



Original Article

Chronic conditions and health status in older cancer survivors[☆]

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ARTICLE INFO

Article history:

Received 30 September 2013

Received in revised form 3 December 2013

Accepted 10 December 2013

Available online 2 January 2014

Keywords:

Cancer survivorship

Comorbidity

Elderly

Aging

ABSTRACT

Background: With the aging population and improved cancer care, the number of cancer survivors is steadily increasing. Planning for their care requires an understanding of the impact of cancer and chronic conditions on quality of life. We sought to determine chronic conditions and health status in older cancer survivors compared to controls. **Methods:** In this retrospective cross-sectional study, we used survey data from 18,133 cancer survivors and 94,407 controls age 65 and older who participated in the Behavioral Risk Factor Surveillance System 2009 telephonic survey. Our main measures were chronic conditions (cardiovascular disease, hypertension, diabetes mellitus, high cholesterol, and arthritis) and poor health status (poor or fair self-rated health).

Results: Cancer survivors were older, more likely white, had higher education, and slightly more likely to have a healthcare provider and higher levels of emotional support. More survivors reported having 2 or more chronic conditions compared to controls (67.5% vs. 64.5%, respectively). Health status was lower for survivors, and was significantly different by racial/ethnic group. In a multivariable model for health status, having 2 or more chronic conditions was more strongly associated with poorer health status than cancer survivorship.

Conclusions: Cancer survivors had slightly higher numbers of chronic conditions and poorer health status than controls. However, chronic conditions were more strongly associated with poor health status than cancer. Monitoring for recurrence and second cancers is important in cancer survivors, but chronic conditions also need to be given priority due to their substantial impact on health status.

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1. Introduction

In the United States, nearly 1.6 million new cases of cancer were diagnosed in 2010 [1]. The number of cancer survivors in the United States was estimated at 13.7 million in 2012, or 4% of the US population [2], and is projected to increase to almost 18 million by 2022 [3]. The National Coalition for Cancer Survivorship defines a survivor as an individual diagnosed with cancer, from the moment of diagnosis and for the balance of life [4]. Due to improvements in early detection, treatment, and supportive care, the number of cancer survivors is steadily increasing. In fact, after initial diagnosis, 68.1% of cancer survivors live 5 or more years [3]. Cancer is a disease associated with aging, and the incidence of cancers is highest in people 65 and older [2]. As the population ages over the next few decades, the incidence of cancer thus will increase significantly [5]. Therefore, cancer and the effects of cancer on an aging population have a substantial long-term impact on the care of cancer survivors.

Cancer survivors have ongoing effects on their physical and mental health as a result of cancer and its treatment [6]. For example, there is an increased incidence of cardiac comorbidities and metabolic

syndrome from chemotherapy, hormonal anti-cancer therapy, and radiation treatment [7–10]. Cancer survivors have difficulties in adjusting to and coping with their illness, increasing psychological distress, and have diminished quality of life as a result of cancer and its treatment [11–13]. Cancer survivors have a high prevalence of comorbid illness and unhealthy behaviors [14,15].

Planning for the care of the growing number of cancer survivors requires an understanding of the additional illness burden related to cancer survivorship. Older persons with a history of cancer have a high prevalence of comorbid illness, physical limitations, and functional disability [16]. This is particularly important, as some cancer survivors are at increased risk of receiving suboptimal comorbidity care [17]. Our objective was to determine the prevalence of chronic conditions and poor health status in older cancer survivors compared to older persons without cancer. We hypothesized that older cancer survivors would have an increased physiologic and psychological toll as a result of cancer, and thus have higher rates of chronic illness and poorer health status.

2. Patients and methods

2.1. Data

We used results from the 2009 Behavioral Risk Factor Surveillance System (BRFSS) Questionnaire for respondents age 65 years and older.

[☆] All authors had access to the data and had a role in writing the manuscript.

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The BRFSS is an annual telephonic survey conducted on a representative sample of the United States population. All data from the BRFSS are self-reported, and the core questionnaire included items on health status, health behaviors, and chronic conditions. Details about the BRFSS and sampling techniques have been described elsewhere [18].

Participants in the BRFSS survey were asked about cancer history as part of the core modules administered to all participants. We used these questions to establish a population of cancer survivors and a population of controls 65 years and older without a history of cancer. We defined cancer survivors as participants who responded “yes” to the question “Have you ever been told by a doctor, nurse, or other health care professional that you have cancer?” We defined controls as persons who answered “no” when asked if they had cancer. Cancer survivors were also asked how many cancers they had, the type of their first cancer, and the age at first diagnosis of cancer.

We excluded from survivors or controls people who answered “don’t know/not sure” regarding a cancer history. We also excluded survivors with more than one cancer, because we would be unable to be certain about the timing of cancer diagnosis, and could include people actively receiving treatment for a newer cancer. We excluded survivors who had a cancer diagnosis within 2 years, because we were unable to determine whether they were actively receiving treatment for cancer. We excluded people with non-melanoma skin cancer. Finally, we excluded adult survivors of childhood cancer, because they would have different cancers and treatments, and hence, different long-term survivorship issues that have been described elsewhere [19].

This study was approved by the Institutional Review Board of the University of Texas MD Anderson Cancer Center, with a waiver of informed consent.

2.2. Measures

2.2.1. Chronic conditions

All participants in the BRFSS were asked about a select number of chronic conditions. These conditions were high blood pressure, high cholesterol, cardiovascular disease (which included heart attack, coronary heart disease, or stroke), diabetes mellitus, or arthritis (which included arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia).

2.2.2. Poor health status

Health status was part of the core questionnaire of the BRFSS. Participants were asked to rate their general health as excellent, very good, good, fair or poor. We defined poor health status as a rating of fair or poor on this item.

2.2.3. Independent variables

We included demographic factors possibly associated with comorbidity and/or health status, including sex, race/ethnicity, educational level, marital status, employment, and income. We also used responses related to healthcare access, including having one or more healthcare providers and deferring medical care due to cost, as potential predictors of comorbidity or health status. Finally, we used participants’ responses regarding the levels of emotional support and life satisfaction as possible factors associated with poor health status.

2.3. Statistical analysis

The sampling design of BRFSS was accounted for and we used SAS survey procedures in all analyses. Each respondent in the BRFSS is assigned a final sample weight according to the probability of selection, number of phones and adults in the household, and population estimates for age, sex, and race/ethnicity by United States region or state [18]. We determined the prevalence and 95% confidence interval (CI) for survivors and controls for all independent variables. Given the relationship between increasing age with increasing likelihood of chronic conditions, we determined the age-adjusted prevalence for each of the

five chronic conditions, using population based estimates for prevalence of age groups from the United States Census data for 2010. We examined the association between cancer history and poor health status. Due to a significant relationship between race/ethnicity and health status in bivariate analysis, we also presented the prevalence of poor health status stratified across different racial/ethnic groups, adjusted for age. We constructed a multivariable model controlling for socio-demographic factors for the association between independent variables and poor health status, treating the number of chronic conditions and cancer survivorship as independent variables in the model. We also constructed separate multivariable models for cancer survivors and for controls for the association between independent variables and poor health status to determine whether the association with chronic conditions and poor health status was different in the two groups. All analyses were completed using SAS software (SAS Institute, Cary, SD).

3. Results

The 2009 BRFSS survey included 136,270 respondents who were 65 years and older at the time of the survey. After excluding people who were not sure about a diagnosis of cancer ($n = 7567$), those with more than one type of cancer or missing cancer type ($n = 6606$), those diagnosed with cancer within 2 years of the survey ($n = 4264$), cancer survivors with non-melanoma skin cancer ($n = 5228$), and adult survivors of childhood cancer ($n = 65$), our final sample comprised 18,133 cancer survivors representing 5,364,042 persons and 94,407 controls representing 27,273,521 persons 65 years and older in the United States. Most survivors (78.8%) were diagnosed with cancer 5 or more years prior to the survey, and the median time since diagnosis was 9.6 years. The characteristics of respondents with population estimates for cancer survivors and controls without cancer are shown in Table 1. A higher proportion of cancer survivors was older, white, and reported a college education. Survivors were more likely to have at least one healthcare provider and less likely to defer medical care due to cost; although these differences were significant, they were small. Survivors were also slightly more likely to report higher levels of emotional support. There were no substantial differences in marital status or life satisfaction between survivors and controls.

The age-adjusted prevalence of chronic conditions is shown in Table 2. The prevalence of cardiovascular disease and arthritis was slightly but significantly higher in survivors. Hypertension, high cholesterol, and diabetes mellitus prevalence were similar in both groups. More survivors reported having two or more chronic conditions compared to controls (67.5% vs. 64.5%, respectively). Among the cancer survivors only, survivors who were 80 years and older had a higher prevalence of cardiovascular disease (32.8% vs. 28.3%, respectively) and arthritis (60.2% vs. 56.2%, respectively) compared to those who were 65 to 79 years of age. There was no difference in the prevalence of 2 or more chronic conditions in the older vs. younger groups (67.9% vs. 68.0%, respectively). The prevalence of chronic conditions varied by cancer type, but among the most common cancers, the prevalence of 2 or more chronic conditions ranged from 60.1% for lung cancer to 69.2% for melanoma.

Cancer survivors had poorer health status compared to controls. Overall, before adjustment for age, 29.7% (95% CI 28.5–30.9%, population estimate 1,593,120) of cancer survivors reported fair or poor self-rated health compared to 25.0% (95% CI 24.5–25.5%, population estimate 6,818,380) of controls. The relationship between cancer survivorship and poor health status was substantially different across different racial/ethnic categories (Table 3). Survivors who were white, black, or Asian had significantly worse self-rated health compared to controls, but this relationship was reversed for Hispanics and Native Americans, in whom controls had worse self-rated health. Poor health status was associated with older age and with type of cancer among cancer survivors. A higher proportion of cancer survivors 80 years and older reported poor health status compared to survivors 65 to 79 years of age, 32.8%

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