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Preventive Care in Older Cancer Survivors

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Abstract

Objective—To study factors that influence receipt of preventive care in older cancer survivors.

Methods—We analyzed a nationally representative sample of 12,458 older adults from the 2003 Medicare Current Beneficiary Survey. Factors associated with non-receipt of preventive care were explored among cancer and non-cancer survivors, using logistic regression.

Results—Among cancer survivors, 1,883 were diagnosed >one year at survey completion. A cancer history was independently associated with receipt of mammogram (AOR=1.57, 95%CI=1.34–1.85), flu shot (AOR=1.33, 95%CI=1.16–1.53), measurement of total cholesterol in the previous six months (AOR=1.20, 95%CI=1.07–1.34), pneumonia vaccination (AOR=1.33, 95%CI=1.18–1.49), bone mineral density (BMD) testing (AOR=1.38, 95%CI=1.21–1.56) and lower endoscopy (AOR=1.46, 95%CI=1.29–1.65). However, receipt of preventive care was not optimal among older cancer survivors with only 51.2% of female cancer survivors received a mammogram, 63.8% of all cancer survivors received colonoscopy, and 42.5% had BMD testing. Among cancer survivors, factors associated with non-receipt of mammogram included age 85 years (AOR=0.43, 95%CI=0.26–0.74) and scoring three points on the Vulnerable Elders Survey-13 (AOR=0.94, 95%CI=0.80–1.00). Factors associated with non-receipt of colonoscopy included low education (AOR=0.43, 95%CI=0.27–0.68) and rural residence (AOR=0.51, 95%CI=0.34–0.77). Factors associated with non-receipt of BMD testing included age 70 (AOR=0.59, 95%CI=0.39–0.90), African American race (AOR=0.51, 95%CI=0.27–0.95), low education (AOR=0.23, 95%CI=0.14–0.38) and rural residence (AOR=0.43, 95%CI=0.27–0.70).

Conclusion—Although older cancer survivors are more likely to receive preventive care services than other older adults, the prevalence of receipt of preventive care services is low.

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Keywords

preventive medicine; cancer; survivors

1. INTRODUCTION

Improvements in the early diagnosis and treatment of cancer have led to a rapidly growing population of cancer survivors. More than half of all cancer survivors are living well beyond five years after a cancer diagnosis and in 2009 the cancer survivor population in the US exceeded 13.7 million.[1,2] Over 60% of cancer survivors are aged 65 and above, and 57% of all newly diagnosed cancer occur in people over age 65 years of age.[3] Improving the quality of care for older cancer survivors is becoming increasingly important.

The health of older cancer patients is heterogeneous, and many have chronic conditions that affect their care. Cancer treatment can lead to an increase in comorbid conditions.[4] Studies show that chronic medical conditions and second primary cancers are more common among cancer survivors than persons without a history of cancer.[5–8] For example, chronic medical conditions such as hypertension, heart disease, metabolic syndrome, and chronic obstructive pulmonary disease have been found to be more prevalent in cancer survivors.[5,9] Although recently cancer screening for older patients, especially those aged 75 and over, has been questioned and remains controversial. The benefits of cancer screening in cancer survivors may be higher due to their higher risk of cancer development.[3,10]

Studies show that the receipt of preventive care services is likely low in cancer survivors. Previous studies reveal conflicting results on whether cancer survivors receive increased or decreased preventive care services compared to those without cancer. In addition, previous studies have included survivors of all ages, which limits our understanding of receipt of preventive care services by patients over age 65. Persons aged 65 and older comprise a large proportion of cancer survivors, have unique healthcare needs, and contribute the most to health care costs.[11]

In this study we utilized a large, nationally representative, population-based survey, the Medicare Current Beneficiary Survey (MCBS), to assess the prevalence of receipt of preventive care services and to examine factors associated with non-receipt of various preventive services in older cancer survivors. This study builds upon our previous work with MCBS that demonstrated older cancer survivors have a higher likelihood of chronic conditions and frailty than their age-matched peers without cancer.[4] The primary objectives were to compare the prevalence of receipt of preventive care in elderly cancer survivors with the prevalence of receipt in those without cancer and to identify factors independently associated with non-receipt of preventive care in older cancer survivors. The information gained from this study could help guide interventions designed to improve preventive care of older cancer survivors.

2. MATERIALS AND METHODS

2.1. Data Source and Study Sample

Data Source—We used cross sectional data from the 2003 MCBS, a nationally representative in-person survey of randomly sampled Medicare beneficiaries. The MCBS is administered by the Federal Centers for Medicare and Medicaid Services (CMS). Participants completed a baseline interview and three follow-up interviews per year over four years. Data were collected through personal interviews of the beneficiary or a proxy chosen by the beneficiary if he/she was physically or mentally unable to do the interview. On average, approximately 12% of the community interviews in each round were conducted by proxy.[12] The Access to Care files contain information collected in the fall interview and include information on beneficiaries' demographics, socioeconomic status, and indicators of health status and functional status. Interviewees were requested to have their medical records on hand at the time of the interview.

Study Sample—The sample of respondents from the year 2003 MCBS Access to Care survey was drawn from the Medicare enrollment file to be representative of the Medicare population as a whole. The oldest age group (85 years and over) were over-sampled to permit more detailed analysis of this sub-population. Samples were selected by using a stratified, multistage probability sample design. The response rates for the MCBS were over 80%.[13]

For this study, we restricted our analysis to community-dwelling Medicare beneficiaries who were 65 years or older (n=12,016). The sample of patients with a history of cancer was created by including those who responded both affirmatively to the question "Has a doctor ever told you that you had any kind of cancer, malignancy or tumor other than skin cancer?" and negatively to the question "Was your diagnosis of cancer made within the last year?" The analytic sample had a total of 1,882 people with a history of cancer and 10,133 people without a history of cancer.

2.2. Variables

Dependent Variables—The dependent variables we examined included the receipt of the following preventive care practices: blood pressure measurement within the previous six months, a cholesterol measurement within the previous six months, a flu vaccination within one year, pneumonia vaccination ever given, discussion of a fall with a physician following a fall, a bone mineral density (BMD) test ever completed, a mammogram within one year in women and completion of a lower endoscopy (sigmoidoscopy or colonoscopy) in the past. These dependent variables were obtained from MCBS questions.

Independent Variables—We studied the independent impact of various factors on the receipt of each of the preventive care services listed above. Our primary independent variable of interest was a self-reported history of cancer, which identified survey participants who were cancer survivors. Others included age (65–69, 70–74, 75–79, 80–84, 85), gender, race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, other), body mass index (BMI), region (urban, large rural, small rural, remote rural areas), education (less than 9th

grade, 9th grade–high school, some college, associate degree and above), marital status (married vs. not married), income (<25k, 25K–50K, 50 K), and insurance (Medicaid, HMO enrollment). “Vulnerability” was included as a measure of function and frailty and was defined as scoring three or more on the VES-13.[12] The VES-13 score was calculated from age (1 point for age 75–84, 3 points for age ≥ 85), self-rated health status (one point for fair or poor), difficulty with physical activities (one point for difficulty with each of six physical activities with a maximum of two points), and difficulties with functional activities (maximum of four points for presence of any functional deficit).

Chronic medical conditions such as self-reported histories of heart disease, pulmonary disease, and neurologic diseases were assessed similarly to other research utilizing MCBS. [14,15] Although comorbidity severity was not available, we chose the most prevalent chronic diseases in older adults; and these selected diseases had a measurable impact on mortality and disability.[16] Using methods similar to other research, variables that could influence care such as poor vision or hearing were also considered as comorbidities.[16,17] Cancer was excluded from the comorbidity score. Table 1 lists the variables included in the comorbidity count, and comorbidity was categorized into four categories (zero, one, two, or three or more health conditions).

2.3. Statistical Analysis

The goals of our analysis were to determine whether a self-reported history of cancer was independently associated with the receipt of preventive care services and to determine which characteristics were independently associated with non-receipt of services among cancer survivors.

Baseline differences in sample characteristics such as age, gender, race, socioeconomic status, education and income between cancer survivors and non-cancer groups were evaluated. The statistical significance of the differences between the groups was assessed using a Chi-squared test for categorical variables and t-test for continuous variables.

Multivariable logistic regressions were utilized to determine the association of cancer with each of the dependent variables. Separate models were estimated for each of the eight outcome variables. Adjusted odds ratios (AORs) and their 95% confidence intervals (95% CIs) indicate the independent association of each variable on the likelihood of the outcome, controlling for the effects of all other variables in each model.

To determine predictors of non-receipt of preventive care services among cancer survivors specifically, separate multivariable logistic regressions were used to determine the independent association between variables of interest with each dependent variable in the cancer survivor sample alone. In these models, the cancer variable was not included as a dependent variable. We excluded breast cancer survivors when evaluating factors associated with non-receipt of mammography in female cancer survivors because mammography may be considered surveillance in these patients. We excluded colorectal cancer survivors when evaluating factors associated with non-receipt of colonoscopy in cancer survivors.

Because the MCBS utilizes a stratified, multistage sampling scheme and oversamples certain population groups, each person has an unequal probability of inclusion in the survey. To obtain nationally representative population estimates, we conducted the analysis with SAS SURVEY procedures (version 9.13; SAS Institute, Inc, Cary, NC) and used the MCBS cross-sectional weight to adjust for the complex multistage sample design and non-responses. The University of Rochester's institutional review board approved this analysis with "exempt" status.

3. RESULTS

A total of 1,883 older adults reported a diagnosis of cancer more than one year prior to completing the 2003 survey. Table 1 displays the weighted, unadjusted demographic and clinical characteristics of the cancer survivor and non-cancer groups. Patients reporting a cancer history were more likely to be older, non-Hispanic white, and to have at least some college education ($p<0.01$). Cancer survivors were also more likely to receive abnormal VES-13 scores as compared to controls ($p<0.01$). A greater proportion of patients with a cancer history had three or more comorbid conditions when compared to patients without a history of cancer. Of the 1,883 patients with cancer, breast (4.2%) and prostate (3.0%) were the most prevalent (Table 2).

Figure 1 displays the receipt of preventive care services in non-cancer patients and in cancer survivors. Cancer survivors were more likely than patients without cancer to have received all preventive care services, except for fall discussion after a fall. These services included blood pressure measurement within the last six months, blood cholesterol measured within the last six months, a flu shot the previous winter, a pneumonia vaccination in the past, a bone mineral density exam completed, a lower endoscopy ever completed for those without a history of colorectal cancer, and, for women without a history of breast cancer, a mammogram within the last year. Though the overall receipt of preventive care services was greater in cancer survivors, the percentage of patients receiving these services was low. Only 51.2% of women with a cancer history underwent a mammogram within the previous year, 63.8% of cancer survivors had ever undergone lower endoscopy, and only 42.5% had ever undergone bone mineral density testing. Only 54.5% of cancer survivors underwent BMD testing and only 48.4% of cancer survivors had a discussion with a physician following a fall..

Figure 2 displays the independent association of cancer on receipt of preventive care. A history of cancer was independently associated with the receipt of preventive care services including recent blood pressure measurement (AOR=1.44, 95%CI=1.64–1.78), recent cholesterol measurement (AOR=1.20, 95%CI=1.07–1.34), recent mammogram (AOR=1.57, 95%CI=1.34–1.85), flu shot previous year (AOR=1.33, 95%CI=1.16–1.53), pneumonia vaccination (AOR=1.33, 95%CI=1.18–1.49), bone mineral density (BMD) testing (AOR=1.38, 95%CI=1.21–1.56) and lower endoscopy (AOR=1.46, 95%CI=1.29–1.65). Cancer was not associated with an increased likelihood of discussion of falls by provider (AOR=1.04, 95%CI=0.82–1.32), despite a higher prevalence of falls (26.2% versus 21.9%) in cancer survivors.

Table 3 reports the significant factors that were independently associated with the non-receipt of preventive care services in cancer survivors. Low education was associated with non-receipt of cholesterol measurement (AOR=0.35, 95%CI=0.18–0.71) and blood pressure measurement within the last six months (AOR=0.47, 95%CI=0.30–0.72). Rural residence was also associated with non-receipt of cholesterol measurement (AOR=0.36, 95%CI=0.21–0.60). Race (non-Hispanic Black, AOR=0.44, 95%CI=0.287–0.70) was associated with non-receipt of flu vaccination. Factors associated with non-receipt of mammography included age 85 (AOR=0.43, 95%CI=0.26–0.74) and higher vulnerability, VES-13 score 3, (AOR=0.94, 95%CI=0.89–1.00). Age 70 (AOR=0.59, 95%CI=0.39–0.90), being non-Hispanic Black (AOR=0.51, 95%CI=0.27–0.95) and low education (AOR=0.23, 95%CI=0.14–0.38) were associated with non-receipt of BMD testing. Low education (AOR=0.43, 95%CI=0.27–0.68) and residing in a remote rural area (AOR=0.51, 95%CI=0.34–0.77) were associated with non-receipt of lower endoscopy. Comorbidity was associated with increased likelihood of receipt of blood pressure measurement (AOR=8.25, 95%CI=4.20–16.21), cholesterol measurement (AOR=2.86, 95%CI=1.96–4.18) and pneumonia vaccination (AOR=1.67, 95%CI=1.19–2.36).

4. DISCUSSION

In this study, although a cancer history increased the likelihood of preventive care services, the overall receipt of these services was low. Only 54.9% of women cancer survivors underwent a recent mammogram, only 63.8% of cancer survivors had ever undergone colonoscopy, and only 42.5% had ever undergone BMD testing. Of particular concern to cancer survivors was the lack of attention to bone health such as BMD testing and fall counseling, since cancer treatment increases the risk of osteoporosis and cancer survivors had more falls.

Prior literature has shown low receipt of preventive care services both in cancer survivors and in patients without a history of cancer.[11,18–20] In this study of a nationally representative sample, a cancer history was independently associated with receipt of all services, except for fall discussion after a fall. Most of the existing studies analyzing receipt of preventive care services focused on breast cancer survivors.[19–21] Few studies have examined preventive care receipt in survivors of different cancers; one study found that survivors with a history of breast, colorectal cancer, and prostate cancer had increased receipt of cancer screening compared to those without a history of cancer.[19,22] Our study results are similar. However, we also examined factors independently associated with non-receipt of preventive care. Low socioeconomic status and rural residence were both associated with non-receipt of preventive care services. Male gender was associated with lack of BMD testing. In addition to a cancer history, comorbidity was associated with increased receipt of BP measurement cholesterol measurement, pneumonia vaccination and mammography in women. These findings may reflect that patients with a history of cancer and comorbidities are seen more often by a variety of providers, giving more opportunity for such services to occur. Studies in breast cancer patients have found that survivors who regularly visited with both a primary care provider and oncologist were more likely to receive recommended preventive care services compared to survivors visiting either a primary care provider or an oncologist alone.[19]

Patients with low bone mineral density were at a higher risk for fracture, however only 40.6 % of cancer survivors received a BMD test. In male cancer survivors, only 27.5% received BMD. These data demonstrated that low education, increased age, rural residence, and male gender were associated with non-receipt of BMD testing. Many cancer treatments can increase the risk of falls in older cancer patients by affecting bone mineral density. For example, studies have shown an increased risk of falls, osteopenia, osteoporosis and fractures in patients on androgen deprivation therapy for prostate cancer and hormonal therapy for breast cancer.[23–25] These treatments place patients at a much higher risk for fractures and other injuries.

It is notable that in our sample, 26.2% of cancer survivors over age 65 have a history of at least one fall and the prevalence of falls was higher in the cancer survivors than in those without a history of cancer (21.9%). These findings indicated no association between a cancer history and fall discussions with providers. These findings were more prevalent with older cancer survivors, those who live in a rural area, and those with higher functional status. Falls place patients at a much higher risk for fractures and other injuries. Other series have reported that up to 30% of community dwelling adults over age 65 fall each year.[26–28] Falls are a serious problem in older adults, and lead to considerable morbidity including reduced function and mortality.[29] Given the increased prevalence of falls and known impact of cancer treatments on bone health, screening and addressing fall risk and bone density is essential in cancer survivors.

There are limitations that should be considered when interpreting these findings. Our cancer sample was heterogeneous and included any patients with a reported diagnosis of cancer. This sample likely included long-term cancer survivors in addition to patients with more recent history of cancer. We did restrict our analysis to survivors who were diagnosed with cancer more than one year ago. We also had limited information regarding cancer stage and treatment. As this was a cross-sectional study, causality and temporal relationships cannot be assessed. Receipt of preventive service was patient-reported. Information on physician visit frequency and physician practices was not captured, as we did not have access to this data. Information regarding patient values was also not captured, which could alter treatment decisions.

Despite the above limitations, this study shows that preventive care receipt is low in older cancer patients. Factors associated with non-receipt of preventive care services were identified, which can help target underserved cancer survivors in need of services. The cancer survivor population is rapidly growing. Studies show that over 50% of this population is aged 65 and greater, an age range in which comorbid conditions and risk of subsequent cancers are especially prominent. In order to maintain quality of survivorship, it is important to address preventive care services for comorbid conditions and second primary cancers in survivors.

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Receipt of Preventive Care Services

Figure 1.
Receipt of Preventive care

Figure 2.
Independent Association of Cancer on Receipt of Preventive Care

Table 1

Characteristics of Elderly Medicare Beneficiaries

	Cancer (N=1883)		Non-Cancer (N=10133)		p Value ^b
	N	% ^a	N	% ^a	
Age					<0.01
Mean					
65–69	287	16.9	2280	26.2	
70–74	393	25.8	2231	25.9	
75–79	446	25.7	2082	21.5	
80–84	430	18.8	1930	15.1	
85	327	12.9	1591	11.3	
Gender					<0.01
Male	749	39.4	4356	43.0	
Female	1134	60.6	5758	57.0	
BMI (mean)	26.77		26.67		0.32
Race					<0.01
Non-Hispanic white	1683	89.1	8664	85.5	
Non-Hispanic black	123	6.9	825	8.2	
Other	74	4.0	603	6.3	
Hispanic	84	4.3	789	7.9	<0.01
Marital Status					0.70
Married	989	54.8	5347	55.3	
Other	894	45.2	4767	44.7	
Income					0.83
Less than 25K	1083	56.1	6015	56.9	
25K–50K	546	29.9	2826	29.4	
More than 50K	254	14.0	1273	13.7	
Education					<0.01
Less than 9 th grade	232	11.4	1589	14.5	
9 th grade-high school	988	52.7	5281	52.4	

	Cancer (N=1883)		Non-Cancer (N=10133)		p Value ^b
	N	% ^a	N	% ^a	
Some college	283	15.5	1373	13.9	
Associate degree and above	375	20.4	1831	19.1	
Vulnerable Elders Survey					<0.01
Normal Score (<3)	988	52.47	5803	57.38	
Abnormal Score (≥ 3)	895	47.53	4311	42.62	
Comorbidity					
Vision	140	6.7	706	6.2	0.37
Hearing	151	7.2	682	6.0	0.07
Hypertension	1210	64.3	6039	58.7	<0.01
Coronary Artery Disease	424	21.7	2129	19.9	0.10
Congestive heart failure	180	8.8	711	6.3	<0.01
Valvular heart disease	207	10.5	932	8.8	0.01
Arrhythmia	472	24.7	2098	19.7	<0.01
Other heart condition	210	10.8	1014	9.6	0.12
Cerebrovascular disease	237	11.9	1200	11.1	0.35
Arthritis	1182	61.7	5686	54.8	<0.01
Mental disorder	294	15.6	1256	12.4	<0.01
Parkinson's disease	24	1.1	154	1.4	0.34
Emphysema/asthma/COPD	309	16.3	1373	13.4	<0.01
Diabetes	394	20.6	1997	19.8	0.53
Number of comorbidities					<0.01
0	229	13.2	1743	18.7	
1	465	25.7	2554	26.5	
2	389	21.2	2185	21.8	
3 or more	755	39.8	3439	33.0	

^aWeighted prevalence;^bChi-square tests

Table 2**Cancer Survivor Prevalence and Population Estimates**

Cancer Site (N=1883)	N	Prevalence		U.S. Population Estimates (millions) ^a
		(%) ^a	Std Err	
Lung	74	0.6	0.07	0.2
Colon	271	2.1	0.13	0.6
Breast	521	4.2	0.19	1.3
Cervical/uterine	251	2.1	0.13	0.6
Prostate	374	3.0	0.17	0.9
Bladder	91	0.7	0.07	0.2
Ovarian	71	0.6	0.07	0.2
Other ^b	443	3.7	0.19	1.1
Total	1883	15.2	0.39	4.6

^aPrevalence and U.S. population estimates are based on weighting algorithm provided by MCBS

^bIncludes cancers with small sample size or no specification provided

Table 3Factors Associated with Receipt of Preventive Care in Cancer Survivors^a

Preventive Care Service	Independent Variable	AOR (95% CI)	P
BP Taken within 6 months	Education		
	8 th Grade	0.35(0.18–0.71)	<0.01
	9 th Grade- High School	0.41(0.23–0.73)	<0.01
	Rurality		
	Isolate Rural	0.46(0.23–0.91)	0.03
	Age		
	Greater than 85	2.00(0.82–4.89)	0.03
	Comorbidity		
	1 Comorbidity	2.32(1.47–3.68)	<0.01
	2 Comorbidities	2.78(1.64–4.69)	<0.01
	3 Comorbidities	8.25(4.20–16.21)	<0.01
Cholesterol Taken Within 6 months	Education		
	8 th Grade	0.47(0.30–0.72)	<0.01
	Rurality		
	Small Rural	0.36(0.21–0.60)	<0.01
	Gender		
	Female	1.03(1.01–1.05)	<0.01
	Comorbidity		
	1 Comorbidity	1.55(1.07–2.23)	0.02
Flu Shot Given Within last year	Race		
	Non-Hispanic Black	0.44(0.287–0.70)	<0.01
	Hispanic	0.51(0.28–0.94)	0.03
	Rurality		
	Small Rural	0.63(0.42–0.95)	0.0288
	Age		
	75–79	1.75(1.16–2.63)	<0.01
	80–84	2.36(1.52–3.66)	<0.01
Pneumonia Vaccination Given Ever	Age		
	85	1.68(1.07–2.70)	0.03
	Race		
	Other	0.38(0.22–0.65)	<0.01
	Age		
	75–79	2.19(1.46–3.27)	<0.01
	80–84	2.00(1.36–2.96)	<0.01
	85 and greater	1.73(1.13–2.65)	0.01
	Income		

Preventive Care Service	Independent Variable	AOR (95% CI)	P
	25K–50K	1.61(1.08–2.41)	0.02
	Comorbidity		
	3 Comorbidities	1.67(1.19–2.36)	<0.01
	Insurance		
	HMO Coverage	1.49(1.07–2.07)	0.02
Colonoscopy or Sigmoidoscopy Ever	Education		
	8 th Grade	0.43(0.27–0.68)	<0.01
	9 th Grade-High School	0.60(0.43–0.85)	<0.01
	Rurality		
	Small Rural	0.67(0.47–0.96)	0.03
	Isolate Rural	0.51(0.34–0.77)	<0.01
Fall Discussion with Physician	Age		
	75–79	0.40(0.21–0.73)	<0.01
	Rurality		
	Large Rural	0.48(0.24–0.93)	0.03
	Abnormal VES Score	1.16(1.05–1.28)	<0.01
Bone Mineral Density Ever Completed	Age		
	70–74	0.59(0.39–0.90)	0.01
	75–79	0.60(0.40–0.91)	0.01
	80–84	0.65(0.44–0.96)	0.03
	85	0.42(0.26–0.68)	<0.01
	Race		
	Non-Hispanic Black	0.51(0.27–0.95)	0.03
	Education		
	8 th Grade	0.23(0.14–0.38)	<0.01
	9 th Grade- High School	0.49(0.36–0.67)	<0.01
	Rurality		
	Isolate Rural	0.43(0.27–0.70)	<0.01
	Gender		
	Female	11.33(8.08–15.89)	<0.01
Mammography Within Last Year	Age		
	85	0.43(0.26–0.74)	<0.01
	Insurance		
	Medicaid	0.55(0.34–0.88)	0.01
	Abnormal VES Score	0.94(0.89–1.00)	0.04
	BMI	1.02(1.00–1.04)	0.03

^a All results are included in the appendix. Models are adjusted for all other variables.