

Reach of the Montana Cancer Control Program to Women with Disabilities

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Abstract Women with disabilities have lower screening rates for breast and cervical cancer with some evidence suggesting that people with disabilities experience higher cancer mortality and may receive a different course of treatment. This study examined whether women with and without disabilities using Montana Cancer Control Program (MCCP) differ in use of breast (BCS) and cervical (CCS) screening services, receipt of and follow up for inconclusive or abnormal results, and compliance with BCS and CCS US Preventive Services Task Force recommendations. Study participants were women eligible for MCCP screening services between November 2012 and October 2014, with eligibility based on insurance status (underinsured/no insurance), income requirements (<200 % poverty based on income/household size), and age. The data derive from participant self-report (demographic, disability, and health history including previous mammogram or Papanicolaou test) and MCCP records of screening tests (clinical breast exam, mammogram, or Pap test), results, and follow up visits. About 11.5 % of MCCP participants reported having a disability. MCCP recipients with a disability were significantly older, more likely to be non-Hispanic White, and more likely to have poor health profiles.

Disability status did not affect use of MCCP screening services, screening outcome, or follow up for inconclusive or abnormal results. However, women with disability had significantly lower BCS and CCS compliance (based on US Preventive Task Force guidelines) than women without disability, which persisted in adjusted analyses controlling for other significant factors. The MCCP is reaching un/underinsured Montana women with disabilities. While disability status in this sample was not related to use of MCCP services or screening outcome, MCCP recipients with disabilities have significantly lower BCS and CCS compliance. Efforts to increase compliance for un/underinsured Montana women with a disability are warranted.

Keywords Cancer screening · Women with disability · Health disparity

Introduction

Nearly 20 % of Americans report living with disability [1], yet this considerable segment of the population experiences pervasive health inequalities [2]. Persons with disabilities experience a disproportionate burden of health risks, inaccessible health care environments that restrict access to care, and poor outcomes that are at least partially preventable. One emerging area of concern related to these inequalities is disparities in cancer screening and outcomes for women with disabilities.

National data have established that women with disabilities are less likely to receive breast and cervical cancer screening at recommended intervals [3–6]. Furthermore persons with disabilities experience higher cancer mortality and may receive a different course of treatment than persons without disabilities [7]. A study conducted by

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McCarthy et al. [8] reported that women with disabilities who receive Medicare and are diagnosed with stage I to IIIA breast cancer: (1) experience higher breast-cancer mortality and all-cause mortality; (2) are less likely to receive breast-conserving surgery; and (3) are less likely to receive standard treatments after breast-conserving surgery [8]. Examining the same outcomes using Surveillance, Epidemiology, and End Results (SEER) data from the National Cancer Institute, Roetzheim et al. [9] found women with disabilities who had a fee for service Medicare plan had worse outcomes than those with a managed care plan. Thus, early detection may be of particular importance for women with disabilities who are underinsured.

Healthy People 2020 includes explicit objectives to reduce barriers to health care among persons with disabilities (see <http://www.healthypeople.gov/2020/topics-objectives/topic/disability-and-health>). Reported barriers to screening among women with disabilities include cost, transportation, lack of accessible facilities, and lack of doctor recommendation [10–12]. Furthermore, emerging research suggests that predominantly rural geographic settings may present greater disparities in screening utilization than more densely populated ones [13–15]. However, most published evidence demonstrating disability-related disparities in clinical preventive service use, including cancer screening, is drawn from large national surveys, such as the Behavioral Risk Factor Surveillance System and Medical Expenditure Panel Survey [6].

Given the emerging evidence regarding inequalities in cancer screening and care for women with disabilities, this study evaluates reach to women with disabilities by a state-based cancer screening program that targets providing cancer screening to underinsured women in a rural state. The specific objectives of this paper were to examine whether Montana Cancer Control Program (MCCP) clients with and without disabilities differed in their (1) use of cancer screening services, (2) compliance with national breast and cervical cancer screening recommendations, and (3) receipt of and follow up for inconclusive or abnormal screening results. In addition, the study examined what demographic or health history factors were associated with compliance with US Preventive Services Task Force (USPSTF) recommendations the relationship between disability status and compliance in unadjusted and adjusted models.

Methods

Data Source

Primary data collection occurred within the Montana Department of Public Health and Human Services (DPHHS). Since 1996 the MCCP has provided colorectal

cancer, breast cancer, and cervical cancer screening to uninsured or underinsured Montanans who meet both age and income requirements. The MCCP provides cancer screening services by providing direct payment to service providers who conduct the service. Only data from breast and cervical cancer screening participants were used for this analysis. The MCCP collected self-reported and screening result data for all screening program participants.

Sample

The sample includes women eligible for the MCCP from November 1st, 2012 through October 31st, 2014. The MCCP's eligibility requirements for breast cancer screening (BCS) were women 50–64 years of age, plus 65 and older if not enrolled in Medicare B (coverage for medically necessary services), who were uninsured or underinsured, and earned below 200 % of the federal poverty level based on number of residents in household and total household income. Women eligible for cervical cancer screening (CCS) included those between the ages of 21–64 years of age, plus those 65 and older if at high risk for cervical cancer and not enrolled in Medicare B with the same insurance and income threshold requirements as for breast cancer screening. Eligibility exceptions for age, income, and insurance guidelines were made based on additional factors such as cancer risk and/or previous history. Medicare B beneficiaries are excluded as Medicare B covers two types of services: (1) preventive services to prevent illness or detect a disease or (2) medically necessary services or supplies for diagnosis or treatment of a medical condition.

Data

Self-reported data included basic demographic information (e.g. age, race, ethnicity, residence, health insurance status), plus recipient's self-reported health history and health behavior information [e.g., previous mammogram and Papanicolaou (i.e. "Pap") test, history of breast problems and hysterectomy (the nature of the problems or procedure were not further specified), and tobacco use].

Items to determine disability status for this study were based upon the six disability types measured in the American Community Survey (ACS): (1) hearing difficulty; (2) vision difficulty; (3) cognitive difficulty; (4) ambulatory difficulty; (5) self-care difficulty; and (6) independent living difficulty (see <https://www.census.gov/people/disability/methodology/acs.html>). This study defined a woman as having a disability if she indicated at any time during her use of screening services experiencing one or more of these limitations. Women also had the option to decline to answer these questions.

Compliance for BCS and CCS was based on the most current guidelines (as of July 2015) published by the USPSTF [16, 17]. The USPSTF recommends that women between the ages of 50–74 receive a mammogram biennially and that women 21–65 years old receive a Papanicolaou (Pap test) at least once every 3 years or once every 5 years if a human papillomavirus (HPV) test is included in conjunction with the Pap test. This study determined screening compliance based on women's age at their initial visit (those 50–74), report of having a previous mammogram/Pap test history in the last 2 (mammogram) or 3 years (Pap smear), and/or receipt of a mammogram and/or Pap test at the MCCC. We excluded women that were not within the recommended age range as well as cases in which we suspected information bias or systematic error may be present (e.g. inconsistent reporting of previous mammogram and/or Pap test). Additional analyses examined differences based on disability status for (1) the proportion of women received an abnormal or inconclusive result and (2) those who did not follow up within 90 days after receiving an abnormal result.

Statistical Analysis

Primary statistical analysis was performed on IBM SPSS.21 and 95 % confidence intervals for binomial proportions were calculated using STATA 13.0. Basic descriptive statistics were calculated (i.e. mean, frequency) for demographic and health behavior/history data. An independent sample *t* test examined differences in age by disability status and cancer screening compliance. Chi square tests measured differences by disability and cancer screening compliance for categorical variables (i.e. race/ethnicity, tobacco use, breast problems, hysterectomy). The coefficient Cramer's V was used to measure effect size for analyzing two nominal variables. Both unadjusted and adjusted logistic regressions were conducted to examine whether disability status was significantly related to compliance for BCS and CCS. Covariates identified in the multinomial logistic regression included age at first visit, race/ethnicity, health insurance status, tobacco use, breast problem status (for BCS compliance), and hysterectomy status (for CCS compliance).

Results

The dataset included 7521 women who enrolled in MCCC services during this 2 years time period (Table 1). MCCC participants tended to be middle-aged (mean = 51.2 ± 8.8 years), non-Hispanic White (71.8 %) and non-Hispanic Native American (19.5 %) women. Most were uninsured (98.6 %). In terms of their history of health problems and

behaviors, 8.8 % reported having breast problems, 16.2 % reported having had a previous hysterectomy, and 16.6 % reported using tobacco. Eight-hundred sixty four of the 7521 women (11.5 %) reported one or more disabilities, distributed as follows: 145 women reported a hearing difficulty (1.9 %), 62 a vision difficulty (0.8 %), 424 a cognitive difficulty (5.6 %), 465 an ambulatory difficulty (6.2 %), 122 a self-care difficulty (1.6 %), and 237 an independent living difficulty (3.2 %).

Table 1 also presents these data by disability status. Women with disabilities were significantly older (52.5 ± 8.2 years) than women without disabilities (51.0 ± 8.8 years; $p < 0.001$). Women with disabilities also had different distributions based on race/ethnicity than women without disabilities ($\chi^2 = 11.69$; $p < 0.001$). Women with disabilities were also significantly more likely than those without disabilities to report using tobacco (29.7 vs. 14.9 %; $p < 0.001$) with a Cramer's V of 0.128, indicating a moderate effect size, and to report having health problems.

No significant differences were detected between women with and without disabilities in their use of MCCC screening services for having a clinical breast examination (CBEs), a mammogram, or a Pap test (Table 1). Most (92.5 %) MCCC users received either a CBE or mammogram with the MCCC, over three-quarters (78.7 %) had a mammogram, and about half (51.9 %) had a Pap test. There were also not significant differences between women with and without disability for receipt of an abnormal or inconclusive result for BCS or CCS that required follow up (19.0 vs. 17.9 % and 21.2 vs. 19.6 % respectively) or for rates of failing to follow-up within 90 days (3.2 vs. 1.9 % vs. 0.6 % vs. 0.5 %). While not significant, there was a trend for women with disabilities to have slightly higher rates of BCS and CCS results that require follow up.

Compliance rates with the USPSTF guidelines (Table 1) among the full sample were low, with about half (51.9 %) of MCCC enrollees compliant with BCS and less than half (43.5 %) CCS compliant. However, compliance rates for both BCS and CCS were significantly lower among women with disabilities. Women with disabilities were less likely to be BCS compliant (45.0 %; 95 % CI 40.9, 49.1 %) than women without disabilities (52.9 %; 95 % CI 51.3, 54.4 %) ($\chi^2 = 12.735$; $p < 0.001$). For CCS compliance, women with disabilities were significantly less compliant (37.2 %; 95 % CI 33.9, 40.5 %) than women without disabilities (44.3 %; 95 % CI 43.1, 45.5 %) ($\chi^2 = 15.688$; $p < 0.001$). Table 2 presents results from analyses that examined whether demographic and health history factors were related to screening compliance. Women compliant with both the BCS and CCS guidelines were significantly younger (BCS: compliant 55.7 ± 4.8 years; non-compliant

Table 1 Demographic, health behavior, health history, and screening compliance by disability status of women in MT Cancer Control Prevention (MCCP) program: November 2012–October 2014

Variables	Total n = 7521	Disability n = 864	No disability n = 6657	Significance	Cramer's V ^a
Age at first visit (mean, SD)	51.2 ± 8.8	52.5 ± 8.2	51.0 ± 8.8	$p < 0.001^b$	
Race/ethnicity (%)				$\chi^2 = 11.69^{**}$	
White, non-Hispanic	5374 (71.8)	635 (74.2)	4739 (71.4)		
Native American, non-Hispanic	1457 (19.5)	139 (16.2)	1318 (19.9)		
Hispanic, any race (including multiracial)	248 (3.3)	22 (2.6)	226 (3.4)		
Any race (including multiracial), non-Hispanic	410 (5.5)	60 (7.0)	350 (5.3)		
Health insurance (%)	106 (1.4)	7 (0.8)	99 (1.5)	NS ^c	
Health behavior/history (%)					
Tobacco use	1247 (16.6)	257 (29.7)	990 (14.9)	$\chi^2 = 122.321^{***}$	0.128
Breast problems	663 (8.8)	111 (12.8)	552 (8.3)	$\chi^2 = 19.741^{***}$	0.051
Hysterectomy	1219 (16.2)	168 (19.4)	1051 (15.8)	$\chi^2 = 7.529^{**}$	0.032
Received MCCP screening (≥1 visit) (%)					
BCS (CBE ^b and/or mammogram)	6959 (92.5)	796 (92.1)	6163 (92.6)	NS ^c	
BCS (mammogram only)	5918 (78.7)	691 (78.7)	5227 (78.5)	NS ^c	
CCS (Pap test only)	3906 (51.9)	457 (52.9)	3449 (51.8)	NS ^c	
BCS and CCS (CBE and/or Mam + Pap test)	3403 (45.2)	393 (45.5)	3010 (45.2)	NS ^c	
BCS results (N = 7103; %)					
Result requires follow-up	1279 (18.0)	154 (19.0)	1125 (17.9)	NS ^c	
Failed to follow-up ^d	26 (2.0)	5 (3.2)	21 (1.9)	NS ^c	
CCS results (n = 7341; %)					
Result requires follow-up	1442 (19.6)	179 (21.2)	1263 (19.6)	NS ^c	
Failed to follow-up	7 (0.5)	1 (0.6)	6 (0.5)	NS ^c	
BCS compliance (%; 95 % CI)	Screening compliance				
	Total n = 4634	Disability n = 589	No disability n = 4045	Significance	Cramer's V
Mammogram, every 2 years, women 50–74 years ^e	2403 (51.9; 50.4, 53.3)	265 (45.0; 40.9, 49.1)	2138 (52.9; 51.3, 54.4)	$\chi^2 = 12.735^{***}$	0.052
CCS Compliance (%; 95 % CI)	Screening compliance				
	Total n = 7416	Disability n = 850	No disability n = 6566	Significance	Cramer's V
Pap test, every 3 years, women 21–65 years old ^e	3227 (43.5; 42.4, 44.7)	316 (37.2; 33.9, 40.5)	2911 (44.3; 43.1, 45.5)	$\chi^2 = 15.688^{***}$	0.046

^a Cramer V interpretations: only can be used to determine relative differences in association

^b Independent sample T test

^c Non significant

^d Analysis conducted on 1287

^e Based on most recent USPSTF recommendations

Pearson Chi Square: * $p < .05$; ** $p < .01$; *** $p < .001$

58.0 ± 3.9 years; $p < 0.001$ | CCS: compliant 50.1 ± 8.9 years; non-compliant 51.9 ± 8.3 years; $p < 0.001$) and significantly more likely to have insurance (BCS:

$\chi^2 = 8.964$; $p < 0.01$ | CCS: $\chi^2 = 17.97$; $p < 0.001$). Compliance status also differed significantly by race/ethnicity distribution (BCS: $\chi^2 = 11.170$; $p < 0.05$ | CCS:

Table 2 Demographics and health behaviors/history by cancer screening compliance of women in MT Cancer Control Prevention (MCCP) Program: November 2012–October 2014

Variables	BCS Compliance n = 4634 ^a				CCS Compliance n = 7416 ^b							
	Yes	No	Significance	Cramer's V ^g	Yes	No	Significance	Cramer's V ^g				
Age at first visit (mean ± SD)	55.7 ± 4.8	58.0 ± 3.9	$p < 0.001^c$		50.1 ± 8.9	51.9 ± 8.3	$p < 0.001^c$					
Race/ethnicity (%)			$\chi^2 = 10.570^*$				$\chi^2 = 47.429^{***}$					
White, non-Hispanic	1809 (75.7)	1598 (72.0)			2444 (76.0)	2879 (69.1)						
Native American, non-Hispanic	409 (17.1)	456 (20.6)			508 (15.8)	905 (21.7)						
Hispanic, any race including multiracial	69 (2.9)	56 (2.5)			101 (3.1)	143 (3.4)						
Non-Hispanic, any race including multir	104 (4.3)	108 (4.9)			163 (5.1)	241 (5.8)						
Health insurance (%)	42 (1.7)	17 (0.8)	$\chi^2 = 8.945^{**}$	0.044	66 (2.0)	37 (0.9)	$\chi^2 = 17.970^{***}$	0.049				
Health behavior/history (%)												
Tobacco use	382 (15.9)	332 (14.9)	NS ^d		519 (16.1)	713 (17.0)	NS ^d					
Breast problems	216 (9.0)	145 (6.5)	$\chi^2 = 9.981^{**}$	0.046	293 (9.1)	356 (8.5)	NS ^d					
Hysterectomy	523 (21.8)	449 (20.1)	NS ^d		273 (8.5)	922 (22.0)	$\chi^2 = 247.594^{***}$	0.183				
Disability status (%)			$\chi^2 = 15.178$; $p = 0.001$				$\chi^2 = 15.988^{***}$					
No limitation	2138 (89.0)	1907 (85.5)			2911 (90.2)	3655 (87.3)						
1 Limitation	165 (6.9)	181 (8.1)			179 (5.5)	313 (7.5)						
2+ Limitations	100 (4.2)	143 (6.4)			137 (4.2)	221 (5.3)						
	<i>B</i>	Standard error	Wald statistic	Sig	OR	95 % CI ^f	<i>B</i>	Standard error	Wald Statistic	Sig	OR	95 % CI ^f
Disability status unadjusted for covariates	−0.315	0.089	12.665	<0.001	0.73	0.613, 0.868	−0.297	0.075	15.61	<0.001	0.74	0.641, 0.861
	<i>B</i>	Standard error	Wald statistic	Sig	AOR ^e	95 % CI ^f	<i>B</i>	Standard error	Wald statistic	Sig	AOR ^e	95 % CI ^f
Disability status adjusted for covariate	−0.238	0.096	6.125	0.013	0.79	0.653, 0.952	−0.258	0.081	10.1	0.001	0.77	0.659, 0.906

^a 11 cases excluded of 4656 eligible women due to info bias or systematic error

^b 42 cases excluded of 7458 eligible women due to info bias or systematic error

^c Independent sample T Test

^d Non significant

^e Adjusted odds ratio

^f 95 % confidence interval

^g Cramer V interpretations: only can be used to determine relative differences in association

Pearson Chi Square: * $p < .05$; ** $p < .01$; *** $p < .001$

$\chi^2 = 48.525$; $p < 0.001$). While tobacco use was not related to compliance for either BCS or CCS, women with a history of breast problems were more likely to be compliant for BCS ($\chi^2 = 9.981$; $p = 0.001$) and women who had hysterectomies were significantly more likely to be CCS compliant ($\chi^2 = 15.988$; $p < 0.001$).

Subsequent results showed disability status was significantly related to BCS and CCS compliance in both unadjusted and adjusted models. Specifically, controlling for relevant covariates (i.e. age, race/ethnicity, health insurance, tobacco use, and breast problems), women with disabilities had 27 % less odds of complying with BCS guidelines than women without disabilities in our study (OR 0.73; 95 % CI 0.605, 0.871; $p = 0.013$). Similarly, controlling for the same demographic variables plus previous hysterectomy (minus breast problems) in the model showed that women with disabilities had 22 % less odds of complying with CCS guidelines than women without disabilities in our study (OR 0.782; 95 % CI 0.671, 0.911; $p = 0.002$).

Discussion

This study reveals that the MCCP is reaching un/underinsured women with disabilities. Nearly 12 % of women using MCCP services between October 2012 and November 2014 reported experiencing limitations in at least one of five domains (e.g., mobility, cognition, sensory, self-care, or instrumental activity of daily living). The proportion of Montana women with disabilities reached by the MCCP compares favorably with statewide prevalence data from the American Community Survey, which indicates approximately 10.5 % (90 % MOE \pm 1.08; $n = 2962$) of non-institutionalized Montanan women between 18 and 64 years of age report having a disability [18]. Additionally, women with and without disabilities did not differ significantly in their use of cancer screening services, as women with and without disabilities were equally likely to have received a breast cancer screening, a cervical cancer screening, or both services. Nevertheless, substantially fewer women utilized the MCCP cervical cancer screening services (51.9 %) than the breast cancer screening services (92.5 %). The lower cervical screening rate may be an artifact of the sampling window of two, rather than 3 years, which is the current recommended USPSTF duration for CCS.

Also encouraging were results that showed no significant differences between women with and without disabilities in the rate of screening results that require follow up or in rates of actual follow up. However, compliance rates with the USPSTF recommendations for mammography and Pap testing reveal significantly lower compliance

for these exams by women with disabilities than women without a disability, even in analyses that controlled for relevant demographic factors (i.e., age, race/ethnicity, region, smoking, history of breast problems or hysterectomy). The findings are comparable to those reported by Armour et al. [19] from a nationally representative sample, where women with disabilities were less likely to report a mammogram (72.2 vs. 78.8 %; $p < 0.001$) within 2 years and receive a Pap test (78.9 vs. 83.4 %; $p < 0.001$) within 3 years. While the overall trend of lower compliance among women with disabilities is similar between this state-based study and national data, there are notable methodological differences between the studies related to the sampling frame and changes in mammography screening recommendations. The Montana sample derives from a select group of *un/underinsured* women using state-funded cancer screening services while the nationally representative sample included both women with and without insurance. Thus, insurance status may partially explain the lower overall BCS and CCS compliance reported in this study. Additionally, while the USPSTF recommendations served as the basis for determining BCS and CCS compliance in both studies, the studies differed in the age range included for mammography screening compliance within the past 2 years. The national sample surveyed women 40 years and older whereas this study examined compliance among women 50–64 years old [4]. Furthermore, while this study observed significant differences in compliance rates between women with and without disabilities, the effect size for BCS and CCS compliance measured using the Cramer's V coefficient were negligible to small. This may suggest that although real differences exist in BCS and CCS compliance rates between women with and without disabilities, with time the MCCP program may mitigate these differences through stressing the importance of and encouraging regular screenings for eligible women whether they remain eligible for the state-based program or move onto private, federal, or other sources of insurance.

Notably, women with disabilities using the MCCP services were significantly more likely to smoke (large effect size), report breast problems, and have had a hysterectomy. Given the higher rates of these health risks among women with disabilities, it is encouraging that Montana's state-based cancer screening program is effectively reaching and covering screening services to this group of women with disabilities who also face limited access to these services. Additionally, evidence from this study showing that women who report limitations are more likely to smoke and experience higher rates of gynecologic health problems may help cancer screening program staff members to view these encounters as educational opportunities with an underserved population. In particular, as smoking increases

risk for several cancers, these visits can be viewed as a potentially sensitive time to inform women about the health risks of smoking during which they may be open to being connected with tobacco cessation programs.

Several limitations of this study should be noted. First, these results cannot be directly compared to published national and state estimates of cancer screening as this sample derives from women seeking CPS and does not reflect a broader cross-section of the population of women from either the state or a national level. Second, current CCS guidelines recommend CCS screening every 5 years for women 30–65 if combined with HPV testing. However, this dataset did not include an item to determine whether a woman had previous HPV testing, rather the dataset only contained information about whether a woman received an initial HPV test within the MCCP ($n = 908$; 12.1 %; not shown in table). Thus, compliance based on current guidelines that consider both Pap and HPV testing may have yielded more accurate estimates of screening compliance. Third, women with disabilities may be more likely than women without disabilities to intermittently qualify for Medicaid coverage. Thus, the screening program data may not have contained information about screenings performed when women were covered by another payer and it is possible compliance may be artificially low. However, participants were able to provide self-reported information about a previous mammogram.

Conclusion

These initial analyses suggest that Montana's cancer control program is successfully reaching a group of women who are known to have reduced access to [10, 20–22] and compliance with cancer screening [19, 21]. Nevertheless, low compliance across un/underinsured Montana women suggests overall efforts are needed to increase adherence to USPSTF recommendations for both BCS and CCS are necessary. While the MCCP is reaching women with disabilities, further research should examine issues regarding physical accessibility of mammography facilities/equipment and gynecologic services as this has been previously identified as a barrier for those with disabilities [5, 23].

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References

1. Brault, M.W. (2012). Americans with Disabilities: 2010: US Census Bureau, US. Department of Commerce USA.
2. Krahn, G., Walker, D. K., Correa-De-Araujo, R. (2015). Persons with disabilities as an unrecognized health disparity population. *American Journal of Public Health, 105*(Suppl 2), S198–S206. doi:10.2105/AJPH.2014.302182.
3. Andresen, E. M., Peterson-Besse, J. J., Krahn, G. L., Walsh, E. S., Horner-Johnson, W., & Iezzoni, L. I. (2013). Pap, mammography, and clinical breast examination screening among women with disabilities: A systematic review. *Womens Health Issues, 23*(4), e205–e214. doi:10.1016/j.whi.2013.04.002.
4. Armour, B. S., Thierry, J. M., & Wolf, L. A. (2009). State-level differences in breast and cervical cancer screening by disability status: United States, 2008. *Womens Health Issues, 19*(6), 406–414. doi:10.1016/j.whi.2009.08.006.
5. Horner-Johnson, W., Dobbertin, K., Andresen, E. M., & Iezzoni, L. I. (2014). Breast and cervical cancer screening disparities associated with disability severity. *Womens Health Issues, 24*(1), e147–e153. doi:10.1016/j.whi.2013.10.009.
6. Peterson-Besse, J. J., O'Brien, M. S., Walsh, E. S., et al. (2014). Clinical preventive service use disparities among subgroups of people with disabilities: A scoping review. *Disability and Health Journal, 7*(4), 373–393. doi:10.1016/j.dhjo.2014.04.005.
7. Forman-Hoffman, V. L., Ault, K. L., Anderson, W. L., Weiner, J. M., Stevens, A., Campbell, V. A., & Armour, B. S. (2015). Disability status, mortality, and leading causes of death in the United States community population. *Medical Care, 53*(4), 346–354.
8. McCarthy, E. P., Ngo, L. H., Roetzheim, R. G., Chirikos, T. N., Li, D., Drews, R. E., & Iezzoni, L. I. (2006). Disparities in breast cancer treatment and survival for women with disabilities. *Annals of Internal Medicine, 145*(9), 637–645.
9. Roetzheim, R. G., Chirikos, T. N., Wells, K. J., et al. (2008). Managed care and cancer outcomes for Medicare beneficiaries with disabilities. *The American Journal of Managed Care, 14*(5), 287.
10. Yankaskas, B. C., Dickens, P., Bowling, J. M., et al. (2010). Barriers to adherence to screening mammography among women with disabilities. *American Journal of Public Health, 100*(5), 947.
11. Suzuki, R., Krahn, G., Small, E., & Peterson-Besse, J. (2013). Multi-level barriers to obtaining mammograms for women with mobility limitations: Post workshop evaluation. *American Journal of Health Behavior, 37*(5), 711–718. doi:10.5993/AJHB.37.5.15.
12. Todd, A., & Stuijbergen, A. (2012). Breast cancer screening barriers and disability. *Rehabilitation Nursing, 37*(2), 74–79.
13. Wei, W., Findley, P. A., & Sambamorthi, U. (2006). Disability and receipt of clinical preventive services among women. *Womens Health Issues, 16*, 286–296.
14. Coughlin, S. S., Thompson, T. D., Hall, H. I., Logan, P., & Uhler, R. J. (2002). Breast and cervical carcinoma screening practices among women in rural and nonrural areas of the United States, 1998–1999. *Cancer, 111*(1), 2801–2812.
15. Coughlin, S. S., Leadbetter, S., Richards, T., & Sabatino, S. A. (2008). Contextual analysis of breast and cervical cancer screening and factors associated with health care access among United States women, 2002. *Social Science and Medicine, 66*(2), 260–275. doi:10.1016/j.socscimed.2007.09.009.
16. Force USPST. (2015). Final update summary: Breast cancer: Screening.
17. Force USPST. U.S. Preventive Services Task Force grade definitions after March 2007–2008.
18. Erickson, W., Lee, C., & von Schrader, S. (2015). *Disability statistics from the 2013 American Community Survey (ACS)*.

- Ithaca: Cornell University Employment and Disability Institute (EDI).
19. Armour, B. S., Thierry, J. M., & Wolf, L. A. (2009). State-level differences in breast and cervical cancer screening by disability status, United States, 2008. *Womens Health Issues, 19*, 406–414. doi:[10.1016/j.whi.2009.08.006](https://doi.org/10.1016/j.whi.2009.08.006).
 20. Smeltzer, S. C. (2006). Preventive health screening for breast and cervical cancer and osteoporosis in women with physical disabilities. *Family & Community Health, 29*(1S), 358–438.
 21. Iezzoni, L. I., McCarthy, E. P., Davis, R. B., & Siebens, H. (2000). Mobility impairments and use of screening and preventive services. *American Journal of Public Health, 90*(6), 955–961.
 22. Mudrick, N. R., Breslin, M. L., Liang, M. H., & Yee, S. (2012). Physical accessibility in primary health care settings: Results from California on-site reviews. *Disability and Health Journal, 5*(3), 159–167. doi:[10.1016/j.dhjo.2012.02.002](https://doi.org/10.1016/j.dhjo.2012.02.002).
 23. Horner-Johnson, W., Dobbertin, K., Lee, J. C., & Andresen, E. M. (2014). Disparities in health care access and receipt of preventive services by disability type: Analysis of the medical expenditure panel survey. *Health Services Research, 49*(6), 1980–1999.