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Are long-term cancer survivors and physicians discussing health promotion and healthy behaviors?

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Abstract
Purpose This study aimed to (1) describe the proportion of survivors reporting that a physician discussed strategies to improve health and (2) identify which groups are more likely to report these discussions.
Methods Lung cancer and colorectal cancer (CRC) survivors (>5 years from diagnosis) (n=874) completed questionnaires, including questions on whether, in the previous year, a physician discussed (1) strategies to improve health, (2) exercise, and (3) diet habits. Chi-square tests and logistic regression models were used to examine whether the likelihood of these discussions varied by demographic and clinical characteristics.
Results Fifty-nine percent reported that a physician discussed strategies to improve health and exercise, 44 % reported discussions on diet, and 24 % reported no discussions. Compared to their counterparts, survivors with lower education were less likely to report discussing all three areas, but survivors with diabetes were more likely. Survivors ≥65 years old were less likely to report discussing strategies to improve health and diet. Males and CRC survivors reported discussing diet more than their female and lung cancer counterparts, respectively.
Conclusion The frequency of health promotion discussions varied across survivor characteristics. Discussions were more frequently reported by some groups, e.g., survivors with diabetes, or among individuals less likely to engage in healthy behaviors. In contrast, males and older and less educated survivors were less likely to have these discussions.
Implications for Cancer Survivors Decreasing physician barriers and encouraging patients to discuss health promotion, especially in the context of clinical care for older survivors and those with low education, is essential for promoting the overall well-being of cancer survivors.

Keywords Cancer survivors · Health behavior · Health promotion · Physician advice

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Introduction

The 5-year relative cancer survival rate has improved to 68 %, greatly increasing the number expected to reach long-term survivorship [1]. Long-term survivors are at increased risk for comorbid conditions (i.e., diabetes, osteoporosis, cardiovascular disease) compared to the general population [2, 3]. These comorbidities, as well as cancer recurrence and overall mortality, are caused not only by the primary cancer and its treatment, but potentially by poor diet, limited physical activity, and other lifestyle behaviors [4]. Survivors fall short of meeting dietary and physical activity recommendations [5–7] and have a high risk for comorbid conditions. Given findings that provider-delivered information is effective for encouraging healthy behaviors [8, 9], promoting healthy behavior habits and sharing information on how to maintain overall health and wellness is especially important for this population in both primary care and oncology settings [10].

The frequency of survivors reporting having health promotion discussions with their physicians is varied. One investigation based on the 2005 California Health Interview Study

found that 68 % of cancer survivors reported that a physician discussed exercise and 61 % reported discussions related to diet [11]. Studies conducted using data from 2000 found that less than half or the survivors received advice on physical activity (35 %) and dietary habits (<30 %) [12, 13]. However, most survivors (80 %) indicated that they were interested in receiving health promotion advice [12]. Moreover, some groups may be more likely to have these conversations. In non-cancer populations with conditions such as hypertension, blacks, males, adults with Medicare insurance, and medically complex patients, such as overweight and diabetic patients, were more likely to receive lifestyle advice than their counterparts [14, 15]. Given the importance of a healthy diet and a program of regular physical activity for all adults, determining whether physician discussions about health promotion varies across subgroups of cancer survivors, as it does in other patient groups, will help identify gaps in care for specific groups of cancer survivors.

Despite the emphasis on long-term survivorship care by medical and non-medical organizations since 2000 [16, 17] and increasing evidence on the importance of lifestyle behaviors in survivorship [10, 18, 19], survivors have reported limited communication on health promotion with their health care providers, and few recent studies have sought to examine the issue [20]. The aims of the present study were to determine the proportion of long-term lung cancer and colorectal cancer (CRC) survivors participating in the Cancer Care Outcomes Research and Surveillance (CanCORS) Consortium study reporting that a physician discussed strategies to improve health or prevent illness and/or discussed current exercise and diet habits. Moreover, whether these discussions were more likely for some groups of survivors than others was examined. Based on findings in non-cancer populations, we hypothesized that blacks, males, and complex patients, i.e., with other comorbidities, would be more likely to have health promotion discussions with physicians than their counterparts. Similarly, because CRC incidence may be associated with lack of healthy eating and exercise [21], we expected that these participants would be more likely to have their physician discuss health promotion than lung cancer patients.

Materials and methods

Data and sample selection

The CanCORS Consortium was established by the National Cancer Institute in 2001 [22]. When initially funded, it was comprised of five geographically distinct sites, five Cancer Research Network (CRN) integrated health systems, and 15 Veterans Health Administration hospitals. CRC and lung cancer patients within 4 to 7 months of diagnosis, recruited through state cancer registries and health care administrative data, participated in baseline and follow-up surveys about initial treatment, care, and symptoms between 2003 and 2005 (CanCORS I). Minorities (African American, Asian/Pacific Islander, and Hispanic) were oversampled. For CanCORS II, patients were re-contacted beginning in 2012. Surveys focusing on long-term follow-up care and health were administered to patients and survivors. For CanCORS II, an advanced-disease survey was delivered to those with recurrent disease (n=101), and a disease-free survey was administered to those without recurrent disease (n=889). CanCORS II was available only in English. The survey instruments, comprised of validated questionnaires as well as new items developed for CanCORS, were pilot-tested prior to implementation [23]. Human subjects review boards approved all procedures at participating sites.

Sample selection criteria

The present study focused on the disease-free (no recurrent cancer) survivors from the CanCORS II survey (n=889). Fifteen survivors who did not see a physician (primary care or any other type) in the previous 12 months were excluded. The final sample size was 874.

Measures

Four primary dependent variables were used based on three study questions: “In the past 12 months, did a physician discuss: specific things you could do to improve heath or prevent illness?”; “How much or what kinds of food you eat?”; and “How much or what kind of exercise you get?” The fourth dependent variable was a summary variable indicating whether the survivor reported having any of the three discussions with their physician. Response options were “yes, definitely”, “yes, somewhat”, and “no”. The options “yes, definitely” and “yes, somewhat” were collapsed to create a dichotomous variable where one equals “yes” and zero equals “no” for each of the three dependent variables.

Survivors self-reported frequency of alcohol use and smoking status. Frequency of alcohol use was assessed through two items, extracted from the Behavioral Risk Factor Surveillance Survey, that measure frequency of drinking alcohol and the amount per occasion. Sine there was no item to assess whether a physician discussed drinking, alcohol consumption was not examined further. Less than 2 % of the entire sample qualified as heavy drinkers (women=≥4 drinks on any occasion and men=≥5 drinks). Overall, 44 % did not drink at all, and 47 % reported only one to two drinks per occasion. For smoking, survivors were asked whether they had smoked in the past 12 months. Those who responded “yes” then indicated whether they were a current smoker and whether a health care provider advised them to quit smoking. Only 13 % (n=110) of the sample reported smoking

in the past 12 months, and 56 % of the 110 reported current smoking. Among those with a smoking history, 71 % reported that a health care provider had advised them to quit.

Data on age category, race, gender, marital status, and highest education achieved were obtained from baseline surveys. Clinical information on cancer type, stage, and time since diagnosis was obtained from medical records or cancer registries if medical records were unavailable. Comorbidities, including high blood pressure, heart condition (heart attack, congestive heart failure, angina), stroke, diabetes, and pulmonary condition (chronic lung disease, emphysema) were self-reported by survivors at the time of the CanCORs II survey.

Data analysis

Frequencies are presented for categorical variables, and mean and standard deviations (SD) are presented for continuous variables. Chi-square tests were used to assess for differences in each physician advice variable by age (<65 vs. ≥65 years), race (non-minority vs. minority), gender, cancer type, education, comorbidities (high blood pressure, diabetes, heart condition, stroke, pulmonary condition), diagnosis stage (stage 0/I vs. stage II–IV), and treatment type (surgery, radiation, and chemotherapy).

Four multivariable logistic regression models were conducted for each of the dependent variables. Variables found to be significant (at p=<0.05) with any of the dependent variables in the chi-square analyses were included in each of the multivariable models. Although treatment type was not significant in a bivariate analysis, it was included in the multivariable model because of its association with comorbidities (e.g., treatment-induced diabetes). Multicollinearity checks indicated no collinearity issues. Hosmer-Lemeshow goodness-of-fit statistics indicated adequate model fit [24]. Analyses were conducted with SAS V9.3 (Cary, NC) [25].

Results

Sample characteristics

Of the sample, 73 % were 65 or older at the time of survey, 52 % were male, and 80 % were White (Table 1). Most survivors had at least some college education. Of the survivors, 74 % were CRC survivors, and 69 % were diagnosed at stage I or II. The mean number of years from diagnosis was 7.5 years (SD=0.58) with a range of 6.1 to 9.4 years. Sixty-three percent had high blood pressure, 29 % reported a heart condition, and 26 % reported having diabetes. Almost all survivors (91 %) reported that the type of physician they had seen in the past 12 months was a primary care physician. Most survivors (75 %) reported that a physician discussed at least one of the health care topics (Table 2). Approximately one third of the survivors discussed all three health promotion topics with their physicians (results not shown), and 24 % did not have these discussions.

Physician discussions on strategies to improve health or prevent illness

Over half of the participants reported that a physician discussed strategies to improve health or prevent illness (Table 2). As determined by bivariate analyses, younger survivors, those with higher education, and those with diabetes or with high blood pressure had a higher frequency of reporting these discussions (Table 3). Significant associations were confirmed in the multivariable model, where those with diabetes, high blood pressure, and/or pulmonary conditions were more likely to report discussing strategies to improve health. Older patients and those with lower education (less than high school or high school degree) were less likely to report discussing strategies to improve health compared to their counterparts (Table 4).

Physician discussions on how much or what kinds of food were eaten

Less than half of participants (44 %) reported that the physician discussed how much and what kinds of food they eat. Younger survivors, minorities, males, CRC survivors, and those with diabetes had higher frequencies of reporting receiving advice on food (Table 3). The multivariable model supported findings from the bivariate analysis (Table 4).

Physician discussions on how much or what kind of exercise

Over half of the participants reported that a physician discussed exercise habits (Table 2). Compared to their counterparts, younger survivors, minorities, CRC survivors, those with higher education, and those with diabetes had a higher frequency of reporting that a physician discussed exercise. The multivariable model indicated that those with diabetes were significantly more likely to report that a physician discussed exercise (Table 4). Survivors with less than a high school education (OR 0.45, 95 % CI 0.27–0.75) or a high school education (OR 0.66, 95 % CI 0.45–0.97) were significantly less likely to report that their physician discussed exercise habits compared to those with a college degree or higher.

Physician discussions of any of the three health promotion topics

Younger survivors, males, minorities, those with higher education, those who received chemotherapy and radiation, and

Table 1 Patient characteristics of long-term CRC and lung cancer survivors (n=874)

	Number	Percent
Age (years)		
<55	57	6.52
55–59	76	8.70
60–64	108	12.36
65–69	138	15.79
70–74	136	15.56
75–79	317	36.27
80+	42	4.81
Gender		
Male	458	52.40
Female	416	47.60
Race		
White	660	76.07
Hispanic	25	2.86
Black	113	12.93
Asian	31	3.55
Other[a]	43	5.15
Education		
Less than high school	94	10.76
High school	242	27.69
Some college	249	28.49
College degree or higher	255	29.18
Marital status		
Married/partnered	615	70.37
Widowed	108	12.36
Divorced/separated	106	12.13
Never married/single	42	4.81
Cancer type		
Lung	225	25.74
Colorectal cancer	649	74.26
Stage at diagnosis		
Stage I	381	43.59
Stage II	223	25.51
Stage III	237	27.12
Stage IV	29	3.32
Years since diagnosis		
Mean (SD)	7.59 (0.58)	
Range	6.07–9.38	
Surgery		
No	53	6.06
Yes	817	93.48
Treatments		
Neither	470	53.78
Radiation or chemotherapy only	282	32.27
Both	117	13.39
Type of doctor(s) seen in last 12 months		
Primary care	798	91.35
Other type of doctor only	76	8.70
Diabetes		
No	642	73.46
Yes	228	26.09
Heart condition[b]		
No	619	70.82
Yes	251	28.72
High blood pressure		
No	322	36.84
Yes	550	62.93
Stroke		
No	798	91.30
Yes	73	8.35
Depression		
No	691	79.06
Yes	178	20.37
Pulmonary condition[c]		
No	735	84.10
Yes	133	15.22
Any alcohol use		
No	742	84.90
Yes	132	15.10
Smoked cigarettes in past 12 months		
No	764	87.41
Yes	110	12.6
Current smoker (among past smokers)		
No	48	
Yes	62	

[a] Includes American Indian/Native American, Native Hawaiian, other Pacific Islander, more than one race, other, refused/do not know

[b] Heart condition includes heart attack, coronary artery disease, angina, heart failure, or other heart problem

[c] Pulmonary condition includes lung disease or emphysema

those with diabetes or high blood pressure had higher frequencies of a physician discussing any of three areas of health promotion (Table 3). In the multivariable model, age, education, treatment, and diabetes remained significant (Table 4.)

Discussion

Among long-term CRC and lung cancer survivors who had seen a physician in the past 12 months, 59 % reported that their doctor discussed strategies to improve health, 59 % reported that their doctor discussed exercise, and 44 % reported that their doctor discussed the foods they ate. Of concern, almost one in four did not discuss any of the three areas with their physicians. Additionally, subgroups of survivors, older

Table 2 Frequency of reporting physician discussion on health promotion: "In the past 12 months, did a doctor talk to you about…"

	Number	Percent
Things you could do to improve health or prevent illness?		
No	342	39.13
Yes	518	59.27
How much or what kind of exercise you get?		
No	347	39.70
Yes	518	59.27
How much or what kind of food you eat?		
No	485	55.49
Yes	385	44.05
Summary measure: Have any of three discussions?		
No	218	24.94
Yes	656	75.06

survivors and those with low education, who are also at higher risk of poor outcomes compared to their counterparts, were less likely to report discussions related to health promotion.

The percentages of survivors reporting that their physician discussed exercise and diet (59 and 44 %, respectively) were higher than those previously reported from studies conducted using data from 2000 (35 and 30 % [12]; 26 and 30 % [13]) but slightly lower than those from Weaver and colleagues (68 and 61 %, respectively) [11]. It is possible that the present findings provide evidence for a trend toward improvement in physicians having discussions of health promotion topics with cancer survivors. However, the present population was comprised of CRC and lung cancer survivors; previous studies included only breast and prostate cancer survivors or a heterogeneous mix of cancer types. It is possible that health promotion discussions in these cancer survivor groups remain low as previously reported.

Despite the potentially improved frequency of health promotion discussions, a substantial proportion of survivors surveyed in CanCORS reported not having them. Physician-reported barriers to discussing lifestyle behaviors with cancer survivors include concerns that lifestyle advice may be perceived as insensitive or implying blame [26], lack of knowledge and confidence to discuss the benefits of lifestyle factors [27], and lack of awareness of the importance of lifestyle factors [28]. To some extent, these barriers contradict how survivors perceive health promotion advice from physicians. One study of survivors recently completing treatment found that 80 % reported lifestyle advice to be helpful and stated that doctors had a duty to provide this information; only a few (15 %) felt advice would be insensitive [29].

Although physician engagement in information exchange for lifestyle behaviors can effectively and positively change behavior [8, 9], in the present study, some survivors, particularly those who were older and those with low education, were less likely to report having health behavior discussions. Compared to younger survivors, older survivors were less likely to report having at least one discussion of health promotion and less likely to discuss strategies to improve health and diet. However, they are especially in need of physician advice on health behaviors, given that older survivors are less likely to undertake healthful behavior change [12, 30] or maintain healthy behavior [30]. Further, compared to younger survivors, older survivors are more receptive to advice from physicians (e.g., perceived as beneficial) [29]. On the contrary, survivors with lower education may not have such attitudes: in fact, survivors with higher education had more positive attitudes toward receiving advice from physicians than those with lower education [29]. This may explain our finding that CanCORS survivors with lower education were less likely to have at least one discussion of health promotion and discussions about exercise. These findings are of concern because older and less educated populations are, compared to their counterparts, less likely to engage in healthy behaviors [30, 31] but are at higher risk for recurrence or other comorbid conditions [31].

Several of the present findings are encouraging. Although some groups are less likely to engage in healthy behaviors, e.g., males and minorities [12, 32, 33], as determined in the present research, they were more likely to report discussing the foods they eat with their physicians. Similarly, survivors with health conditions for which there are clear linkages between healthy behaviors and better outcomes were more likely to discuss health improvement strategies, exercise, and diet [34]. For CRC survivors, there are benefits (e.g., long-term survival, recurrence) of healthy lifestyle behavior [35]. Diabetes was the only comorbidity associated with higher likelihood of discussing all health topics with physicians. Not only are cancer survivors with diabetes more likely to report that cancer is affecting their health [36] and desire information on lifestyle behaviors [37, 38], but there is evidence for the health benefits of physical activity and improved diet for diabetes, independent of cancer [39]. In contrast, survivors with high blood pressure were more likely to report discussions about strategies to improve health, but not specifically on diet or exercise. This finding is in part consistent with data from a previous study in which survivors with cardiovascular disease were more likely to report that a physician discussed with them overall behavior change and exercise, but not diet [11].

There are limitations of the present study. CanCORS' survey questions referred only to discussions with one doctor and did not assess whether other types of health care professionals discussed health behaviors. The questions also did not identify whether the physician gave specific advice or simply had a conversation with the survivor about current habits. Since data on height and weight were not available, we could not determine if a discussion of health promotion differs for normal

Table 3 Bivariate relationships between reporting a physician discussed health promotion and demographic and clinical characteristics

	Physician discussed…											
	strategies to improve health/ prevent illness			how much and what kind of food eaten			how much and what kind of exercise			any of the three topics		
	N	%	*p*	*N*	%	*p*	*N*	%	*p*	*N*	%	*p*
Age												
<65 years	173	72.38	<0.001	129	53.53	0.001	153	63.49	0.179	200	82.99	0.001
≥65 years	345	55.56		256	40.70		365	58.49		456	72.04	
Gender												
Male	284	62.56	0.235	227	49.67	<0.001	281	61.67	0.259	356	77.73	0.055
Female	234	57.64		158	38.26		238	57.91		300	72.12	
Race												
Non-minority	379	58.67	0.104	261	39.79	<0.001	380	58.19	0.075	485	79.91	0.059
Minority	139	64.95		124	57.94		138	65.09		171	73.48	
Education												
Less than high school	42	46.15	0.008	38	40.86	0.481	46	48.94	0.035	61	64.89	0.027
High school degree	137	57.81		102	42.32		136	56.90		175	72.31	
Some college	153	62.70		118	47.77		154	62.86		194	77.91	
College or higher	167	65.75		107	41.96		164	64.31		201	78.82	
Cancer type												
Lung	101	56.42	0.081	63	35.00	0.002	96	53.63	0.026	165	73.33	0.488
CRC	309	63.84		239	48.78		308	63.11		491	75.65	
Treatment												
Neither	200	59.00	0.204	142	41.52	0.166	198	58.41	0.509	333	70.85	0.007
Radiation or chemotherapy only	152	66.38		112	48.48		145	62.77		228	80.85	
Both	58	61.05		48	49.48		61	62.89		91	77.78	
Stage at diagnosis												
Stage I	219	58.24	0.481	159	41.95	0.226	222	58.73	0.528	278	72.97	0.318
Stage II	129	59.45		94	42.15		128	58.18		166	74.44	
Stage III	150	64.10		116	49.36		150	64.10		188	79.32	
Stage IV	19	65.52		15	51.72		17	58.62		23	79.31	
Heart condition												
No	362	59.54	0.423	269	43.67	0.532	364	59.48	0.671	460	74.31	0.357
Yes	155	62.50		115	46.00		152	61.04		159	77.29	
Diabetes												
No	361	57.12	0.002	248	38.87	<0.001	363	57.35	0.010	465	72.43	0.003
Yes	155	69.20		134	58.77		153	67.11		188	82.46	
High blood pressure												
No	171	54.11	0.005	129	40.31	0.067	180	56.65	0.103	230	71.43	0.062
Yes	347	63.90		256	46.72		336	61.88		424	77.09	
Stroke												
No	476	60.56	0.817	351	44.10	0.699	474	60.08	0.845	596	74.69	0.368
Yes	42	59.15		33	46.48		43	58.90		58	79.45	
Depression												
No	404	59.32	0.260	297	43.04	0.165	405	59.30	0.491	514	74.38	0.308
Yes	112	64.00		86	48.86		110	62.15		139	78.09	
Pulmonary condition												
No	430	59.31	0.142	334	45.57	0.050	439	60.47	0.472	546	74.29	0.184
Yes	86	66.15		48	36.36		76	57.14		106	79.70	

Table 4 Odds ratios for reporting a physician discussed health promotion topic in the past 12 months

	Strategies to improve health/prevent illness		Discuss how much and what kind of food eaten		Discuss how much and what kind of exercise		Any of the three topics	
	N=816		*N*=825		*N*=821		*N*=828	
	OR	95 % CI	OR	95 % CI	OR	95 % CI	OR	95 % CI
Age (ref=≥65 years)								
<65 years	2.18	(1.52–3.12)	1.58	(1.13–2.21)	1.18	(0.84–1.65)	1.86	(1.22–2.82)
Gender (ref=male)								
Female	0.94	(0.70–1.26)	0.9	(0.51–0.92)	0.99	(0.74–1.32)	0.84	(0.60–1.17)
Race (ref=non-minority)								
Minority	1.13	(0.79–0.162)	1.71	(1.20–2.42)	1.30	(0.92–1.86)	1.36	(0.89–2.07)
Education (ref=≥college degree)								
Less than high school	0.43	(0.26–0.73)	0.85	(0.51–1.44)	0.45	(0.27–0.75)	0.42	(0.24–0.72)
High school degree	0.66	(0.44–0.97)	0.97	(0.66–1.44)	0.66	(0.45–0.97)	0.61	(0.39–0.95)
Some college	0.80	(0.54–1.18)	1.23	(0.84–1.80)	0.90	(0.61–1.31)	0.88	(0.56–1.38)
Cancer type (ref=lung)								
CRC	1.24	(0.86–1.78)	1.41	(0.97–2.04)	1.18	(0.82–1.68)	1.10	(0.73–1.64)
Treatment (ref=neither)								
Radiation or chemotherapy only	1.33	(0.96–1.86)	1.45	(1.05–2.00)	1.23	(0.62–1.49)	1.49	(1.02–2.18)
Both radiation and chemotherapy	1.11	(0.71–1.74)	1.40	(0.90–2.18)	0.96	(0.58–1.38)	1.19	(0.72–1.98)
Diabetes (ref=no)								
Yes	1.80	(1.26–2.58)	2.23	(1.59–3.13)	1.55	(1.10–2.18)	1.99	(1.31–3.03)
High blood pressure (ref=no)								
Yes	1.61	(1.18–2.20)	1.13	(0.83–1.55)	1.19	(0.88–1.61)	1.33	(0.94–1.88)
Pulmonary condition (ref=no)								
Yes	1.64	(1.04–2.59)	0.81	(0.51–1.28)	1.00	(0.65–1.55)	1.62	(0.96–2.73)
Hosmer-Lemeshow goodness-of-fit $X^2(df)$	X^2=5.54(8)		X^2=9.83(8)		X^2=7.35(8)		X^2=8.46(8)	
	p=0.806		p=0.278		p=0.499		p=0.390	

OR odds ratio, *CI* confidence interval, *ref* reference group

weight vs. overweight patients. Without a measure of overweight status, we cannot determine the clinical relevance of some of the discussions that were missed (e.g., greater implications for an overweight CRC survivor vs. a normal weight lung cancer survivor). The evidence is mixed on the difference in receiving health promotion advice by overweight status. Some studies found that the receipt of health promotion advice did not differ by overweight status [13]; others did find differences [11]. Comorbidities were self-reported, and their duration was not known. Persistent, long-term comorbidities may increase health care utilization and the likelihood that physicians will discuss health promotion with survivors. Finally, there was a potential for recall bias with the patient report of the discussion questions, and we were unable to validate the responses with physician notes.

The results indicate that more survivors may be having health promotion discussions than in the recent past, yet a substantial proportion of survivors do not report these discussions. Furthermore, while physicians are more frequently having health promotion discussions with some survivors for whom there are known benefits from healthy behaviors and/or who are known to be less likely to engage in healthy behaviors (e.g., survivors with diabetes and males), they are not discussing these behaviors with other survivors who are at higher risk for poor outcomes associated with limited healthy behaviors, e.g., older and less educated survivors. Further research is warranted on how to promote these discussions; to educate physicians, other health care providers, and survivors on evidence-based guidelines related to health promotion; and to encourage health lifestyle strategies for survivors.

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