Receipt of Provider Advice for Smoking Cessation and Use of Smoking Cessation Treatments Among Cancer Survivors

Elliot J. Coups, PhD¹, Lara K. Dhingra, PhD^{2,3,4}, Carolyn J. Heckman, PhD¹, and Sharon L. Manne, PhD¹

¹Cancer Prevention and Control Program, Fox Chase Cancer Center, Philadelphia, PA, USA; ²Department of Pain Medicine and Palliative Care, Beth Israel Medical Center, New York, NY, USA; ³Department of Neurology, Albert Einstein College of Medicine, New York, NY, USA; ⁴Department of Psychiatry and Behavioral Sciences, Albert Einstein College of Medicine, New York, NY, USA.

BACKGROUND: As the number of cancer survivors increases, the assessment and intervention for smoking among survivors are increasingly important.

OBJECTIVE: This study examined the extent to which cancer survivors reported being asked and advised about smoking by health-care providers and their use of smoking cessation treatments during quit attempts.

DESIGN: The data were drawn from the 2005 National Health Interview Survey, an annual health survey of US adults.

PARTICIPANTS: The participants were 1,825 individuals who reported being diagnosed with cancer at least 1 year previously and provided data regarding their current smoking status.

MEASUREMENTS: Participants completed items assessing demographics, health and health-care factors, and smoking-related variables.

MAIN RESULTS: More than three-quarters of participants (81.0%) reported that their smoking status was known by a health-care provider. Among current smokers (17.6%) who visited a health-care provider in the past year, 72.2% reported being advised to quit smoking by a provider. Factors associated with a higher rate of receiving advice to quit included greater cigarette consumption ($P=0.008$), more medical comorbidities ($P=0.001$), high psychological distress ($P=0.003$), and lack of health-care insurance ($P=0.03$). Among current smokers who tried to quit in the last year, 33.5% used pharmacotherapy cessation treatment and 3.8% used an evidence-based behavioral treatment.

CONCLUSIONS: This study reveals considerable missed opportunities for health-care providers to advise cancer survivors about smoking and provide evidence-based interventions. Systematic efforts are needed to increase the provision of smoking cessation advice and use of cessation treatments among cancer survivors.

KEY WORDS: smoking; tobacco use; counseling; smoking cessation; cancer survivors.

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An estimated 11.1 million individuals in the United States have a personal history of cancer.¹ The number of these cancer survivors has increased for several decades and will continue to rise.² Thus, research and clinical attention has increasingly focused on the psychosocial and medical needs of cancer survivors. Among these needs, the assessment and intervention for health-damaging behaviors such as smoking are of critical importance. Although smoking is the leading preventable cause of both cancer-related and overall disease mortality,^{3,4} relatively little attention has been paid to smoking during the survivorship phase of cancer care, which is the focus of the current study.

Nearly one-half to three-quarters of individuals who are newly diagnosed with cancer are current smokers, up to half of whom will continue to smoke after their diagnosis.⁵ Among long-term cancer survivors, rates of current smoking are higher for younger adults compared to older adults.^{6–8} Continued smoking among cancer survivors adversely impacts multiple quality of life domains, increases the risk of recurrence and second primary cancers, decreases survival,^{9–11} and increases the incidence and progression of multiple cardiovascular and respiratory diseases.¹² These multiple adverse effects highlight the importance of addressing the issue of continued smoking among cancer survivors. Individuals who continue to smoke even after a diagnosis of cancer may require more intensive assistance to quit smoking than smokers who have not experienced a serious health threat such as cancer.

Although most cancer survivors are highly interested in smoking cessation programs,¹³ only two-thirds of individuals smoking at the time of diagnosis report being advised to quit smoking by a health-care provider.^{13,14} In a sample of mostly long-term cancer survivors drawn from the 2000 National Health Interview Survey (NHIS), 42.3% of individuals who visited a health-care provider in the past year reported being asked about their smoking status.¹⁵ These studies suggest that opportunities to deliver smoking cessation interventions are commonly missed for cancer survivors.

The US Public Health Service Clinical Practice Guidelines¹⁶ recommend that health-care providers screen for and address tobacco use at every patient visit and outline a comprehensive approach to smoking assessment and intervention, which can be summarized as the 5As¹⁷: (1) Ask about smoking, (2) Advise individuals to quit, (3) Assess willingness to quit, (4) Assist individuals who wish to quit, and (5) Arrange appropriate follow-up visits and care. Even brief counseling (less than 3 min) by a health-care provider effectively promotes smoking

cessation among adults in the general population.^{16,18} More intensive counseling produces greater smoking cessation rates, although the highest rates are obtained when an evidence-based behavioral treatment is used in tandem with pharmacotherapy.¹⁶ The extent to which cancer survivors utilize smoking cessation treatments during quit attempts is not known.

In this study, we used data from the nationally representative 2005 NHIS to examine: (1) the extent to which cancer survivors report being asked about their smoking status and are advised to quit smoking by health-care providers; (2) demographic, health, and health-care correlates of receiving advice from a health-care provider to quit smoking; (3) the extent to which survivors use smoking cessation treatments during quit attempts.

METHODS

Procedure

Study data were drawn from the 2005 NHIS, which included a Cancer Control Supplement. Full details regarding the 2005 NHIS are available elsewhere.¹⁹ In brief, the NHIS is an annual representative health survey conducted via an in-person interview with civilian, non-institutionalized US adults. The data are collected using a multistage, clustered, cross-sectional design, with state-level stratification and oversampling of Black and Hispanic populations. The response rate for the data used in this study was 69.0%.¹⁹

Participants

Participants were drawn from the 31,428 individuals selected as Sample Adults for the 2005 NHIS. Individuals were included in the current study if they reported being told by a doctor that they had been diagnosed with cancer (with the exception of non-melanoma skin cancer), were not diagnosed in the past year (since we could not determine whether past-year smoking quit attempts or receipt of health-care provider advice occurred before or after the cancer diagnosis), and completed questions regarding their current smoking status. This resulted in a sample of 1,825 cancer survivors.

Measures

Selection of potential correlates was guided by relevant prior research.^{20–23}

Demographics. Participants indicated their gender, age, race/ethnicity, and education level.

Health and Health-care Variables. Participants reported the type of cancer(s) they were diagnosed with and the age of diagnosis, from which we calculated the number of years since their (first) cancer diagnosis. We created an index of comorbid medical conditions by totaling each participant's reported history of the following: coronary heart disease, hypertension, angina, myocardial infarction, stroke, emphysema, asthma, chronic bronchitis, weak or failing kidneys, and liver problems. Participants answered a single item regarding their overall

health. They answered questions about their alcohol consumption. We denoted individuals as being risky drinkers if they reported consuming 5 or more alcoholic drinks in a day 12 or more times in the past year, or if they reported an average consumption of more than 14 drinks per week for men or more than 7 drinks for women.²⁴ Participants' level of nonspecific psychological distress during the past 30 days was assessed using the validated six-item K6 measure; individuals with a score of 13 or more were denoted as having high distress.²⁵ A single item asked participants to indicate their perceived risk of getting cancer again (*less likely*, *about as likely*, or *more likely*) compared to an average individual of the same age and gender. Participants indicated the number of times they visited a doctor or other health-care provider in the previous year and whether they had any public or private health-care insurance coverage.

Smoking Variables. Participants completed questions about their current and previous use of cigarettes. Individuals who reported smoking every day or some days were denoted as current smokers,²⁶ and they reported their daily cigarette intake, age of smoking initiation, and whether they would like to quit smoking. Participants reported the number of individuals (including themselves) who smoke inside the home, and we coded responses according to whether other people smoked in the home. Individuals who had visited a health-care provider in the past year indicated whether they were asked by a provider if they smoke, and if not, whether this was because their smoking status was already known by the provider. Current smokers reported whether a health-care provider advised them to quit smoking in the last year, and if so, the type(s) of provider who gave the advice. They also indicated whether they had made a quit attempt (i.e., not smoked for at least 1 day in an effort to quit) in the past year. Individuals who had made a quit attempt in the past year indicated which of the following cessation methods (if any) they had used: nicotine gum; nicotine patch; another nicotine replacement product (i.e., nasal spray, inhaler, lozenge, or tablet); a prescription pill (e.g., Zyban, bupropion, or Wellbutrin); a telephone help line; a stop smoking clinic, class, or support group (asked as a single item); one-on-one counseling; help or support from family or friends; the Internet; books, pamphlets, videos, or other materials (asked as a single item); acupuncture or hypnosis. Consistent with previous research,²⁷ we also recoded responses to these items to denote whether individuals had used any form of pharmacotherapy (i.e., nicotine gum, nicotine patch, another nicotine product, or a prescription pill) and/or any evidence-based behavioral method (i.e., a telephone help line; a stop smoking clinic, class, or support group; or one-on-one counseling).

Data Weighting and Statistical Analyses

All statistical analyses were conducted using SUDAAN (version 10; Research Triangle Institute, Research Triangle Park, NC) and were weighted based on design, ratio, and nonresponse adjustments, with poststratification adjustments for 2000 US Census-based estimates of age, gender, and race/ethnicity. All percentages reported in the Results section are weighted, and all sample sizes are unweighted. A series of logistic regression

analyses was used to examine correlates of receipt of health-care provider advice to quit smoking. A cutoff of $P < 0.05$ was used to determine statistical significance for all analyses.

RESULTS

Almost 60% of the 1,825 participants were female, the median age was 67 years, 87.0% were white, and one-quarter (24.4%) were educated to the college level or beyond. Nineteen participants (1.0%) reported quitting smoking in the past year, and current smoking was reported by 17.6% of individuals. As shown in Table 1, the current smoking rate varied according to cancer diagnosis (see Table 1). Low rates of current smoking (from 9.2–12.2%) were found among survivors of breast, prostate, and colon cancers, and melanoma, although many of these individuals were former smokers. Current smoking rates were higher for uterine (27.1%) and cervical cancer (42.5%) survivors. As shown in Table 2, almost all participants reported visiting a health-care provider in the past year, less than half (41.0%) of whom reported being asked about smoking by a provider. Of those not asked about smoking, more than two-thirds reported that their health-care provider already knew their smoking status. Among the 310 current smokers, 72.2% of those who had visited a health-care provider in the past year reported being advised to quit smoking. Almost all individuals receiving quit advice indicated that it came from a physician, although 15.0% were advised to quit smoking by a dentist. Almost two-thirds of the current smokers indicated a desire to quit smoking, and more than a third had tried quitting in the last year. On average, current smokers started smoking on a regular basis more than 30 years ago and almost half reported smoking at least 20 cigarettes per day.

Results of logistic regression analyses examining correlates of being advised to quit smoking by a health-care provider in the past year are shown in Table 3. Individuals were more likely to report receiving quit advice if they had a higher number of comorbid medical conditions, high psychological distress, no health-care insurance, or smoked at least a pack of cigarettes per day. The rate of receiving advice to quit smoking did not differ for the remaining variables, although several associations approached significance. Specifically, evidence for a higher rate of receiving quit advice was found for individuals reporting poor health (compared to those reporting

Table 2. Receipt of Health-care Provider Screening and Advice, Quit Motivation and Attempts, and Smoking Characteristics Among Cancer Survivors, 2005 National Health Interview Survey

	Sample %
Full sample (N=1,825)	
Visited a health-care provider in the last year	95.7
Asked about smoking by health-care provider*	41.0
Health-care provider knew smoking status†	69.7
Asked about smoking by health-care provider or provider knew smoking status*	81.0
Current smokers (N=310)	
Advised to quit smoking by health-care provider*	72.2
Type of provider who gave advice to quit smoking‡	
Physician	96.8
Nurse	5.9
Dentist	15.0
Dental hygienist	5.9
Other	6.4
Would like to quit smoking	
Yes	64.7
No	31.4
Don't know	3.9
Tried to quit smoking in the last year	40.2
Age when started smoking regularly (years) (M=17.5)	
≤12	11.3
13–15	27.0
16–18	33.2
19–24	19.9
≥25	8.6
Number of years since started smoking regularly (M=33.9)	
1–10	8.4
11–20	14.9
21–30	17.8
31–40	21.3
>40	37.6
Number of cigarettes currently smoke per day (M=16.7)	
1–9	22.6
10–19	31.8
≥20	45.6

Note. M = mean. All sample sizes are unweighted, and all percentages are weighted. Data source: National Center for Health Statistics (2006). *Among individuals who reported visiting a health-care provider in the last year. †Among individuals who reported visiting a health-care provider in the last year but were not asked about smoking. ‡Among individuals who reported visiting a health-care provider in the past year and were advised to quit smoking

very good/excellent health) and for those with more health-care provider visits.

The utilization of smoking cessation treatments by current smokers who tried to quit in the last year ($n=130$) is shown in

Table 1. Smoking Status Stratified by Cancer Diagnosis and for the Full Sample of Cancer Survivors (N = 1,825), 2005 National Health Interview Survey

Type of cancer	Sample size	Median age (years)	Years since diagnosis (M)	Smoking status		
				Current % ± 95% CI	Former % ± 95% CI	Never % ± 95% CI
Cervical	173	48	15.6	42.5±7.9	27.8±6.9	29.8±7.2
Colon	169	76	11.4	12.2±7.0	41.9±8.3	45.9±8.5
Female breast	415	69	10.4	9.4±2.8	30.6±4.9	60.0±5.3
Melanoma	161	65	11.6	12.0±5.3	37.5±8.2	50.5±8.4
Prostate	277	74	7.5	9.2±3.3	51.4±6.3	39.4±6.3
Uterine	136	61	18.2	27.1±9.3	31.1±9.1	41.8±9.6
Other cancer	544	62	10.7	19.9±4.4	38.5±4.6	41.6±4.8
Any cancer	1,825	67	11.1	17.6±2.1	37.7±2.5	44.7±2.7

Note. M = mean. All sample sizes are unweighted and all percentages are weighted. Data source: National Center for Health Statistics (2006)

Table 3. Correlates of Cancer Survivors' Receipt of Health-care Provider Advice to Quit Smoking (N=268 Current Smokers), 2005 National Health Interview Survey

	Sample %	Advised to quit smoking		
		%	OR (95% CI)	P value*
Sex				0.99
Male	34.0	72.3	Reference	
Female	66.0	72.2	0.99 (0.49–2.01)	
Age (years)				0.07
18–39	27.6	66.8	Reference	
40–59	37.3	80.1	2.01 (0.88–4.59)	
60–69	19.6	70.8	1.21 (0.47–3.12)	
70–79	11.7	74.4	1.45 (0.52–4.06)	
≥80	3.9	36.0	0.28 (0.06–1.23)	
Race/ethnicity				0.10
Non-Hispanic white	87.4	72.6	Reference	
Non-Hispanic black	8.3	73.3	1.04 (0.38–2.83)	
Non-Hispanic other	1.5	17.1	0.08 (0.01–0.79)	
Hispanic	2.8	87.7	2.69 (0.52–14.00)	
Education level				0.42
Some high school or less	28.0	73.8	Reference	
High school graduate	35.6	65.4	0.67 (0.29–1.58)	
Some college	25.6	78.7	1.31 (0.49–3.49)	
College graduate	10.7	74.3	1.03 (0.33–3.17)	
Number of comorbid medical conditions				0.001
0	41.4	62.2	Reference	
1	23.4	68.6	1.32 (0.60–2.92)	
≥2	35.2	86.4	3.87 (1.84–8.13)	
Self-reported overall health				0.08
Poor	16.1	87.6	Reference	
Fair	23.2	71.6	0.36 (0.11–1.12)	
Good	29.8	73.4	0.39 (0.13–1.16)	
Very good/excellent	30.8	63.6	0.25 (0.08–0.72)	
Risky drinker				0.47
No	82.6	73.6	Reference	
Yes	17.4	67.5	0.74 (0.33–1.67)	
High psychological distress				0.003
No	87.7	69.3	Reference	
Yes	12.3	93.1	5.94 (1.86–18.96)	
Perceived risk of another cancer compared to others				0.12
Less likely	13.1	74.9	Reference	
About as likely	38.2	65.0	0.62 (0.27–1.46)	
More likely	48.8	79.9	1.33 (0.56–3.15)	
Others smoke inside the home				0.39
No	69.0	70.2	Reference	
Yes	31.0	76.8	1.41 (0.65–3.07)	
Number of health-care visits in the past year				0.09
1–3	30.1	66.9	Reference	
4–7	27.8	65.0	0.92 (0.42–2.03)	
≥8	42.0	80.9	2.10 (0.96–4.57)	
Health-care coverage				0.03
Private	53.7	66.2	Reference	
Public	32.6	74.6	1.50 (0.72–3.13)	
None	13.7	90.2	4.69 (1.45–15.23)	
Time since cancer diagnosis (years)				0.99
1–4	32.1	73.4	Reference	
5–9	24.2	72.9	0.97 (0.38–2.52)	
10–19	25.1	73.9	1.03 (0.41–2.56)	
≥20	18.6	71.2	0.89 (0.35–2.26)	
Number of years since started smoking regularly				0.22
1–10	9.0	46.1	Reference	
11–20	15.8	79.8	4.61 (1.18–17.98)	
21–30	14.5	80.0	4.67 (0.98–22.26)	
31–40	21.6	73.8	3.30 (0.95–11.49)	
>40	39.2	70.8	2.84 (0.92–8.79)	
Number of cigarettes currently smoke per day				0.008
1–9	23.9	63.4	Reference	
10–19	32.2	65.3	1.09 (0.46–2.55)	
≥20	43.8	84.6	3.17 (1.37–7.33)	

Note. All percentages are weighted. Data source: National Center for Health Statistics (2006). *P value for the Wald chi-square statistic that examines the association of each correlate with receipt of provider advice to quit smoking

Table 4. One-third reported use of pharmacotherapy cessation treatments, with most of these individuals using the nicotine patch. In contrast, only 3.8% reported using any evidence-based behavioral treatments. However, 25.6% reported utilizing help or support from family or friends. Overall, half of the current smokers who attempted to quit in the past year did not use any of the specific smoking cessation treatments asked about in the current study.

DISCUSSION

Nearly all of the cancer survivors in this study reported visiting a health-care provider in the last year, which provides optimism for universal provider assessment and intervention for smoking. However, fewer than half of the participants reported being asked about their smoking status by a health-care provider. While this is consistent with prior research,¹⁵ our results extend previous findings by indicating that providers are largely aware of the smoking status of their cancer survivor patients, as they likely assessed smoking status at previous visits. Regular assessment of smoking by providers is important as it sets the stage for discussing smoking, providing quit advice, and delivering cessation interventions, and because smoking relapse is common among individuals who have quit smoking.

With regard to the second step of the 5As framework (Advise),^{16,17} which was a key outcome in the current study, almost three-quarters of the current smokers reported being advised to quit smoking by a health-care provider in the past year. Cancer survivors were more likely to receive smoking cessation advice if they had multiple comorbid illnesses or

were likely in need of more intensive smoking cessation support, as suggested by their high psychological distress, lack of health-care insurance, or heavy smoking. These results indicate that providers may provide targeted smoking cessation advice to smokers who are more vulnerable to continued smoking and relapse. However, considerable opportunities to recommend smoking cessation to many cancer survivors are missed. In light of cancer survivors' heightened risk for poor health outcomes, consistent health-care provider delivery of advice to quit smoking is a key issue in this increasing population.

While it is important to assess and intervene for smoking among all individuals, there are unique opportunities and challenges in this regard with cancer survivors compared to those with no personal cancer history. Most smokers in the current study reported a desire to quit, and more than a third had stopped smoking for at least 1 day in the past year in an effort to quit. This high level of motivation to quit and prior quit attempts provide hope for potential future smoking cessation. However, smokers also tended to be long-term, heavy tobacco users, placing them at high risk for continued smoking and relapse following a quit attempt.¹⁶ Further, the reported use of evidence-based pharmacotherapy or behavioral treatments during quit attempts was low and consistent with rates in the general population²⁰ despite cancer survivors' high health risk profile. To our knowledge, this is the first descriptive study to examine cancer survivors' use of smoking cessation treatments during quit attempts. The study findings suggest that systematic, comprehensive efforts are needed to achieve universal smoking cessation advice and treatment for cancer survivors. In addition to the general smoking cessation resources available for clinicians and patients from the US Department of Health and Human Services,²⁸ detailed provider guidelines and general information on tobacco use and cessation among cancer survivors are available.^{5,9,11,29}

Table 4. Use of Smoking Cessation Treatments Among Cancer Survivors Who Are Current Smokers and Tried to Quit in the Last Year (N = 130), 2005 National Health Interview Survey

	Sample %
Pharmacotherapy	
Nicotine gum	9.3
Nicotine patch	26.1
Another nicotine replacement product*	6.5
Prescription pill†	7.9
Any nicotine replacement product and prescription pill†	4.6
Any type of pharmacotherapy	33.5
Evidence-based behavioral treatment	
Telephone help line	2.0
Stop smoking clinic, class, or support group	2.4
One-on-one counseling	1.9
Any behavioral treatment	3.8
Any pharmacotherapy or evidence-based behavioral treatment	33.8
Both pharmacotherapy and evidence-based behavioral treatment	3.5
Other treatment/assistance	
Help or support from family or friends	25.6
Internet	3.5
Books, pamphlets, videos, or other materials	9.0
Acupuncture or hypnosis	5.3
None of the treatments listed above	51.4

Note. All percentages are weighted. Data source: National Center for Health Statistics (2006). *Nasal spray, inhaler, lozenge, or tablet. †For example, Zyban, bupropion, or Wellbutrin.

Implications of Study Results for Health-care Providers

An increasing number of specialist cancer survivorship clinics and programs are being developed and implemented across the United States. Smoking assessment and cessation efforts should be an integral component of the care delivered by physicians and other health-care providers in these survivorship clinics and programs. However, the majority of cancer survivors receive follow-up care and management of general medical issues in community oncology and internal medicine settings.^{30–32} Thus, primary care providers are positioned to provide smoking assessment and intervention for cancer survivors. Many cancer survivors who smoke have a long-term dependence on nicotine. For these individuals, it may be particularly important for multiple providers to coordinate delivery of the 5As, which may boost smoking cessation rates.¹⁶ For smokers who do not wish to quit, providers can attempt to increase quit motivation using the 5Rs approach (Relevance, Risks, Rewards, Roadblocks, and Repetition) outlined by Fiore and colleagues,¹⁶ which can help patients identify benefits of quitting and useful coping strategies to manage barriers to quitting. Issues related to cancer survivorship can usefully be raised by providers when discussing the first 3Rs, and may help to address common fatalistic beliefs

(e.g., “the damage is done,” “it is too late to quit”) and low self-efficacy for cessation.¹¹

Attempts to increase the provision of smoking assessment and intervention by health-care providers should accompany efforts to raise cancer survivors’ knowledge of the risks of continued smoking, the benefits of quitting, and access to evidence-based pharmacotherapy and behavioral cessation treatments. The use of systems-level strategies can facilitate the identification of smokers (e.g., using expanded vital signs, chart labels, or computerized records), the delivery of smoking cessation advice and brief intervention (e.g., via health-care provider education, automated reminders and checklists), and the coordination of smoking cessation treatments (e.g., by a dedicated tobacco-dependence treatment coordinator).³³ Identification of an individual’s status as a cancer survivor (as well as the presence of other relevant comorbidities) in such systems may promote the delivery of pharmacological and tailored behavioral interventions that take into account pertinent opportunities and challenges. Further research is needed to develop and test such interventions and to establish optimal models for their delivery and uptake in diverse medical settings.

Study Limitations

The study results are subject to several limitations. Participants self-reported their prior and current smoking, although the likelihood of reporting bias is minimized by the non-judgmental situation in which data were collected and the broad focus of the survey.^{34,35} Further, all information regarding receipt of provider assessment and advice for smoking was self-reported, and the extent and quality of any advice provided is not known. There were insufficient numbers of current smokers for each cancer type to examine potential differences in receipt of smoking cessation advice according to cancer diagnosis. Due to sample size limitations, we were unable to examine reported use of smoking cessation treatments among cancer survivors who successfully quit smoking in the past year ($n=19$). Data on individuals’ use of pharmacological smoking cessation treatments do not include use of varenicline (Chantix), an effective first-line medication that became available in 2006. Potentially relevant cancer-related information was not available in the dataset, including disease stage at diagnosis, and current disease and treatment status (although in view of the typical time since diagnosis in the current study, it is likely that few participants were receiving treatment). Additionally, detailed data are not available on the types of health-care providers (e.g., general internists, oncologists, and other physicians) visited by study participants.

CONCLUSIONS

Health-care providers are largely aware of the smoking status of cancer survivors, although more than a quarter of current smokers in this study did not report receiving provider advice to quit smoking in the last year. Most cancer survivors who smoke are motivated to quit, and more than a third report a past-year quit attempt, but use of evidence-based smoking cessation treatments is low. There is a need for further research and clinical efforts to promote and sustain smoking cessation among cancer survivors. Given the expected continued growth in the cancer survivor population, attention to the

important issue of smoking among survivors is timely and has the potential to have long-lasting beneficial effects.

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Corresponding Author: Elliot J. Coups, PhD; Cancer Prevention and Control Program, Fox Chase Cancer Center, 510 Township Line Road, 1st floor, Philadelphia, PA 19012, USA (e-mail: Elliot.Coups@fccc.edu).

REFERENCES

1. Ries LAG, Melbert D, Krapcho M, Stinchcomb DG, Howlander N, Horner MJ, et al. SEER Cancer Statistics Review, 1975–2005. National Cancer Institute: Bethesda, MD. Available at: http://seer.cancer.gov/csr/1975_2005. Accessed March 3, 2009.
2. Edwards BK, Howe HL, Ries LA, et al. Annual report to the nation on the status of cancer, 1973–1999, featuring implications of age and aging on U.S. cancer burden. *Cancer*. 2002;94:2766–92.
3. American Cancer Society. Cancer Facts and Figures 2008. Atlanta: American Cancer Society; 2008.
4. Mokdad AH, Marks JS, Stroup DF, Gerberding JL. Actual causes of death in the United States, 2000. *JAMA*. 2004;291:1238–45.
5. Cox LS, Africano NL, Tercyak KP, Taylor KL. Nicotine dependence treatment for patients with cancer. *Cancer*. 2003;98:632–44.
6. Bellizzi KM, Rowland JH, Jeffery DD, McNeel T. Health behaviors of cancer survivors: examining opportunities for cancer control intervention. *J Clin Oncol*. 2005;23:8884–93.
7. Blanchard CM, Courneya KS, Stein K. Cancer survivors’ adherence to lifestyle behavior recommendations and associations with health-related quality of life: results from the American Cancer Society’s SCS-II. *J Clin Oncol*. 2008;26:2198–204.
8. Coups EJ, Ostroff JS. A population-based estimate of the prevalence of behavioral risk factors among adult cancer survivors and noncancer controls. *Prev Med*. 2005;40:702–11.
9. Gritz ER, Fingeret MC, Vidrine DJ, Lazev AB, Mehta NV, Reece GP. Successes and failures of the teachable moment: smoking cessation in cancer patients. *Cancer*. 2006;106:17–27.
10. Gritz ER, Vidrine DJ, Lazev AB. Smoking cessation in cancer patients: never too late to quit. In: Given CW, Given B, Champion VL, Kozachik S, Devoss DN, eds. *Evidence-Based Cancer Care and Prevention: Behavioral Interventions*. New York: Springer; 2003:107–40.
11. Ostroff JS, Dhingra LK. Smoking cessation and cancer survivors. In: Feuerstein M, ed. *Handbook of Cancer Survivorship*. New York: Springer; 2007:303–22.
12. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health. The health consequences of smoking: a report of the Surgeon General. Washington, D.C., 2004. Available at http://www.cdc.gov/tobacco/data_statistics/sgr/sgr_2004. Accessed March 3, 2009.
13. Demark-Wahnefried W, Peterson B, McBride C, Lipkus I, Clipp E. Current health behaviors and readiness to pursue life-style changes among men and women diagnosed with early stage prostate and breast carcinomas. *Cancer*. 2000;88:674–84.
14. Blanchard CM, Denniston MM, Baker F, et al. Do adults change their lifestyle behaviors after a cancer diagnosis. *Am J Health Behav*. 2003;27:246–56.
15. Sabatino SA, Coates RJ, Uhler RJ, Pollack LA, Alley LG, Zauderer LJ. Provider counseling about health behaviors among cancer survivors in the United States. *J Clin Oncol*. 2007;25:2100–6.

16. **Fiore MC, Jaén CR, Baker TB, et al.** Treating Tobacco Use and Dependence: 2008 Update. Clinical Practice Guideline. Rockville, MD: U.S. Department of Health and Human Services. Public Health Service. May 2008.
17. **Whitlock EP, Orleans CT, Pender N, Allan J.** Evaluating primary care behavioral counseling interventions: an evidence-based approach. *Am J Prev Med.* 2002;22:267–84.
18. **Stead LF, Bergson G, Lancaster T.** Physician advice for smoking cessation. *Cochrane Database Syst Rev* 2008(2):CD000165.
19. National Center for Health Statistics (NCHS). NHIS survey description. Hyattsville MD: NCHS, Centers for Disease Control and Prevention (CDC), 2006. Available at http://www.cdc.gov/nchs/about/major/nhis/quest_data_related_1997_forward.htm. Accessed March 3, 2009.
20. **Cokkinides VE, Halpern MT, Barbeau EM, Ward E, Thun MJ.** Racial and ethnic disparities in smoking-cessation interventions: analysis of the 2005 National Health Interview Survey. *Am J Prev Med.* 2008;34:404–12.
21. **Doescher MP, Saver BG.** Physicians' advice to quit smoking. The glass remains half empty. *J Fam Pract.* 2000;49:543–7.
22. **Lopez-Quintero C, Crum RM, Neumark YD.** Racial/ethnic disparities in report of physician-provided smoking cessation advice: analysis of the 2000 National Health Interview Survey. *Am J Public Health.* 2006;96:2235–9.
23. **Ossip-Klein DJ, McIntosh S, Utman C, Burton K, Spada J, Guido J.** Smokers ages 50 + : who gets physician advice to quit. *Prev Med.* 2000;31:364–9.
24. **Kushi LH, Byers T, Doyle C, et al.** American Cancer Society guidelines on nutrition and physical activity for cancer prevention: reducing the risk of cancer with healthy food choices and physical activity. *CA Cancer J Clin.* 2006;56:254–81.
25. **Kessler RC, Barker PR, Colpe LJ, et al.** Screening for serious mental illness in the general population. *Arch Gen Psychiatry.* 2003;60:184–9.
26. National Center for Health Statistics. The National Health Interview Survey Tobacco Information Web Site. Available at http://www.cdc.gov/nchs/about/major/nhis/tobacco/nhis_tobhoma.htm. Accessed March 3, 2009.
27. **Curry SJ, Sporer AK, Pugach O, Campbell RT, Emery S.** Use of tobacco cessation treatments among young adult smokers: 2005 National Health Interview Survey. *Am J Public Health.* 2007;97:1464–9.
28. Agency for Healthcare Research and Quality. Treating Tobacco Use and Dependence: 2008 Update. Available at <http://www.ahrq.gov/path/tobacco.htm>. Accessed March 3, 2009.
29. **Klosky JL, Tyc VL, Garces-Webb DM, Buscemi J, Klesges RC, Hudson MM.** Emerging issues in smoking among adolescent and adult cancer survivors: a comprehensive review. *Cancer.* 2007;110:2408–19.
30. **Hewitt M, Greenfield S, Stovall E, eds.** From Cancer Patient to Cancer Survivor: Lost in Transition. Washington, DC: National Academies Press; 2006.
31. **McCabe MS, Jacobs L.** Survivorship care: models and programs. *Semin Oncol Nurs.* 2008;24:202–7.
32. **Oeffinger KC, McCabe MS.** Models for delivering survivorship care. *J Clin Oncol.* 2006;24:5117–24.
33. **Curry SJ, Keller PA, Orleans CT, Fiore MC.** The role of health care systems in increased tobacco cessation. *Annu Rev Public Health.* 2008;29:411–28.
34. **Patrick DL, Cheadle A, Thompson DC, Diehr P, Koepsell T, Kinne S.** The validity of self-reported smoking: a review and meta-analysis. *Am J Public Health.* 1994;84:1086–93.
35. **Wells AJ, English PB, Posner SF, Wagenknecht LE, Perez-Stable EJ.** Misclassification rates for current smokers misclassified as nonsmokers. *Am J Public Health.* 1998;88:1503–9.