ARE WOMEN WITH DISABILITY AND MULTI-MORBIDITY BEING SCREENED FOR CERVICAL CANCER? A RETROSPECTIVE COHORT STUDY IN ONTARIO, CANADA

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ABSTRACT

BACKGROUND: Evidence suggests that people with disabilities and/or multiple chronic conditions may experience challenges in accessing quality primary care. Therefore, we aimed to determine the relationship between appropriate cervical cancer screening and level of disability for screening-eligible women in Ontario and to determine the influence of relevant sociodemographic variables and health-related variables, including level of morbidity (measured by number of chronic conditions), on screening for these women.

METHODS: This retrospective population-based cohort study uses multiple linked administrative health databases, including two waves of the Canadian Community Health Survey (2005 and 2007/08). There were 22,824 women included in the study, 7,600 of whom reported some level of disability.

RESULTS: Women with disability tended to be significantly older, less educated, and of lower income than women without disability, and were more than four times as likely to have at least two chronic conditions: 36.2% had at least two chronic conditions versus 8.4% among women without disability. Overall, 62.7% of women with no disability had been appropriately screened for cervical cancer versus 53.6% of women with some level of disability. In multivariate logistic regression, age, rurality, education and household income were each independently associated with cervical cancer screening. There was a significant interaction between level of morbidity and level of disability. Women with a higher level of disability were less likely to be screened than women with a lower level of disability as their level of morbidity increased.

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CONCLUSION: As the population ages, the number of persons in the province of

Ontario with complex medical needs is increasing. Policy makers should take note of

these results as they work toward improving primary health care for all.

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INTRODUCTION

Preventative health services, such as screening for cervical, breast and colorectal cancer, are important components of primary care. For example, cervical cancer screening has been highly effective in Canada, where incidence and mortality have steeply declined in recent decades due to widespread use of the Papanicolaou (Pap) test[1, 2]. Because of the effectiveness of the Pap test, it is estimated that up to 90% of invasive cervical cancers can be prevented by regular screening[3]. Accordingly, Canada has among the world's lowest annual incidence and mortality rates of invasive cervical cancer[10, 11]. Current Ontario guidelines recommend that women 21 years and over be screened every three years until the age of 70 years[4].

Cervical cancer screening, with its proven effectiveness, clear guidelines and broad applicability, serves as an important example of a preventative tool that should be equally accessed by all eligible women, regardless of concurrent illness or disability. However, the literature suggests that people with disabilities or with multiple chronic conditions may experience challenges in accessing quality preventative health care. Those with multi-morbidity (the co-existence of at least two chronic conditions in one patient) and complex healthcare needs often receive care that is fragmented, incomplete, inefficient, and ineffective[5-7]. Several barriers to access to quality care for people with disability have been identified in the literature, including structural, attitudinal, educational, and system barriers[8]. A recent systematic review found that barriers to quality primary care for people with multi-morbidity included insufficient

consultation time and fragmentation of health care[7]. Although people with multi-

morbidity or disability have an overall higher use of health services, previous research

has suggested that they may be less likely to receive preventative health services such

as screening[9-12]. However, there is a gap in the literature with regard to

understanding the extent to which level of disability and multi-morbidity interact and

influence screening.

Therefore, in this retrospective cohort study, we linked provincial survey and

administrative data to determine the relationship between appropriate cervical cancer

screening and level of disability for screening-eligible women in Ontario. We also aimed

to determine the influence of relevant sociodemographic and health-related variables,

including level of morbidity, on appropriate screening for these women.

METHODS

Data Sources

The data sources used in this study were accessed at the Institute for Clinical

Evaluative Sciences (ICES), and included the 2005 and 2007/2008 Canadian

Community Health Surveys (CCHS), and several administrative health databases

including Ontario Health Insurance Plan (OHIP) Claims, the Registered Persons

Database [RPDB], the Ontario Cancer Registry (OCR), and the Canadian Institute of

Health Information Discharge Abstract Database (CIHI-DAD). The CCHS is a cross-

sectional self-report survey administered by Statistics Canada. The survey gathers

information on health status, health care utilization and health determinants for the

Canadian population. The OHIP Claims Database contains physicians' fee-for-service claims and the RPDB documents the age, sex, date of birth, date of death, and postal code of each health card holder in the province. The Ontario Cancer Registry (OCR) is a registry of all Ontario residents who have been newly diagnosed with cancer or who have died of cancer. The CIHI-DAD contains information on all hospital discharges and corresponding diagnostic and procedure codes. Ontario residents were linked through all administrative databases and to the CCHS by a unique anonymized identifying number.

Study Population

The study population was drawn from respondents to the 2005 CCHS and 2007/2008 CCHS who agreed to have their responses linked with their personal health information (approximately 30,000 individuals per CCHS cycle). Cohort members had to be female residents of Ontario, 21 to 69 years of age and alive during an entire three year observation window [i.e. the three calendar years after completion of the survey: January 1, 2006 - December 31, 2008 or January 1, 2009 - December 31, 2011], eligible for OHIP during the entire observation window, and had to have answered the CCHS Participation and Activity Limitation questions. Any woman with a diagnosis of an invasive cervical cancer prior to the end of the observation window or with a prior hysterectomy was excluded, as she would no longer be eligible for screening for the entire three-year period.

Measures

The Participation and Activity Limitation items in the CCHS were used to define level of disability. These items classify respondents by the frequency with which they experience activity limitations due to a condition(s) or long-term health problem that has lasted or is expected to last 6 months or more. We classified women who reported never, sometimes and often experiencing activity limitations as having no, moderate and severe disability respectively.

Sociodemographic measures documented for each cohort member from the CCHS included age, immigrant status, level of education, household income, and marital status. The Rurality Index of Ontario score and neighbourhood income quintile based on women's postal codes were further obtained from administrative databases[13].

Morbidity was defined on the basis of the presence of at least one of several chronic conditions noted on the CCHS, namely arthritis, hypertension, chronic obstructive pulmonary disorder (COPD), diabetes, heart disease, cancer, stroke, Alzheimer's or other dementias, and mood/anxiety disorder. In 2009, more than 40% of Canadian adults reported having at least one of these conditions[14]. Specifically, level of morbidity was defined as having zero, one or at least two of these chronic conditions. Other health-related measures drawn from administrative databases included health care use during the study period, namely overall physician visits, family physicians visits, specialist visits, emergency room visits, and hospitalizations.

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We used OHIP fee codes for Pap tests to identify appropriate cervical cancer screening. Screening rates were examined over a three-year period as per provincial guidelines[4], specifically the three calendar years following each cohort member's completion of the CCHS.

Data Analysis

We used descriptive statistics to describe demographics of the study cohort. We also conducted parametric and non-parametric bivariate analyses. All statistical tests were performed at the 5% level of significance, two-sided, using SAS for Unix, version 9.1.3 (SAS Institute, Cary, NC). We employed multivariate logistic regression to examine differences in cervical screening rates. Predictor variables included household income, age as a continuous variable, education, rurality, and level of morbidity, and level of disability. We also tested for an interaction effect between level of morbidity and level of disability.

This study was approved by the Research Ethics Board of Sunnybrook Health Sciences Centre.

RESULTS

Results were initially stratified by year of completion of CCHS, but as differences were negligible, the survey cohorts were subsequently combined. Table 1 describes the demographic characteristics of the study cohort. There were a total of 22 824 women included, 7 600 of whom had some level of disability (moderate or severe). Women with

disability tended to be significantly older, less educated, and of lower income than women without disability. They were slightly less likely to live in large urban areas, and slightly more likely to live in small urban areas. Women with disability were also more likely to be separated or divorced, and more than four times as likely to have at least two chronic conditions: 36.2% had at least two chronic conditions versus 8.4% among women without disability. Differences across sociodemographic characteristics tended to be more pronounced as level of disability increased from moderate to severe. During the study period, women with disability had significantly more family physician visits (mean 15.1 vs. 10.7, p<.001), specialist visits (mean 8.1 vs. 4.8, p<.001) and emergency room visits (mean 2.5 vs. 1.6, p<.001).

Overall, 62.7% of women with no disability had been appropriately screened for cervical cancer versus 53.6% of women with some level of disability. Bivariate analyses were conducted for all sociodemographic variables versus level of disability (Table 2). Screening rates were persistently significantly lower for women with disability than without disability across sociodemographic subgroups. As well, screening rates decreased across all levels of disability as age category increased, as level of education decreased, as household income decreased, as level of rurality increased, and as number of chronic conditions increased. Screening rates were higher for married women versus women who were widowed, single, separated or divorced. The lowest screening rate overall was seen for women with severe disability and less than secondary school education (33.0%) and the highest was seen for women with no disability and who had a household income of at least $100,000 per year (72.4%).

An interaction was observed between morbidity and disability with regards to cervical

cancer screening (Figure 1). Across all levels of morbidity, screening rates decreased

as level of disability increased, especially from moderate to severe disability. Lower

screening rates were most pronounced for women with at least two chronic conditions

compared to those with zero or none, particularly between those with moderate

disability versus those with no disability. Comparing the best-case and worst-case

scenarios for disability and morbidity, 64.5% of women with no disability and no chronic

conditions were appropriately screened as compared to only 39.9% of women with

severe disability and two or more chronic conditions.

Multivariate logistic regression results are described in Table 3. The interaction between

level of morbidity and level of disability was statistically significant, p=0.0056. Women

with a higher level of disability had significantly lower odds of screening than women

with a lower level of disability as their level of morbidity increased. Age, rurality,

education, and household income were also each independently associated with

cervical cancer screening.

DISCUSSION

In this retrospective cohort study, we have shown that women with disability in Ontario

are at a significant sociodemographic disadvantage as compared to their peers without

disability, having lower income, less education, and being less likely to have marital or

common-law supports. Both their degree of socioeconomic disadvantage and their

disability placed these women at risk of lower rates of cervical cancer screening, with as few as 33.0% of women with both severe disability and less than a secondary school education being screened appropriately. We found a strong interaction effect between disability and morbidity, such that increased morbidity resulted in the greatest inequalities in screening among women with severe disability.

Our findings suggest that women with disability, particularly those with multiple chronic conditions, are not consistently receiving appropriate cervical cancer screening in Ontario, despite having more contact with the health care system and with their primary care providers than their peers. There may be several reasons for these findings. Time constraints due to competing demands at primary care visits may play a major role, namely a focus on more acute medical management of their chronic conditions or disabilities[5, 7, 15-18]. Physical limitations, both in getting to physicians' offices and within physicians' offices, such as the examination table, have also been identified as potentially influencing screening practices for women with disabilities[9, 19-22]. Inaction on the part of physicians may also be a barrier to screening for women with disabilities, with physicians 'self-identified lack of confidence' having been noted in the literature[23-25]. Also, physician recommendation is known to be an important predictor of cervical cancer screening[26, 27]. Our findings also suggest that there is a significant effect on screening of moving from no to moderate disability for women with two or more chronic conditions, but not for women with zero or one chronic conditions. This may reflect that increased health care needs only become detrimental to screening at a threshold level of competing demands.

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In addition to screening inequalities due to their disability and/or due to the presence of co-morbid conditions, it appears that these women are also vulnerable to under-screening because of their socioeconomic disadvantage. It is well documented in the literature that women with less income and education have lower cervical cancer screening rates relative to their more affluent and more educated peers[28-33], a disparity that is evident even within a universal health care system such as that which exists in Ontario. Research also suggests that married women are more likely to be screened [34-39], which is consistent with our findings that women who were less likely to be screened were also less likely to be in a married or common-law relationship. Barriers to screening for socioeconomically disadvantaged women include being able to afford transportation, being able to afford childcare, lack of awareness of the need for screening, low health literacy, and again, lack of physician recommendation[26, 27, 40-42].

Our results are consistent with other Canadian and international literature. A recent multi-country study showed that disability was consistently more prevalent in the poorest than richest wealth quintiles[43]. In their population-based study, Cobigo et al. demonstrated that the proportion of Ontario women with intellectual and developmental disabilities who were not screened for cervical cancer was nearly twice that of women without these disabilities[44]. Expected use of health care resources was adjusted for in regression analysis but any potential interaction effects were not examined. Multi-morbidity has been strongly associated with preventable hospital admissions, with this

risk being exacerbated by socioeconomic deprivation, which suggests room for improvement in primary care[45]. Cervical cancer screening inequalities in Ontario have previously been shown for women of low income and foreign-born women[29, 46, 47], and cervical cancer screening rates among Ontario women with traumatic spinal cord injury have been shown to be significantly influenced by income[5]. Women with an intermediate level of co-morbidity have previously been found to have higher cervical cancer screening rates than those with either a higher or lower level [48].

It is feasible that the inequalities we observed may extend to other forms of preventative health care, such as screening for other cancers and other preventable chronic conditions. Therefore in future research we plan to examine appropriate use of other preventative health services such as breast and colorectal cancer screening, and screening for diabetes and hyperlipidemia. It will be important to determine if the inequalities we observed in this study are only applicable to preventive care procedures such as cancer screening, or if they also extend to screening that is performed by simpler measures such as blood tests.

Recent primary care reforms in Ontario have potentially allowed for longer appointment times [as physicians are often paid by capitation instead of fee-for-service], and for non-physician health professionals such as nurse practitioners to become involved in delivering preventative care, particularly in Family Health Teams. Therefore, it will be informative to determine the effects that primary care reform has on these results and we will pursue this issue in future research. The Canadian Academy of Health Sciences

recently emphasized that people living with chronic health conditions can benefit from

primary health care teams, appropriate funding models, and continuous quality

improvement[14]. Interestingly, chronic disease management has been found to be best

in community health centres, which are a long-established model of primary health care

that has preceded more recent primary care reform[49]. It would be interesting to

ascertain if this finding about community health centres also holds true for preventive

care in people with both disability and chronic diseases. As well, there are several

primary health care locations in Ontario that have services geared specifically toward

people with disabilities. Future research that evaluates the quality of primary health care

received at these sites will also be crucial to determining the best way to address

inequalities for women with multi-morbidity and/or physical disability.

This study has several limitations. First, it is feasible that some of the women with

disability included in our study may not have been appropriate for cancer screening

depending on their level of illness and co-morbidity. They may not have been expected

to live long enough to qualify for screening or may never have been sexually active.

However, we suspect that patients in the former category would have been less likely to

complete the CCHS and would therefore be relatively few. Second, disability and multi-

morbidity were measured at the beginning of each woman's three-year study period and

might not have stayed consistent throughout the study period. However, for the majority

of women, it is most likely that medical complexity would likely only have worsened over

time. Third, the potential for selection bias exists with the CCHS given its voluntary

nature. Finally, we relied on secondary administrative data that were not expressly

collected for research purposes for this study and are limited by what is available. For

example, it is not possible to know who instigated screening, the patient or the provider.

Similarly, administrative data do not allow us to identify how many women were offered

the test but declined. However, using administrative data allowed us to conduct a large,

population-based study.

CONCLUSION

As the population ages, the number of persons in the province of Ontario with complex

medical needs is increasing. Our finding that women with physical disabilities and with

co-morbid conditions are not being screened for cervical cancer at the same rate as

their peers, as well as the fact that they have lower socioeconomic position, which also

influences screening, is concerning as it suggests that this vulnerable and growing

population is not receiving appropriate quality preventive care. Policy makers should

take note of these results as they work toward improving primary health care for all.

ACKNOWLEDGEMENTS

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		No Disability (n=15,224)	Yes Disability (n=7,600)	Moderate Disability (n=4,242)	Severe Disability (n=3,358)	P Value*
Total cohort N=22,824		n (%)	n (%)	n (%)	n (%)	
Age	Mean ± SD	42.9 ± 13.5	48.8 ± 13.5	47.6 ± 13.7	50.4 ± 13.1	<0.001
	< 29	2945 (19.3)	892 (11.7)	567 (13.4)	325 (9.7)	
	30-39	4106 (27.0)	1166 (15.3)	734 (17.3)	432 (12.9)	
	40-49	3029 (19.9)	1492 (19.3)	874 (20.6)	618 (18.4)	
	50-59	2748 (18.1)	2000 (26.3)	1031 (24.3)	969 (28.9)	
	60-69	2396 (15.7)	2050 (27.0)	1036 (24.4)	1014 (30.2)	
Country of Birth	Canada	11899 (78.2)	6222 (81.9)	3408 (80.3)	2814 (83.8)	<0.001
	Other	2967 (19.5)	1253 (16.5)	756 (17.8)	497 (14.8)	
Education	Less than secondary	1369(9.0)	1201(15.8)	549(12.9)	652(19.4)	<0.001
	Secondary/Some post	3788(24.9)	1935(25.5)	1063(25.1)	872(26.0)	
	Post secondary	10028(65.9)	4438(58.4)	2620(61.8)	1018(54.1)	
Household Income	< $30,000	2170(14.3)	1993(26.2)	879(20.7)	1114(33.2)	<0.001
	$30,000 to $59,999	4056(26.6)	2129(28.0)	1171(27.6)	958(28.5)	
	$60,000 to $99,999	4288(28.2)	1731(22.8)	1104(26.0)	627(18.7)	
	$100,000 +	3569(23.4)	1149(15.1)	761(17.9)	388(11.6)	
Marital Status	Married/Common Law	9756 (64.1)	4339 (57.1)	2544 (60.0)	1795 (53.5)	<0.001
	Widowed/Single	3821 (25.1)	2036 (26.8)	1110 (26.1)	926 (27.6)	
	Separated/Divorced	1643 (10.8)	1222 (16.1)	587 (13.8)	635 (18.9)	
Chronic Conditions	0	10774 (70.8)	2502 (32.9)	1682 (39.7)	820 (24.4)	<0.001
	1	3178 (20.9)	2350 (30.9)	1368 (32.3)	982 (29.2)	
	2 +	1272 (8.4)	2748 (36.2)	1192 (28.1)	1556 (46.3)	
Rurality Index	0-9 (large urban)	8377 (55.0)	3878 (51.0)	2200 (51.9)	1678 (50.0)	<0.001
	10-44 (small urban)	5001 (32.9)	2771 (36.5)	1513 (35.7)	1258 (37.5)	
	45+ (rural)	1674 (11.0)	862 (11.3)	467 (11.0)	395 (11.8)	
Health System Contact During Study Period	Mean ± SD					
	Physician visits	15.5 (16.1)	23.2 (21.4)	20.7 (19.5)	26.4 (23.2)	<0.001
	Family physician visits	10.7 (11.7)	15.1 (15.2)	13.8 (14.3)	16.7 (16.2)	<0.001
	Specialist visits	4.8 (8.5)	8.1 (11.7)	6.9 (10.0)	9.6 (13.5)	<0.001
	Emergency room visits	1.6 (3.1)	2.5 (4.9)	2.2 (4.1)	2.9 (5.7)	<0.001
	Hospitalizations	0.4 (0.7)	0.6 (1.0)	0.5 (0.9)	0.7 (1.1)	<0.001

*p value represents comparison of "no disability" to "yes disability"

Table 1. Demographics of 22,824 women in study cohort.

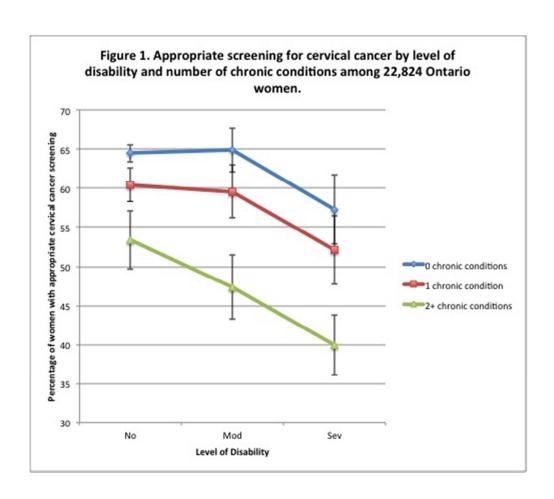|		No Disability (n=15,224)	Yes Disability (n=7,600)	Moderate Disability (n=4,242)	Severe Disability (n=3,358)	P Value*
Total cohort N=22,824		n (%)	n (%)	n (%)	n (%)	
Age	< 29	1951 (66.3)	576 (64.6)	392 (69.1)	184 (56.6)	0.3632
	30-39	2854 (69.5)	751 (64.4)	492 (67.0)	259(60.0)	0.0007
	40-49	2002 (66.1)	903 (60.5)	559 (64.0)	344 (55.7)	0.0002
	50-59	1599 (58.2)	1056 (52.8)	580 (56.3)	476 (49.1)	0.0003
	60-69	1143 (44.7)	787 (38.4)	448 (43.2)	339 (33.4)	<.0001
Country of Birth	Canada	7507 (63.1)	3326 (53.5)	1999 (58.9)	1327 (47.2)	<.0001
	Other	1827 (61.6)	681 (54.4)	433 (57.3)	248 (49.9)	<.0001
Education	Less than secondary	621 (45.4)	454 (37.8)	239 (43.5)	215 (33.0)	0.2324
	Secondary/Some post	2256 (59.6)	1004 (51.9)	579 (54.5)	425 (48.7)	.0011
	Post secondary	6653 (66.3)	2602 (58.6)	1647 (62.9)	955 (63.8)	<.0001
Household Income	< $30,000	1127 (51.9)	843 (42.3)	411 (46.8)	432 (38.8)	<0.0001
	$30,000 to $59,999	2368 (58.4)	1098 (51.6)	670 (57.2)	428 (44.7)	<.0001
	$60,000 to $99,999	2837 (66.2)	1076 (62.2)	706 (68.8)	370 (59.0)	0.003
	$100,000 +	2583 (72.4)	772 (67.2)	520 (68.3)	252 (65.5)	0.0008
Marital Status	Married/Common Law	6374 (65.3)	2444 (56.3)	1542 (60.6)	902 (50.3)	<.0001
	Widowed/Single	2216 (58.0)	1029 (50.5)	619 (55.8)	410 (44.3)	<.0001
	Separated/Divorced	956 (58.2)	598 (48.9)	309 (52.6)	289 (45.5)	<.0001
Chronic Conditions	0	6948 (64.5)	1561 (62.4)	1091 (64.9)	470 (57.3)	0.0487
	1	1922 (60.5)	1327 (56.5)	815 (59.6)	512 (52.1)	0.003
	2 +	679 (53.4)	1185 (43.1)	565 (47.4)	620 (39.9)	<.0001
Rurality Index	0-9 (large urban)	5597 (66.8)	2223 (57.3)	1363 (62.0)	860 (51.3)	<0.001
	10-44 (small urban)	2997 (59.9)	1464 (52.8)	874 (57.8)	590 (46.9)	<0.001
	45+ (rural)	780 (46.5)	346 (40.1)	206 (44.1)	140 (35.4)	<0.001

*p value represents comparison between "no disability" and "yes disability"

Table 2. Number and proportion of women appropriately screened for cervical cancer by level of disability and sociodemographic characteristics.

	Adjusted odds ratio [95% confidence interval]
Age	0.98 [0.98-0.98]
Rurality Index	
Small urban vs. large urban	0.81 [0.76-0.87]
Rural vs. large urban	0.60 [0.55-0.66]
Education	
Less than secondary vs. post-secondary	0.65 [0.59-0.72]
Secondary vs. post-secondary	0.85 [0.80-0.91]
Household Income	
<$30,000 vs. $100,00+	0.49 [0.44-0.54]
$30-59,999 vs. $100,00+	0.63 [0.58-0.68]
$60-99,999 vs. $100,00+	0.81 [0.74-0.88]
Disability	
Moderate vs. no disability	1.10 [0.98-1.24]
Severe vs. no disability	0.86 [0.74-1.01]
Chronic Conditions	
1 vs. 0 conditions	1.12 [1.02-1.23]
2+ vs. 0 conditions	1.03 [0.90-1.17]
Disability*Chronic Conditions	
Moderate vs. no disability (0 conditions)	1.10 [0.98-1.24]
Severe vs. no disability (0 conditions)	0.86 [0.74-1.01]
Severe vs. moderate disability (0 conditions)	0.78 [0.65-0.94]
Moderate vs. no disability (1 condition)	0.99 [0.86-1.14]
Severe vs. no disability (1 condition)	0.74 [0.64-0.87]
Severe vs. moderate disability (1 condition)	0.75 [0.63-0.90]
Moderate vs. no disability (2+ conditions)	0.77 [0.64-0.91]
Severe vs. no disability (2+ conditions)	0.63 [0.53-0.74]
Severe vs. moderate disability (2+ conditions)	0.82 [0.70-0.97]

Table 3. Results of multivariable logistic regression, where variables included in the model were age (as a continuous variable), rurality, education, household income, level of disability, level of morbidity (i.e. number of chronic conditions), and the interaction between level of disability and level of morbidity.

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Figure 1. Appropriate screening for cervical cancer by level of disability and number of chronic conditions among 22,824 Ontario women.

175x154mm (72 x 72 DPI)