The Incidence of Breast Cancer among Disabled Kansans with Medicare

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Abstract

Background. Breast cancer disparities by disability status are poorly understood. While previous studies have shown increased odds of late stage at diagnosis, it is unclear whether the incidence of breast cancer varies by disability status.

Methods. To assess cancer incidence and stage at diagnosis among disabled and nondisabled Medicare beneficiaries in Kansas, a retrospective cohort study was conducted using linked Medicare enrollment and Kansas Cancer Registry data from 2007 to 2009. Disability status was determined by the indicator for the original reason for Medicare eligibility.

Results. Among the 651,337 Medicare beneficiaries included in the cohort, there were 2,384 cases of breast cancer. The age-adjusted incidence was 313 per 100,000 among female beneficiaries with disabilities and 369 per 100,000 among nondisabled female beneficiaries. The adjusted incidence rate ratio was 0.93 (95% CI 0.73-1.18). When assessing stage at diagnosis, there was no difference in the odds of late stage at diagnosis by disability status (OR = 1.02; 95% CI 0.68-1.50).

Conclusion. No significant difference in incidence or stage at diagnosis was identified among this cohort. The use of Medicare eligibility to define disability status presented a number of limitations. Future studies should seek alternate definitions of disability to assess disparities in breast cancer incidence, including definitions using Medicare claims data.

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Introduction

While racial and ethnic health disparities in breast cancer have been the subject of much research and public health action, breast cancer disparities by disability status are poorly understood. Healthy People 2020 recognizes the significant health disparities people with disabilities face and includes several objectives to ensure people with disabilities are on track toward better health and quality of life.[1] People with disabilities are more likely to experience difficulties or delays in getting the health care they need, not have had a mammogram in the past two years, not engage in fitness activities, use tobacco, be overweight or obese, have high blood pressure, experience symptoms of psychological distress, receive less social-emotional support, and have lower employment rates.[1] It remains unclear how these factors affect the incidence of breast cancer among women with disabilities.

Literature is conflicting related to breast cancer in women with disabilities. Two studies have assessed breast cancer incidence among women with intellectual disabilities and found no significant difference in standardized incidence when compared to the general population.[2,3] There are other studies assessing disabilities and breast cancer, but the inclusion criteria and methodology varied.[4,5] Several studies on breast cancer screening have identified significant disparities among women with disabilities.[6-11]

While literature suggested disparities in cancer screening, treatment, and survival, little is known about the incidence of breast cancer associated with disability. This study assessed health disparities in people with disabilities by determining cancer incidence and stage of breast cancer diagnosis among disabled and nondisabled Medicare beneficiaries in Kansas.

Methods

The study population included female Kansans ages 65 and older who were diagnosed with breast cancer and enrolled in Medicare during 2007 to 2009. Breast cancer cases were obtained from the Kansas Cancer Registry (KCR) database using the Surveillance, Epidemiology, and End Results (SEER) Site Recode ICD-O-3/WHO 2008 value for the breast (26000).[12] Disability status was obtained from the Medicare enrollment file. Disability was defined as having an indication of disability as the original reason for Medicare eligibility. Individuals who have a medical condition that precludes their ability to work are eligible to receive Social Security disability benefits.[13] Since 1972, any individual under age 65 who has been entitled to Social Security disability benefits for 24 months is eligible for Medicare.[14]

Records from KCR were linked to those from the Centers for Medicare and Medicaid Services (CMS) by matching Social Security numbers, with further confirmation based on patient sex, race, date of birth, and zip code of residence. Cancer cases from KCR were excluded if they did not match with the Medicare enrollment file, if the cancer was identified by death certificate only, or if they were diagnosed in a year during which they did not appear in the Medicare enrollment file. Each year of the study period was treated as a separate cohort and each enrollee was counted each year they appeared in the Medicare enrollment database. This project was approved by the Institutional Review Board at the University of Kansas Medical Center.

Variables that were analyzed included date and stage at diagnosis from the KCR database, as well as age at the end of enrollment year, race, and zip code from the Medicare enrollment file. Zip and county codes were used to classify rural or urban residency and county-level poverty. The stage at diagnosis, which is classified by the SEER Summary Stage 2000 system, was categorized as localized (the tumor is confined to breast tissue), regional (the tumor has spread to nearby lymph nodes and/or adjacent tissues), and distant (the tumor has metastasized to another part of the body).[15] A Zip Code Rural-Urban Commuting Area (RUCA) approximation was applied to assign individual's residency into rural versus urban.[16] Individual-level income indicators were not available from KCR and Medicare files. The proportion of county residents below poverty using 2007 estimates from the Area Health Resources Files (AHRF) was used as a surrogate. Low or high poverty in a county was recoded using the median percent below poverty of all Kansas counties.[17]

Group comparisons were performed using Chi square or Fisher’s exact tests, when appropriate. Age-adjusted incidence was calculated using direct standardization with the 2000 US standard population. Poisson regression models were constructed to generate an adjusted incidence rate ratio (IRR) comparing the incidence of breast cancer among disabled and nondisabled beneficiaries. Logistic regression models were used to assess differences in cancer stage at diagnosis by disability status. Likelihood ratio tests were applied to assess effect modification. Deviance analysis in Poisson regression and the Hosmer-Lemeshow test in logistic regression were used to evaluate model adequacy.

Results

The study cohort included 651,337 female Medicare beneficiaries, 65 years and older, in 2007-2009. Selected characteristics are presented in Table 1. When compared to nondisabled beneficiaries, beneficiaries with disabilities tended to be younger, non-white, or residing in counties with high poverty. During the study period, 2,575 cases of breast cancer were diagnosed among Kansas women 65 and older, 2,384 of which met eligibility criteria. Crude incidence was 339 per 100,000 beneficiaries with disabilities and 370 per 100,000 nondisabled beneficiaries. When adjusting for age, breast cancer incidence was 313 per 100,000 among disabled beneficiaries and 369 per 100,000 among nondisabled beneficiaries.

Table 1. Selected characteristics of female Medicare beneficiaries, 2007-2009.

	Disabled		*Nondisabled*		
	n	*%*	*n*	*%*	*p*
Total	37,306		614,031		
Age					< 0.01
65-69	16,397	43.9%	143,386	23.3%	
70-74	9,905	26.5%	122,331	19.9%	
75-79	5,316	14.3%	115,768	18.9%	
80+	5,688	15.3%	232,546	37.9%	
Residency*					0.07
Rural	7,058	48.8%	110,601	49.4%	
Urban	7,401	51.2%	113,116	50.6%	
Race					< 0.01
White	32,284	86.7%	579,589	94.5%	
Black	3,859	10.4%	19,967	3.3%	
Other	1,096	2.9%	13,478	2.2%	
County Poverty†					< 0.01
High	24,708	67.5%	358,897	59.2%	
Low	11,918	32.5%	247,283	40.8%	

* Rural/Urban residency was based on Rural-Urban Commuting Area codes.

† County poverty was defined as the percent living in poverty being above or below the Kansas median (11.6%).

Results from Poisson regression analyses are summarized in Table 2. The incidence rate ratio of breast cancer was 0.92 (95% CI: 0.76-1.10) when comparing disabled to nondisabled beneficiaries. The incidence rate ratio associated with disability did not change significantly after controlling for potential confounders that had a p value of less than or equal to 0.20 in the univariate analysis (i.e., age, race, residency, and county level poverty; Table 1). Thus, the effect of disability on incidence did not appear to be confounded by these covariates. Interaction terms were evaluated using the likelihood ratio test and found to be not significant. The final model, adjusted for

Table 2. Breast cancer incidence rate ratios by disability status: Results from Poisson regression analysis.

Model	*Risk Factor*	*IRR*	*95% CI*	*p*
Unadjusted	**Disabled**			
	Yes	0.92	0.76-1.10	0.34
	No	1.00	-	
Adjusted	**Disabled**			
	Yes	0.93	0.73-1.18	0.54
	No	1.00	-	
	Age			
	65-69	1.00	-	
	70-74	1.21	1.03-1.41	0.02
	75-79	1.23	1.04-1.44	0.01
	80+	1.08	0.94-1.25	0.28

age, is presented in Table 2. A re-scaling was applied to correct for over-dispersion to ensure model adequacy for interpretation.

Table 3 shows the characteristics associated with late stage breast cancer at the time of diagnosis. Patients with disabilities had a higher chance of having their breast cancer diagnosed at a later stage relative to their nondisabled counterparts. However, the difference was not significant statistically ($p = 0.71$). Race was the only factor that varied significantly by stage at diagnosis. Black women were more likely to be diagnosed with late stage breast cancer than other racial groups.

Odds ratios and the corresponding 95% confidence intervals from the logistic regression are shown in Table 4. The unadjusted odds ratio associated with disability for late stage at diagnosis was 1.08 (95% CI: 0.72-1.59). When controlling for potential confounding by age, residency, race, and poverty, the odds ratio for disability remained similar (OR = 1.02, 95% CI 0.68-1.50), so the effect of disability on stage at diagnosis did not appear to be confounded by these covariates. Interaction terms were not statistically significant.

Discussion

This study utilized Kansas Cancer Registry and Medicare linked data to address the relationship between disability and incidence of breast cancer. This study did not identify a significant difference in breast cancer incidence by disability status after adjusting for age. Disability was not associated with increased odds of late stage at diagnosis. To our knowledge, this study was the first to assess cancer incidence by disability status among Medicare beneficiaries. The lack of association between disability status and stage at diagnosis is not consistent with what is reported in the literature. Several implications are worthy of a further discussion.

First, our findings suggested limitations in using Medicare eligibility to define disability and necessitate alternate methodologies for future studies of breast cancer incidence among the disabled. The primary limitation was the broad definition of disability that Medicare eligibility provides. There are published data showing a strong relationship between disability and poor health.[18] People with disabilities may be at increased risk of developing chronic

Table 3. Breast cancer stage at diagnosis by selected characteristics.

		Early Stage (n=1,586)		*Late Stage* (n=711)		
	Total	*n*	*%*	*n*	*%*	*p*
Disabled						0.71
Yes	120	81	67.5%	39	32.5%	
No	2,177	1,505	69.1%	672	30.9%	
Age						0.18
65-69	507	343	67.7%	164	32.3%	
70-74	506	349	69.0%	157	31.0%	
75-79	479	350	73.1%	129	26.9%	
80+	805	544	67.6%	261	32.4%	
Residency*						0.20
Rural	1,091	738	67.6%	353	32.4%	
Urban	1,191	835	70.1%	356	29.9%	
Race						0.01
White	2,169	1,511	69.7%	658	30.3%	
Black	73	39	53.4%	34	46.6%	
Other	52	33	63.5%	19	36.5%	
Poverty†						0.91
High	1,317	909	69.0%	408	31.0%	
Low	965	664	68.8%	301	31.2%	

* Rural/Urban residency based on Rural-Urban Commuting Area codes

† Defined as the county's percent living in poverty being above or below the Kansas median (11.6%)

Table 4. Odds ratios for late stage diagnosis: Results from logistic regression analysis.

Model	*Risk Factor*	*OR*	*95% CI*	*p*
Unadjusted				
	Disabled			
	Yes	1.08	0.72-1.59	0.71
	No	1.00	-	-
Adjusted				
	Disabled			
	Yes	1.02	0.68-1.50	0.94
	No	1.00	-	-
	Race			
	White	1.00	-	-
	Black	2.00	1.24-3.12	< 0.01
	Other	1.32	0.73-2.32	0.34

conditions, while people with certain chronic conditions also may become disabled. Disabilities can include many subtypes (e.g., intellectual/developmental, physical, and mental disabilities as well those resulting from other medical conditions). By only examining the initial reason for Medicare eligibility, the disability category or severity in this broad group of disabled individuals was unable to be assessed. Such heterogeneity of the disabled group may be contributing to our null findings. Future research may include data from other sources such as Medicaid.

Second, study criteria may be different in different studies. Roetzheim and Chiriskos reported that breast cancers in disabled women were diagnosed at a later American Joint Committee on Cancer (AJCC) stage.[5] Differences in findings between our study and the study from Roetzheim and Chiriskos may be attributed to the definitions of study factors. Our study included disabled women with breast cancer, ages 65 and older, while the latter study included disabled women with breast cancer ages 67 to 71 at the time of diagnosis. Our study used the SEER summary staging system and the prior study used the AJCC stages. Stages from both systems are similar to some extent, but they are not identical. Use of SEER summary staging allows studies of cancer burden in a statewide population (like the Kansas Cancer Registry) by including most breast cancer patients in the analysis while using AJCC staging might have excluded patients who have been treated in facilities where AJCC staging was not applied to patient's treatment plan.

Third, certain chronic conditions may lead to disability. In fact, a higher prevalence of chronic diseases (e.g., obesity, behavioral, and psychological disorders) are associated with patients with disabilities.[18] However, the interplay between a higher prevalence of chronic medical conditions, disability, and care seeking behaviors is not clear.[18-19] It is possible that breast cancer incidence in this population was affected by some of these unmeasured confounding variables.

Lastly, the study results may be affected by misclassification bias. Individuals born prior to 1908 were not eligible for Medicare before the age of 65 due to disability, given the timeline of the 1972 provision. These individuals, and those who may have been eligible but did not seek disability benefits, would be misclassified as nondisabled and would bias our findings towards the null. In addition, the individuals that are eligible for Social Security Disability Insurance (SSDI) were affected by work-limiting disabilities which likely represented a subset of all disabilities in older adults. Disabilities that did not meet the Social Security eligibility criteria and those that met eligibility criteria for Medicaid may not be represented in this study.

While no statistically significant results were identified as a result of this analysis, further epidemiological investigation with a modified definition of disability is warranted. Our null findings may be due to limitations of using Medicare eligibility to define disability status among this cohort. Future studies should use more precise definitions of disability to identify disparities in breast cancer incidence, including defining disability with the use of Medicare claims data. Such analyses may be more apt to identify disparities within the state of Kansas and better serve women with disabilities.

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