Why Do Patients of Female Physicians Have Higher Rates of Breast and Cervical Cancer Screening?

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OBJECTIVE: **Women are more likely to receive breast and cervical cancer screening if they see female physicians. We studied whether this is due to differences between male and female physicians, or to differences in their patients.**

SETTING: **Large midwestern, independent practice association style of health plan.**

DESIGN: **We surveyed male and female primary care physicians matched for age and specialty and a stratified random sample of three of each physician's women patients. Physicians reported on their practice setting, their attitudes and practices regarding prevention, and their comfort and skill with various examinations. Patients reported on their sociodemographic characteristics, their attitudes and practices regarding prevention, and their preferences for physician gender. Claims data were used to calculate mammography and Pap smear screening rates for the physicians.**

PARTICIPANTS: **We studied 154 female and 190 male internists and family physicians and 794 of their patients.**

MEASUREMENTS AND MAIN RESULTS: **We compared the responses of male and female physicians and their patients and used multivariable analysis to identify the patient and physician factors that accounted for the differences in screening rates between male and female physicians. Female physicians were more likely to ask new patients about components of prevention, to believe in the effectiveness of mammography, to feel more personal responsibility for ensuring that their patients received screening, and to report more comfort in performing Pap smears and breast examinations. Patients of female physicians were more educated and less likely to be married, but did not differ in other sociodemographic characteristics. They had similar attitudes and practices regarding prevention, except that patients of male physicians were more likely to smoke. Significantly more patients of female physicians preferred a female for some component of care. In multivariable analyses, practice organization, patient preference for a female physician, and prevention orientation of female physicians accounted for up to 40% of screening rate differences between female and male physicians for Pap smears, and 33% for mammography.**

CONCLUSIONS: **Differences in beliefs of male and female physicians and patient preference for a female provider contribute independently to the higher rate of breast and cervical cancer screening by female physicians.**

KEY WORDS: **physician gender; breast cancer screening; cervical cancer screening; mammography; Pap smear.**
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Several recent studies indicate that rates of screening by Pap smear and mammography are higher among female physicians than male physicians.[1–4] Although such differences may occur for several reasons, the underlying explanations are unknown. One hypothesis is that women who choose female physicians may differ in characteristics that are associated with higher screening rates, such as socioeconomic status or strong personal beliefs about prevention. Even if such differences did not exist, some women may simply be reluctant to undergo a Pap smear or mammogram by a male physician, leading to lower screening rates for male physicians despite their efforts at preventive care.

Alternatively, differences between male and female physicians may account for their differences in screening behavior. Male and female physicians themselves may differ in their attitudes concerning prevention, their beliefs about the effectiveness of cancer screening, their practice organization, or in skills that facilitate successful screening.

The purpose of this study was to investigate why patients of male and female physicians have different mammography and Pap smear rates, and to determine the degree to which they can be explained by differences in male and female doctors or differences in patients of male versus female physicians.

METHODS

We studied physicians and female patients who were participants in Medica Choice Health Plan in 1992. Medica is a large, midwestern health plan in the Minneapolis–St. Paul area. Medica Choice is its largest product, an independent practice association model health plan serving approximately 150,000 female adult enrollees. We examined claims data and surveyed a sample of physicians represented in the claims and their female patients. The relations between the claims sample and the survey sample are summarized in Figures 1 and 2. All primary data were collected during 1994.

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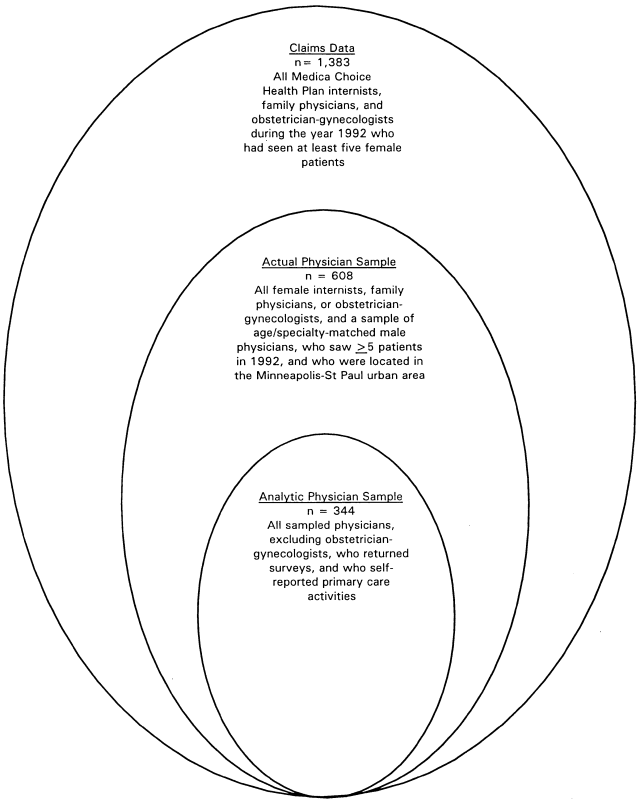

FIGURE 1. Derivation of data sources for physicians and their relationships.

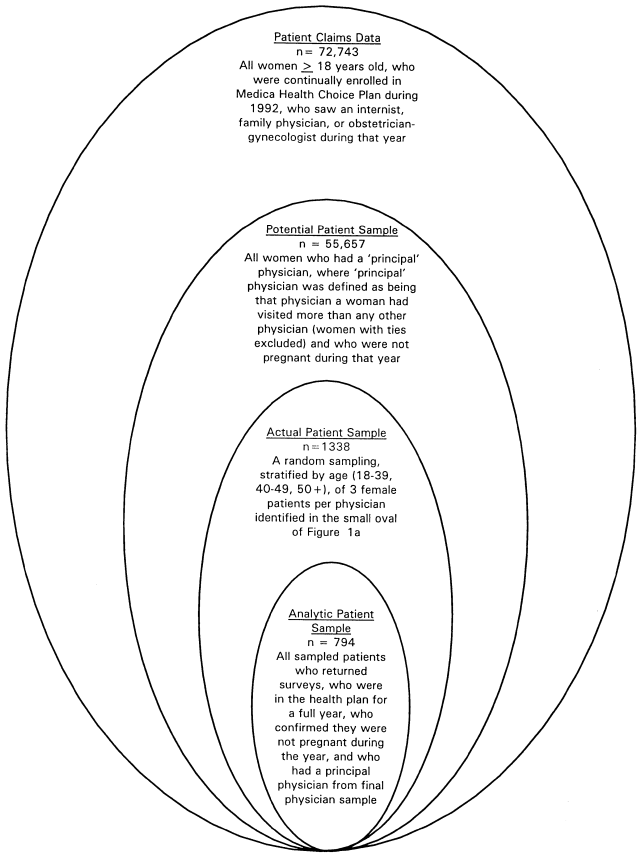

FIGURE 2. Derivation of data sources for patients and their relationships.

The dependent variable in our analysis was the Pap smear or mammography screening rate for male and female physicians. To calculate this screening rate, we used claims data as described below.

Claims Data

We examined claims for all women aged 18 years and older who had seen an internist, family physician, or obstetrician-gynecologist in 1992, who were not pregnant during that year, and who were continuously enrolled in the health plan for all of 1992. We restricted all of our analyses to the Minneapolis–St. Paul metropolitan area because the availability of female physicians in nonmetropolitan areas of Minnesota is limited. We identified a principal physician for each woman patient, defined as the physician with whom the woman had the most visits during the year. In the event of a tie, we excluded the woman from the analyses. We identified mammograms and Pap smears on the basis of procedure claims, and assigned responsibility (or credit) for screening to the patient's principal physician, regardless of whether that physician or someone else ordered or performed the test. The claims data included 55,657 women for Pap smear and 29,435 women aged 40 years and older for mammography.

Physician Sample

We identified all 1,383 Medica physicians who were internists, family physicians, or obstetrician-gynecologists and had seen at least five women during 1992. Physician age was obtained from the Minnesota Medical Association. Physician gender was determined by the first name and confirmed by telephone when the name was ambiguous. Data on physician specialty were obtained from the health plan.

We sampled all female internists, family physicians, and obstetrician-gynecologists. We randomly sampled male physicians, stratified first by specialty, and then matched by age (within 10 years). Although there were many male physicians over age 55, there were few female physicians in this age category. Thus, to ensure a representative sample of male physicians, we also sampled male physicians over age 55 in proportion to their representation in the physician population. In all, 608 physicians were sampled, and we received responses from 559 (92%). Of these, 215 physicians reported doing no primary care or that they were not internists or family physicians and were, thus, excluded from further analysis. Physicians excluded because they did no primary care were most likely to be male internists. Thus, our data describe

the remaining 344 physicians, of whom 154 were women (57 internists and 97 family physicians) and 190 were men (60 internists and 130 family physicians) (Table 1).

Patient Sample

Patient characteristics were assessed in two ways: their age was obtained from the claims database, and their attitudes and beliefs were assessed by survey. The patient sample was selected using information from the 1992 claims data. We identified women who were patients of the principal physicians in our physician sample, and then we randomly sampled and surveyed three patients per physician. To be certain that we included a wide age spectrum of patients, and to enrich our sample for analyses involving mammography, we stratified the sample such that we surveyed one patient aged 18–39 years, one aged 40–49 years, and one over age 50. We surveyed 1,338 patients, yielding 1,204 responses (90% response rate). We excluded responses of patients who were not in the plan for the full year, were pregnant during 1992, or did not have a physician from the final physician sample as their principal provider. This left 794 patients for analysis.

Survey Instruments

We surveyed physicians in our sample by telephone about their practice settings, the degree to which they address a range of prevention issues during patient visits, and beliefs about the effectiveness of mammography and Pap smears. We also asked them to rate their interpersonal skills, their skill at performing Pap smears and breast examinations, and their personal comfort with performing these examinations and taking a sexual history. Finally, we asked these physicians whose responsibility they felt breast and cervical cancer screening was when a woman was seeing another doctor as well as themselves. Table 2 summarizes information collected in the physician survey.

We surveyed patients by mail, with telephone follow-up of nonresponders. We asked patients about demographic information, health status, their orientation to prevention, their health behaviors, and their preferences regarding physician gender. We measured health status by patients' ratings of their health on a 5-point Likert scale ranging from excellent to poor, as well as by the General Health Rating Index developed by the RAND Health Insurance Experiment.[5] In addition to asking about prevention in general, we adapted measures based on the theory of reasoned action to assess emotions, attitudes, social normative influences, and facilitating conditions related to breast and cervical cancer screening.[6] Table 3 summarizes information collected in the patient survey.

Statistical Analysis

From 1992 claims data and the method described above for linking each female patient to a principal physician, we first computed the rates of Pap smear and mam-

Table 1. Comparisons of Surveyed and Analytic Physician Samples

	Total Number of Physicians Surveyed (%) (n = 559)	Actual Number of Physicians on Whom Analyses Are Reported (%) (n = 344)
Gender		
Female	240 (43)	154 (45)
Male	319 (57)	190 (55)
Specialty		
Family medicine	232 (42)	227 (66)
Internal medicine	157 (28)	117 (34)
Ob-gyn	120 (22)	0 (—)
Other	50 (9)	0 (—)
Age group		
<38	192 (34)	125 (36)
38–42	159 (28)	101 (29)
43+	208 (37)	118 (34)

Table 2. Key Data Elements in Physician Survey

Practice setting
- Average time per visit (minutes)
- Organization (solo, academic, single-specialty or multispecialty group)
- Percentage of patients with complex medical problems
- Percentage of time spent doing primary care
- Use of reminder systems for Pap smear and mammography
- Ownership of mammography units

Beliefs about prevention
- How often, during a new patient evaluation, physician asks about health-related behavior: smoking; diet; seat belt use; high-risk sexual practices; date of last Pap smear, mammogram (5-point Likert scale, ranging from "always" to "never")
- Physician-rated effectiveness of Pap smear, mammography (5-point Likert scale, ranging from "very" to "not at all" effective)
- Physician-rated optimal interval for Pap smear, mammography (months)

Skills and comfort
- Self-rated skill at performing: Pap smear, breast examination, overall interpersonal skill (5-point Likert scale, ranging from "excellent" to "poor")
- Self-rated "awkwardness or discomfort" performing: Pap smear, breast examination, sexual history from female (5-point Likert scale, ranging from feeling "not at all" to "very" awkward or uncomfortable)

Responsibility for screening
- "If a woman is seeing you and another doctor, whose responsibility is it to be certain the Pap smear/mammogram is done?" (Mine, Other Doctor, Both, Neither)

Table 3. Key Data Elements in Patient Survey

Demographics
Marital status, ethnicity, income, education, insurance coverage for Pap and mammography
Health status
Self-rated health (excellent-very good-good-fair-poor)
General Health Rating Index
Beliefs about prevention
Optimal interval for: medical checkup, breast examination, mammogram, Pap smear, cholesterol check (number of months or years)
Emotions about Pap smear and mammography: positive/negative feelings, test is beneficial/harmful (sum of score on two 5-point Likert scales)
Attitudes toward Pap smear and mammography: presymptomatic early detection, inconvenience, unfamiliarity, discomfort, radiation risk (sum of scores on 5-point Likert scale)
Social normative influence for Pap smear and mammography: regular doctor, family, friends (mean of product of two 5-point Likert scales for each referent)
Facilitating conditions for Pap smear and mammography: finding time, arranging transportation, ability to pay (sum of scores on three 5-point Likert scales)
Health behaviors
Smoking history, seat belt use
Personal screening history with Pap smear and mammography
Intention for future screening with Pap smear and mammography
Preferences for and current provider specialty and gender for breast examination, Pap smear, other medical care

mography for each metropolitan area physician in the health plan. These individual rates were used to compute the dependent variable in the mean rates of Pap smear and mammography for male and female physicians and to calculate odds ratios (OR) and 95% confidence intervals (CI) using unconditional logistic regression, adjusting for the design effect.[7] Only women over age 40 were considered in the calculation of mammography rates.

The overall screening rates for obstetrician-gynecologists were much higher than those of internists and family physicians (82% vs 49% for Pap smear, 61% vs 48% for mammography). Furthermore, the screening rates for male and female obstetricians differed by less than 4 percentage points. Because of these fundamental differences between obstetrician-gynecologists and the internists or family physicians, neither the univariate nor the multivariate analyses described here include obstetrician-gynecologists.

We compared survey responses for male and female physicians using Student's t tests for continuous variables and χ^2 statistics for categorical responses. We excluded physicians who reported doing no primary care or who reported their specialty as other than internal medicine or family practice. We categorized patients of male and female physicians according to the gender of the principal physician identified in the claims data and compared responses using Student's t tests and χ^2 techniques. We then brought together data elements from the two surveys and sorted them into four groups: (1) patient and physician demographics; (2) characteristics of the physicians' practice; (3) attitudes and beliefs of physicians; and (4) attitudes and beliefs of patients.

Our analysis was structured to evaluate the role of these variables as confounders of the relation between physician gender and screening rates. To act as a confounder of this relation, a variable must be associated with physician gender *and* causally related to screening rates.[8] For example, ownership of mammography units would act as a confounder if female physicians were more likely to own mammography units, and if physicians who own mammography units have higher screening rates.

We identified all variables from each grouping for which there was a moderately strong ($p \leq .15$) bivariate association with physician gender. With this subset of variables, we then used stepwise linear regression to identify the variables from each grouping that also were associated ($p \leq .10$) with physician screening rates after controlling for physician age and specialty and for patient age. We selected these thresholds to decrease the likelihood that important confounders would be overlooked.[9]

We next used a series of structured step-up linear regression models to evaluate the roles of these potential confounders. The dependent variable in each model was the screening rate (calculated from the claims data) for individual physicians in our survey, weighted by the number of patients on which they were based. We confirmed the appropriateness of using linear regression by examining distributions of transformed and untransformed versions of the rates. We first created a "base model"; physician gender, age, and specialty, and the mean age of patients in the physician's practice were forced into the model. We then added other significant patient demographic variables. Next, we added to the base model statistically significant variables describing the practice setting. Then, in two successive steps, we added variables describing the beliefs of patients and physicians that remained statistically significant in the stepwise analyses described above. For each successive set of variable groupings, we estimated R^2 of the model with and without physician gender. We also estimated the adjusted absolute difference in screening rates for male and female physicians at each step and computed the amount that each of the variable groupings contributed to reducing the difference from the base model for the physician gender screening rate, expressed as a percentage reduction. Appendix A lists variables that were included or excluded in the various steps of the modeling.

RESULTS

Based on 1992 claims for all eligible women and their doctors, the screening rates for patients of female physi-

cians were higher than those of male physicians. Pap smear rates were 70% and 57%, respectively, and the OR for screening by a female compared with a male physician was 1.78 (95% CI 1.69, 1.87). Analogous rates for mammography were 56% versus 51% (OR 1.24; 95% CI 1.16, 1.32). These results are consistent with previous findings.[1–3]

Data describing physicians are presented in Table 4. The mean ages of female patients in the practices of male and female physicians were similar. Female physicians reported that they spent more time per visit than male physicians, and they were less likely to be in solo practices or in practices that owned mammography units. More importantly, they had more favorable attitudes and beliefs about prevention: they were consistently more likely to report "always" asking new patients about many elements of prevention, including smoking, high-risk sexual practices, seat belt use, and cancer screening, and reported more responsibility for screening patients who see both them and another physician. Further, they reported feeling more comfort in performing breast examinations, obtaining Pap smears, and taking a sexual history from a woman. Female physicians were also significantly more likely to believe in the effectiveness of annual mammography for women over age 50, but the difference for women

Table 4. Characteristics of Physicians and Their Practices

Characteristic	Female Physicians (*n* = 154)	Male Physicians (*n* = 190)
Practice setting		
Average age of patients, years*	38	39
Average time per visit, minutes	17.3	14.8†
In solo practice, %	3	8‡
Patients with complex problems, %	42	43
Time spent in primary care, %	93	90
Send reminder for mammogram, %	25	30
Send reminder for Pap smear, %	47	38
Own mammography unit, %	23	32‡
Beliefs about prevention		
"Always" ask new patient about, %		
Smoking history	94	87‡
Diet	50	41‡
Seat belt use	39	23†
High-risk sex	44	17†
Last Pap smear	88	77†
Last mammogram	86	78‡
Believe test is "very effective," %		
Pap smear	93	87
Mammogram (women age 40–49)	39	31
Mammogram (women over 50)	93	83†
Believe in 12-month screening interval, %		
Pap smear	83	72†
Mammogram (women 40–50)	8	14
Mammogram (women over 50)	96	92
Self-rating of skills and comfort		
Rate skill as "excellent," %		
Pap smear	62	55
Clinical breast exam	42	35
Overall interpersonal care	65	66
Feel "very comfortable," %		
Performing Pap smear	99	87†
Performing clinical breast exam	96	80†
Taking a sexual history from a female	84	59†
Responsibility for screening		
Responded "mine" or "both," %		
Pap smear	89	76†
Mammography	95	83†

**This variable was calculated from claims data but is included here for clarity.*
†$p \leq .01$.
‡$p \leq .05$.

aged 40–49 years was not significant. They were more likely to endorse a 12-month screening interval for Pap smears but not for mammography.

Table 5 describes patients of male and female physicians. In contrast to the physician data, there were few differences between patients of male and female physicians. More patients of female physicians were college graduates and fewer were married. Although patients of male physicians were more likely to be current smokers, there were no other significant differences in patients of male and female physicians regarding their health behaviors, breast and cervical cancer screening histories, or beliefs about frequency of prevention-oriented examination. Patients of male and female physicians had similar emotions, attitudes, and influences regarding mammography and Pap smear. However, a striking difference was that significantly more patients of female physicians indicated a preference for a female physician for some component of their care and reported they would be reluctant to undergo a breast examination or Pap smear if only a male physician were available.

Table 6 presents results of the multivariable analyses examining confounders of the physician gender differences for Pap smear and mammography. The first two columns of Table 6 present the R^2 of successive models, with and without physician gender in the model. The third column gives the adjusted absolute difference in screening rates between female and male physicians. The final column shows the percentage of the screening rate differences explained by each successive variable grouping. In the base model for Pap smear, the R^2 values with and without physician gender were .23 and .10. As successive variable groupings are entered, the differences between these two R^2 values narrows, indicating that physician gender explains less of the variance in the presence of other confounders. Similarly, in the base model, female physicians had an 11% higher absolute screening rate than male physicians. Adjusting for three main factors (practice organization, patient preference for a female provider, and the physician asking about seat belt use) reduced the absolute difference in screening rates to 6.6%, a reduction of 40%. Patient differences, particularly patient preference for a female physician, explained the bulk of the difference (25%), although having a doctor who asks about seat belt use as an element of prevention explained an additional 10% of the difference.

The factors that affected mammography screening rates were more complicated. Here, two other patient sociodemographic factors (income and education) entered the base model resulting in an 8.2% higher screening rate for female physicians. Patient preference for a female provider explains 21% of the difference in screening rates between female and male physicians. Three items relating to physicians' beliefs about prevention (asking about smoking and seat belt use and belief in a 12-month screening interval for women at least 50 years of age) explain an additional 11%.

DISCUSSION

In this study, we examined two sets of competing explanations for the differences in breast and cervical cancer screening rates between male and female physicians: that they occur because of differences between the physicians or in their patients.

On the patient side, it is unlikely that sociodemographic differences between patients of male and female physicians explain physician gender differences in screening rates because, after adjusting for these in our base models, female internists and family physicians still had 11% higher absolute screening rates for Pap smear and 8.1% for mammography. The hypothesis that women who have female physicians may be more oriented toward prevention is also not supported, in that patients of male and female physicians had similar attitudes and beliefs about prevention.

One patient factor did contribute substantially to explaining the gender differences in screening rates: patient preference for a female examiner. There are several potential mechanisms by which this factor could be associated with higher screening rates. First, rather than explaining how the physician was selected, a patient's response to questions about physician gender preference may simply be a way to rationalize her choice of a female physician. Second, because much of the difference in screening rates remains unexplained, it may be that reluctance to see a male physician is correlated with other unmeasured differences between patients of male and female physicians that account for the residual difference in screening rates.

Several studies have documented differences in communication style between male and female physicians.[10–14] In another part of this study we examined women's reports of doctor-patient communication. Although good communication was associated with higher screening rates, the effect was largely independent of physician gender.[15] Thus, it is unlikely that it explains the large effect of patient preference on the gender differences in screening rates.

A more compelling explanation lies in the screening behaviors of patients who prefer a female examiner yet have a regular provider who is male. In the case of Pap smears, this is 14% of our patient sample. Two thirds of these women see a separate provider for gynecologic care, nearly always a female gynecologist. Among this subgroup of women, the self-reported rate of Pap smear within the past year was more than 10% lower than the rate for the remaining women. Screening rates in this subgroup were similar for women with a separate provider of either gender, suggesting that making and keeping an appointment with a separate provider creates a barrier to receiving this care. Thus, in these cases it may be the fact that satisfying these preferences requires a two-step process which affects screening rates, rather than a failure on the part of male physicians.

The hypothesis that male and female physicians differ is also supported in that their ownership of mammog-

Table 5. Characteristics of Patients of Female and Male Physicians

Characteristic	Patients of Female Physicians (n = 352)	Patients of Male Physicians (n = 442)
Demographics and health status, %		
Married	58	70*
White	93	95
Income ≥ $30,000	67	71
College graduate	42	34*
In fair or poor health	9	11
Insurance for all of mammography cost	59	61
Insurance for all of Pap smear cost	71	71
General Health Rating Index score, mean	72	71
Orientation to prevention: think they should have the following at least every year, %:		
Medical checkup	77	75
Dental exam	94	94
Breast exam	91	89
Mammogram	55	57
Pap smear	84	81
Cholesterol check	73	67
Emotions, attitudes, and influences†		
Emotions about Pap smear [2–10]‡	8.7	8.6
Emotions about mammography [2–10]§	8.5	8.8
Attitude toward Pap smear [6–30]‡	25.0	25.1
Attitude toward mammography [8–40]§	32.6	33.1
Social norm influence for Pap smear [1–25]‡	18.0	17.9
Social norm influence for mammography [1–25]§	17.1	17.6
Facilitating conditions for Pap smear [3–15]‡	13.3	13.1
Facilitating conditions for mammography [3–15]§	13.1	13.2
Health behaviors		
Current smoker, %	16	23‖
"Always" use seat belt, %	75	70
Mean number of Pap smears in past 5 years‡	4.2	4.1
Mean number mammograms in past 5 years§	3.0	3.1
"Very likely" to have Pap smear in next year‡, %	89	84
"Very likely" to have mammogram in next year§, %	72	77
Gender preference, %		
Prefer a female health care provider for		
Breast exam	68	29*
Pap smear	69	31*
Rest of medical care	51	12*
Would be "very reluctant" to have the following exams if only male health care providers were available for		
Breast exam	12	4*
Pap smear	15	6*

*$p \leq .01$.

†*Possible ranges for each scale appear in brackets. High scores indicate more positive attitudes and influences toward mammography or Pap smear. Examples of individual items appear in Table 3.*

‡*For Pap smear, questions based on 280 patients of female physicians and 340 patients of male physicians and who had not undergone hysterectomy.*

§*For mammography, questions based on 233 patients of female physicians and 302 patients of male physicians who were aged 40 years and over.*

‖$p \leq .05$.

Table 6. Sources of Confounding of Physician Gender Screening Rates for Pap Smear and Mammography*

Source	R^2 for Overall Model		Absolute Difference in Screening Rates Between Females and Males	Percentage of Female-Male Differences in Screening Rates (Column 3) Explained by Variables
	Including Physician Gender	Excluding Physician Gender		
Pap Smear†				
Base (physician specialty and age, patient age)	.23	.10	11.0	—
Prace setting: above + type of practice organization	.29	.18	10.5	5
Patient variables: above + patient preference for female provider	.30	.27	7.7	30
Physician variables: above + seat belt use‡	.32	.30	6.6	40
Mammography§				
Base (physician specialty and age, patient age, education and income)	.24	.16	8.2	—
Practice setting: above + type of practice organization	.30	.23	8.1	1
Patient variables: above + patient preference for female provider	.33	.30	6.4	22
Physician variables: above + seat belt, smoking,‡ optimal screening interval for women ≥ 50 years‖	.39	.37	5.5	33

**Variables tested for inclusion were those that had significant univariate associations with physician gender and significant associations with physician screening rates (see Appendix A).*

†*Based on 245 physicians: 160 family physicians and 85 internists.*

‡*Physician reports "always" asking new patients about seat belt use or smoking, respectively.*

§*Based on 202 physicians: 129 family physicians and 73 internists.*

‖*Physician reports of optimal mammography screening interval for women (range 12–30 months).*

raphy units and their attitudes and beliefs differ in the bivariate analyses. Most striking was the greater emphasis on prevention by female physicians, which was consistent across domains of prevention and encompassed a wide array of beliefs and behaviors, ranging from history taking about prevention to a sense of personal responsibility for screening if a patient is seeing two or more physicians. Many of these differences were not true confounders in that they did not also have an independent association with screening rates in our multivariable analyses. However, three items relating to physicians' beliefs about prevention satisfied the criteria for confounding and offer competing explanations. For both the Pap smear and mammography analyses, asking about seat belt use during a new patient evaluation was a powerful explanatory variable for the gender difference in screening rates, while taking a smoking history was implicated in gender differences for mammography screening but not for Pap smear. In other analyses, asking about seat belt use was positively correlated with asking about diet (r = .30, p = .0001), high-risk sexual practices (r = .38, p = .0001), and smoking (r = .20, p = .0001), but inclusion of these other prevention behaviors in our models did not explain as much of the difference as the variable related to seat belt use. Our interpretation is that asking about health-related behavior, especially seat belt use, identifies physicians with the strongest commitment to prevention; asking about seat belt use may be more similar to inquiries about handguns in the home or domestic violence than the more routine and well-publicized aspects of office-based prevention.

We offer several caveats about interpreting these results. First, because of resource constraints, we were only able to survey three patients per physician. Because mammography analyses were performed only for women over age 40, only two patients per physician were included. Thus, estimates of the characteristics of the physicians' patients are based on relatively small numbers. Second, by attributing the screening test to the physician with whom the patient had the most visits in 1992, a given doctor may receive credit if another doctor performed a screening test on his or her patient. Many women with a principal physician who is an internist or family physician will visit an obstetrician-gynecologist annually for Pap smears and breast examinations. However, we believe this is representative of the way providers are being asked to be accountable for screening in actual practice, particularly in "gatekeeper" models in which the primary physician is responsible not only for curtailing unnecessary and costly use of services but also for ensuring necessary care. Many plans already provide individual primary care physicians with feedback on the screening

rates of the patients in their practices. In fact, when we limited claims data analysis to patients who saw only one physician during 1992 (66% of female patients), there were much greater physician gender differences in screening, with substantially lower rates for male internists and family physicians. Excluding women whose principal physician could not be determined because of equal number of visits to two providers would tend to bias the screening rate differences in favor of female physicians, but it is doubtful that this would bias the findings about attitudes and beliefs of doctors or their patients.

Without detailed clinical information and multiple years of claims data, a study of this nature cannot provide information about the rate of appropriate screening. Although it seems likely that the screening rates for mammography reflect failure to provide a necessary service, it is possible that our findings result from overscreening by female physicians compared with males, an issue raised previously by Kreuter et al.[3] To explore this possibility further, we examined the differences in screening rates between male and female physicians considering only women under age 65 in the calculation of Pap smear rates and women aged 50 years and over in those for mammography. The correlations of the screening rates for these populations with the rates on which the analyses were based were quite high (.99 and .78, respectively). Thus, use of a more restrictive definition of appropriateness is unlikely to alter our results. Although optimal screening intervals and the effectiveness of both mammography and Pap smears in certain age groups remain controversial, nearly all of the physicians in this study reported beliefs and practices within the range advocated in published guidelines. In the case of mammography, however, women physicians in our study preferred a shorter screening interval and were more likely than men to believe that screening patients over the age of 50 is effective.

Finally, although we excluded obstetrician-gynecologists from the data reported here, analyses including obstetrician-gynecologists had essentially the same univariate results and would not have meaningfully altered any of our findings or conclusions.

These findings have implications for the delivery of preventive services to women. They suggest that systems of care should direct patients reluctant to have breast or pelvic examinations performed by a male examiner directly to female primary care providers, as the mere fact of wanting or intending to see a separate provider (rather than a failure of male providers) may itself be a barrier to screening. Our findings also indicate that the greater focus on prevention by female physicians is associated with higher rates of screening for breast and cervical cancer. This added focus encompasses a broad spectrum of preventive care and is not limited to inquiries about smoking and cancer screening (e.g., asking about seat belt use). Thus, administrative interventions (such as reminder systems) that can overcome the reliance on physician attitudes to accomplish screening could help improve rates of screening (and perhaps increase other aspects of preventive care), especially among patients of male physicians.

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APPENDIX A

The following variables had univariate associations with physician sex at the $p \leq .15$ level and, thus, qualified for inclusion in the stepwise regression models:

Physician survey
- Average time per visit (minutes)
- Proportion of time doing primary care
- Practice organization (solo, academic, single-specialty or multispecialty group)
- Send reminder for Pap smear or mammography
- Own mammography unit
- "Always" ask new patients about: smoking history, diet, seat belt use, high-risk sex, last mammogram, last pap smear
- Believe that Pap smear or mammogram is "very effective" (women aged 40-49 years and women over 50)
- Believe in 12-month screening interval for Pap and mammography (women over 50)
- Feel "very comfortable" performing clinical breast examination, Pap smear, or taking a sexual history from a female
- Feel at least some responsibility for mammography or Pap smear completion

Patient survey
- Married
- Income
- College graduate
- Believe they should have annual cholesterol check
- "Always" use seat belt
- Emotions about mammography
- Current smoking status
- "Very likely to have a Pap smear in the next year
- Preference for female health care provider

The following variables retained statistical significance at the $p \leq .10$ level after controlling for physician age and specialty and age of patient in the physician's practice.
Those marked with an asterisk (*) remained in the final models ($p \leq .05$).

Pap smear model
- Physician variables
  - Practice organization*
  - Send reminders for Pap smears
  - Always ask about high-risk sex or seat belt use*
  - Comfort taking a sexual history from female
- Patient variables
  - Preference for a female health care provider*

Mammography model
- Physician variables
  - Practice organization*
  - Send reminders for mammography
  - always ask about smoking* or seat belt use*
  - Believe in 12-month screening mammography interval for women aged $\geq$ 50 years*
- Patient variables
  - Education*
  - Income*
  - Smoking status
  - Emotions about mammography
  - Preference for a female health care provider*