Does Sex-Specific Guideline Adherence Depend on the Sex of the Physician?

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Introduction

Studies show that many patients take physician sex into account when choosing a physician. This may occur for a variety of reasons, such as socioeconomic status. (Lurie, 1997) Previous research shows that Pap smear guidelines are adhered to more often by female physicians, while adherence with guidelines for mammograms were equivocal between male and female physicians (Ince-Cushman, 2013). For Pap smear, this finding could be because women are more comfortable having the PAP done at the time of visit or prefer for a female to do the procedure. Another study asking physicians if they thought PSA testing was effective, found that female physicians were significantly more likely to say that it was less effective than male physicians. (Ramirez, 2009). The question is do physicians have an underlying bias for preventive screening based on their sex?

There are different guidelines for ordering mammograms for women ages 40-49 but for women ages 50-74 years of age, the United States Preventative Services Task Force (USPSTF) and American Cancer Society (ACS) recommend mammograms every two years for average risk patients. Pap smear guidelines are every three years for patients ages 21-30 years, and every three to five years for patients between the ages of 30-65 years, depending on HPV co-testing. The USPSTF recommends discussion with the patient before PSA testing in males ages 55-69 years.

In the literature, previous research studied demographics and attitude toward prevention by physicians and all physicians responded they had a similar, positive attitude about preventive tests and guidelines. (Lurie, 1997). Physicians can order the tests, but patients have to be willing to get them done. Are there barriers that come into play to prevent patients from getting them done? If so, can we help them and increase our adherence to prevention rate guidelines in the future?

Research Question

1. Does physician adherence to prevention guidelines differ based on the sex of the patient and the sex of the physician?
2. Does patient adherence differ by the sex of their physician?

Methods

This was a retrospective chart review of outpatient medical records from an Internal Medicine practice located at a community teaching hospital in Detroit, Michigan. The electronic medical record (EMR) was queried for adult patients who had either an annual physical once during the year or at least two follow-up appointments with the same physician in a year. The EMRs (Athena® and eCare®) were then queried for patient age, race, sex, co-morbidities, and insurance type. Where data were not available by query, individual chart review was done. We

assessed patient and physician compliance to USPSTF guidelines for mammography, Pap smears, colon screening and PSA testing. There is no indication for how often PSA should be tested, but three major previous randomized controlled trial studies per USPSTF used testing from every one to four years.

Patients were excluded from all preventive screening if they had active cancer. For mammogram screening, females with history of double mastectomy were excluded. Females with a hysterectomy with no cervix were excluded for the PAP guidelines and men with a history of prostate cancer were excluded for PSA testing. Patients were excluded from colon cancer screening if they had a colectomy. Because colorectal cancer screening can be done multiple ways, we counted the screening as being ordered or done if any of the following had been completed: colonoscopy, sigmoidoscopy, FIT, stool test, and Cologuard.

From the initial query of patients, we included patients who had an annual visit within 2018 or had at least two other visits within the year with the same physician. Our final sample size included 3090 unique patients. After excluding patients under the age of less than 20 years or greater than 80 years of age and those with active cancer, our final was 2807 unique patients.

Data Analysis

Descriptive statistics were calculated to characterize the study group. Continuous variables, such as age, were described using the mean and standard deviation or median and range or interquartile range. Categorical variables were described as frequency distributions. The associations between sex of the physician, sex of the patient and guideline adherence were assessed using chi-squared analysis, Student's t-test and analysis of variance. Multivariable analysis was done using logistic regression. All data were analyzed using SPSS v. 26.0 and a p-value less than 0.05 was considered to indicate statistical significance.

HIPAA/Patient Confidentiality

IRB approval for the study was obtained. All data collection occurred on Ascension St. John Hospital premises. All electronic data are stored on an Ascension St. John network, password protected, encrypted computer. Only the study investigator and data analyst have access to the research data. Data will be stored for seven years after any publication and then destroyed.

Results

We initially reviewed 3,090 charts. We excluded 283 charts of patients who were ages 18-20 years, over 80 years or had active cancer, resulting in a study group of 2807 patients. Of these patients, 78.9% (2214) had an annual visit and 21.1% (593) had two visits in the same year with the same primary care physician.

Table 1 shows the overall demographic and clinical characteristics of the study group. Although male physicians saw more patients than female physicians overall, the median number of patients seen by female physicians was 162.5 (range 1-461) compared to a median of 98 (range 4-327) for male physicians (p=1.0). As seen in Table 1, the study group was equally distributed between Caucasian and Black/African-American patients; however, 61% of the patients were female. Most patients (66.8%) had private insurance.

Table 2 displays the difference in patient characteristics by sex of the provider. Female providers had a preponderance of female patients (85.2%) whereas male providers had a more balanced patient group (44.4% female), $p<0.0001$. Female providers tended to see more African-American patients, more privately insured patients and slightly younger patients than male providers (all $p<0.0001$).

Table 2 also shows that male providers tended to see patients with a significantly higher prevalence of diabetes mellitus, hypertension, congestive heart failure, history of stroke or transient ischemic attack (TIA) and chronic kidney disease.

Table 3 shows compliance with recommended screening by sex of provider. For cervical cancer, breast cancer and colon cancer screening, female physicians were significantly more likely to order screening for their patients than male physicians. For prostate cancer screening, there was no significant difference by sex of the physician.

Table 4 outlines patient compliance with screening, *when ordered*, by sex of the provider. For all screenings, compliance did not vary significantly by sex of the provider.

One potential factor that could confound both the order for screening tests and patient willingness to have tests done is insurance status. Table 5 shows the difference in compliance with orders for screening by patient insurance. There was no significant difference in orders for screening by insurance type, except for PSA testing. Patients with private insurance were most likely to receive an order, compared to patients with public insurance or self-pay ($p<0.0001$).

In Table 5, compliance with screening, *when ordered*, by insurance type is displayed. No significant differences were found.

To account for the differences in the patient groups seen by male and female physicians, we conducted multivariable analysis of screening being ordered using logistic regression. For each screening, variables included in the model were physician sex, patient race, BMI, insurance status and the patient comorbidities that differed in patients seen by male versus female physicians. Patient age was not included in the model because it is included in the definition of each measure.

Cervical Cancer Screening, Women 21-30 Years of Age

For this group, the only variables that could be entered into the model were sex of the physician, BMI and race. After controlling for BMI and race, patients with female physicians were 3.2 times more likely to have screening ordered than patients with male physicians (OR=3.2, $p=0.03$, 95% CI: 1.1, 9.5).

Cervical Cancer Screening, Women 31-65 Years of Age

After controlling for comorbidities, race, BMI and insurance, patients with female physicians were 2.1 (OR=2.1, $p<0.0001$, 95% CI: 1.5, 3.1) times more likely to have screening ordered.

Breast Cancer Screening, Women Ages 40 Years and Older

Among this group, after controlling for other comorbidities, insurance, race, and BMI, patients with a female physician were 83% more likely to have screening ordered (OR=1.83, p=0.001, 95% CI: 1.3, 2.6), women with diabetes mellitus were 74% more likely to have screening ordered (OR=1.74, p=0.04, 95% CI: 1.02, 2.96) and women with hypertension were 50% more likely to have screening ordered (OR=1.50, p=0.04, 95% CI: 1.02, 2.23).

Breast Cancer Screening, Women Ages 50 Years and Older

Among this group, after controlling for comorbidities, insurance, BMI and race, women with a female physician were 2.1 times more likely to have screening ordered (OR=2.1, p=0.002, 95 CI: 1.3, 3.2).

Prostate Cancer Screening, Men Ages 55 to 69 Years

For these patients, men with public insurance were four times (OR=0.25, p=0.001, 95% CI: 0.11, 0.57) less likely to have screening ordered, after controlling for comorbidities, race, sex of the physician and BMI.

Colorectal Cancer Screening, All Patients Ages 50 to 75 Years

For these patients, after controlling for comorbidities, BMI and race, patients with female physicians were 60% more likely to have screening ordered (OR=1.60, p=0.01, 95% CI: 1.1, 2.3). Insurance could not be included in this model.

Discussion

When we look at the basic characteristics of the patients, male physicians have more patients with co-morbid conditions such as diabetes mellitus, hypertension, stroke/TIA, congestive heart failure, and chronic kidney disease stage 3 or higher; however, they do have more male patients compared to female patients. One reason to explain this might be that type 2 diabetes is more common in males than females, and it could lead to more complications such as strokes and kidney disease. Another reason could be that male physicians have older patients with a higher BMI. Based on our results, female physicians are more likely to order or perform PAP smears and mammograms compared to men in their female patients. Is there a subconscious bias to remember to refer to a gynecologist? Or are female physicians more comfortable performing PAP smears than male physicians, which would increase their adherence rate to the guidelines?

Regarding screening for male patients, PSA ordering was not significantly different by sex of the provider. We know there is no good evidence on PSA testing and no true guideline for how often it should be tested. There are no other screening guidelines, however, that incorporate all male patients.

Lastly, we looked at colon cancer screening for physician compliance and adherence to USPSTF guidelines. Analysis for any version of colon cancer screening showed that female physicians were more likely to order screening compared to men. One consideration might be that if a

patient refuses or declines to get a colonoscopy that year, female physicians might offer the other alternative stool studies, such as FIT or Cologuard.

If we examine patient adherence to getting a test done when ordered, based on the sex of the physician they see, there is no difference for any of the tests being done. This means that patients will listen, or even not listen, to their doctor, regardless of which gender physician they see. So in regard to our hypothesis and research question, there is a difference in patient adherence to prevention guidelines for female screening for cervical or breast cancer but not on male screening for prostate cancer. For the non-specific gender testing of colon cancer screenings, female physicians are more likely to order tests than males. Patient adherence to screening orders, however, was the same regardless of the sex of the physician. This brings us to the reason why – is there an underlying bias? Or is it that male physicians do not remember to address preventive screenings and/or get the outside records.

LIMITATIONS

This was a retrospective, single center study which had majority of patients with Medicare or private insurances. Medical records may not be accurate in regard to problem lists if the physician did not have an updated problem list. Also, if the doctor did not have the result in the computer, it was considered not done. The reason for this is because if the result is not in the chart, then we do not get credit by the insurance company.

Conclusions

This information on our research is beneficial and could help change how a clinic is run. Maybe we could use reminder sheets or flags in the computer EMR, especially for male physicians, to inform them what screening tests their patients need. Also, if the patient had their tests done at an outside facility, we could develop a mechanism for the office staff to get those records and scan them into the patients' charts. Lastly, if a program has a resident clinic, maybe putting new female patients with a female physician would increase the adherence rate of PAP smears, mammograms, and colon cancer screening. Clearly, we cannot put all our female patients with female physicians, so we need to develop techniques to help improve the rates of compliance with ordering the tests. If we do not get the results, we do not get credit by insurance companies which can affect our reimbursement rates by insurance companies and more importantly, affect the quality of care we provide to our patients.

Table 1: Overall Characteristics of the Study Group (n=2807)

Characteristic	**Mean ± s.d. or % (n)**
Age (years)	54.6 ± 14.3
BMI	31.2 ± 7.4
Type of Visit	
Annual	78.9% (2214)
Other	21.1% (593)
Sex of Provider	
Male	59.3% (1664)
Female	40.7% (1143)
Race (patient)	
White/Caucasian	44.7% (1256)
Black/African American	43.9% (1232)
Other	2.5% (69)
Declined to say	8.9% (250)
Sex (patient)	
Male	39.0% (1094)
Female	61.0% (1713)
Insurance type	
Private	66.8% (1875)
Public	32.5% (912)
Self-pay	0.7% (19)
Comorbidities	
Mastectomy	1.8% (31)
Total hysterectomy	22.4% (380)
Prostate Cancer	4.6% (37)
Diabetes Mellitus	20.3% (509)
Hypertension	51.8% (1300)
Congestive Heart Failure	3.3% (82)
Stroke/TIA	3.5% (88)
Dementia	0.7% (17)
Chronic Kidney Disease	6.3% (159)
Autoimmune Disease	4.7% (118)

Table 2: Characteristics of Patients by Sex of Provider

Characteristic	Sex of Provider		p-value
	Male	Female	
Age (years)	55.7 ± 14.0	53.0 ± 14.5	<0.0001
BMI	31.6 ± 7.3	30.6 ± 7.5	0.001
Type of Visit			<0.0001
Annual	76.0% (1265)	83.0% (949)	
Other	24.0% (399)	17.0% (194)	
Sex (patient)			
Male	55.6% (925)	14.8% (169)	<0.0001
Female	44.4% (739)	85.2% (974)	
Race (patient)			
White/Caucasian	48.8% (805)	37.4% (427)	
Black/AA	39.4% (656)	52.5% (600)	<0.0001
Other	2.5% (41)	2.4% (28)	
Declined	9.7% (162)	7.7% (88)	
Insurance			
Private	64.0% (1065)	70.9% (810)	<0.0001
Public	35.4% (589)	28.3% (323)	
Self-pay	0.5% (9)	0.9% (10)	
Mastectomy	1.8% (13)	1.9% (18)	0.89
Total Hysterectomy	24.3% (178)	20.9% (202)	0.10
Prostate Cancer	4.3% (30)	6.0% (7)	0.41
Diabetes Mellitus	23.8% (340)	15.6% (169)	<0.0001
Hypertension	58.7% (838)	42.7% (462)	<0.0001
CHF	4.1% (59)	2.0% (22)	0.005
Stroke/TIA	4.6% (66)	2.1% (23)	<0.0001
Dementia	0.7% (10)	0.6% (7)	0.87
CKD	8.0% (114)	4.2% (45)	<0.0001
Autoimmune Disease	4.8% (69)	4.5% (49)	0.72

Table 3: Differences in Screening Test Orders by Sex of Physician

Screening Ordered	Sex of Provider		p-value
	Male	Female	
Mammogram, Women Age 40+ yrs.	86.5% (545)	91.6% (687)	0.002
Mammogram, Women Age 50+ yrs.	89.1% (449)	93.9% (559)	0.004
Pap Smear, Women 21-30 yrs.	69.2% (18)	87.8% (79)	0.02
Pap Smear, Women 31-65 yrs.	77.7% (286)	88.3% (470)	<0.0001
PSA, Men 55-69 yrs.	92.0% (299)	90.9% (50)	0.79
Colon Cancer Screening, 50-75 yrs.	90.6% (932)	94.6% (617)	0.003

Table 4: Differences in Screening Tests Completed When Ordered by Sex of Physician

Screening Done	Sex of Provider		p-value
	Male	Female	
Mammogram, Women Age 40+ yrs.	87.7% (478)	89.2% (613)	0.41
Mammogram, Women Age 50+ yrs.	89.8% (403)	90.2% (504)	0.83
Pap Smear, Women 21-30 yrs.	100% (18)	96.2% (76)	--
Pap Smear, Women 31-65 yrs.	95.8% (274)	97.0% (456)	0.37
PSA, Men 55-69 yrs.	97.3% (291)	98.0% (49)	0.78
Colon Cancer Screening, 50-75 yrs.	87.0% (811)	88.8% (548)	0.29

Table 5: Differences in Screening Tests Ordered by Insurance Type

Screening Ordered	Insurance Type			p-value
	Private	Public	Self-pay	
Mammogram, Women Age 40+ yrs.	88.2% (741)	90.9% (482)	90.0% (9)	0.28
Mammogram, Women Age 50+ yrs.	91.9% (543)	91.4% (459)	100% (6)	--
Pap Smear, Women 21-30 yrs.	84.5% (82)	77.8% (14)	100% (1)	--
Pap Smear, Women 31-65 yrs.	84.4% (648)	82.1% (101)	77.8% (7)	0.72
PSA, Men 55-69 yrs.	95.5% (253)	83.8% (93)	75.0% (3)	<0.0001
Colon Cancer Screening, 50-75 yrs.	92.1% (930)	92.3% (610)	90.0% (9)	0.96

Table 5: Differences in Screening Tests Done when Ordered by Insurance Type

Screening Ordered	Insurance Type			p-value
	Private	Public	Self-pay	
Mammogram, Women Age 40+ yrs.	88.3% (654)	89.4% (431)	66.7% (6)	0.10
Mammogram, Women Age 50+ yrs.	89.9% (488)	90.2% (414)	83.3% (5)	0.85
Pap Smear, Women 21-30 yrs.	96.3% (79)	100% (14)	100% (1)	--
Pap Smear, Women 31-65 yrs.	97.1% (629)	93.1% (94)	100% (7)	--
PSA, Men 55-69 yrs.	97.6% (247)	96.8% (90)	100% (3)	--
Colon Cancer Screening, 50-75 yrs.	87.0% (809)	88.7% (541)	100% (9)	--

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