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Potential Spillover Educational Effects Of Cancer-Related Direct-To-Consumer Advertising On Cancer Patients' Increased Information Seeking Behaviors: Results From A Cohort Study

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Abstract

Spillover effects of exposure to direct-to-consumer advertising (DTCA) of cancer treatments on patients' general inquiry about their treatments and managing their illness are not well understood. This study examines the effects of cancer patients' exposure to cancer-related DTCA on subsequent health information seeking behaviors from clinician and non-clinician sources (lay media and interpersonal contacts). Using a longitudinal survey design over three years, data was collected from cancer survivors diagnosed with colorectal, breast, or prostate cancer who were randomly sampled from the Pennsylvania Cancer Registry. Study outcome measures include patients' information engagement with their clinicians and information seeking from non-medical sources about cancer treatment and quality of life issues, measured in the second survey. The predictor variable is the frequency of exposure to cancer-related DTCA since diagnosis, measured at the round 1 survey. The analyses utilized lagged weighted multivariate regressions and adjusted for round 1 levels of patient-clinician engagement, information seeking from non-medical sources, and confounders. Exposure to cancer-related DTCA is associated with increased levels of subsequent patient-clinician information engagement ($B=.023$, 95% CI=.005 to .040, $p=.012$), controlling for confounders. In comparison, exposure to DTCA is marginally significant in predicting health information seeking from non-clinician sources ($B=.009$, 95% CI=−.001 to .018, $p=.067$). Cancer-related DTCA has potentially beneficial spillover effects on health information seeking behaviors among cancer patients. Exposure to DTCA predicts (a little) more patient engagement with their physicians.

Keywords

direct-to-consumer advertising; cancer; active information seeking; cohort study; Pennsylvania

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CONFLICT OF INTEREST STATEMENT

The author declares that he has no conflict of interest.

INTRODUCTION

The ongoing debate over the benefits and harms of direct-to-consumer advertising (DTCA) of medical treatments (defined as promotional efforts by a pharmaceutical company, healthcare provider, or medical facility to present information about treatments for patients in the lay media environment [1]) has spawned significant research on its impact on patients, healthcare providers, and the broader healthcare system [2–7]. Despite the large body of DTCA research—a systematic review in 2005 identified 2835 publications on DTCA [4]—significant gaps remain in evaluating the impact of DTCA on health information seeking behaviors among patients. Most research focuses on whether DTCA influences patients to inquire specifically about an advertised drug or to request a prescription for the advertised medication [5–9]. Largely unstudied are potentially beneficial spillover effects of DTCA in prompting patients to obtain other health information that are also relevant to managing their illness. In economic theory terms, these spillover effects are termed as positive externalities. Some examples of additional seeking include information on illness prevention, surveillance and diagnosis for new health symptoms, or non-drug ways to improve health [10]. Notably, active health information seeking is recognized as a determinant of numerous cancer prevention and control outcomes (e.g., preventive health behaviors, health screening, illness coping, and psychosocial outcomes) [11].

It is unsurprising to expect DTCA to stimulate information seeking specific to an advertised treatment; that is the primary objective of advertising. However, it is less obvious to expect DTCA to influence patients to seek more broadly about coping with their health condition. Nonetheless, this idea is plausible for a few reasons. First, the US Food and Drug Administration (FDA) guidelines require broadcast DTCA to include “adequate provisions” to refer consumers to doctors and pharmacists, product websites, toll-free numbers, or print ads for more information [12]. These external sources offer opportunities for patients to obtain additional useful health information. Second, DTCA often contains messages directing patients to look for drug-related information *and* about the condition from different sources [13–15]. Furthermore, actors portrayed in DTCA frequently model the behavior of information seeking. These portrayals convey cues that information seeking is beneficial and normative and increase patients’ self-efficacy to seek information [16–18]. Consistent with these observations, many patients report that DTCA would prompt them to seek general information about their health condition and treatment from their healthcare provider or other information channels [5, 19–21].

To examine the potential spillover educational effects of DTCA among cancer patients, this study analyzes whether exposure to cancer-related DTCA is associated with patient-clinician information engagement and seeking from non-clinician sources in a population-based cohort. The following sections describe the methods and findings. Implications for future research in the area of cancer education and policies to regulate cancer-related DTCA are discussed.

METHODS

Study Population

Data were obtained from the first two rounds of a longitudinal population-based survey on information engagement behaviors and health outcomes among cancer patients. The sampling frame comprised 26,608 patients who were diagnosed with breast, prostate, or colorectal cancers and were notified to the Pennsylvania Cancer Registry in 2005. Of these, 3994 patients (15% of the sampling frame) were randomly invited to participate in the round 1 survey in September 2006. The Pennsylvania State Health Department granted permission to access patient data for this research. An oversample of colorectal cancer patients, those with Stage IV disease, and African American patients was added to facilitate planned subgroup analyses in the main study (not presented here). A total of 2013 participants (679 breast cancer patients, 650 prostate cancer patients, and 684 colorectal cancer patients) completed the round 1 survey. The American Association for Public Opinion Research response rates (AAPOR RR#4) for breast, prostate, and colorectal cancer patients were 68%, 64%, and 61% respectively [22]. In the fall of 2007, one year after they were first surveyed, 1293 respondents (64.2% of participants from round 1) completed a follow-up survey (round 2). The response rates in this study compare favorably with response rates of 50% or lower in other mailed health surveys among cancer survivors [23, 24]. Non-response to the round 2 survey was due to refusal to be re-contacted after round 1 (255 patients; 12.7%) and non-response to a repeat mailed survey at round 2 (465 patients; 23%).

Data Collection

Survey questionnaires were designed following literature review, patient interviews, and expert consultation. Information on the study objectives, instructions for opting out, survey questionnaires, a small monetary incentive, and a stamped return envelope were mailed to participants based on a standardized procedure for mail surveys [25]. The patients were informed that participation was voluntary and returning a completed survey implied informed consent. Further details of the data collection and survey instrument development procedures are described fully elsewhere [26]. The institutional review board at the University of Pennsylvania approved the study.

Information Seeking Measures

Prior research indicated that seeking information from physician or health professional sources is a distinct and complementary communication behavior compared with seeking information from sources other than one's health care provider [27, 28]. Therefore, this study included two separate outcome measures—patient-clinician information engagement and information-seeking from non-clinician sources.

Patient-clinician information engagement (PCIE) is defined as cancer patients' engagement with physicians and other health professionals about information related to their cancer (e.g., about treatments, quality of life issues, and other topics). This measure is adapted from prior studies and comprised 6 binary items (yes/no) [29]. Participants were asked to recall if they 1) actively looked for information about their cancer (about treatments but also about other topics) from their doctors, 2) actively looked for information about their cancer from other

doctors or health professionals, 3) actively looked for information about quality of life issues from their doctors, 4) actively looked for information about quality of life issues from other doctors or health professionals, 5) discussed information from other sources with their doctors, and 6) received suggestions from their doctors to go to other sources for more information. The average of these 6 items formed the PCIE scale (round 1 Cronbach's $\alpha=0.69$; round 2 Cronbach's $\alpha=0.73$). While these survey items do not specifically elicit patients' information seeking about advertised cancer treatments, some of the items may conceivably capture patients' underlying engagement with their clinicians about treatment ads (e.g., items 1 and 2 ask about looking for information about treatments while item 5 asks about discussing other sources with doctors).

Information seeking from non-clinician sources is defined as cancer survivors' seeking from sources other than their clinicians about information related to their cancer including treatments, quality of life issues, and other topics. This measure comprised 20 items and is adapted from previous research [30]. Participants were asked if they actively looked for two topics (information about their cancer or information about quality of life issues) from 10 different sources (family members, friends or co-workers; other cancer patients; face-to-face support groups; online support groups; telephone hotlines; television or radio; books, brochures or pamphlets; newspapers or magazines; internet other than personal email or online support groups; or other). The average of these 20 items formed the scale for information seeking from non-clinician sources (round 1 Cronbach's $\alpha=0.81$; round 2 Cronbach's $\alpha=0.82$).

DTCA Exposure Measure

DTCA exposure is conceptualized as the encoded exposure in individuals' memory of having seen or heard ads of cancer treatment. An individual's encoded exposure of encountering DTCA is accessible for later recall and is the minimum trace of memory that would have to occur to reasonably expect DTCA exposure to produce effects on various outcomes including information seeking behaviors [31]. This exposure measure is operationalized as patients' self-reported frequency of encountering cancer-related DTCA since diagnosis. Participants were asked at round 1: "Since your cancer diagnosis, how often have you seen or heard advertisements concerning each of the following? Check all that apply." Responses to three items (treatment alternatives for cancer, dealing with side effects of treatment, and hospitals or doctors offering services for cancer) along a 5-level scale (never, less than every month, about twice a month, about once a week, almost every day) were averaged to form the DTCA exposure scale at round 1 (Cronbach's $\alpha=0.72$). These three items were validated in a separate study involving a sample of 363 cancer patients who were part of a national online panel of cancer survivors. Results from the validation study indicated that these items demonstrated good reliability (internal consistency and test-retest reliability) and construct validity (convergent, nomological, and discriminant validity) when compared with more elaborate items that included detailed descriptions or provided video and print ad exemplars to facilitate recall of exposure for each type of DTCA [32]. Further details of the validation study are available from the author upon request.

Possible confounders included demographic variables (age, sex, race/ethnicity, and education level) and disease characteristics (cancer type, stage [33], health status, and worry about cancer [34]). These variables were included as confounders because prior research reported that demographic and disease characteristics are associated either with information seeking behaviors or exposure to DTCA [6, 20, 35, 36].

Statistical Analyses

The present analyses were performed using round 1 and round 2 survey data. First, correlation analyses were conducted to assess cross-sectional associations between exposure to DTCA and the outcome variables (PCIE and information seeking from non-clinician sources). Preliminary analyses affirmed the relationships between each of the outcome variables and exposure to DTCA satisfied the linearity assumption based on visual inspection of the respective scatterplots and tests of linearity.

To address the concerns about temporal order and spuriousness in inferences of cross-sectional associations, multivariate analyses were performed to predict PCIE and information seeking from non-clinician sources at round 2 with exposure to DTCA in round 1, controlling for each of the seeking behaviors at round 1 and other confounders. There were 369 patients who were randomly selected to answer a shortened version of the questionnaire in round 1 that excluded items on DTCA exposure. Missing values for PCIE and information seeking at both rounds 1 and 2 were minimal (1–2%). To reduce bias and sampling variability due to missing values in the DTCA exposure variable, the Mplus software version 7 was utilized to fit full information maximum likelihood (FIML) models [37]. The FIML technique is superior to ad hoc methods for dealing with missing data in predictor variables (e.g., listwise deletion, pairwise deletion, mean imputation) and has the benefit of reducing bias and sampling variability in multiple regression models [38]. Huber-White covariance adjustments were applied to the estimated standard errors to adjust for non-normality in the data. The models applied post-stratification sample weights to adjust the sample to the Pennsylvania Cancer Registry population in terms of race, age, gender, marital status, time of diagnosis, and stage at diagnosis. The weighting procedure further accounted for survey non-response and the oversampling of certain subgroups of patients. This permitted inferences to be made about the broader population of patients with colon, breast, or prostate cancer in Pennsylvania. Analyses with and without sampling weights were substantively identical. Therefore, only weighted analyses are reported.

RESULTS

Table 1 summarizes the distribution of the key measures and characteristics of the study population at both rounds 1 and 2. The distribution of the information seeking and DTCA exposure variables were non-normal (skewness ranged from -0.866 to 1.040 ; kurtosis ranged from -1.229 to 0.498 ; all univariate Shapiro-Wilk tests were significant at $p < .00005$). At round 1, mean age of the study sample was 66 years, half of the sample was female (51%), most of the sample was white (83%), and almost half (44%) completed some college or higher education.

Based on correlation analyses, exposure to DTCA is significantly associated with PCIE (Pearson's $r=0.259$, $p<.00005$) and seeking from non-clinician sources (Pearson's $r=0.370$, $p<.00005$) at round 1. However, these cross-sectional findings do not permit inferences about the causal direction of the relationships between DTCA exposure and seeking behaviors and could be confounded by other patient characteristics.

Table 2 summarizes the lagged regression models predicting PCIE and information seeking from non-clinician sources at round 2 with exposure to DTCA at round 1, controlling for the respective information engagement behaviors measured at round 1 and other confounders. The results indicate that exposure to DTCA at round 1 is significantly associated with subsequent PCIE (unstandardized coefficient $B=0.023$, 95% CI=0.005 to 0.040, $p=0.012$). The association between exposure to DTCA and information seeking from non-clinician sources at round 2 is marginally non-significant although the estimated effect trends in the positive direction. Other significant predictors for both analyses are prior PCIE or information seeking from non-clinician sources at round 1, education level (higher active seeking with some college or higher education), race/ethnicity (higher active seeking in African-American compared to white patients), and cancer-related worry.

DISCUSSION

Much of the controversy surrounding the societal value and risks of DTCA focuses on whether patients' interests are better served with this form of public health communication. From a patient empowerment standpoint, proponents contend that DTCA places valuable health information in the hands of patients, fosters a patient-centered model of health care delivery, and strengthens patient-physician communications by activating patients to participate in their health care and treatment decisions [10]. Opponents counter that reliance on DTCA, which is at heart motivated by profit generation for advertisers and manufacturers, to perform such a crucial public education role is a "haphazard approach to health promotion" and could undermine public health [39, 40].

This current study offers new empirical evidence that explores the role of DTCA in empowering patients within the specific context of cancer care. Based on cross-sectional and lagged analyses, the results suggest that there are small but significant spillover effects of DTCA on cancer patients' active health information seeking behaviors, particularly in terms of engaging with their physicians and other health professionals for cancer-related or quality-of-life information. These findings may reflect a previously unmeasured and unintended benefit of DTCA gradually shifting the paternalistic health care delivery paradigm to a patient-centered model [8, 41]. Increased patient-driven communication about cancer-related health information could in turn improve a variety of health outcomes [42]. For instance, cancer patients who are information seekers are more likely to adopt healthy lifestyles, be adherent to surveillance, and have improved psychosocial outcomes than non-seekers [11, 29, 43, 44]. The absolute size of the detected effect of DTCA exposure on information seeking behavior is small, but if this effect is relevant to a large number of patient-clinician interactions, the population effect on health outcomes could be substantial.

Viewed from a cancer education perspective, increased DTCA-prompted interactions between cancer patients and their clinicians could have beneficial or negative implications. On one hand, these interactions represent valuable teachable moments when providers can take advantage of patients' interest in managing their cancer to engage in meaningful conversations about cancer-related concerns, quality of life issues, and effective ways of coping with problems [45, 46]. Conversely, some clinicians view discussion about information from DTCA as an inefficient use of time for the visit [47] that may "lead to further displacement of medically important services" [48]. Seeing that DTCA is here to stay in the foreseeable future, it would be imperative for providers to be able to strike a balance between the time demands of addressing patients' information needs following DTCA exposure and providing other clinical services during a consultation.

Previous studies that evaluate theoretical pathways of DTCA effects on information seeking offer several psychosocial mechanisms and explanations for the findings in this study. For example, Welch Cline and Young reported frequent occurrences of cues in DTCA that modeled identity rewards (e.g., models depicted as healthy, active, or friendly in the ads) and relational rewards (e.g., models depicted as a family or as romantic partners) in conjunction with the advertised product [16, 17]. The authors posited that the presence of such social modeling cues could motivate patients to find out more information about their symptoms from their physicians. In another study among young women, having positive outcome expectancies of discussing about an advertised drug with physicians increased women's intention to communicate with physicians about the drug [49]. Furthermore, Deshpande and colleagues reported that favorable opinions about DTCA utility (a scale derived from three items about whether DTCA allowed people to be more involved with their health care, make decisions about prescription medicines, and educate people about risks and benefits of prescription medicines) doubled the odds of survey respondents utilizing DTCA information to talk to their doctor about a medical condition [8]. Further research will be necessary to fully explicate the underlying processes of the observed associations between DTCA and patients' active information seeking behaviors in this present study.

This study's findings could also have implications on public policy considerations about regulating DTCA. On one hand, these results lend support to an argument by proponents that DTCA indirectly benefits patients by encouraging broader health information seeking behaviors that may in turn lead to more appropriate cancer care [50]. As a result, policies governing DTCA should be relaxed to promote greater dissemination of valuable health information to consumers [10]. On the other, there might be more cost-effective and direct means to increase patients' health information seeking behaviors rather than relying on DTCA [40]. Critics point to possible negative effects of DTCA including patients being misled by emotional appeals, alteration of physician prescription behaviors, inappropriate use of prescription drugs or health services, bias in reliance on medications rather than lifestyle changes, and ballooning healthcare costs [39, 51]. More research is needed to assess the benefits and risks of DTCA thoroughly as a form of public health communication for cancer patients and to inform evidence-based policies for DTCA.

This study is limited in a few aspects. First, the outcome measures do not distinguish between specific information seeking about advertised cancer treatments from general seeking about other health topics related to cancer (e.g., other treatment options or quality of life issues). Second, self-reported information seeking behaviors could be subject to recall error. The reliance on self-reports, while imperfect, is a trade-off in order to interview a large population-based sample of cancer patients repeatedly over time. Although direct observations of patient-clinician engagement would be more accurate, this would have been feasible only in smaller settings. Third, a sizable number of respondents had missing data on the DTCA exposure variable due to random assignment to a shortened questionnaire. This could have reduced the power to detect significant lagged effects. To reduce the possibility of bias, the lagged analyses employed FIML techniques to handle missing values. Fourth, the relationships observed in this study among Pennsylvanian cancer patients may not generalize to patients with other diagnoses or in other geographic regions.

This present study differs from previous research on DTCA effects in a few ways. First, recognizing the unique context of cancer treatment in comparison to other disease conditions, this study focuses on the effects of exposure to a specific subset of advertising (i.e., cancer-related DTCA) among cancer patients. This ensures that the DTCA exposure in question is highly salient for the study population. In contrast, earlier research typically measured exposure to DTCA in general among healthy consumers for whom DTCA may have little salience [5, 19]. Second, prior surveys tended to rely on cross-sectional survey designs in analyzing associations between DTCA exposure with patient behaviors or outcomes. These surveys were therefore limited in their ability to untangle the causal direction of the associations. In comparison, this study relies on longitudinal data to establish the temporal order between DTCA exposure and information seeking behaviors and further controls for prior information seeking behaviors as means of reducing the threat of confounding by individual preferences toward health information seeking.

In sum, this longitudinal study among cancer patients in Pennsylvania found that increased exposure to DTCA significantly predicts a small increase in subsequent active health information seeking from health professional. DTCA is marginally significant in predicting information seeking from non-health professional sources. Given that population-level effects of DTCA are relatively unknown, these results offer useful insights that would inform cancer education research, clinical practice, and the policy debate surrounding the utility of DTCA.

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Table 1

Summary Statistics And Characteristics Of Study Population At Rounds 1 and 2

	Round 1 (n=2013)			Round 2 (n=1293)			
	Range	Mean	SD	%	Mean	SD	%
<u>Principal variables</u>							
Exposure to DTCA	1.00 to 5.00	2.40	1.01		-	-	
Patient-clinician information engagement (PCIE)	0.00 to 1.00	0.53	0.29		0.29	0.28	
Information seeking from non-clinician sources	0.00 to 1.00	0.22	0.17		0.14	0.16	
<u>Control variables</u>							
Age (years)		66.2	12.4		65.5	11.9	
Sex							
Female				50.9			51.4
Male				49.1			48.6
Race/Ethnicity							
White				83.1			86.2
African-American				12.8			10.4
Hispanic or other race/ethnicity				4.2			3.4
Education							
High school or below				56.5			53.4
Some college or above				43.5			47.6
Cancer Type							
Breast cancer				33.7			34.8
Prostate cancer				32.3			33.3
Colon cancer				34.0			31.9
Lerman Cancer Worry Scale (not at all to almost all the time)	1.00 to 5.00	2.43	1.00		2.36	0.97	
Cancer Stage							
Stage 0 to II				71.0			73.9
Stage III				12.9			13.0
Stage IV				16.1			13.2
Health Status (poor to excellent)	1.00 to 5.00	3.11	0.94		3.22	0.90	

Table 2

Lagged Multiple Regression Models Predicting Patient-Clinician Information Engagement (PCIE) and Information Seeking From Non-clinician Sources At Round 2 (N=1293)

<u>Independent variables</u>	PCIE at round 2			Seeking at round 2		
	B	95% CI	p	B	95% CI	p
DTCA at round 1	0.023	0.005 – 0.040	0.012	0.009	–0.001 – 0.018	0.067
PCIE at round 1	0.348	0.291 – 0.405	<0.001	-		
Seeking at round 1	-			0.466	0.410 – 0.522	<0.001
Age	0.001	–0.001 – 0.002	0.334	0.000	0.000 – 0.001	0.361
Education						
Some college or higher	0.043	0.013 – 0.074	0.005	0.015	0.000 – 0.030	0.056
Race/Ethnicity						
African-American	0.090	0.038 – 0.142	0.001	0.041	0.011 – 0.071	0.008
Hispanic or other	0.026	–0.047 – 0.099	0.486	0.015	–0.033 – 0.064	0.533
Cancer Type						
Female colon cancer	0.043	–0.014 – 0.099	0.139	0.021	–0.006 – 0.048	0.120
Breast cancer	0.040	–0.011 – 0.091	0.123	–0.004	–0.027 – 0.019	0.709
Prostate cancer	0.024	–0.029 – 0.078	0.377	–0.024	–0.047 – –0.001	0.038
Lerman Cancer Worry Scale	0.039	0.021 – 0.057	<0.001	0.013	0.004 – 0.022	0.003
Cancer Stage						
Stage III	0.051	–0.007 – 0.110	0.084	–0.009	–0.033 – 0.014	0.431
Stage IV	0.071	0.016 – 0.126	0.011	0.013	–0.013 – 0.038	0.329
Health Status	–0.003	–0.021 – 0.014	0.700	–0.001	–0.010 – 0.008	0.772
Constant	0.161			0.044		
R ²	0.243				0.348	

NOTE. Full information maximum likelihood models presented here; B refers to unstandardized maximum likelihood coefficients; referent group for education level is high school and below; referent group for race/ethnicity is white; referent group for cancer type is male colon cancer; cancer type and gender was combined into a single variable to reflect the different gender-specific cancer types (breast and prostate cancers); referent group for cancer stage is stage 0-II.