HHS Public Access

Author manuscript

J Psychosoc Oncol. Author manuscript; available in PMC 2019 May 27.

Published in final edited form as:

J Psychosoc Oncol. 2018 ; 36(1): 64–81. doi:10.1080/07347332.2017.1399193.

Are cancer survivors following the national comprehensive cancer network health behavior guidelines? An assessment of patients attending a cancer survivorship clinic

Kelly A. Hyland, BA[a,b,e], **Jamie M. Jacobs, PhD**[c,d], **Inga T. Lennes, MD, MPH, MBA**[c], **William F. Pirl, MD, MPH**[c,d,f], and **Elyse R. Park, PhD, MPH**[c,d,e]

[a]Department of Health Outcomes and Behavior, Moffitt Cancer Center, Tampa, Florida, USA;

[b]Department of Psychology, University of South Florida, Tampa, Florida, USA;

[c]Massachusetts General Hospital Cancer Center, Boston, Massachusetts, USA;

[d]Mongan Institute for Health Policy, Massachusetts General Hospital, Boston, Massachusetts, USA;

[e]Department of Psychiatry, Sylvester Comprehensive Cancer Center, Miami, Florida, USA;

[f]Sylvester Cancer Center, Miami, Florida, USA

Abstract

Purpose: Engaging in positive health behaviors post-treatment is important for cancer survivors' health. However, little is known about whether survivors are practicing health promoting behaviors. We aimed to explore whether survivors are meeting the recent health behavior guidelines set forth by the National Comprehensive Cancer Network (NCCN) and to examine associations between health behaviors and distress.

Methods: Sixty-six survivors completed a cross-sectional questionnaire assessing health behaviors prior to an initial appointment at a survivorship care clinic. Information about sociodemographic, clinical, and psychosocial variables and six health behavior recommendations, including physical activity, sunscreen use, tobacco use, alcohol consumption, weight management, and annual primary care provider visits, was collected.

Findings: Only 7.6% of survivors met all six NCCN health behavior guidelines. One in ten (10.6%) survivors had smoked a cigarette in the previous 30 days, and half did not use sunscreen regularly (50%), had an unhealthy body mass index (53%), and did not engage in >10 MET-h/ week of physical activity (50%). Approximately 1 in 6 (15.1%) survivors reported drinking beyond the recommended limit, and a similar proportion had not seen a PCP in the previous year (27.3%). Clinically significant levels of distress (>5; range 0–10) on the NCCN distress scale were reported by 64.6% of survivors. Participants with clinical levels of distress were less likely to adhere to health behavior guidelines than those who were not distressed (p D .002).

CONTACT Elyse R. Park, PhD, MPH, epark@mgh.harvard.edu, Mongan Institute for Health Policy, Massachusetts General Hospital, 50 Staniford Street, 9th Floor, Boston, Massachusetts 02114, USA.

Conclusions: Overall, survivors engaged at a survivorship clinic did not meet the NCCN recommended health behavior guidelines. Implications for Psychosocial Providers or Policy: Survivors' health behaviors and distress should be assessed and intervened upon during survivorship care. Survivorship clinics may provide a unique forum in which to provide ongoing behavioral health counseling and psychosocial support for these patients.

Keywords

cancer survivorship; health behaviors; distress; survivorship clinic

Background

There are nearly 15.5 million cancer survivors living in the United States (U.S.) today, and an expected 20.3 million by 2026 (Bluethmann, Mariotto, & Rowland, 2016). Throughout survival, cancer survivors may face profound and lasting physical and psychological complications secondary to cancer diagnosis and treatment, including pain (Glare, Davies, & Finlay, 2014), fatigue (Bower, Ganz, & Desmond, 2000), anxiety (Harrington, Hansen, Moskowitz, Todd, & Feuerstein, 2010) and depressive symptoms (Greer et al., 2011), and poor quality of life (Jansen et al., 2011). Additionally, cancer survivors continue to be at elevated risk for comorbid diseases (Leach, Weaver, & Aziz, 2015), second primary cancers (Curtis et al., 2006; Oeffinger, Baxi, Novetsky Friedman, & Moskowitz, 2013), and mortality (Baade, Fritschi, & Eakin, 2006).

In the context of these long-term physical and psychological challenges, engaging in health behaviors may be advantageous to survivors' health. A health behavior as defined in the International Encyclopedia of Social and Behavioral Sciences is "any activity undertaken for the purpose of preventing or detecting disease or for improving health and well-being," such as regular physical activity and avoiding tobacco use (Conner, 2001). Engaging in health behaviors has been shown to improve quality of life, mitigate cancer-related late effects, and reduce the risk of co-morbid health conditions, cancer recurrence, new primary tumors, and mortality in survivors (Vijayvergia & Denlinger, 2015). A 2006 report by the Institute of Medicine (IOM) identified the optimization of health behaviors as a core component of survivorship care, important in helping survivors to achieve or maintain good health and prevent health problems in the future (Institute of Medicine & National Research Council, 2006). Furthermore, the IOM and the American Society of Clinical Oncology (ASCO) suggest that oncology clinicians should summarize such recommendations for preventative health and follow-up care in a Survivorship Care Plan (Institute of Medicine & National Research Council, 2006; Mayer, Nekhlyudov, & Snyder, 2014).

In order to inform and facilitate physician recommendations for cancer survivors' engagement in health behaviors, the National Comprehensive Cancer Network (NCCN) put forth cancer survivor-specific healthy lifestyle guidelines (National Comprehensive Cancer Network, 2016). Specifically, the NCCN guidelines recommend that cancer survivors (1) avoid or stop use of tobacco products, (2) apply sunscreen regularly, (3) achieve and maintain a healthy body weight, (4) engage in regular physical activity, (5) minimize alcohol intake, and (6) visit a primary care provider annually.

Survivors who follow these guidelines may experience notable quality of life and health benefits. For example, physical activity has been associated with reduced all-cause and cancer-specific mortality in survivors (Ballard-Barbash, Friedenreich, & Courneya, 2012; McTiernan, Irwin, & Vongruenigen, 2010), and regular follow-up with a primary care provider is integral for survivor health monitoring, early detection, and adherence to cancer-specific screening recommendations (Wilbur, 2015). Conversely, survivors who do not engage in health behaviors may encounter deleterious effects. Cigarette smoking has many adverse implications for survivor health, including increased risk of new primary cancers and decreased survival time (Tabuchi, Ito, & Ioka, 2013; U.S. Department of Health & Human Services, 2014). Cancer survivors, most notably those with a previous skin cancer or who have undergone radiation therapy, are more sensitive to sun exposure and at increased risk for secondary skin cancers (Zwemer, Mahler, Werchniak, & Recklitis, 2012). Underweight and obese survivors have been shown to have reduced disease-free and overall survival as compared to normal weight patients (Chan & Norat, 2015; Sinicrope, Foster, & Yothers, 2013), and obesity is also linked to increased risk for comorbid health conditions in survivors, including heart disease and type II diabetes (McTiernan, 2005).

While the benefits of singular health behaviors have been demonstrated, little is known about health behaviors, collectively, among cancer survivors, and furthermore, whether survivors are following recommendations. Unfortunately, studies that have examined multiple behaviors have found low rates of adherence to healthy lifestyle practices (Bellizzi, Rowland, Jeffery, & McNeel, 2005; Blanchard, Courneya, & Stein, 2008; Mayer et al., 2007). Moreover, certain sociodemographic, clinical, and psychosocial factors may be associated with survivors' health behaviors (Bellizzi et al., 2005; Bluethmann, Basen-Engquist, & Vernon, 2015; Coups & Ostroff, 2005; Harding, 2012; Rabin & Pinto, 2006). Distress is one such psychosocial factor that may play a role in health behavior engagement. Cancer diagnosis and treatment can cause elevated distress, which persists into survivorship; indeed, approximately one in three survivors continue to endorse clinical levels of distress within the first year post-treatment (Carlson, Groff, Maciejewski, & Bultz,). Thus, the NCCN guidelines also emphasize the importance of distress assessment and monitoring into survivorship care (NCCN Distress Guidelines: National Comprehensive Cancer Network, 2016; Holland, Andersen, & Breitbart, 2013). Importantly, engaging in health behaviors may improve quality of life and serve as a protective factor from distress in survivors (Blanchard et al., 2008). However, only one study to date has investigated the relationship between health behaviors and distress in survivors (Harding, 2012). Harding (2012) found that survivors who were current smokers or were physically inactive were more likely to endorse symptoms of anxiety, sadness, or hopelessness compared to those who were non-smokers or physically active. Although little is known about the relationship between health behaviors and distress in survivors, literature suggests that cancer survivors are receptive to behavioral health recommendations, which may benefit survivor's physical and psychological well-being (Demark-Wahnefried, Peterson, & McBride, 2000; Vijayvergia & Denlinger, 2015).

The NCCN Survivorship Guidelines provide a comprehensive and pertinent structure to evaluate and intervene upon health behaviors in survivorship care. Thus, it is clinically meaningful to establish benchmark rates of adherence to the NCCN health behavior guidelines in survivors. We aimed to examine adherence to six key health behavior practices

as detailed in the NCCN guidelines in cancer survivors attending a survivorship care clinic. In addition, we aimed to assess associations between adherence to health behavior recommendations and distress, as well as sociodemographic and clinical factors. It was hypothesized that a minority of patients would meet all of the NCCN health behavior guidelines and that survivors who engage in fewer health behaviors would report higher levels of distress.

Methods

Participants

Survivors attending an initial visit to the Cancer Survivorship Clinic at the Massachusetts General Hospital (MGH) Cancer Center between January 2011 and May 2012 were invited to complete a survey prior to their first appointment. As described previously, the clinic used a consultative model where patients were referred to the clinic by their oncology providers or were self-referred (Sporn et al., 2015). Sixty-seven patients attended appointments at the clinic, and all patients were invited to complete the intake survey on paper or electronically via a secure Research Electronic Data Capture (REDCap) link. The information collected was used to guide discussion during patients' clinical appointment. Prior to completing the survey, patients could sign a written consent form to have their survey responses stored for a data repository. All patients consented to having their data stored for research purposes. Data from 66 patients were included in the current analyses; one participant did not finish the survey and was excluded. The Institutional Review Board of the MGH/Partners Human Research Committee approved this research.

Sociodemographics ––—Patient reported data were collected on age, sex, race, ethnicity, education level, partner status, and insurance status. Time since most recent diagnosis, cancer type, and cancer stage were obtained from patients' electronic health record.

Distress ––—Patient distress over the previous week was assessed with a single-item distress thermometer (range D 0 "not at all distressed" to 10 "very distressed") (NCCN Distress Guidelines: National Comprehensive Cancer Network, 2016). The distress thermometer has been used widely in cancer patient and survivor populations and validated as a short form with good specificity in ruling out survivors without elevated distress using a cutoff score of ≥5 (Craike, Livingston, & Warne, 2011).

NCCN Survivorship Health Behaviors ––—The NCCN survivorship guidelines (National Comprehensive Cancer Network 2016) were used to identify health behavior recommendations and adherence cutoffs for cancer survivors' cigarette smoking, body mass index, physical activity, sunscreen use, alcohol use, and regular primary care visits (Table 1). The recommendations were compared with questionnaire measures in the data repository. Measures that captured survivor health behavior adherence as described in the NCCN guidelines were selected for inclusion in the current study.

Smoking.: Survivors who reported having smoked a cigarette in the previous 30 days were considered non-adherent to the guideline.

Body Mass Index.: Survivors were asked to self-report their height (feet/inches) and weight (pounds), and the standard Imperial conversion measure was used to calculate BMI (Centers for Disease Control and Prevention). Survivors were considered non-adherent if their BMI fell outside the "Normal" range (<18.5 kg/m^2 or >25 kg/m^2).

Physical activity.: Participants completed a physical activity questionnaire previously validated in samples of colorectal (Meyerhardt, Giovannucci, & Holmes, 2006) and breast (Holmes, Chen, & Feskanich, 2005; Holmes et al. 2005; Meyerhardt et al. 2006) cancer survivors. Survivors reported the average amount of time they engaged in specific physical activities per week (e.g., running, walking, biking) ranging from 0 minutes to 11 or more hours. Established metabolic equivalent (MET) values representing the amount of energy expenditure in a given activity were used to compute average MET hours per week (Meyerhardt, Giovannucci, & Holmes, 2006). Assigned MET values ranged from 3 (walking at a normal pace) to 12 (running). Adherence was dichotomized using the World Health Organization cutoff of 10 MET-hours per week (MET h/week) (Global Recommendations on Physical Activity for Health 2010). Survivors who did not engage in at least 10 MET h/week of physical activity were considered non-adherent.

Sunscreen application.: Regular sun safety was assessed using a single item, assessing how often an individual wears sunscreen when going outside for more than an hour on a sunny summer day (Zwemer et al., 2012). Participants responded on a 5-point Likert scale ranging from "always" to "never." Survivors who reported "sometimes," "seldom," or "never" wearing sunscreen were considered non-adherent to the guideline.

Alcohol consumption.: Two items from the Alcohol Use Disorders Identification Test (Audit-C) were used to assess alcohol consumption frequency and volume of use (Bush, Kivlahan, & McDonell, 1998). The average number of drinks consumed per day of reported drinking over the previous year was calculated. The Audit-C response options collapse "1–2 drinks," and so an average of 1.5 was used in these calculations for women, and an average of 2 for men. Women who reported drinking an average of more than 1.5 drinks per drinking day or men who reported drinking an average of more than 2 drinks per drinking day were classified as non-adherent.

Regular primary care.: Survivors were asked the date of their last PCP visit, and those who had not seen their PCP within the previous year were considered non-adherent to the recommendation.

Statistical analyses

Data were entered into REDCap, a secure web-based data collection program, and exported to PAWS Statistics (Version 18). Means and frequencies were calculated for each health behavior and survivors were dichotomized as adherent or non-adherent to each health behavior guideline. A health behavior composite score ranging from zero to six was calculated for each survivor, with non-adherence to a health behavior accounting for one point and higher scores indicating greater non-adherence. Chi-squares and t-tests were conducted to determine relationships among health behavior adherence and distress, as well

as sociodemographic and clinical correlates; there were not enough racial/ethnic categories represented in the sample to run meaningful analyses. Results were evaluated at a two-tailed level of significance ($p < .05$). Data missing was infrequent for five of six health behaviors, with one individual not completing questions about smoking status and alcohol consumption. Thirteen participants did not complete the item assessing date of last visit to a primary care provider. For participants who did not complete this item, responses to questions providing more contextual information about identification of a primary care provider were considered, including "Do you have a primary care provider?" and "Who do you consider your primary care provider?" Data were considered to be missing not at random, as these participants either responded that they did not have a primary care provider or identified the oncologist as their main health care provider. As missing data are considered to be missing not at random, participants with missing data for a health behavior were considered non-adherent to the recommendation.

Results

Sample characteristics

Of the 66 survivors, 62.1% were female, and the majority was White (95.5%), Non-Hispanic (84.8%), and partnered (65.1%) (Table 2). The median age was 49 years old. Participants were well-educated, with 75.7% having completed college or graduate work, and most were covered by private insurance (84.8%). Cancer types included breast, lymphoma, gastrointestinal, head/neck, melanoma, sarcoma, genitourinary, thyroid, gynecologic, and lung. At the time of appointment to the survivorship clinic, 21.2% of survivors were diagnosed with Stage I disease, 31.8% Stage II, 19.7% Stage III, and 24.4% Stage IV. Survivors were a median of two years from diagnosis. The mean distress score was 5.5 (SD D 3.1).

Survivor health behaviors

Six (9.1%) survivors reported smoking a cigarette in the previous 30 days (Table 3). Half (50%) of survivors reported "sometimes," "seldom," or "never" using sunscreen when going outside on a sunny summer day. Fifty-three percent of participants had an unhealthy body weight; half (45.5%) of participants did not meet physical activity recommendations using the World Health Organization's cutoff of 10 MET-h/week. Approximately 14% of survivors reported alcohol consumption that exceeded the sex-specific recommendations. Twenty-seven percent had not seen a primary care provider in the previous year.

Only 7.6% of participants reported adherence to all six recommendations as set forth by the NCCN survivorship guidelines [Range: 1–6 recommendations met]. Additionally, 28.8% of survivors reported engaging in one unhealthy behavior, 28.8% in two, 21.2% in three, and 13.6% in 4 or more unhealthy behaviors.

Associations between health behaviors and sociodemographic and clinical characteristics

Most survivors who reported smoking a cigarette in the previous 30 days were non-partnered [x^2 (1) =4.6, p = .032]. Survivors who reported lower rates of sunscreen wearing were more likely to be non-partnered [x^2 (1) = 5.4, p=0.20] Survivors who did who not obtain the

prescribed ≥10 MET-h/week of physical activity were more likely to be older (not meeting PA: M 55.0 years, SD 11.7; meeting PA: M = 47.9 years, SD = 11.5); t(64) = −2.5, p = .016, and male [x^2 (1) = 5.2, p = .021]. Being male was associated with drinking beyond the alcohol recommendations [x^2 (1) = 2.0, p = .047]. BMI did not differ by sociodemographic or clinical factors. Health behaviors did not differ by educational attainment (college education versus not), insurance status (public versus private), or non-metastatic (stage I–III) versus metastatic (stage IV) disease status.

Associations between health behaviors and distress

There was a significant difference in distress scores between smokers (M = 8.2, SD = 1.5) and non-smokers (M = 5.3, SD = 3.1), such that smokers were more distressed, t(10.3) = −4.0, p = .002. Survivors who met the physical activity recommendations (M = 4.8, SD = 3.2) were less distressed than those who did not (M = 6.3, SD = 2.8); t(63) = −2.0, p = .055; however, this difference did not reach statistical significance. Overall, survivors who scored ≥5 on the distress scale reported less engagement in health behaviors (composite score range: 0–5 unhealthy behaviors) compared to survivors who scored below the distress cutoff, t(63.0) = −3.2, p = .002 [≥5 M = 2.4, SD = 1.3; <5 M = 1.4, SD = 0.7].

Discussion

The objective of this study was to examine whether adult cancer survivors attending a survivorship clinic are adhering to NCCN health behavior guidelines. Overall, we found that very few survivors (7.6%) were adherent to all six of the NCCN health behavior guidelines explored. Our findings are similar to earlier studies that examined health behavior adherence among survivors, where less than 8% of survivors were meeting a combination of nutrition, physical activity, cigarette smoking, and BMI guidelines (Blanchard et al., 2008; Mayer et al., 2007). These low rates are concerning given the potential physical and psychological consequences of survivors' non-adherence to health behaviors (Vijayvergia & Denlinger, 2015).

To our knowledge, this is the first study to examine the health behaviors of adult survivors of varied cancers in the context of the NCCN Guidelines for Cancer Survivorship (National Comprehensive Cancer Network, 2016). In particular, no previous studies have reported survivors' rates of regular primary care visits; we found that 72.7% of our sample reported regular primary care visits. It is possible that patients preferred to see an oncology clinician due to greater perceived competence and expertise in cancer survivor care (Tralongo et al., 2016). However, ongoing healthcare visits with a primary care provider throughout the cancer care trajectory are important for health monitoring and management of other health conditions. The current data are also unique in that they were collected in a survivorship care clinic. The survivorship clinic model is patient-centered and can integrate a focus on behavioral health needs, as the visit is driven by patient-identified issues rather than medical necessity (i.e., reviewing test results), allowing for more time devoted to supportive care. As survivors may be motivated to make health behavior changes (Blanchard, Denniston, & Baker, 2003; Demark-Wahnefried, Aziz, Rowland, & Pinto, 2005; Hawkins, Smith, & Zhao, 2010) and brief behavioral counseling can impact patients' lifestyle practices (Fisher,

Williams, Beeken, & Wardle, 2015), survivorship clinicians are well positioned to assess and intervene with survivor health behaviors and distress, which may optimize health outcomes (Demark-Wahnefried, Pinto, & Gritz, 2006).

Generally, our findings support previously reported rates of health behavior engagement among cancer survivors in other settings. Rates of current cigarette smoking, physical inactivity, and sunscreen non-adherence in the current sample are comparable to previously reported rates in samples of cancer survivors (Bellizzi et al., 2005; Blanchard et al., 2008; Bluethmann et al., 2015; Coups & Ostroff, 2005; Demark-Wahnefried et al., 2000; Harding, 2012; Mayer et al., 2007; Mowls, Brame, Martinez, & Beebe, 2016; Zhao, Li, & Okoro, 2013). Risky drinking in the current sample was somewhat higher compared to rates in the literature (Coups & Ostroff, 2005; Mowls et al., 2016; Zhao et al., 2013). Conversely, the percentage of individuals in the current study with an abnormal BMI compares favorably to the number of individuals in other studies with an unhealthy BMI (Bluethmann et al., 2015; Coups & Ostroff, 2005; Demark-Wahnefried et al., 2000). Due to the cross-sectional nature of the study, we were unable to assess whether survivors' health behaviors changed over time. Longitudinal research is warranted to evaluate how health behaviors change from pre-diagnosis, throughout the cancer trajectory and into survivorship. Predictive modeling using large datasets would allow for further exploration of the relationship between health behaviors and distress over time, and may help to identify risk factors associated with lower health behavior engagement.

Associations between demographic and psychosocial variables and health behavior non-adherence were found, although there were no differences in early versus advanced stage disease. Consistent with previous findings, older survivors (>49 years) tended to be more inactive (Coups & Ostroff, 2005; Harding, 2012; Van Blarigan & Meyerhardt, 2015). While the median age of the current sample was younger than the median age of cancer survivors in US, this may be a reflection of the proclivity of survivors to utilize services at a survivorship clinic, or the individuals whom oncologists are more likely to refer. Male survivors were more likely to report risky drinking compared to females, a gender phenomenon that is well established in the population at large (Nolen-Hoeksema, 2004) but has not been fully explored in cancer survivors.

Accordingly, in our study, survivors who were adherent to more of the NCCN health behavior recommendations were less likely to endorse clinically elevated distress. Nearly two-thirds of survivors in our sample endorsed clinically significant levels of distress at the time of their visit to the survivorship clinic. This is significantly higher than previous studies of survivors (Dunn, Ng, & Holland, 2013; Harding, 2012). Differences in distress levels in the current sample, as compared to previous work, may be a product of the survivors in our sample and setting in which they were seen. The majority of studies examining survivor health behaviors to date have used public data [i.e., the National Health Institute Survey (NHIS) and Behavior Risk Factor Surveillance System (BRFSS)] (Bellizzi et al., 2005; Coups & Ostroff, 2005; Harding, 2012; Mowls et al., 2016). Our finding that a majority of survivors endorsed elevated distress may be a reflection of the patients who are attending a survivorship clinic. More distressed individuals may be more likely to seek help, and

oncologists may be more likely to refer patients who are struggling with post-cancer adjustment or in apparent distress.

While we cannot assume directionality due to the cross-sectional nature of the study, the implications of the association between distress and health behaviors can be considered bidirectionally. Symptoms of distress may negatively influence survivors' health behaviors; indeed, depressive symptoms and anxiety have been linked to heavy drinking and continued smoking in survivor populations (Berg, Thomas, & Mertens, 2013; Lown, Goldsby, & Mertens, 2008). Conversely, engagement in health behaviors may alleviate distress. Examining health behaviors, collectively, provides a better overall picture of behavioral health to determine which and how they co-occur. Some lifestyle factors, such as body mass index and physical activity, naturally cluster together and positive change in one area may lead to improvement in another (Kenzik, Morey, & Cohen, 2015). Alternatively, some health behaviors may be compensatory—overcompensating for one risky behavior by being particularly adherent in another realm (Park, Streck, & Gareen, 2014). Examining health behaviors together allows for a holistic approach to healthy lifestyle promotion.

Clinical implications

The current findings highlight the potential need for regular assessment of health behaviors and distress, particularly with survivors who are not meeting NCCN guideline recommendations. Cancer care has been dubbed a "teachable moment" for oncology clinicians to discuss the importance of health behaviors with patients (Bluethmann et al., 2015; Vijayvergia & Denlinger, 2015), as survivors may be motivated to engage in practices they view as protective against future cancerrelated problems and to discontinue behaviors perceived as contributing to their cancer diagnosis (Rabin & Pinto, 2006). Unfortunately, the prevalence of health behavior conversations with oncology clinicians is low (Demark-Wahnefried et al., 2005), with time constraints, lack of reimbursement, a perception that patients do not want such suggestions and unclear delineation of which provider should be responsible for such discussions serving as barriers to engagement (Sabatino, Coates, & Uhler, 2007). Given these constraints, the role of the oncologist may be to assess health behaviors rather than intervene. Integration of assessment tools that are aligned with the NCCN health behavior and distress guidelines into electronic health record systems can help to promote the systematic collection of data that can be used for both clinical and research applications. Routine assessment will assist with the identification of individuals who are in need of health behavior intervention who can then be referred appropriately.

In larger cancer care networks, this referral may be to a provider with expertise in survivorship care. These providers can then target survivor-specific barriers to post-treatment health behaviors, such as symptom burden (e.g., fatigue, lymphedema), psychological distress, physical limitations as a result of treatments, and weight gain or loss. Nesting survivorship clinics within the cancer center helps to ensure continuity of care, and may facilitate treatment co-management among providers. Furthermore, access to shared documentation can help providers to deliver consistent messaging about the importance of health behaviors into survivorship and to keep providers abreast of current issues.

However, with the growing number of cancer survivors (Bluethmann et al., 2016), a significant portion of survivorship care will be delivered in the community. Routine health behavior screening is particularly important in the community setting, where resources may be limited. Fortunately, the availability of virtual support delivery and web-based resources can provide survivors with expanded, cost-effective access to health behavior interventions and psychosocial support (Goode, Lawler, Brakenridge, Reeves, & Eakin, 2015, Martin et al., 2016). Mental health clinicians who specialize in behavioral medicine, particularly those with training in motivational interviewing or cognitive behavioral therapy, are well suited to fulfill this role.

The NCCN guidelines offer a promising structure to help standardize clinicians' health behavior recommendations to survivors. While oncologists may not have the time or resources to carry out these conversations and follow up on health behavior discussions, referral to a clinician who can intervene with and provide psychosocial support around behavior change can help survivors to engage in health behaviors.

Limitations

This study is unique in that participants were attending an appointment at a specialized cancer survivorship clinic nested within a cancer center. However, survivors' proactive attendance to the survivorship care clinic may reflect enhanced motivation and health concern in these individuals, inspiring healthier behavioral practices than found among other survivors. Relatedly, generalizability of these findings may be limited based on the sociodemographic profile of patients at an academic medical center, particularly lack of racial and ethnic diversity. Self-report health behavior information may be subject to reporter bias, as individuals may over-report desirable behaviors and under-report risky behaviors. Therefore, the current estimates of health behavior engagement should be viewed as conservative. Small sample size may have impacted the ability to find significant results; indeed, several analyses approached but did not achieve significance, potentially due to insufficient power. The inclusion of survivors across several cancer types can be considered a limitation of the study, as we were unable to conduct intra-tumor site analyses to explore health behaviors by cancer type. However, inclusivity may also be viewed as a strength, as most studies explore within tumor site, limiting generalizability to other cancer types. Dietary behavior and nutritional recommendations are offered in the NCCN guidelines, but these data were not collected in the present study. Dietary information may be useful in interpreting data from related health metrics, such as BMI, and would be important to look at in future studies. Future work should also explore the associations between health behaviors and demographic characteristics in larger samples of survivors, as the current study may not have been powered to detect some of these differences. The current analysis used cigarette smoking in the previous 30 days to evaluate tobacco use; future studies should evaluate use of alternative tobacco products (e.g., chew, dip, snus, e-cig) as the NCCN guidelines recommend that survivors abstain from all tobacco products.

Conclusions

Cancer survivors attending a cancer survivorship clinic at an academic cancer center who reported higher levels of distress were unlikely to be meeting NCCN health behavior recommendations. Distress may be a key element of intervention to improve cancer survivors' health behaviors.

Acknowledgment

This study was supported by internal funds from the Massachusetts General Hospital Cancer Center. The authors would like to thank Nora Sporn and Justin Eusebio for their assistance with the study.

Funding

Massachusetts General Hospital (Internal Funds).

References

Baade PD, Fritschi L, & Eakin EG (2006). Non-cancer mortality among people diagnosed with cancer (Australia). Cancer Causes Control, 17(3), 287–297. 10.1007/s10552-005-0530-0 [PubMed: 16489536]

Ballard-Barbash R, Friedenreich CM, Courneya KS, et al. (2012). Physical activity, biomarkers, and disease outcomes in cancer survivors: A systematic review. Journal of the National Cancer Institute, 104(11), 815–840. 10.1093/jnci/djs207 [PubMed: 22570317]

Bellizzi KM, Rowland JH, Jeffery DD, & McNeel T (2005). Health behaviors of cancer survivors: Examining opportunities for cancer control intervention. Journal of Clinical Oncology, 23(34), 8884–8893. 10.1200/JCO.2005.02.2343 [PubMed: 16314649]

Berg CJ, Thomas AN, Mertens AC, et al. (2013). Correlates of continued smoking versus cessation among survivors of smoking-related cancers. Psychooncology, 22(4), 799–806. 10.1002/pon.3077 [PubMed: 22488864]

Blanchard CM, Courneya KS, & Stein K (2008). American cancer society's SCS-II. Cancer survivors' adherence to lifestyle behavior recommendations and associations with healthrelated quality of life: Results from the American cancer society's SCS-II. Journal of Clinical Oncology, 26(13), 2198–2204. 10.1200/JCO.2007.14.6217 [PubMed: 18445845]

Blanchard CM, Denniston MM, Baker F, et al. (2003). Do adults change their lifestyle behaviors after a cancer diagnosis? American Journal of Health Behavior, 27(3), 246–256. 10.5993/AJHB.27.3.6 [PubMed: 12751621]

Bluethmann SM, Mariotto AB, & Rowland JH (2016). Anticipating the "Silver Tsunami": Prevalence trajectories and comorbidity burden among older cancer survivors in the United States. Cancer Epidemiology, Biomarkers & Prevention, 25, 1029–1036. 10.1158/1055-9965.EPI-16-0133

Bluethmann SM, Basen-Engquist K, Vernon SW, et al. (2015). Grasping the "teachable moment": Time since diagnosis, symptom burden and health behaviors in breast, colorectal and prostate cancer survivors. Psychooncology. 10.1002/pon.3857

Bower JE, Ganz PA, Desmond KA, et al. (2000). Fatigue in breast cancer survivors: Occurrence, correlates, and impact on quality of life. Journal of Clinical Oncology, 18(4), 743–753. 10.1200/JCO.2000.18.4.743 [PubMed: 10673515]

Bush K, Kivlahan DR, McDonell MB, et al. (1998). The AUDIT alcohol consumption questions (AUDIT-C): An effective brief screening test for problem drinking. Ambulatory care quality improvement project (ACQUIP). Alcohol use disorders identification test. Archives of Internal Medicine, 158(16), 1789–1795. 10.1001/archinte.158.16.1789 [PubMed: 9738608]

Carlson LE, Groff SL, Maciejewski O, & Bultz BD (2010). Screening for distress in lung and breast cancer outpatients: A randomized controlled trial. Journal of Clinical Oncology, 28(33), 4884–4891. 10.1200/JCO.2009.27.3698 [PubMed: 20940193]

Centers for Disease Control and Prevention. About adult BMI. Retrieved from http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html Accessed on September 5, 2016.

Chan DSM, & Norat T (2015). Obesity and breast cancer: Not only a risk factor of the disease. Current Treatment Options in Oncology, 16(5), 22 10.1007/s11864-015-0341-9 [PubMed: 25904412]

Conner MT (2001). Health behaviors In: Smelser NJ & Baltes PB (Eds.), International encyclopedia of social and behavioral sciences. Amsterdam: Pergammon.

Coups EJ, & Ostroff JS (2005). A population-based estimate of the prevalence of behavioral risk factors among adult cancer survivors and noncancer controls. Preventive Medicine, 40 (6), 702–711. 10.1016/j.ypmed.2004.09.011 [PubMed: 15850868]

Craike MJ, Livingston PM, & Warne C (2011). Sensitivity and specificity of the distress impact thermometer for the detection of psychological distress among CRC survivors. Journal of Psychosocial Oncology, 29(3), 231–241. 10.1080/07347332.2011.563347 [PubMed: 21590570]

Curtis RE, Freedman DM, Ron E, Ries LAG, Hacker DG, Edwards BK, …, Fraumeni JF Jr. (Eds), (2006). New malignancies among cancer survivors: SEER cancer registries (pp. 1973–2000). Bethesda, MD: National Cancer Institute, NIH Publ. No. 05–5302.

Demark-Wahnefried W, Peterson B, McBride C, et al. (2000). Current health behaviors and readiness to pursue life-style changes among men and women diagnosed with early stage prostate and breast carcinomas. Cancer, 88(3), 674–684. 10.1002/(SICI)1097-0142(20000201)88:3<674::AID-CNCR26>3.0.CO;2-R [PubMed: 10649263]

Demark-Wahnefried W, Aziz NM, Rowland JH, & Pinto BM (2005). Riding the crest of the teachable moment: Promoting long-term health after the diagnosis of cancer. Journal of Clinical Oncology, 23(24), 5814–5830. 10.1200/JCO.2005.01.230 [PubMed: 16043830]

Demark-Wahnefried W, Pinto BM, & Gritz ER (2006). Promoting health and physical function among cancer survivors: Potential for prevention and questions that remain. Journal of Clinical Oncology, 24(32), 5125–5131. 10.1200/JCO.2006.06.6175 [PubMed: 17093274]

Dunn J, Ng SK, Holland J, et al. (2013). Trajectories of psychological distress after colorectal cancer. Psychooncology, 22(8), 1759–1765. 10.1002/pon.3210 [PubMed: 23125004]

Fisher A, Williams K, Beeken R, & Wardle J (2015). Recall of physical activity advice was associated with higher levels of physical activity in colorectal cancer patients. BMJ Open, 5 (4), e006853 10.1136/bmjopen-2014-006853

Glare PA, Davies PS, Finlay E, et al. (2014). Pain in cancer survivors. Journal of Clinical Oncology, 32(16), 1739–1747. 10.1200/JCO.2013.52.4629 [PubMed: 24799477]

Global Recommendations on Physical Activity for Health. (2010). Geneva: World Health Organization Retrieved from http://www.ncbi.nlm.nih.gov/books/NBK305057/

Goode AD, Lawler SP, Brakenridge CL, Reeves MM, & Eakin EG (2015). Telephone, print, and Web-based interventions for physical activity, diet, and weight control among cancer survivors: A systematic review. Journal of Cancer Survivorship: Research and Practice, 9(4), 660–682. 10.1007/s11764-015-0442-2 [PubMed: 25757733]

Greer JA, Solis JM, Temel JS, Lennes IT, Prigerson HG, Maciejewski PK, & Pirl WF (2011). Anxiety disorders in long-term survivors of adult cancers. Psychosomatics, 52(5), 417–423. 10.1016/j.psym.2011.01.014 [PubMed: 21907059]

Harding M (2012). Health-promotion behaviors and psychological distress in cancer survivors. Oncology Nursing Forum, 39(2), E132–E140. 10.1188/12.ONF.E132-E140 [PubMed: 22374501]

Harrington CB, Hansen JA, Moskowitz M, Todd BL, & Feuerstein M (2010). It's not over when it's over: Long-term symptoms in cancer survivors–a systematic review. International Journal of Psychiatry in Medicine, 40(2), 163–181. 10.2190/PM.40.2.c [PubMed: 20848873]

Hawkins NA, Smith T, Zhao L, et al. (2010). Health-related behavior change after cancer: Results of the American cancer society's studies of cancer survivors (SCS). Journal of Cancer Survivorship, 4(1), 20–32. 10.1007/s11764-009-0104-3 [PubMed: 19902360]

Holland JC, Andersen B, Breitbart WS, et al. (2013). Distress management. Journal of the National Comprehensive Cancer Network, 11(2), 190–209. 10.6004/jnccn.2013.0027 [PubMed: 23411386]

Holmes MD, Chen WY, Feskanich D, et al. (2005). Physical activity and survival after breast cancer diagnosis. JAMA, 293(20), 2479–2486. 10.1001/jama.293.20.2479 [PubMed: 15914748]

Institute of Medicine and National Research Council. (2006). From cancer patient to cancer survivor: Lost in transition. Washington, DC: The National Academies Press.

Jansen L, Herrmann A, Stegmaier C, Singer S, Brenner H, & Arndt V (2011). Health-related quality of life during the 10 years after diagnosis of colorectal cancer: A populationbased study. Journal of Clinical Oncology, 29(24), 3263–3269. 10.1200/JCO.2010.31.4013 [PubMed: 21768465]

Kenzik KM, Morey MC, Cohen HJ, et al. (2015). Symptoms, weight loss, and physical function in a lifestyle intervention study of older cancer survivors. Journal of Geriatric Oncology, 6(6), 424–432. 10.1016/j.jgo.2015.08.004 [PubMed: 26362355]

Leach CR, Weaver KE, Aziz NM, et al. (2015). The complex health profile of long-term cancer survivors: Prevalence and predictors of comorbid conditions. Journal of Cancer Survivorship, 9(2), 239–251. 10.1007/s11764-014-0403-1 [PubMed: 25319681]

Lown EA, Goldsby R, Mertens AC, et al. (2008). Alcohol consumption patterns and risk factors among childhood cancer survivors compared to siblings and general population peers. Addiction, 103(7), 1139–1148. 10.1111/j.1360-0443.2008.02242.x [PubMed: 18554347]

Martin EC, Basen-Engquist K, Cox MG, Lyons EJ, Carmack CL, Blalock JA, & Demark-Wahnefried W (2016). Interest in health behavior intervention delivery modalities among cancer survivors: A cross-sectional study. JMIR Cancer, 2(1), e1 10.2196/cancer.5247 [PubMed: 28410164]

Mayer DK, Nekhlyudov L, Snyder CF, et al. (2014). American society of clinical oncology clinical expert statement on cancer survivorship care planning. Journal of Oncology Practice, 10(6), 345–351. 10.1200/JOP.2014.001321 [PubMed: 25316025]

Mayer DK, Terrin NC, Menon U, Kreps GL, McCance K, Parsons SK, & Mooney KH (2007). Health behaviors in cancer survivors. Oncology Nursing Forum, 34(3), 643–651. 10.1188/07.ONF.643-651 [PubMed: 17573323]

McTiernan A, Irwin M, & Vongruenigen V (2010). Weight, physical activity, diet, and prognosis in breast and gynecologic cancers. Journal of Clinical Oncology, 28(26), 4074–4080. 10.1200/JCO.2010.27.9752 [PubMed: 20644095]

McTiernan A (2005). Obesity and cancer: The risks, science, and potential management strategies. Oncology (Williston Park, NY), 19(7), 871–881-882, 885–886.

Meyerhardt JA, Giovannucci EL, Holmes MD, et al. (2006). Physical activity and survival after colorectal cancer diagnosis. Journal of Clinical Oncology, 24(22), 3527–3534. 10.1200/JCO.2006.06.0855 [PubMed: 16822844]

Mowls DS, Brame LS, Martinez SA, & Beebe LA (2016). Lifestyle behaviors among US cancer survivors. Journal of Cancer Survivorship. 10.1007/s11764-016-0515-x

National Comprehensive Cancer Network. (2016). National comprehensive cancer network clinical practice guidelines in oncology (NCCN Guidelines). Survivorship. Version 2.2016. Accessed October 4, 2016.

NCCN Distress Guidelines: National Comprehensive Cancer Network. (2016). NCCN clinical practice guidelines in oncology (NCCN Guidelines). Distress management version 2.2016. Accessed August 16, 2016.

Nolen-Hoeksema S (2004). Gender differences in risk factors and consequences for alcohol use and problems. Clinical Psychology Review, 24(8), 981–1010. 10.1016/j.cpr.2004.08.003 [PubMed: 15533281]

Oeffinger KC, Baxi SS, Novetsky Friedman D, & Moskowitz CS (2013). Solid tumor second primary neoplasms: Who is at risk, what can we do? Seminars in Oncology, 40(6), 676–689. 10.1053/j.seminoncol.2013.09.012 [PubMed: 24331190]

Park ER, Streck JM, Gareen IF, et al. (2014). A qualitative study of lung cancer risk perceptions and smoking beliefs among national lung screening trial participants. Nicotine & Tobacco Research, 16(2), 166–173. 10.1093/ntr/ntt133 [PubMed: 23999653]

Rabin C, & Pinto B (2006). Cancer-related beliefs and health behavior change among breast cancer survivors and their first-degree relatives. Psychooncology, 15(8), 701–712. 10.1002/pon.1000 [PubMed: 16302292]

Sabatino SA, Coates RJ, Uhler RJ, et al. (2007). Provider counseling about health behaviors among cancer survivors in the United States. Journal of Clinical Oncology, 25(15), 2100–2106. 10.1200/JCO.2006.06.6340 [PubMed: 17513816]

Sinicrope FA, Foster NR, Yothers G, et al. (2013). Body mass index at diagnosis and survival among colon cancer patients enrolled in clinical trials of adjuvant chemotherapy. Cancer, 119(8), 1528–1536. 10.1002/cncr.27938 [PubMed: 23310947]

Sporn NJ, Smith KB, Pirl WF, Lennes IT, Hyland KA, & Park ER (2015). Sexual health communication between cancer survivors and providers: How frequently does it occur and which providers are preferred? Psycho-Oncology, 24(9), 1167–1173. 10.1002/pon.3736 [PubMed: 25534170]

Tabuchi T, Ito Y, Ioka A, et al. (2013). Tobacco smoking and the risk of subsequent primary cancer among cancer survivors: A retrospective cohort study. Annals of Oncology, 24(10), 2699–2704. 10.1093/annonc/mdt279 [PubMed: 23894040]

Tralongo P, Giuliano SR, Di Mari AM, Bordonaro S, Romano F, Pumo V, … Iemmolo S (2016). Survivors preferences about the role of the oncologist and primary care provider. Journal of Clinical Oncology, 34(3 Suppl.), 259–259. 10.1200/jco.2016.34.3_suppl.259 [PubMed: 26644532]

U.S. Department of Health and Human Services. (2014). The health consequences of smoking: 50 Years of progress. A report of the surgeon general. Atlanta, GA: 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 Printed with corrections, January 2014.

Van Blarigan EL, & Meyerhardt JA (2015). Role of physical activity and diet after colorectal cancer diagnosis. Journal of Clinical Oncology, 33(16), 1825–1834. 10.1200/JCO.2014.59.7799 [PubMed: 25918293]

Vijayvergia N, & Denlinger CS (2015). Lifestyle factors in cancer survivorship: Where we are and where we are headed. Journal of Personalized Medicine, 5(3), 243–263. 10.3390/jpm5030243 [PubMed: 26147495]

Wilbur J (2015). Surveillance of the adult cancer survivor. American Family Physician, 91(1), 29–36. [PubMed: 25591198]

Zhao G, Li C, Okoro CA, et al. (2013). Trends in modifiable lifestyle-related risk factors following diagnosis in breast cancer survivors. Journal of Cancer Survivorship, 7(4), 563–569. 10.1007/s11764-013-0295-5 [PubMed: 23793468]

Zwemer EK, Mahler HIM, Werchniak AE, & Recklitis CJ (2012). Sun exposure in young adult cancer survivors on and off the beach: Results from project reach. Journal of Cancer Survivorship, 6(1), 63–71. 10.1007/s11764-011-0201-y [PubMed: 22002547]

Table 1.

NCCN health behavior guideline, survey item & adherence definition.

Health behavior	NCCN guideline	Survey item	Adherence criteria
Cigarette smoking	*Avoid tobacco products. Attempt tobacco cessation if currently smoking or using smokeless tobacco.*	Have you smoked a cigarette, even a puff in the last 30 days? (Yes or No)	**Adherent:** No cigarette use in the past 30 days **Non-adherent:** Yes, cigarette in the past 30 days
Body Mass Index (BMI)	*Achieve and maintain a healthy body weight throughout life. Calculate and monitor BMI.*	BMI was calculated using patient self-reported height (ft/inches) and weight (lbs).	**Adherent:** Normal Weight (18.5–25 kg/m^2) **Non-adherent:** Underweight (<18.5 kg/m^2) Overweight (25–30 kg/m^2) Obese (>30 kg/m^2)
Sun safety	*Practice sun safety. Utilize a sunscreen with an SPF of at least 30 that protects against UVA and UVB rays and is water resistant. Apply generously and reapply every 2 hours or after swimming/excessive sweating. Consider physical barriers whenever possible (i.e., hats, shirts with sleeves, avoiding direct sun during peak hours).*	When you go outside on a sunny summer day for more than one hour, how often do you use sunscreen or sunblock? (Always to Never)	**Adherent:** Always; Nearly always **Non-adherent:** Sometimes; Seldom; Never
Alcohol	*Minimize alcohol intake; limit intake to one drink/day for a woman and 2 drinks/day for a man.*	How often did you have a drink containing alcohol in the past year? (Bush, Kivlahan, & McDonell, 1998) How many drinks did you have on a typical day when you were drinking in the past year? (Bush, Kivlahan, & McDonell, 1998)	**Adherent (males):** ≤2 drinks/day **Adherent (females):** ≤1.5 drinks/day **Non-adherent (males):** >2 drinks/day **Non-adherent (females):** >1/5 drinks/day
Physical activity	*Engage in physical activity regularly. Avoid inactivity and a sedentary lifestyle. Strive for at least 150 minutes of moderate or 75 minutes of vigorous activity per week, spread out over the course of the week.*	Metabolic activity rates calculated (MET-h/week) from patient reported minutes of physical activity per week (Meyerhardt, Giovannucci, & Holmes, 2006)	**Adherent:** >10 MET-h/week of moderate and/or vigorous physical activity **Non-adherent:** <10 MET-h/week of moderate and/or vigorous physical activity
Primary care physician	*Follow up with primary care physician regularly*	When did you last see your PCP? Date of visit to survivorship clinic used to calculate time since last PCP visit	**Adherent:** Saw PCP in past 365 days **Non-Adherent:** Did not see PCP in past 365 days

Table 2.

Means, standard deviations, and frequencies of demographic, medical, and psychosocial variables (N = 66).

Variable	*M* ± SD or *n* (%)
Age (years, median) [Range]	49 [24–77]
Gender	
Female	41 (62.1%)
Male	25 (37.9%)
Race	
White	63 (95.5%)
Asian	2 (3.0%)
Black/African American	1 (1.5%)
Other	1 (1.5%)
Ethnicity	
Non-Hispanic	56 (84.8%)
Hispanic	1 (1.5%)
Missing	9 (13.6)
Highest education level	
Some high school	1 (1.5%)
Completed high school/GED	4 (6.1%)
Some college	11 (16.7%)
Completed college or graduate work	50 (75.7%)
Relationship status	
Partnered	43 (65.1%)
Not partnered	23 (34.8%)
Health insurance *	
Private Health Insurance	56 (84.8%)
Public Health Insurance	15 (22.7%)
Don’t know	1 (1.5%)
Time since diagnosis (years, median)	2.2
Types of cancer	
Breast	21 (31.8%)
Lymphoma/Myeloma	12 (18.2%)
Gastrointestinal (*pancreatic, colorectal, gastric*)	12 (18.2%)
Head/Neck	6 (9.1%)
Melanoma	6 (9.1%)
Sarcoma	4 (6.1%)
Genitourinary (*bladder, kidney, prostate*)	3 (4.5%)
Thyroid	2 (3.0%)
Gynecologic (ovarian, endometrial)	2 (3.0%)
Lung	1 (1.5%)
Stage **	
I	14 (21.2)

Variable	*M* ± SD or *n* (%)
II	21 (31.8%)
III	13 (19.7%)
IV	16 (24.2%)
Distress [0–10]	5.5 ± 3.1

*Percentages do not add up to 100 as participants could select multiple answers.

**Missing = 2.

Table 3.

Frequencies of health behaviors & percent survivors not meeting guidelines (N = 66).

Variable	*M* ± SD or *n* (%)	Not meeting guidelines
Cigarette smoking – (last 30 days) *		10.6%
Yes	6 (9.1%)	
No	59 (89.4%)	
Sunscreen		50.0%
Always	16 (24.2%)	
Almost always	17 (25.8%)	
Sometimes	17 (25.8%)	
Seldom	7 (10.6%)	
Never	9 (13.6%)	
Body Mass Index (BMI)	25.2 ± 5.3	
BMI categories		53.0%
Underweight	5 (7.6%)	
Normal	31 (47.0%)	
Overweight	18 (27.3%)	
Obese	12 (18.2%)	
Physical activity (MET-h/week)		50.0%
Mean	17.8 ± (18.8)	
Median	10.10	
Physical activity categories		
< 10 MET-h/week	33 (50%)	
≥10 MET-h/week	33 (50%)	
Alcohol consumption *		15.1%
Drinking within recommendations	56 (84.8%)	
Drinking beyond recommendations	9 (13.6%)	
PCP visit within the past year **		27.3%
Yes	48 (72.7%)	
No	5 (7.6%)	

* *N* missing = 1.

** *N* missing = 13.