

Association of primary care physician sex with cervical cancer and mammography screening

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Abstract

Objective To assess whether the sex of primary care physicians is associated with differing rates of cervical cancer and mammography screening in a contemporary multicultural context.

Design Structured medical record review of a retrospectively defined cohort.

Setting Academic urban primary care clinic in Montreal, Que.

Participants Seven male physicians and 9 female physicians, and all female patients aged 14 to 69 years registered to one of the physicians (N=1948).

Main outcome measures Screening compliance rates as measured by the elapsed time between the last visit and cervical cancer screening for all women in the study. In addition, in women aged 50 to 69 years, elapsed time between the last visit and mammography screening.

Results Crude rates of Papanicolaou tests for patients of female primary care physicians were higher than for patients of male primary care physicians in all patient age groups. The lowest rates of Pap testing were among the youngest and oldest patients. After adjustment for patient age, first language, and region of birth, as well as physician age, the odds ratio of having a Pap test was 2.24 (95% CI 1.18 to 4.28) for the patients of female physicians, relative to those of male physicians. The adjusted odds ratio for mammography screening was 1.25 (95% CI 0.97 to 1.61) for patients of female physicians.

Conclusion Male primary care physician sex is associated with lower rates of cervical cancer screening in an urban multicultural context. The study did not detect a physician sex effect in the mammography cohort.

EDITOR'S KEY POINTS

- Little research has focused directly on whether physician sex affects rates of screening mammography and cervical cancer screening. Given that women now make up a larger proportion of primary care physicians, screening behaviour in primary care as a whole could have changed from that identified in previous studies.
- This study examined the frequency of Papanicolaou smears and mammograms in a Canadian multicultural urban population to see if previous findings of screening rates were still applicable to this contemporary context.
- In this study, female patients of male family physicians were less likely to have cervical cancer screening. However, no physician sex effect on mammography was discernible from the data, despite previous studies having demonstrated a physician sex difference in mammography screening. This might be a result of the small size of the mammography cohort.

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Lien entre le dépistage du cancer du col et la mammographie et le sexe du médecin de première ligne

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Résumé

Objectif Vérifier s'il existe une association entre le sexe des médecins de première ligne et le taux de dépistage du cancer du col et de mammographie dans un contexte contemporain multiculturel.

Type d'étude Revue structurée des dossiers médicaux d'une cohorte définie rétrospectivement.

Contexte Une clinique universitaire de premiers soins de la ville de Montréal, au Québec.

Participants Seize médecins (7 hommes et 9 femmes) et toutes les patientes de 14 à 69 ans enregistrées auprès d'un de ces médecins (n = 1948).

Principaux paramètres à l'étude Taux de fidélité au dépistage tel qu'établi par le temps écoulé entre la dernière visite et le dépistage du cancer du col pour toutes les patientes de l'étude. Aussi, dans le cas des femmes de 50 à 69 ans, le temps écoulé entre la dernière visite et la mammographie de dépistage.

Résultats De façon générale, les taux de tests de Papanicolaou étaient plus élevés pour les patientes des femmes médecins de première ligne que pour celles de leurs collègues mâles, et ce, quel que soit l'âge des patientes. C'est chez les patientes les plus jeunes et les plus vieilles que les taux de Pap test étaient les plus bas. Après ajustement pour l'âge, la langue maternelle et la région de naissance des patientes, de même que pour l'âge des médecins, le rapport de cote d'avoir un Pap test était de 2,24 (IC à 95% 1,18 à 4,28) pour les patientes des femmes médecins par rapport à celles des médecins mâles. Le rapport de cote ajusté pour la mammographie de dépistage était de 1,25 (IC à 95% 0,97 à 1,61) pour les patientes des femmes médecins.

Conclusion Le fait d'être un médecin de sexe masculin est associé à un taux plus faible de dépistage du cancer du col dans un contexte urbain multiculturel. Cette étude n'a pas trouvé d'effet du sexe dans la cohorte des mammographies.

POINTS DE REPÈRE DU RÉDACTEUR

Peu d'études ont porté directement sur l'effet du sexe du médecin sur son taux de dépistage du cancer du col et de mammographie de dépistage. Comme les femmes représentent maintenant une proportion plus grande des médecins de première ligne, le mode de dépistage dans l'ensemble des établissements de soins primaires pourrait avoir changé par rapport à celui observé dans les études antérieures.

Cette étude a vérifié la fréquence des frottis de Papanicolaou et des mammographies dans une population urbaine multiculturelle du Canada afin de déterminer si les taux de dépistage s'appliquent toujours à ce contexte contemporain.

Cette étude a montré que les patientes des médecins mâles étaient moins susceptibles d'avoir un dépistage du cancer du col. Les données ne permettaient toutefois pas de déterminer si le sexe du médecin affectait le taux de mammographie, malgré le fait que les études antérieures avaient montré une différence de dépistage selon le sexe du médecin. Cela pourrait être dû à la petite taille de la cohorte des mammographies.

Cet article a fait l'objet d'une révision par des pairs.
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Ensuring access to and promotion of cervical and breast cancer screening has been a concern in the North American health care system for decades.¹⁻³ While numerous papers have discussed factors affecting screening, only a relatively small amount of quantitative research has focused directly on the effects of physician sex on rates of screening mammography and cervical cancer screening. We found only 2 similar studies generating odds ratios (ORs) from either direct observation or chart audits.^{1,2}

The most definitive study to date was a large retrospective study, done in the urban midwestern United States, using data from 1990.¹ It demonstrated a decrease in mammography and cervical cancer screening associated with male internists and family physicians but not with male gynecologists. This confirmed what 2 studies using survey data had suggested previously.^{4,5}

Similarly, a study using direct observation data from family practices in northeast Ohio from 1993 to 1994 demonstrated a significant physician sex effect on screening ($P < .05$).²

Other studies have shown differences in screening related to physician sex. However, they have largely been surveys requiring patients and physicians to recall data or they have suffered from methodologic limitations.^{2,3,5-19} No studies have looked quantitatively at primary care physician sex while simultaneously examining patient foreign birth and first language.

Given that attitudes might change with time, geography, and culture, family practice physicians in a contemporary Canadian multicultural urban environment might not have the same attitudes or behaviour as those practising in the midwestern United States more than 15 years ago.

The number of women entering medicine and primary care continues to increase.²⁰ Differing attitudes of female physicians toward screening have been identified and proposed as contributing to the relative decrease in screening associated with male primary care providers.²⁰ Given that women now make up a larger proportion of primary care physicians, screening behaviour in primary care as a whole could have changed from that identified in previous studies.

We examined the frequency of Papanicolaou smears and mammograms in a Canadian multicultural urban population to see if previous findings were still applicable to this contemporary context.

METHODS

Sample

The study took place in a group family medicine practice in Montreal, Que. The charts of all women aged 14 to 69 years who were registered to a study clinic physician

between 2005 and 2009 were reviewed. Three of the originally pulled charts were excluded because the patients exceeded the age criteria. The practice consisted of 7 male physicians and 9 female physicians. The charts were audited manually for the following variables of interest: physician sex and patient age, country of birth, first language, last clinic visit, last Pap test, and last mammogram. The only exclusion criterion was age younger than 14 or older than 69 years at the time of data collection. Hysterectomy and mastectomy were not exclusion criteria because we were analyzing intention to screen.

Data extraction

Pap test and mammogram data were extracted from the chart by one examiner (J. Shuldiner). A primary care physician was available to the examiner to resolve any questions or unclear data. A different examiner extracted and coded demographic data found in the study clinic's computer database (J. Segouin).

Data coding

Dates were recorded in years only, as precise dates were not always available from the chart. The Pap screening interval was defined as the year of the last visit minus the year of the last Pap test. Cervical cancer screening was considered to have been performed if the Pap screening interval was 0 or 1 year for women younger than 25 years of age. For women aged 25 to 69, screening was considered to have been done if the Pap screening interval was 0 to 3 years. Screening was considered on an intent-to-screen basis; for all age groups if it was documented that screening was considered but not indicated or was declined, then it was coded as screened. If the patient declined screening when it was offered by the patient's primary care physician and screening was then performed by another practitioner, the original physician's intent was still coded.

Mammography was also coded on an intent-to-screen basis. Screening was considered complete if the mammography screening interval was 0 to 2 years for women aged 50 to 69.

First language was coded as English, French, Spanish, or other based on the availability of services usually not requiring a translator at the study clinic.

Mexico was coded as part of Latin America instead of North America owing to assumed better linguistic and cultural fit.

Statistical analysis

Multiple logistic regression was used to investigate the association between cervical cancer screening and primary care physician sex while controlling for patient age, physician age, and patient region of birth and first language. Patient and physician age were modeled as interval scale variables. For geographic region, country of

origin was recoded to larger geographic regions: North America, the Caribbean, Latin America, Europe, the Middle East, North Africa, sub-Saharan Africa, Southeast Asia, and other parts of Asia. However, geographic region was dichotomized as North America or other in the analysis. The generalized estimating equations (GEE) approach²¹ was used to take into account the potential correlation of observations between patients assigned to the same physician. Standard errors were calculated using an exchangeable correlation structure (assuming the same correlation for any pair of patients from the same physician). Unadjusted and adjusted ORs and 95% CIs for cervical cancer screening by physician sex were calculated. A similar GEE logistic regression was performed for the mammography subgroup (women aged 50 to 69 years).

A sensitivity analysis was done to determine if it was reasonable to assume that missing data were missing completely at random. In the GEE logistic regression computations, only the cohort of subjects with complete data for all variables were considered. This method of handling missing data, known as *listwise deletion*, provides valid inferences in regression analysis if data are missing completely at random.²²

All statistical procedures were performed using SAS for Windows, version 9.2. All hypothesis tests were 2-sided and performed at the $P < .05$ significance level.

Ethics approval was obtained from the McGill Faculty of Medicine, Research and Graduate Studies.

RESULTS

The patient group consisted of 1948 women who met the selection criteria for the study. Male physicians were responsible for 1049 (53.9%) patients and female physicians for 899 (46.1%) patients.

The mean (SD) age of the study group was 36.4 (13.1) years. The median age was 36 years. The cervical cancer cohort contained 421 (21.6%) women aged 14 to 25 and 1642 women (84.3%) aged 14 to 49 years.

The mean (SD) physician age was 45.3 (11.3) years. The median physician age was 42.5 years.

Non-North American origin accounted for 56.5% of the cohort (Table 1). There was no dominant geographic region of origin among women born outside North America. Country of birth was not determined for 183 (9.4%) women. Non-North American birth ($n = 1761$) was not found to be significantly associated with cervical cancer screening: the adjusted OR was 1.13 (95% CI 0.88 to 1.46).

Table 1. Cervical cancer screening by patient region of birth: Of the 1948 eligible patients, 1500 (77.0%) were screened for cervical cancer.

REGION	NO. OF PATIENTS SCREENED	TOTAL NO. OF PATIENTS	SCREENED, %
North American	513	664	77.3
Non-North American	849	1101	73.2
• Caribbean	101	121	83.5
• Europe	117	168	69.6
• Latin America	91	120	75.8
• North Africa	114	158	72.1
• Rest of Africa	102	126	81.0
• Middle East	40	53	75.5
• Southeast Asia	139	161	86.3
• Rest of Asia	145	194	74.7
Unknown	138	183	75.4

Francophones made up 40.2% of the study group ($n = 784$). There were 413 anglophones (21.2%) and 107 Spanish speakers (5.5%). The remaining 590 (30.3%) patients spoke other languages. First language was not determined for 54 (2.8%) women.

Cervical cancer screening rates and outcomes by physician sex are summarized in Table 2. Unadjusted rates of cervical cancer screening were different

Table 2. Cervical cancer screening outcomes and rates, by sex of physician

SCREENING OUTCOMES	PATIENTS OF MALE PHYSICIANS (N = 1049), N (%)	PATIENTS OF FEMALE PHYSICIANS (N = 899), N (%)	TOTAL (N = 1948), N (%)
Screened	761 (72.6)	739 (82.2)	1500 (77.0)
Screened with Pap test	633 (60.3)	609 (67.2)	1242 (63.8)
Screened by intention, no Pap test	128 (12.2)	130 (14.4)	258 (13.2)
• Patient refused	12 (1.1)	12 (1.3)	24 (1.2)
• Patient had gynecologist	39 (3.7)	65 (7.2)	104 (5.3)
• Patient had had hysterectomy	4 (0.3)	1 (0.1)	5 (0.3)
• Too early for patient to have Pap test	25 (2.4)	17 (1.9)	42 (2.2)
• Patient was celibate	48 (4.6)	35 (3.9)	83 (4.3)

between male and female physicians: 82.2% for females and 72.6% for males. The unadjusted screening rates varied by patient age category (Figure 1).

The unadjusted OR for female physicians documenting cervical cancer screening (N=1948) was 1.88 (95% CI 1.13 to 3.09), and with those patients who received screening from gynecologists removed (n=1844) it was 1.89 (95% CI 1.13 to 3.14). The OR adjusted for physician age and patient age, region of origin, and first language (n=1761) was 2.24 (95% CI 1.18 to 4.28), favouring female physician screening.

The mammography cohort consisted of 306 women aged 50 to 69 years. Two of the 16 physicians in the practice group, both female, had no female patients in this age group. The physician mammography cohort therefore consisted of 14 physicians: 7 female and 7 male. No patients in the mammography cohort had mastectomies documented. Male physicians were responsible for 154 patients and female physicians for 152 patients (Table 3). The unadjusted OR for mammography screening (N=306) was 1.30 (95% CI 0.83 to

2.04) for patients of female physicians. The OR adjusted for physician age and patient age, region of origin, and first language (n=284) was 1.25 (95% CI 0.97 to 1.61).

DISCUSSION

This study suggests that in a Canadian urban environment, patients of male family physicians are less likely to have cervical cancer screening than patients of female physicians are. This previously identified sex difference appears to have persisted over time despite societal and medical cultural changes. The adjusted OR of 2.24 (95% CI 1.18 to 4.28) demonstrates that male primary care physician sex remains associated with lower cervical cancer screening rates. Two studies have shown similar results. Using data from 1990, 1 study showed an adjusted OR of 2.14 (95% CI 1.83 to 2.51),¹ while another, using data from 1994 to 1995, showed an OR of 2.51 (95% CI 1.77 to 3.55).² Figure 2^{1,2}

Figure 1. Cervical cancer screening compliance by patient age category and sex of physician

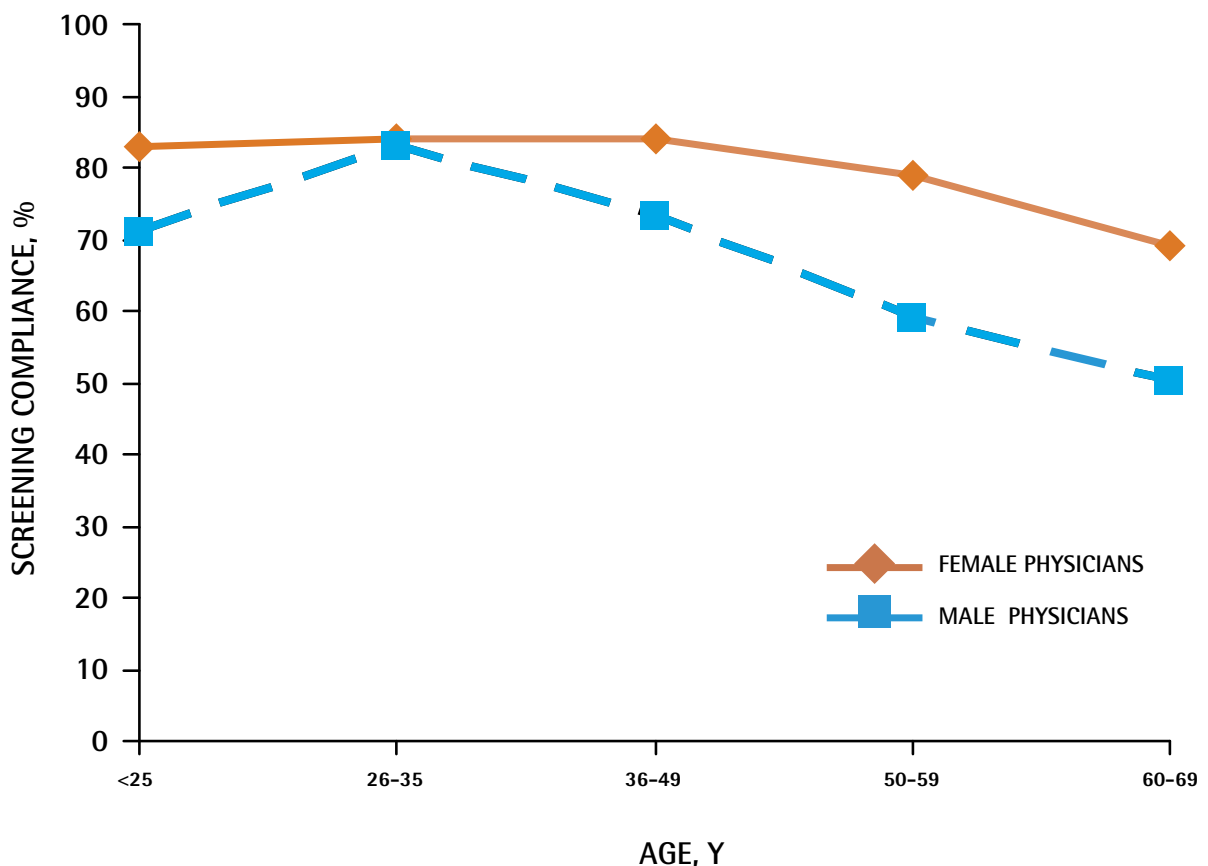
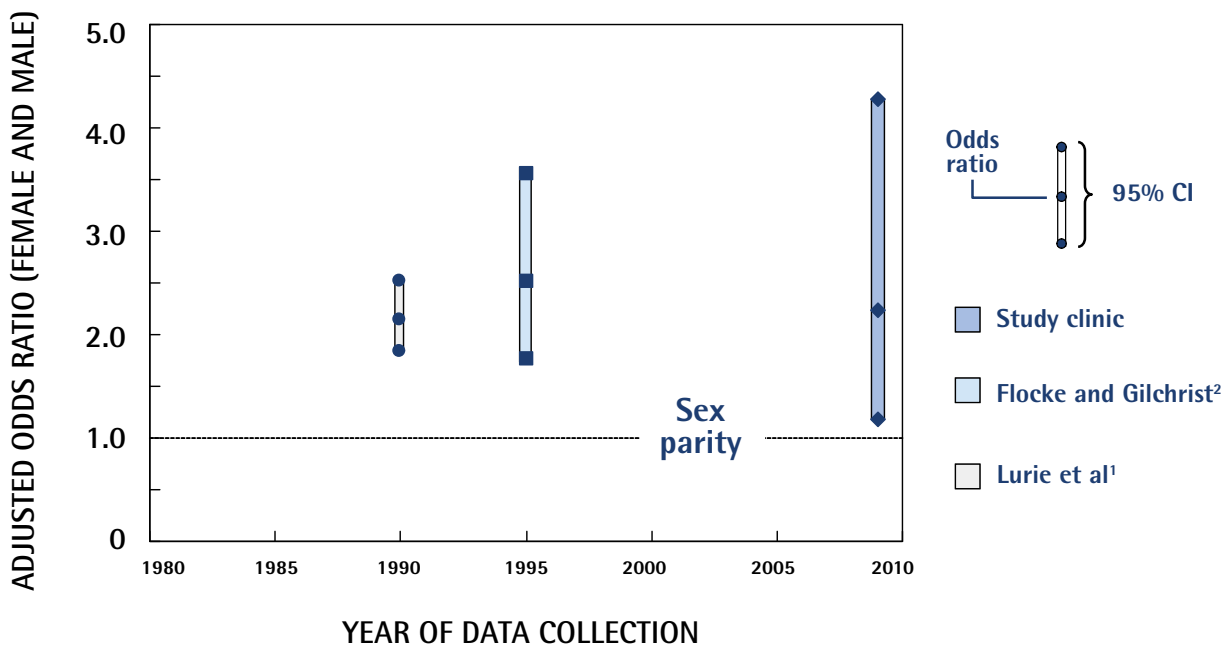


Table 3. Mammography screening outcomes and rates, by sex of physician

MAMMOGRAPHY SCREENING OUTCOMES	PATIENTS OF MALE PHYSICIANS (N = 154), N (%)	PATIENTS OF FEMALE PHYSICIANS (N = 152), N (%)	TOTAL (N = 306), N (%)
Not screened	77 (50.0)	66 (43.4)	143 (46.7)
Screened	77 (50.0)	86 (56.6)	163 (53.3)
Screened with mammography	59 (38.3)	62 (40.8)	121 (39.5)
Screened by intention, no mammography	18 (12.0)	24 (15.8)	42 (13.7)
• Patient had gynecologist	15 (9.7)	22 (14.4)	37 (12.1)
• Patient refused	3 (2.0)	2 (1.3)	5 (2.0)
• Patient had had mastectomy	0 (0.0)	0 (0.0)	0 (0.0)

Figure 2. Historic comparison of odds ratios for cervical cancer screening, by primary care physician sex



shows a historic comparison of the ORs with their respective 95% CIs.

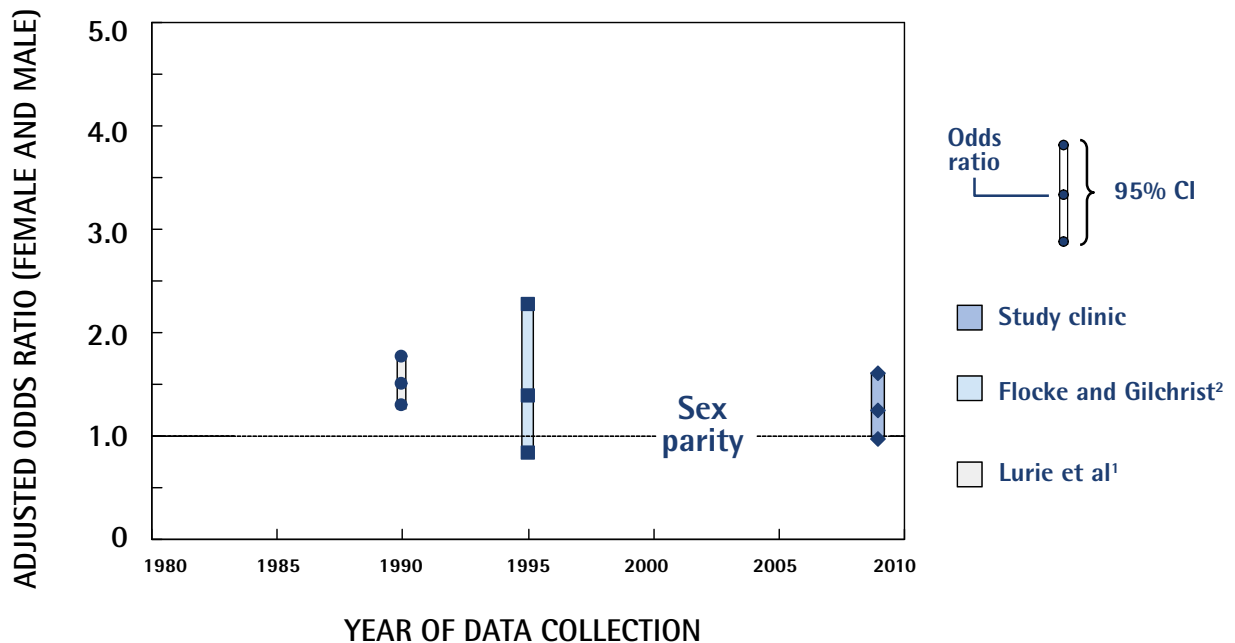
Foreign birthplace, previously identified as an important barrier to cancer screening,¹⁶ was not found to significantly affect rates of cervical cancer screening in this study. This might be because the study clinic had specialized expertise for dealing with a multicultural patient population, rather than reflecting a general trend toward improved screening of foreign-born women.

The association of male physician sex with decreased cervical cancer screening was more pronounced at

the extremes of the age distribution (Figure 1). The sex difference in Pap testing might be owing to male physicians being less comfortable performing pelvic examinations on women at either end of the screening age spectrum.¹ It is also possible that female patients are less comfortable with male primary care physicians at the extremes of age. The study was not designed to look at the dynamics of sex interactions.

No physician sex effect on mammography was discernible from our data, despite previous studies having demonstrated a physician sex difference. It is therefore not clear whether a physician sex effect

Figure 3. Historic comparison of odds ratios for mammography screening, by primary care physician sex



for mammography still exists. Yet, the adjusted OR is similar to previous studies (Figure 3^{1,2}) with a trend favouring increased screening by female physicians; Lurie et al reported an adjusted OR of 1.50 (95% CI 1.29 to 1.76) and Flocke and Gilchrist reported an adjusted OR of 1.39 (95% CI 0.84 to 2.28).^{1,2} This suggests that if a physician sex association exists for mammography, it is weaker than with cervical cancer screening.

One strong confounder is that in Quebec there is a provincial recall system for mammography, in which many patients are called for mammograms by a third party, and the results are then sent to the primary care physicians. The findings of this study, specifically the decreased screening rates with male practitioners, lend support for a recall system for Pap testing as well.

Limitations

This study had limitations affecting its external validity. Only a single urban clinic was sampled. The clinic itself serves a particularly multicultural and low-income neighbourhood, located within an electoral district with a median income of \$20226. By comparison, the Canadian national median income is \$41348.²³

The physician group was small with 16 physicians; all but one were academic family physicians and professional

medical educators. Given the frequency of internal audits, shared charting, and teaching by example, the effect of male primary care physician sex is likely much less pronounced than it would be in non-teaching clinics.


The study clinic also serves a young population. This resulted in a small mammography cohort compared with older studies.

Female patients who have strong interest in prevention might be more likely to seek care from female physicians.⁸ This study did not examine how much of the increase in Pap testing by female physicians was the result of patient self-assignment.

Religion is not routinely documented in patient charts at the study clinic, thus it was not possible to extract or code this information. Although the study looked at larger geographic regions, it did not directly look at the association of culture and religion with cervical cancer and mammography screening.

The study did not investigate whether delegating the Pap test to another provider would resolve the physician sex association. A separate study in a clinic with self-sampling procedures or where trained nurses perform cervical cancer screening would help clarify whether the association of male physician sex with lower screening rates is related to the need to perform pelvic examinations.

Conclusion

An association was found between male primary care physician sex and lower rates of cervical cancer screening in a Canadian multicultural urban context. This study suggests that male primary care physician sex remains associated with lower rates of cervical cancer screening despite changes in medical practice, culture, and shifting demographic characteristics. 

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Contributors

All authors contributed to the concept and design of the study; data gathering, analysis, and interpretation; and preparing the manuscript for submission.

Competing interests

None declared

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