIML technique is preferable to ad hoc methods for dealing with missing data in predictor variables (e.g., listwise deletion, pairwise deletion, and mean imputation) and is shown to reduce bias and sampling variability in multivariate regression models (43–45). Missing cases for the outcome measure were dropped from the model estimations. There was no evidence of multi-collinearity among the predictors; tolerance measures were above 0.25 and variance inflation factors were below 3.9.

To reflect the distribution of cases in the PCR by cancer type, date of diagnosis, cancer stage, and demographic variables, post-stratification weights were applied to the data for analyses. This permitted inferences about patients with colorectal, breast, or prostate cancer within the PCR population. The results of the regression analyses were substantively identical to parallel analyses without weights. Therefore, only the weighted analyses are reported here.

Sensitivity Analyses

PET use at round 2 was missing for 174 individuals (44 ‘I don’t know’ and 130 missing). We conducted a sensitivity analysis to assess whether recoding these cases as ‘No PET scans’ would alter the findings substantively (making the assumption that these participants did not receive PET scans). To explore the reverse causal hypothesis that PET use leads to more information seeking rather than information seeking leading to PET use, we fit regression models predicting patient-clinician information engagement and seeking from non-medical sources at round 3 with reported PET scan use at round 2, controlling for those information engagement behaviors at round 2. Absence of these reverse causal pathways would strengthen an interpretation that information engagement predicted PET use.

Results

Table1 summarizes unweighted and weighted characteristics of the analyzed sample. The prevalence of reporting PET scans for routine surveillance was 10.6% in the twelve months preceding the round 3 survey in this study sample. The profile of the analyzed sample was similar to patients with the 3 cancers (colorectal, breast, and prostate cancer) from the PCR with the exception of marital status.

We ranked the individual sources that participants sought from about cancer or quality of life in Table 2. The most common non-medical sources about cancer or quality-of-life information were newspapers or magazines; books, brochures or pamphlets; family, friends, coworkers; other cancer patients; television or radio; and the internet. Participants reported seeking from an average of 3 out of these 20 non-medical sources. The most common forms of patient-clinician engagement were actively looking for cancer-related information, discussing information from elsewhere, and looking for quality-of-life information from one’s treating physicians. Patient-clinician information engagement and seeking from non-medical sources were significantly correlated ($r=0.615$, $p<.0005$). In other words, patients who sought from medical sources tended to seek from non-medical sources as well.

Table 3 shows the series of logistic regression models predicting PET at round 3 with information seeking variables alone (Model 1), information seeking variables and confounders (Model 2), and the full model adjusting for PET at round 2 (Model 3). The results from Model 3 indicate that seeking information from non-medical sources was associated with an increased odds of subsequent routine PET scan by 3.7 times (95% CI = 1.1,12.1; $p = 0.032$), over and above other variables that could predict of PET scan use. To facilitate the interpretation of this finding, we computed the marginal probabilities of PET scan at round 3 from the regression coefficients for patients who did not seek from any non-medical source compared with patients who reported the mean level of seeking (i.e., average of 3 non-medical sources), holding all other predictors constant at their respective means. The predicted probability of PET scan at round 3 increased from 3.1% among patients who did not seek from any source to 5.4% in patients who sought from 3 sources. In contrast, patient-clinician information engagement was not significantly associated PET scan use. We further examined whether patient-clinician information engagement and seeking from non-medical sources interacted in their associations with PET at round 3 by introducing an interaction term between these variables; this interaction was not significant and was therefore omitted from the final model. PET at round 2 strongly predicted PET receipt at round 3. Other significant predictors included gender and cancer type (more likely among male colon cancer patients than other cancer types) and marital status (less likely in married patients). Predictors in Model 3 accounted for 46% of the variation in PET at round 3.

Findings from the sensitivity analyses were consistent with the above main results. In the first analysis, seeking information from non-medical sources remained significantly associated with reported PET scans in round 3 (OR = 3.7; 95% CI = 1.1, 12.1; $p = 0.029$) when missing cases were coded as not receiving PET scans. In the second sensitivity test to assess the reverse possibility that PET use led to more information seeking rather than information seeking leading to PET use, the reverse lagged relationships were not significant. This strengthened the inference that seeking information from non-medical sources was predictive of subsequent reported PET use.

Discussion

PET use in cancer care increased dramatically over the last decade, raising concerns about cost, radiation exposure when used in combination with CT, and false positive or false negative PET results (4–10,18). This trend is particularly concerning in the setting of routine surveillance because of the lack of improved survival or outcome benefits for breast, colon, or prostate cancer patients (13–16). Left unchecked, PET use may place patients at risk of medical harms from the procedure itself or from unnecessary invasive procedures (7). Indiscriminate PET use could also contributed is proportionately to exponential growth in costs of cancer care (4).

This study of Pennsylvania cancer survivors found that PET utilization for routine surveillance in the twelve months preceding the third round of surveys (based on patient self-report) appears modest (10–11%). However, this level of PET overuse may be problematic at the population level because of the large and growing number of cancer survivors. In 2012, there were 13.7 million cancer survivors—the majority were prostate (2.8 million), breast (2.9 million), and colorectal (1.2 million) cancer survivors. It is estimated that by 2022, there would be 18 million cancer survivors (46). We therefore recommend monitoring more recent trends to assess whether PET overuse has increased over time. This study further found that PET use was strongly associated with survivors seeking cancer-related information from non-medical sources (i.e., lay interpersonal contacts and mass media sources), even after adjusting for prior receipt of PET scans and other potential confounders. In contrast, we did not detect a lagged relationship between patient-clinician information engagement and PET for routine surveillance. These findings pose several implications for stakeholders involved in the post-treatment care of cancer patients and generate additional research questions for future studies.

Most importantly, these findings suggest that exposure to cancer-related information through mass media and lay interpersonal sources may be driving inappropriate utilization of high cost advanced imaging procedures. This information may include specific promotional materials for cancer surveillance with PET used by healthcare facilities or information that advocates the benefits of new medical technology in general. One important question is whether these promotional materials are misstating the benefits of PET given that the use of PET imaging for routine cancer surveillance is inconsistent with clinical practice guidelines for most malignancies. While there is little published work describing the quality of promotional materials for PET imaging specifically, studies have found that promotional materials for self-referral CT and MRI imaging companies often contain statements that lack clear scientific evidence and almost uniformly fail to identify the risks of receiving these procedures (47). Presently, there are no regulations to govern marketing practices of radiology facilities that target patients, although some specialty societies such as the American College of Radiology provide advice for patients on the relative benefits and risks of PET and other forms of medical imaging (48). Further investigation is needed to determine if promotional materials of PET imaging are in fact influencing patients' (and their physicians') decisions regarding cancer surveillance procedures. If so, policies or professional guidelines may be necessary to ensure that healthcare facilities convey accurate and reliable facts about the appropriate forms of cancer follow-up to patients.

There are several possible explanations for the observed association that deserve further investigation. First, cancer-related information seeking may lead to increased patient demand for PET scans from providers and subsequent referral for scans. The influence of patient demand on provider prescribing behavior in the setting of prescription medications is well established. Specifically, patients who request specific medications are often prescribed the medications that they requested (24,27,49). Second, the observed association between information seeking and PET use could be due to physician recommendations. For instance, physicians may be more inclined to offer PET scans to patients who are more actively engaged in seeking information about their care. Third, some patients experience persistent symptoms or late effects of treatment and therefore tend to seek information and require follow-up visits more frequently. These visits could provide more opportunities for physicians to suggest PET scans. Fourth, patients who are active information seekers may be more open to suggestions about PET for surveillance from their physicians. Because little is known about the frequency and impact of patient-physician discussions about PET imaging for surveillance, more work is needed to elucidate the mechanisms through which patient information exposure may relate to PET utilization.

It is important to note that the information seeking and patient-clinician information engagement measures in this study were not specific to information about PET or cancer surveillance testing and do not capture whether patients were exposed to direct-to-consumer promotions of PET facilities. Consequently, the observed relationship may be an underestimation of the true relationship between actively seeking information on PET and receiving such scans later. Alternatively, the observed findings may also represent the effect of exposure to more general information about cancer-related technologies on testing. Future research is needed to determine the nature and content of cancer-related information from non-medical sources that influences receipt of inappropriate testing with PET imaging for routine surveillance. For instance, studies could focus on developing valid measures of the level of exposure to information about PET and other unnecessary surveillance testing from non-medical sources among cancer survivors.

This study was limited by the reliance on self-reported measures of receiving PET scans for routine follow-up. We were unable to ascertain whether participants accurately reported receiving PET for treatment monitoring or restaging purposes. We propose a few reasons why we believe the threat of over-reporting PET scans for routine surveillance was minimal in this study. First, participants were reminded not to include the times they underwent testing because of a new symptom or health concern. In addition, receipt of PET was measured on average 3 years following cancer diagnosis. We surmise that it is unlikely patients were still receiving active treatment that would require PET for monitoring purposes. Furthermore, we excluded from the analyses participants diagnosed with advanced cancers (stage IV) as well as those who were informed they had metastatic disease by their doctors as these patients might have required imaging procedures for confirming suspected metastases or planning palliative care. Nevertheless, validation studies to compare self-reported measures of PET scans for routine surveillance with medical records may be necessary to assess the accuracy of survey measures.

This study was conducted among cancer patients from Pennsylvania and only included patients who were diagnosed with three cancer types (i.e., breast, colon, and prostate). Despite this, the population-based sample in this study represented an improvement from prior studies, which focused on elderly patients eligible for Medicare or patients receiving treatment within a single healthcare system. This study further evaluated communication behaviors and utilization of advanced imaging through direct surveys of cancer survivors rather than analyzing claims data. In addition, we have no prior reasons to expect that the observed association would differ based on geographic location.

Conclusion

Advanced imaging studies including PET entail potential medical harms and costs (4–6,10), it behooves healthcare providers, health services researchers, and health policy makers to closely monitor factors driving inappropriate utilization of high-cost imaging procedures, such as PET for routine cancer follow-up. This study represents an attempt to understand the role of one potential predictor of PET use—cancer survivors' engagement in active seeking of cancer-related information from non-medical sources.

Acknowledgments

Research Support: R.C. Hornik received P50CA095856; R.C. Hornik and K. Armstrong received P20CA095856 from the National Cancer Institute. A.S.L. Tan and L. Gibson were supported for this work by P20CA095856.

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Table 1

Characteristics of analyzed sample (n=944)

	Unweighted			Weighted		
Characteristics	**Mean**	**SD**	**%**	**Mean**	**SE**	**%**
Self-reported PET scans (at least one) at round 3			10.6			10.5
Self-reported PET scans (at least one) at round 2			11.1			11.0
Seeking from non-medical sources at round 2	0.0	0.5		0.0	0.0	
Patient-clinician information engagementat round 2	0.0	0.6		0.0	0.0	
Age at cancer diagnosis (years)	65.3	11.4		67.7	0.5	
Gender – Female			51.1			51.4
Education – Some college and above			50.8			49.6
Race/ ethnicity						
White			85.4			86.6
Black			11.3			8.5
Hispanic or other			3.3			4.9
Marital status – Married			70.7			59.4
Cancer type						
Colon cancer (male)			13.8			13.6
Colon cancer (female)			14.9			15.2
Breast cancer			36.1			36.2
Prostate cancer			35.2			35.0
Type of treatment received						
Surgery			74.2			71.7
Radiation therapy			51.1			50.9
Systemic therapy (Chemotherapy or hormonal therapy)			49.6			47.6
Health status at round 2[a]	3.3	0.9		3.3	0.0	
Cancer stage[b]						
Stage 0–II			82.4			82.1
Stage III			10.8			10.6
Lerman Cancer Worry at round 2[c]	6.8	2.8		6.5	0.1	
Followed doctor’s recommendations about cancer follow up tests at round 2[d]	4.5	0.9		4.4	0.7	

	Unweighted			Weighted		
Characteristics	**Mean**	**SD**	**%**	**Mean**	**SE**	**%**
Frequency of doctor visits at round 2[e]	2.6	0.9		2.5	0.0	
Concern about reducing the chance of cancer recurrence at round 2 – Yes			68.3			68.3

Notes:

[a]Ranged from 1 'Poor' to 5 'Excellent';

[b]Cancer stage was assessed at time of diagnosis and was categorized into 0-II and III because prostate cancer patients in this population were all diagnosed at stage II or above—this did not influence the substantive results for the analysis;

[c]Ranged from 3 to 15 (sum of 3 items with responses ranging on a 5-point scale from 'not at all' to 'almost all the time') ;

[d]Ranged from 1 'Never' to 5 'Always' in the past 12 months;

[e]Ranged from 1 '0 times' to 5 'More than 7 times' in the past 12 months.

Missing values for variables: PET at round 3 (174), PET at round 2 (289), Seeking from non-medical sources (175), patient-clinician information engagement (180), age (1), education (2), health status (115), cancer stage (64), Lerman worry scale (138), followed doctor's recommendations about tests (157), doctor visits (134), concern about reducing recurrence (126).

Table 2

Frequency statistics of individual items in seeking from non-medical sources and patient-clinician information engagement

Individual Survey Items	Weighted average % (95% CI)
Seeking from non-medical sources items	
Actively looked for information about cancer from:	
Newspapers or magazines	30.8 (26.8, 35.1)
Books, brochures or pamphlets	29.1 (25.2, 33.3)
Family members, friends or co-workers	27.0 (23.1, 31.4)
Other cancer patients	24.7 (21.3, 28.5)
Television or radio	23.2 (19.7, 27.2)
Internet (other than personal e-email and online support groups)	14.3 (11.5, 17.5)
Face-to-face support groups	3.0 (1.9, 4.7)
Telephone hotlines (e.g., from the American Cancer Society)	1.7 (1.0, 2.9)
Online support groups	1.2 (0.6, 2.3)
Other	1.4 (0.8, 2.5)
Actively looked for information about quality of life issues from:	
Books, brochures or pamphlets	22.0 (18.4, 26.2)
Newspapers or magazines	20.7 (17.4, 24.5)
Other cancer patients	18.0 (14.5, 22.0)
Family members, friends or co-workers	17.8 (14.7, 21.3)
Television or radio	12.7 (10.1, 15.9)
Internet (other than personal e-email and online support groups)	10.4 (8.0, 13.3)
Face-to-face support groups	1.9 (1.2, 3.3)
Telephone hotlines (e.g., from the American Cancer Society)	1.6 (0.9, 2.9)
Online support groups	0.1 (0.0, 0.5)
Other	1.3 (0.7, 2.1)
Patient-clinician information engagement items	
Actively looked for information about cancer from my doctors	42.2 (37.9, 46.6)
Discussed information from another source with my doctors	41.1 (36.9, 45.5)
Actively looked for information about quality of life issues from my doctors	31.8 (27.9, 36.1)
Doctors have suggested I get information from other sources	17.3 (13.8, 21.5)
Actively looked for information about cancer from other doctors or health professionals	13.8 (11.1, 16.9)
Actively looked for information about quality of life issues from other doctors or health professionals	8.4 (6.2, 11.2)

Notes: Percentages reported here are weighted using post-stratification weights to match the sample to the PCR population.

Table 3

Weighted multiple logistic regression model predicting self-reported PET scans at Round 3 (n=944)

	Model 1		Model 2		Model 3	
Independent variables	**OR (95% CI)**	***P***	**OR (95% CI)**	***P***	**OR (95% CI)**	***P***
Seeking from non-medical sources at round 2	2.92 (1.21,7.07)	0.018	2.75 (1.00,7.53)	0.050	3.67 (1.12,12.05)	0.032
Patient-clinician information engagement at round 2	1.00 (0.56,1.78)	1.000	1.16 (0.60,2.23)	0.660	0.90 (0.40,2.00)	0.795
Reported receiving prior PET scans at round 2	-	-	-	-	13.92 (6.02,32.19)	<.0005
Age at cancer diagnosis (years)	-	-	1.01 (0.99,1.04)	0.285	1.01 (0.98,1.03)	0.707
Education level						
High school or below (referent)	-	-	1.00		1.00	
Some college or above	-	-	0.47 (0.25,0.90)	0.023	0.59 (0.28,1.22)	0.150
Ethnicity						
White (referent)	-	-	1.00		1.00	
Black	-	-	1.14 (0.45,2.93)	0.782	0.95 (0.33,2.7)	0.922
Hispanic and other	-	-	0.26 (0.04,1.54)	0.136	0.45 (0.09,2.13)	0.312
Marital status						
Not married (referent)	-	-	1.00		1.00	
Married	-	-	0.39 (0.20,0.75)	0.005	0.35 (0.18,0.69)	0.003
Cancer Type by Gender						
Colon cancer (male)	-	-	1.00		1.00	
Colon cancer (female)	-	-	0.21 (0.08,0.58)	0.002	0.19 (0.06,0.61)	0.005
Breast cancer	-	-	0.01 (0.04,0.25)	<.0005	0.13 (0.05,0.36)	<.0005
Prostate cancer	-	-	0.12 (0.04,0.39)	<.0005	0.14 (0.04,0.51)	0.003
Received surgery	-	-	0.45 (0.14,1.45)	0.182	0.40 (0.11,1.50)	0.174
Received radiation therapy	-	-	1.10 (0.48,2.54)	0.827	1.48 (0.58,3.77)	0.411
Received systemic treatment (chemotherapy or hormonal therapy)	-	-	2.17 (0.98,4.79)	0.056	1.48 (0.64,3.41)	0.362
Health status at round 2	-	-	0.90 (0.64,1.25)	0.520	0.90 (0.62,1.29)	0.555
Cancer stage						
Stage 0 to II (referent)	-	-	1.00		1.00	
Stage III	-	-	1.89 (0.81,4.38)	0.139	1.89 (0.8,4.45)	0.144
Lerman Cancer Worry at round 2	-	-	1.16 (1.03,1.31)	0.012	1.14 (0.99,1.32)	0.060

	Model 1		Model 2		Model 3	
Independent variables	**OR (95% CI)**	***P***	**OR (95% CI)**	***P***	**OR (95% CI)**	***P***
Followed doctor's recommendations about cancer-follow up tests at round 2	-	-	1.35 (0.91,2.01)	0.138	1.40 (0.86,2.30)	0.178
Frequency of doctor visits at round 2	-	-	1.52 (1.01,2.29)	0.046	1.29 (0.82,2.03)	0.266
Concern about reducing the chance of cancer recurrence at round 2	-	-	0.50 (0.24,1.06)	0.072	0.58 (0.25,1.38)	0.218
R-square	0.061		0.381		0.463	

Notes: OR: adjusted odds ratio; 95% CI: 95% confidence interval.