

# Smoking Behaviors Among Cancer Survivors: An Observational Clinical Study

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## Abstract

**Purpose:** Smoking is a well-recognized risk factor for several cancers including cancers of the lung, bladder, and head and neck. Studies have shown that smoking can adversely affect the outcomes of different modalities of cancer treatment. This study examines smoking behaviors among cancer survivors to collect information necessary to create successful smoking cessation interventions.

**Methods:** For this observational clinical study, questionnaires were sent to 1,000 randomly selected patients diagnosed with cancer between 2003 and 2007 in one cancer center. Data were statistically analyzed to determine the likelihood of a patient quitting smoking after being diagnosed with cancer.

**Results:** We received 187 responses from the 1,000 surveys sent (18.7%). Of these, 166 were usable for analysis. The mean

age of respondents was 64 ( $\pm$  13) years. Men were more likely than women to be past smokers (55% of men and 32% of women respectively,  $P = .003$ ). Fifty-two percent of respondents reported having a history of smoking. However, only 20% of patients reported having been active smokers at the time they were diagnosed with cancer. Furthermore, only 44% of these reported having quit smoking after their diagnosis with cancer. Only 62% of all respondents reported that they had been informed of the dangers of smoking by their health care provider during cancer treatment.

**Conclusion:** In our study sample, less than one half (44%) of smoking cancer patients quit smoking after their cancer diagnosis, and only 62% of smoking cancer patients received smoking cessation counseling from their physicians. Intervention programs are needed to help cancer survivors to quit smoking. Prospective clinical trials may help identify the ideal intervention for smoking cessation.

## Introduction

Smoking is a known risk factor for many types of cancer, including cancers of the lung, bladder, esophagus, stomach, kidney, cervix, pancreas, and head and neck.<sup>1</sup> Furthermore, studies have shown that continued smoking during treatment for many types of cancer has several adverse effects on treatment, such as increasing the chances of a second malignancy<sup>2-4</sup> and interfering with the three most common cancer treatments: surgery, chemotherapy, and radiation therapy.<sup>5</sup> Specifically, smoking increases the risk for infection during surgery and slows wound healing afterward<sup>6</sup>; increases the risk of adverse effects from and decreases the response to radiation therapy<sup>7,8</sup>; and may decrease the effectiveness of chemotherapy drugs.<sup>9</sup> Several studies have also shown that continued smoking after cancer diagnosis increases mortality rates.<sup>7,10,11</sup> Moreover, it has been proposed that smoking cessation attempts begun immediately after cancer diagnosis may have a higher than normal success rate.<sup>5,12</sup>

Factors that influence smoking habits among cancer patients have been evaluated in several studies. Interventional studies showed cessation rates of 22% to 59%,<sup>5,12,13</sup> and observational studies showed similar cessation rates of 24% to 69%.<sup>14-17</sup> Most of these studies have involved patients with head and neck and lung cancers. The purpose of this study is to examine the smoking habits among patients with various types of cancer as a preliminary step to creating a successful smoking cessation intervention.

## Methods

This research project was approved by the West Virginia University institutional review board. Participants were eligible if they had been diagnosed with or treated for any type of cancer, were older than 18 years of age, and could read English. We randomly selected a pool of 1,000 patients diagnosed with or treated for cancer between January 1, 2003, and December 31, 2007 at the Mary Babb Randolph Cancer Center at West Virginia University Hospital. These patients were mailed a three-page (22-item) questionnaire with a cover letter explaining the study.

Data obtained from the questionnaire consisted of sociodemographic information, clinical and smoking history, and smoking cessation information. There were no personal identification questions. Sociodemographic information collected included age, sex, ethnicity, zip code, level of education, and whether respondents were married or living with a partner. Clinical information included type of cancer and time since diagnosis. Smoking history parameters included current smoking status (whether participants were current, former, or never smokers); smoking frequency; quit time in relation to cancer diagnosis; and, as a proxy for secondhand smoking exposure, whether additional household members and close associates were smokers. Smoking cessation information collected included motivation for smoking cessation attempts; stage of readiness for quitting; awareness of smoking dangers; cessation counseling offered by the health care team; availability of social support for quitting; interest in a cessation program; and pref-

erence for the timing and type of cessation program to offer. Participants were given 6 weeks to respond to the mailing.

Data were analyzed using SPSS version 15 (SPSS Inc, Cary, North Carolina). Statistical analyses included descriptive statistics: calculation of frequencies for categorical data and mean and standard deviation (SDs) for continuous data. In addition, z-scores were determined for differences between various proportions, such as the proportion of men and women who were former smokers. Logistic regression analysis was conducted to determine the relationship between smoking status and several other variables (age, sex, and education).

## Results

Of the 1,000 surveys mailed, 187 were returned (18.7%). Of these, 166 were included in the analysis. Of the 21 respondents whose surveys were ineligible for inclusion, 11 reported that they had not been diagnosed with cancer; four were reported as deceased; three provided insufficient information; and three reported that they had never smoked and therefore believed they should not participate in the study. Both the demographic characteristics and smoking status of the participants are summarized in Table 1.

A similar proportion of men and women were current smokers: 10.4% of men and 11.6% of women. However, men were much more likely than women to be past smokers (55% of men *v* 32% of women;  $P = .003$ ), and much less likely than women to be never smokers (34% of men and 57% of women;  $P = .005$ ). The mean age  $\pm$  SD was  $64 \pm 13$  years for the entire sample,  $57.1 \pm 12.7$  years for current smokers,  $66.8 \pm 11.4$  for past smokers, and  $63.1 \pm 13.9$  for never smokers. Current smokers were significantly younger than past smokers ( $P = .002$ ), although the differences in age between never smokers and both current and past smokers were not statistically significant. The ethnicity of the entire sample of respondents was homogenous, with 84% of participants identifying themselves as white. White was the dominant ethnic group regardless of smoking status. Assessment of level of education included 147 patients who responded to this question (Table 1). It showed that 96% of patients had attended high school, 85% had graduated from high school, and 26% had at least some college. After controlling for age and sex, we found that never smokers were more educated ( $P < .001$ ) than past and current smokers.

With respect to the clinical data collected, 7.8% of respondents reported having been diagnosed with cancer in the past year; 22.3% had been diagnosed 1 to 2 years ago; 29.5% were diagnosed 2 to 5 years ago; another 29.5% had been diagnosed 5 to 10 years ago; and 10.8% had been diagnosed with cancer more than 10 years ago. Table 2 shows the cancer site data collected for the entire sample. The top three cancers represented in the sample were breast, skin, and prostate cancer, followed by head and neck and lung cancers, and lymphomas. The other category was comprised of cancers that occurred with lower than 2% frequency in the study population. These cancers included

acute myeloid leukemia and cancers of the bladder, kidney, liver, bone, ovary, pancreas, and spleen.

Of the 166 eligible respondents, 87 patients (52%) reported having positive smoking histories (current or past), while 79 patients (48%) reported having never smoked. Among the 87 with positive smoking histories, 34 patients (39%) reported being active smokers when diagnosed with cancer. Only 15 (44%) of these 34 patients reported having maintained abstinence from smoking after receiving their cancer diagnosis, while more than half (56%) reported having continued to smoke thereafter (Table 3). Assessment of level of readiness to quit smoking among these patients showed that only a little more than half of these patients (58%) had thought about quitting or tried to quit. Of the 19 patients in this subgroup, four reported they were trying to quit; four reported that they were planning to quit; and three reported that they were thinking about quitting.

With regard to household members or close associates who smoke, current smokers were more likely than past or never smokers to live with a smoker ( $P < .01$ ), and also more likely to spend time with smokers more than three times per week ( $P < .01$ ). Never smokers and past smokers, however, reported similar levels of exposure to household members and close associates that smoke. Patients who reported active smoking when they were diagnosed with cancer ( $n = 34$ ) were asked about how motivated they were to try to quit; whether a health care provider ever told them to quit smoking or warned them about the dangers of smoking during treatment for cancer; whether they had read anything about dangers of smoking; and how interested they were in participating in a smoking cessation program. Less than half (44%) of the respondents who were active smokers at the time of cancer diagnosis had been informed of the specific dangers of smoking by any health care team member during their cancer treatment. Sixty-two percent reported that they had tried to quit smoking since having been diagnosed with cancer. This study showed that patients, despite continuing to smoke after being diagnosed with cancer, are interested in smoking cessation programs. Approximately equal proportions of patients preferred obtaining printed materials, individual counseling (such as with a family doctor), and lifestyle change programs involving others with cancer. A cessation or lifestyle change program involving family members and friends was not favored.

## Discussion

In our study, only 44% of cancer patients who were smokers at diagnosis maintained abstinence after they were diagnosed with cancer. This rate is comparable to those reported in previous studies.<sup>12-19</sup> Only 62% of patients who were smokers at diagnosis reported having been told to quit by their doctors. Furthermore, only 44% reported that the dangers of smoking for cancer patients were explained to them by a health care provider. Level of education was a predictor of smoking status in our population; never smokers were significantly more edu-

**Table 1. Patient Characteristics and Smoking Status of Eligible Patients**

Characteristic	Respondents							
	Current Smoker		Past Smoker		Never Smoker		Total	
	No.	%	No.	%	No.	%	No.	%
Sex								
Male	7	39	37	54	23	29	67	40
Female	11	61	30	44	54	67.5	95	57
No response	1	1.5	1	1.5	2	2.5	4	2.4
Ethnicity								
African American	1	5	0	0	1	1	2	1
White	15	83	55	81	69	86	139	84
Native American	2	11	9	13	4	5	15	9
Other	1	5.6	0	0	0	0	1	0.6
No response	0	0	4	5.9	5	6	9	5.4
Level of education								
Middle school	0	0.0	4	5.9	2	2.5	6	3.6
High school	16	84.2	43	63.2	29	36.7	88	53.0
Some college (no degree)	1	5.3	2	2.9	12	15.2	15	9.0
2-year degree	0	0.0	1	1.5	7	8.9	8	4.8
4-year degree	2	10.5	8	11.8	10	12.7	20	12.0
Masters degree	0	0.0	3	4.4	3	3.8	6	3.6
Doctoral degree	0	0.0	1	1.5	3	3.8	4	2.4
No response	0	0.0	6	8.8	13	16.5	19	11.4

cated than current and past smokers (Table 1). This trend is consistent with that found in the 2002 National Survey on Drug Use and Health.<sup>20</sup> In addition, current smokers were more likely than past or never smokers ( $P < .01$ ) to have another smoker in their household and to spend time with smokers more than three times per week. This may indicate that a

person is less likely to quit smoking if he or she lives with another smoker.

The findings in this study indicate that current smoking prevalence among cancer patients is about the same in men and women; and that men are more likely to be former smokers than

**Table 2. Cancer Site of Patients Who Responded to Survey**

Type of Cancer	No.*	%
Breast	52	31.3
Skin	30	18.1
Prostate	18	10.8
Head and Neck	12	7.2
Lung	10	6
Lymphoma	9	5.4
Colorectal	7	4.2
Leukemia	6	3.6
Gastric	4	2.4
Cervical	4	2.4
Other	28	16.8

\* Allows for patient to have more than one type of cancer.

**Table 3. Smoking Status Among Patients With Positive Smoking History**

Smoking Status	No.	%
Total sample studied	166	100
Positive smoking history (current or past)	87	52
Never smoker	79	48
Of those with positive smoking history (current or past)	87	100
Smoking when diagnosed with cancer	34	39
Quit before diagnosis of cancer	52	60
No response	1	1
Of those smoking when diagnosed with cancer	34	100
Quit after cancer diagnosis	15	44
Continued to smoke after cancer diagnosis	19	56

women. It has also been shown previously that lifetime smoking prevalence is significantly higher in men.<sup>21</sup> This may indicate that among ever smokers (past and current), men are more likely to quit than women. Smoking cancer patients need well-structured smoking cessation programs, either through individual counseling by health care providers or through lifestyle change group therapy involving others with cancer. This study allowed patients to suggest which smoking cessation interventions they would most prefer. We propose that the ideal intervention programs can be identified in prospective clinical trials.

Limitations to this study included the low response rate (19%). This response rate is not unusual, given that this was an unpaid mail survey and no other incentive was provided. The low response rate raises the possibility of nonresponse bias that could question the validity of the findings; a nonresponse analysis was not conducted. Furthermore, the percentage of respondents who reported having been current smokers when diagnosed with cancer was 20% of the total sample, which is comparable to the 2005 smoking rate for West Virginia (26.6%).<sup>21</sup> Selection bias cannot be excluded in our study, since past or never smokers may have been more likely to respond to our survey than current smokers because of the effect of social desirability.

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However, the validity of our study may be supported by the fact that the smoking rate for our study was comparable with that of the state of West Virginia. Another concern about our patient sample is that it is ethnically homogeneous (84% white). This may limit the extrapolation of our results to other areas with similar ethnic breakdowns, such as other Appalachian areas. These data may not be representative of more ethnically diverse areas.

### Authors' Disclosures of Potential Conflicts of Interest

Although all authors completed the disclosure declaration, the following authors or their immediate family members indicated a financial interest. No conflict existed for drugs or devices used in a study if they are not being evaluated as part of investigation.

Author	Employment	Leadership	Consultant	Stock	Honoraria	Research Funds	Testimony	Other
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DOI: 10.1200/JOP.0912001

