

Women's views about breast cancer prevention at mammography screening units and well women's clinics

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ABSTRACT

Background Women attending mammography screening units (MSUs) and well women's clinics (WWCs) represent a motivated cohort likely to engage in interventions aimed at primary breast cancer (BCa) prevention.

Methods We used a feasibility questionnaire distributed to women (40–49 or 50–74 years of age) attending MSUs and WWCs in Halifax, Nova Scotia, to examine

- women's views about BCa primary prevention and sources of health care information,
- prevalence of lifestyle-related BCa risk factors, and
- predictors of prior mammography encounters within provincial screening guidelines.

Variables examined included personal profiling, comorbidities, prior mammography uptake, lifestyle behaviours, socioeconomic status, health information sources, and willingness to discuss or implement lifestyle modifications, or endocrine therapy, or both. A logistic regression analysis examined associations with prior mammography encounters.

Results Of the 244 responses obtained during 1.5 months from women aged 40–49 years ($n = 75$) and 50–74 years ($n = 169$), 56% and 75% respectively sought or would prefer to receive health information from within, as opposed to outside, health care. Lifestyle-related BCa risk factors were prevalent, and most women were willing to discuss or implement lifestyle modifications (93%) or endocrine therapy (67%). Of the two age groups, 49% and 93% respectively had previously undergone mammography within guidelines. Increasing age and marital status (single, separated, or divorced vs. married or partnered) were independent predictors of prior mammography encounters within guidelines for women 40–49 years of age; no independent predictors were observed in the older age group.

Conclusions Women attending MSUs and WWCs seem to largely adhere to mammography guidelines and appear motivated to engage in BCa primary prevention strategies, including lifestyle modifications and endocrine therapy. Women's views as observed in this study provide a rationale for the potential incorporation of BCa risk assessment within the "mammogram point of care" to engage motivated women in BCa primary prevention strategies.

Key Words Prevention, breast cancer

Curr Oncol. 2020 June;27(3)e336–e342

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INTRODUCTION

Breast cancer (BCa) affects 1 in 8 Canadian women during their lifetime^{1,2}. The disease comprises several underlying subtypes that are associated with varying biologic behaviours^{3,4}. Of those malignancies, approximately

65%–75% are characterized by the expression of endocrine receptors (estrogen receptor, or progesterone receptor, or both), and are influenced by the surrounding endocrine milieu⁵. Increased risk for BCa has been associated with a number of variables that influence that endocrine milieu: menopausal status, time from menarche until first

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Supplemental material available at <http://www.current-oncology.com>

live birth, higher body mass index (BMI), use of hormone replacement therapy⁶, and a number of other lifestyle-related factors (for example, physical inactivity or sedentary lifestyle, and high alcohol intake).

The improvements in BCa outcomes achieved worldwide to date have been attributed primarily to the early detection of cancer through secondary cancer prevention (that is, breast screening) and provision of adjuvant systemic therapies that reduce cancer recurrence⁷. Primary prevention can be achieved through modification of some combination of recognized lifestyle-related BCa risk factors (for example, high BMI, physical inactivity or sedentary lifestyle, and high alcohol intake) and pharmacologic intervention (for example, tamoxifen chemoprevention)⁸. Women attending mammography screening units (MSUs) and well women's clinics (WWCs) potentially represent a motivated cohort likely to engage in interventions aimed at BCa primary prevention. In Nova Scotia, the Nova Scotia Breast Screening Program conducts annual screening mammography for asymptomatic women 40–49 years of age, offered on a self-referral basis, and screening every 2 years for those 50–74 years of age. The prevalence of lifestyle-related risk factors for BCa among women attending MSUs and WWCs and the views of those women about BCa primary prevention are currently unknown.

The objectives of the present cross-sectional study, conducted in women 40–49 and 50–74 years of age attending MSUs and WWCs, were to examine

- women's views about BCa primary prevention and sources of health care information,
- prevalence of lifestyle-related risk factors for BCa, and
- predictors of prior mammography encounters within provincial screening guidelines.

METHODS

Participant Cohort

Women 40 to 74 years of age without a prior history of BCa who attended a MSU (Nova Scotia Breast Screening Program, Halifax, Nova Scotia) or a WWC (Family Focus Group, Halifax), or both, over a 1.5-month period in 2017 were approached to participate in a survey questionnaire (supplementary Appendix A1). Respondents were stratified according to age groups relevant to provincial screening guidelines (40–49 years vs. 50–74 years). "Prior mammography encounter within guidelines" was defined as being within an 18-month (women aged 40–49 years) or 30-month period (women aged 50–74 years) from last mammography.

The study was approved by the IWK Research Ethics Board.

Statistical Analysis

Participant characteristics (including their views about BCa primary prevention and sources of health care information) and personal prevalence of lifestyle-related BCa risk factors were examined by age group. The associations between participant characteristics and mammography behaviour (that is, within vs. outside guidelines) were examined using chi-square tests, the Student *t*-test, the Wilcoxon rank-sum

test, and univariate logistic regression, as appropriate. All variables significant at $p < 0.1$ were included in a multivariate logistic regression model to identify independent predictors of mammography behaviour. Odds ratios and associated 95% confidence intervals are reported. Models were run separately for the two age groups. All statistical analyses were carried out using the SAS/STAT 12.1 software application (version 9.4: SAS Institute, Cary, NC, U.S.A.).

RESULTS

During the planned 1.5-month period, 244 women aged 40–49 years ($n = 75$) and 50–74 years ($n = 169$) completed the questionnaire (Table I). Of those responders, 56% and 75% respectively indicated that they sought or would prefer to receive health information from within as opposed to from outside the health care system. Overall, most were willing to discuss or implement lifestyle modifications (93%) or endocrine therapy (67%) for BCa prevention. Lifestyle-related BCa risk factors were prevalent in both age cohorts: 43.2% (40–49 years) and 27.0% (50–74 years) had a BMI exceeding 30; 14.9% and 25.0% consumed 1 or more alcoholic drinks daily; 48.6% and 38.1% did not meet exercise guidelines; and 54.2% and 45.8% had high rates of inactivity or a sedentary lifestyle.

Prior mammography encounters within provincial guidelines were reported by 49% of respondents 40–49 years of age and 93% of those 50–74 years of age. In the univariate analysis, a number of variables were associated with mammography encounters (Table II), but only age and marital status remained significant in the multivariate model (Table III). In women 40–49 years of age, prior mammography encounters (within vs. outside guidelines) were positively associated with increasing age (odds ratio per 1-year increase: 1.24; 95% confidence interval: 1.01 to 1.52), but inversely associated with being married or partnered compared with being single, separated, or divorced (odds ratio: 0.28; 95% confidence interval: 0.08 to 0.96). In women 50–74 years of age, no significant predictors of mammography behaviour were identified in the multivariate analysis. Most importantly, mammography behaviour was not associated with women's views about BCa prevention.

DISCUSSION

Women attending MSUs and WWCs appear motivated to engage in primary BCa prevention strategies, including lifestyle modifications and possibly endocrine therapy. The higher enthusiasm for engaging in lifestyle modifications (93%) as opposed to endocrine therapy (67%) could reflect a genuine preference for nonpharmacologic interventions or a lack of sufficient knowledge about endocrine therapy. In our study, lifestyle-related BCa risk factors, including high BMI, high alcohol intake, and low physical exercise or high inactivity, were prevalent. Lifestyle modifications could help to address BCa risk and improve cardiovascular health^{9,10}, although uptake remains low in target populations^{11,12}. Endocrine-based pharmacologic intervention is another recognized BCa prevention strategy for women at high risk for BCa. Indeed, a number of risk prediction models currently incorporate clinico-epidemiologic

TABLE I Characteristics of the study participants

Characteristic ^a	Age group					
	40–49 Years		50–74 Years		Overall	
	(n)	(%) ^b	(n)	(%) ^b	(n)	(%) ^b
Participants	75	(30.7)	169	(69.3)	244	(100)
Menopausal status ¹						
Pre- or perimenopausal	65	(97.0)	47	(28.7)	112	(45.9)
Postmenopausal	2	(3.0)	117	(71.3)	119	(48.8)
Education ²						
<High school or high school	10	(13.3)	54	(33.3)	64	(26.2)
≥College or university	65	(86.7)	108	(66.7)	173	(70.9)
Marital status ³						
Single, separated, or divorced	22	(29.7)	43	(26.4)	65	(26.6)
Married or living with partner	52	(70.3)	120	(73.6)	172	(70.5)
Employment status ⁴						
Not employed or retired	3	(4.0)	82	(50.6)	85	(34.8)
Employed (part-time or full-time)	72	(96.0)	80	(49.4)	152	(62.3)
Household income						
Missing or prefer not to answer	6	(8.0)	51	(30.2)	57	(23.4)
<\$60,000	20	(26.7)	38	(22.5)	58	(23.8)
\$60,000–\$99,999	20	(26.7)	49	(29.0)	69	(28.3)
≥\$100,000	29	(38.6)	31	(18.3)	60	(24.6)
Insurance coverage ⁵						
None	3	(4.1)	10	(6.2)	13	(5.3)
Public	1	(1.3)	40	(25.0)	41	(16.8)
Private	70	(94.6)	110	(68.8)	180	(73.8)
Body mass index ⁶						
<25	17	(23.0)	59	(36.2)	76	(31.2)
25 to <30	25	(33.8)	60	(36.8)	85	(34.8)
>30	32	(43.2)	44	(27.0)	76	(31.2)
Smoking history						
None	39	(52.0)	78	(46.2)	117	(48.0)
Current or ex-smoker	36	(48.0)	91	(53.8)	127	(52.0)
Alcohol use ⁷						
Daily intake						
Never or <1	63	(85.1)	123	(75.0)	186	(76.2)
≥1	11	(14.9)	41	(25.0)	52	(21.3)
Binge behaviour (monthly) ⁸						
Never or <1	58	(77.3)	129	(78.2)	187	(76.6)
≥1	17	(22.7)	36	(21.8)	53	(21.7)
Average nutrition intake						
Vegetable servings ^{9a}						
Higher (1 to ≥2 daily)	36	(48.0)	90	(53.3)	126	(51.6)
Lower (≤4 to 6 weekly)	39	(52.0)	79	(46.7)	118	(48.4)
Fruit servings ^{9b}						
Higher (1 to ≥2 daily)	38	(50.7)	93	(55.0)	131	(53.7)
Lower (≤4 to 6 weekly)	37	(49.3)	76	(45.0)	113	(46.3)
Red meat servings ¹⁰						
Lower (<1 weekly)	18	(26.9)	51	(34.2)	66	(25.6)
Higher (≥1 weekly)	49	(73.1)	98	(65.8)	153	(59.3)
Meeting total MVPA guidelines ¹¹						
Yes	37	(51.4)	99	(61.9)	136	(55.7)
No	35	(48.6)	61	(38.1)	96	(39.3)

TABLE I Continued

Characteristic ^a	Age group					
	40–49 Years		50–74 Years		Overall	
	(n)	(%) ^b	(n)	(%) ^b	(n)	(%) ^b
Meeting resistance exercise guidelines ¹²						
Yes	18	(24.7)	38	(23.6)	56	(23.0)
No	55	(75.3)	123	(76.4)	178	(73.0)
Average daily sedentary time ¹³						
Low	33	(45.8)	84	(54.2)	117	(48.0)
High	39	(54.2)	71	(45.8)	110	(45.1)
Prior mammography encounter ¹⁴						
Within screening guidelines	37	(49.3)	157	(92.9)	194	(79.5)
Outside screening guidelines	38	(50.7)	12	(7.1)	50	(20.5)
Health info source						
Practice ¹⁵						
Within health care	34	(45.3)	103	(60.9)	170	(69.7)
Outside health care	41	(54.7)	66	(39.1)	61	(25.0)
Desire ¹⁶						
Within health care	58	(77.3)	125	(74.0)	129	(52.9)
Outside health care	17	(22.7)	44	(26.0)	107	(43.8)
Willingness for intervention						
Lifestyle modification ¹⁷						
Yes	70	(93.3)	152	(93.3)	222	(91.0)
No or unknown ^c	5	(6.7)	11	(6.7)	16	(6.6) ^a
Endocrine therapy ¹⁸						
Yes	51	(68.0)	107	(66.5)	158	(64.7)
No or unknown ^d	24	(32.0)	54	(33.5)	78	(32.0) ^b
Hysterectomy						
Yes	4	(5.3)	48	(28.4)	52	(21.3)
No	71	(94.7)	121	(71.6)	192	(78.7)
Potential tamoxifen contraindication						
Yes	70	(93.3)	145	(85.8)	29	(11.9)
No	5	(6.7)	24	(14.2)	215	(88.1)
Bone mineral density testing ¹⁹						
Yes	8	(10.7)	94	(56.3)	102	(41.8)
No	67	(89.3)	73	(43.7)	140	(57.4)
Osteopenia or osteoporosis medications						
Yes	1	(1.3)	23	(13.6)	24	(9.8)
No	74	(98.7)	146	(86.4)	220	(90.2)

^a In this table, the numeric footnotes refer to definitions supplied in supplementary Appendix A2 about the relevant variables.

^b The sum of the response percentages for individual variables might not always equal 100%. Participants were allowed to leave questions unanswered, resulting in missing data. For most part, missing responses totaled to less than 5%; all are specifically noted in the supplementary material.

^c “Unknown” responses totaled 78% of the “No/unknown” responses (14 of 16 responses) when study participants were asked about their willingness to engage in interventions to implement lifestyle modifications.

^d “Unknown” responses totaled 81% of the “No/unknown” responses (63 of 78 responses) when study participants were asked about their willingness to engage in interventions to implement endocrine therapy.

MVPA = moderate-to-vigorous physical activity.

variables to assess BCa risk and potentially to identify those who could benefit from pharmacologic interventions (for example, selective estrogen receptor modulators and aromatase inhibitors)¹³.

Women attending MSUs and WWCs seem largely to adhere to screening mammography. The observed association between mammography behaviour (within vs. outside

guidelines) and increasing age within the group 40–49 years of age was not surprising given the current debate about mammography screening in that group compared with the older group (50–74 years of age). The Canadian Task Force on Preventive Health Care recommends that women 40–49 years of age who are not at increased risk should not attend mammography screening¹⁴. The

TABLE II Univariate logistic regression models for potential predictors of mammography behaviour, within compared with outside guidelines

Variable	Comparison	Age group ^a			
		40–49 Years		50–74 Years	
		OR	95% CI	OR	95% CI
Age	Per 1-year increase	1.32	1.10 to 1.60	1.04	0.94 to 1.14
Body mass index	Per 1-unit increase	1.00	0.94 to 1.07	0.95	0.87 to 1.04
Menopausal status	Post- vs. Pre- or perimenopausal	1.03	0.06 to 17.24	0.82	0.21 to 3.17
Education	≥College vs. ≤High school	1.55	0.40 to 5.98	1.36	0.37 to 5.05
Marital status	Married or partnered vs. Single, separated, or divorced	0.34	0.12 to 0.98	1.95	0.52 to 7.27
Employment status	Employed vs. Not employed or retired	Not estimable		0.63	0.17 to 2.33
Household income	\$60,000–\$99,999 vs. <\$60,000	0.07	0.01 to 0.72	0.42	0.08 to 2.19
	≥\$100,000 vs. <\$60,000	0.25	0.08 to 0.80	1.06	0.19 to 6.03
Insurance coverage	Other insurances vs. None or public or pharmacare only	Not estimable		0.53	0.11 to 2.60
Smoking history	Current or ex-smoker vs. Never-smoker	0.69	0.28 to 1.70	0.21	0.05 to 1.00
Alcohol					
Daily intake	<1 vs. ≥1	1.93	0.51 to 7.24	2.30	0.69 to 7.70
Binge behaviour (monthly)	<1 vs. ≥1	1.53	0.51 to 4.57	1.21	0.31 to 4.73
Nutrition intake					
Vegetable servings ^b	Higher vs. Lower ^c	1.62	0.65 to 4.03	0.80	0.24 to 2.63
Fruit servings ^b	Higher vs. Lower ^c	1.62	0.65 to 4.04	1.79	0.54 to 5.87
Red meat servings	Lower vs. Higher ^d	1.30	0.44 to 3.86	4.37	1.25 to 15.31
Red meat intake	Yes vs. No	2.00	0.174 to 23.26	1.95	0.22 to 17.24
Meeting MVPA guidelines	Yes vs. No	2.48	0.96 to 6.41	1.17	0.36 to 3.88
Meeting resistance guidelines	Yes vs. No	3.62	1.13 to 11.63	0.92	0.24 to 3.58
Daily sedentary time	Low vs. High	0.88	0.35 to 2.22	1.20	0.33 to 4.31
Health info source					
Practice	Outside vs. Within health care	1.18	0.48 to 2.93	2.01	0.52 to 7.69
Desire	Outside vs. Within health care	0.65	0.22 to 1.95	1.06	0.27 to 4.12
Willingness for intervention					
Lifestyle modification	Willing vs. Not willing	0.63	0.10 to 4.00	1.59	0.18 to 13.89
Endocrine therapy	Willing vs. Not willing	1.58	0.59 to 4.20	2.08	0.58 to 7.52
Hysterectomy surgery	Yes vs. No	1.03	0.14 to 7.69	1.21	0.31 to 4.65
Bone mineral density testing	Yes vs. No	1.82	0.40 to 8.26	1.59	0.47 to 5.45
Osteopenia or osteoporosis medications	Yes vs. No	Not estimable		0.77	0.16 to 3.77
Potential tamoxifen contraindication	Yes vs. No	0.67	0.11 to 4.24	0.46	0.12 to 1.85

^a Based on 244 respondents: 75 aged 40–49 years, and 169 aged 50–74 years. Statistically significant results appear in boldface type.
^b One serving of vegetables is defined as 1 cup of raw leafy vegetables, or 1/2 cup of other vegetables such as carrots or peas, excluding potatoes; one serving of fruit is defined as 1 medium-sized fruit or 1/2 cup chopped, cooked, or canned fruit (excluding fruit juice).
^c 1–2 or more servings daily compared with 4–6 servings or fewer weekly.
^d Less than 1 serving compared with 1 or more servings weekly.
 OR = odds ratio; CI = confidence interval; MVPA = moderate-to-vigorous physical activity.

associations between mammography behaviour and socioeconomic variables such as marital status or household income were interesting. Previous studies have shown that higher individual, parental, and life-course socioeconomic status is positively associated with cancer screening^{15–17}. Most importantly, perhaps, women’s willingness to engage in primary prevention strategies was not associated with

their prior mammography behaviour, although that lack of an association could reflect a selection bias involving highly motivated women in the clinical settings of the present study.

The results of our study should be examined within the context of a number of limitations. The study involved women attending 1 MSU and 1 WWC in an urban setting,

TABLE III Multivariate logistic regression model for independent predictors of mammography behaviour within compared with outside guidelines^a

Variable	Comparison	Age group			
		40–49 Years ^b		50–74 Years	
		OR	95% CI	OR	95% CI
Age	Per 1-year increase	1.24	1.01 to 1.52		
Marital status	Single, separated, or divorced vs. married or partnered	1.0	Reference		
Smoking history	Never vs. Current or ex-smoker			1.0	Reference
				0.27	0.06 to 1.33
Red meat servings	<1 per week vs. ≥1 per week			1.0	Reference
				3.55	0.99 to 12.72
Meeting MVPA guidelines	No vs. Yes	1.0	Reference		
		2.35	0.78 to 7.12		
Meeting resistance guidelines	No vs. Yes	1.0	Reference		
		2.66	0.70 to 10.18		

^a Based on 244 respondents: 75 aged 40–49 years, and 169 aged 50–74 years. Statistically significant results appear in boldface type.

^b Higher household income in this group was significant on univariate analysis, but was not included in the multivariate analysis because of low counts.

OR = odds ratio; CI = confidence interval; MVPA = moderate-to-vigorous physical activity.

and its results should therefore not be generalized to other settings without further confirmatory studies. Although household income was significant in the univariate analysis, we did not include that variable in the multivariate analysis because of low statistical power and missing data. We did not provide ample details about endocrine therapy to the survey respondents; it is therefore conceivable that women's views toward endocrine therapy might have been more favourable after more detailed discussions with their primary care providers. Indeed, most women indicated that they sought or would prefer to receive health information from within, as opposed to outside, the health care system. The study should also be considered within the context of the potential selection bias of the respondents (that is, women who completed the questionnaire relative to those who chose not to) given the small percentage of women who elected to complete the questionnaire (approximately 4%) among all those attending the MSU and the WWC during the study period, and our inability to capture the characteristics of the nonrespondent group compared with the respondent group.

SUMMARY

The high prevalence of lifestyle-related BCa risk factors observed in the study and women's views about BCa prevention strategies, including lifestyle modifications or pharmacologic interventions, could have future practical implications. The inclusion of women's views on those subjects and their preferred sources of health care information is a specifically novel aspect of the study. An assessment of BCa risk could be incorporated into the “mammogram point of care” to engage motivated women in BCa primary prevention strategies¹⁸. Ultimately, the benefits of adopting BCa primary prevention strategies for at-risk women could outweigh those of early detection (that is, screening) or relapse prevention (that is, adjuvant therapies).

CONFLICT OF INTEREST DISCLOSURES

We have read and understood *Current Oncology's* policy on disclosing conflicts of interest, and we declare that we have none.

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