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Current depression among adult cancer survivors: Findings from the 2010 Behavioral Risk Factor Surveillance System

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ABSTRACT

Background: A cancer diagnosis and subsequent treatments constitute a significantly increased psychological burden among cancer patients. This study examined the prevalence of current depression and the risk factors associated with a high burden of depression among cancer survivors in the US.
Methods: We analyzed data from 3550 cancer survivors (aged ≥18 years) and 26,917 adults without cancer who participated in the 2010 Behavioral Risk Factor Surveillance System. Depressive symptoms were assessed by the Patient Health Questionnaire-8 diagnostic algorithm. Participants with a total depression severity score of ≥10 were defined as having current depression. Prevalence and prevalence ratios were estimated by conducting log-linear regression analysis while controlling for potential confounders.
Results: Overall, 13.7% of cancer survivors (vs. 8.9% of adults without cancer, $P < 0.001$) reported having current depression; the prevalence varied significantly by cancer category. Among cancer survivors, after multivariate adjustment for covariates, cancer diagnosis within a year, being in 'other' racial/ethnic group, divorced, separated, widowed, or never married, current or former smoker, or having histories of diabetes, disability, or depression were associated with significantly higher prevalence ratios for current depression; whereas being at an advanced age (≥60 years old), attaining educational levels of >high school graduate, or engaging in leisure-time physical activity were associated with significantly lower prevalence ratios for current depression.
Conclusion: Our results indicate that cancer survivors are at increased risk of current depression. Targeting cancer survivors at high risk of depressive issues may be especially important for clinical support and interventions aimed at improving mental well-being.

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1. Introduction

Cancer is a major public health problem and constitutes the second leading cause of death in the US [1–3]. The advances in cancer screening and diagnostic methods, effective treatment, and improved post-treatment follow-up care have led to a sustained decline in cancer mortality and a steady increase in the number of cancer survivors over the past decade in the US [4,5].

Cancer patients experience a significant level of psychosocial problems as a consequence of their cumulative adverse experiences from the time they start coping with their initial diagnosis and uncertain prognosis, through the period when they cope with treatments, side-effects, and financial burden, followed by their survival stage where they face lingering concerns about disease recurrence. For example, previous studies have shown that cancer patients had increased risks for depression, anxiety, and other psychiatric disorders especially within the first year after cancer diagnosis [6–11]. A recent meta-analysis also showed the prevalence

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of depression was 8–24% among cancer patients; this wide range of prevalence may be attributable to the differences in the type of instruments used to measure depression, the type of cancer, or the treatment phase [12]. In addition, population-based surveys of US adults and Australians have also shown a significantly higher prevalence of serious psychological distress [13–15], depression, anxiety, and post-traumatic stress disorder [16,17] among cancer survivors compared with adults with no cancer history.

Despite the high burden of psychological disorders in cancer patients, utilization of mental health services is low among cancer patients [15,18]. Psychosocial interventions have proven effective and economical for helping cancer patients and families overcome challenges associated with cancer diagnosis, decrease distress, increase coping with cancer treatment, and improve mood and quality of life [19–21]. For example, in a randomized controlled trial, Stagl et al. reported that early cognitive-behavioral stress management was associated with fewer depressive symptoms in long-term breast cancer survivors [22]. Thus, screening and identifying cancer survivors who are at elevated risk of depressive issues would be important for providing clinical support and interventions to improve long-term psychological well-being in cancer survivors.

To date, no population-based studies have been conducted to evaluate current depression among US cancer survivors. By using a large, US state-based population survey, we sought to (1) determine the prevalence of current depression among cancer survivors overall, by type and number of cancers, by duration of cancer survivorship, and by cancer treatment; (2) compare depression prevalence to that found among adults with no cancer history; and (3) investigate potential predictors to identify cancer survivors at high risk of current depression based on their sociodemographic characteristics, lifestyle factors, and comorbid chronic conditions.

2. Methods

2.1. Study design

The Behavioral Risk Factor Surveillance System (BRFSS) is a population-based telephone survey conducted annually in all 50 states, Washington, DC, and participating US territories to collect health information including health-related behavioral risk factors, preventive health practices, health care access, and chronic conditions among noninstitutionalized US adults aged 18 years or older. Detailed information about the BRFSS survey design, sampling methods, data collection, and weights has been described elsewhere [23–26]. The median survey response rate for the 2010 BRFSS was 54.6%, and the median cooperation rate (the percentage of eligible persons contacted who completed the interview) was 76.9% [23].

2.2. Study population and data collection

In the 2010 BRFSS, 6 states (Indiana, Massachusetts, Missouri, New Jersey, Ohio, and Wisconsin) used both the Cancer Survivorship Module and the Anxiety and Depression Module; therefore, data collected in these 6 states were analyzed for this study. The questionnaire for the Cancer Survivorship Module has been described previously [15]. Participants were asked whether they had ever been told by a doctor, nurse, or other health professional that they had cancer (response dichotomized as yes/no), and if yes, how many different types of cancer they had (dichotomized as having 1 or ≥2 types of cancer), at what age they received the first cancer diagnosis, and with what type of cancer they were most recently diagnosed. The duration of cancer survivorship was calculated as participants' age subtracted by the age of first diagnosis, and was categorized as ≤1, >1 to <5, 5 to <10, 10 to <15, 15 to <20, 20 to <25, and ≥25 years. Based on the most recent cancer diagnosis, cancer types were categorized in the following groups: (1) female breast cancer, (2) female reproductive cancer (i.e., cervical, endometrial, and ovarian cancer), (3) male reproductive cancer (i.e., prostate and testicular cancer), (4) gastrointestinal cancer (i.e., cancer of the colon, esophagus, liver, pancreas, rectum, and stomach), (5) melanoma skin cancer (nonmelanoma skin cancer, a relatively benign condition, was excluded from our analysis.), (6) other known cancers (including male breast cancer, leukemia/lymphoma, neuroblastoma, and cancers of the brain, neck, oral cavity, pharynx, thyroid, heart, lung, kidney, bladder, bone, or any other body region), and (7) type-unknown cancers. Cancer treatment was assessed by asking participants whether they were currently receiving treatment for cancer including surgery, radiation therapy, chemotherapy, or chemotherapy pills (dichotomized as yes/no).

The Anxiety and Depression Module assessed participants' depressive symptoms by using the Patient Health Questionnaire-8 (PHQ-8) diagnostic algorithm as described elsewhere [27,28] with response options and scoring summarized in Table 1. Participants with a total depression severity score of ≥10 were defined as having current depression. The PHQ-8 has been shown to provide valid measures of depressive symptoms and severity among the general population as used for the diagnostic criteria of the DSM-IV major depressive disorder [29]. A total depression score of ≥10 has a sensitivity and specificity of 88% for major depression, representing clinically significant depression [29–31].

For study covariates, we included demographic variables such as age in years (18–39, 40–59, 60–79, and ≥80), sex, race/ethnicity (non-Hispanic white, non-Hispanic black, and other), educational attainment (less than high school graduate, high school graduate or GED, and greater than high school graduate), and marital status (currently married/living with a partner, previously married – i.e., divorced, widowed, or separated, and never married). In addition, we also included in our analysis health-related behavioral risk factors (i.e., cigarette smoking, leisure-time physical activity, and excessive alcohol drinking), health care access measures (insurance coverage and routine check-up), and comorbid chronic conditions (i.e., obesity, physician-diagnosed diabetes and heart disease, disability, and ever-diagnosed depression); definitions for these measures are summarized in Table 2.

2.3. Statistical analyses

During the data management process, participants who responded "don't know/not sure," refused to answer, or had missing responses to any of the study variables were set as missing. We estimated the weighted prevalence of current depression by cancer diagnosis overall and by category and number of cancers, duration of survivorship, and cancer treatment. A log-linear regression analysis with robust variance estimator was conducted to estimate the prevalence ratios (PRs) and 95% confidence intervals (CIs) for current depression after adjustment for study covariates. We conducted the analyses by using SAS (version 9.2, SAS Institute, Cary, NC) and SUDAAN software (release 10.0.1, Research Triangle Institute, Research Triangle Park, NC) to account for the multistage, complex sampling design.

3. Results

3.1. Characteristics of the study population

During data collection for the 2010 BRFSS survey, a total of 35,926 adults participated in the survey for both the Cancer Survivorship Module and the Anxiety and Depression Module in