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Linking physician attitudes to their breast cancer screening practices: a survey of US primary care providers and gynecologists

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Abstract

Despite changes to breast cancer screening guidelines intended to decrease screening in younger and older women, mammography rates remain high. We investigated physician attitudes towards screening younger and older women. Surveys were mailed to US primary care providers and gynecologists between May and September 2016 (871/1665, 52.3% adjusted response rate). We assessed physician (1) attitudes towards screening younger (45–49 years) and older (75+ years) women and (2) recommendations for routine mammography. We used exploratory factor analysis to identify underlying themes among physician attitudes and created measures standardized to a 5-point scale. Using multivariable logistic regression models, we examined associations between physician attitudes and screening recommendations. Attitudes identified with factor analysis included: potential regret, expectations, and discordant guidelines (referred to as potential regret), patient-related hazards due to screening, physician limitations and uncertainty, and concerns about rationing care. Gynecologists had higher levels of potential regret compared to internists. In adjusted analyses, physicians with increasing potential regret (1-point increment on 5-point scale) had higher odds of recommending mammography to younger (OR 8.68; 95% CI 5.25–14.36) and older women (OR 4.62; 95% CI 3.50–6.11). Increasing concern for patient-related hazards was associated with decreased odds of recommending screening to older women (OR 0.68; 95% CI 0.56–0.83). Physicians were more motivated by potential regret in recommending screening for younger and older women than by concerns for patient-related hazards in screening. Addressing physicians' most salient concerns, such as fear of missing cancer diagnoses and malpractice, may present an important opportunity to improving delivery of guideline-concordant cancer screening.

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Keywords

breast cancer; cancer screening; primary care; gynecology; guidelines

Introduction

Evolving breast cancer screening guidelines have shifted towards reducing screening for younger (ages 40-49) and older (ages 75 and over) women given concerns that these groups of women may be more likely to experience the harms of mammography screening relative to its potential benefits.¹⁻³ In spite of guideline changes, rates of mammography screening continue to remain high among younger and older women.⁴⁻⁷ For example, following the 2009 US Preventive Services Task Force (USPSTF) recommendations to start biennial mammography screening for women 50-74 years, rather than starting at age 40, screening rates for younger women were unchanged by 2011.⁸ Prior research highlights the difficulty with the ‘de-implementation’—abandonment of medical practices that are not evidence-based—of guidelines. Factors such as inertia, organizational culture, financial incentives, personal values, and patient expectations may influence physician behavior, overriding evidence such as from randomized controlled trials.^{9,10}

A key determinant of breast cancer screening is whether a primary care provider (PCP) or gynecologist recommends mammography to their patient.¹¹ Existing research suggest that these recommendations are informed by organizational guidelines. Physicians who report trusting the USPSTF recommendations—which have tended to be the most conservative guidelines—are less likely to recommend screening.^{4,12,13} At the same time, a majority of physicians who report trusting USPSTF, for example, continue recommending screening in excess of these guidelines, with rates of screening remaining largely unchanged following guideline changes.¹⁴ Physician specialty has also been linked with screening recommendations. Gynecologists, in part reflecting the recommendations of their professional society, were most likely to recommend mammography screening starting at an early age, recommending annual rather than biennial screening, and continuing screening among older women compared to internists or family physicians.^{13,15}

To inform efforts to implement guidelines that seek to reduce screening in younger and older women, it is critical to better understand the drivers of physician screening recommendations including the underlying physician attitudes and beliefs towards mammography screening in their younger and older patients. These attitudes and beliefs may help decide which organizational guideline physicians report trusting, explain variable adherence to these guidelines, and be shaped by specialty training and experiences. However, prior studies investigating physicians' attitudes and beliefs towards breast cancer screening have tended to focus on a very limited set of attitudes and beliefs, often using a single question concerning perceived clinical effectiveness, not examining the subsequent impact on physician screening recommendations, and sometimes only including smaller/regional physician samples. These studies have found significant heterogeneity in attitudes around the influence of various organizational guidelines and concerning effectiveness of breast cancer screening in younger and older women.^{13,14,16}

Building on the prior literature and drawing upon a large national survey of primary care providers and gynecologists, we sought to investigate a broad range of attitudes and beliefs towards mammography screening, using factor analysis to group them into underlying themes. We then investigated whether these themes varied according to which guidelines physicians trusted the most and physician specialty. Lastly, we examined whether attitudes and beliefs were associated with physician breast cancer screening recommendations for women of different age groups.

Methods

Data for our study were obtained from the Breast Cancer Social Networks study (CanSNET), a national survey of primary care physicians. The Johns Hopkins University Institutional Review Board approved this study.

Physician recruitment

Primary care providers were randomly sampled from the American Medical Association Master file, including 1500 internal medicine (IM), family medicine (FM) and general practice (GP) physicians and 500 gynecologists. Physicians were included if they provided primary care or general gynecologic care to women ages 40 and older. Mailed surveys were sent between May and September 2016 and an unconditional \$10 incentive was provided in the first mailing. All non-responders received an additional two mailings. In the third mailing, we offered a \$40 gift card upon completion of the survey. Physicians had the opportunity to respond to the survey online and phone calls were made to non-responders.

Outcome

To determine breast cancer screening practices, we asked physicians how often they typically recommended mammograms to women in different age groups “with no family history and no prior breast issues, including no prior positive biopsies or increased genetic susceptibility to breast cancer”. Response options included: I do not recommend screening, recommend screening yearly, recommend screening every other year or recommend screening at another interval. Responses were dichotomized as recommending screening or not.

Primary independent variable

Physicians were asked for degree of agreement with a series of statements regarding their attitudes and beliefs around mammography screening for women ages 45-49 and ages 75+, age groups for which guidelines are the most discordant. (Appendix B). Statements were based on prior literature and modified based on pilot testing with physicians who provide routine primary or gynecologic care to women ages 40+. ^{14,17-19} A series of 9 statements were asked to physicians regarding screening younger women. This was similarly repeated for screening older women, but an additional 3 statements specific to discontinuing cancer screening were included. Physicians rated their agreement using a 5-point Likert scale.

Covariates

Physician and practice characteristics that previously have been shown to influence screening practices were obtained from the survey.^{13,15,20} Physician characteristics included race/ethnicity, gender, specialty, whether the physician worked full time in outpatient practice, and if the physician was personally sued for failing to diagnose any type of cancer. AMA data was used to obtain respondents' ages and for missing survey data on gender (N=20) and specialty (N=39). Additionally, physicians were asked to select the organization's guideline they trusted most for breast cancer screening – options included American Cancer Society (ACS), USPSTF, American Congress of Obstetricians and Gynecologists (ACOG), other, and I am not sure/no preference. Responses for other and I am not sure/no preference were combined given small sample sizes. Practice characteristics included size of the physician's practice, employer type, and percentage of uninsured patients seen.

Statistical Analysis

We used descriptive statistics to summarize physician and practice characteristics. We performed a series of three analyses. First, to identify underlying themes among physician attitudes and beliefs, we performed exploratory factor analysis using the principal-component factor method and varimax rotation.²¹ All factors with eigen values greater than one were considered further. Within each factor, item loadings were similar. Because of this, we created summary scores by computing unweighted averages of items loading on each factor. Scores ranged from 1 to 5, with greater scores representing greater concern with the attitude or belief.

Second, we determined whether physician attitudes and beliefs varied by (1) physician specialty and (2) most trusted guidelines. To do this, we used Kruskal-Wallis ranks tests, given that the distributions of scores for physician attitudes and beliefs were not normal, followed by multivariable linear regression models. In our regression models, our outcome was physician attitudes and beliefs for each age group, using physician specialty and trusted guidelines as our main independent variables. These models adjusted for additional physician characteristics (age, race/ethnicity, gender, full-time outpatient status, and if the physician was sued in failing to diagnose a cancer) and practice characteristics (size, employer type, and percent of uninsured patients). Separate models were constructed for each attitude and belief and for each age group.

Third, using multivariable logistic regression, run separately by age group, we evaluated whether screening recommendations varied by physician attitudes and beliefs, adjusting for the above physician and practice characteristics. All attitudes and beliefs were included in the same model. Recognizing the potential relationship between physician attitudes and beliefs and trusted guidelines, we performed sensitivity analyses excluding the covariate trusted guidelines to evaluate their impact on the association between physician attitudes and beliefs and screening recommendations.

We used multiple imputation methods using chained equations to account for missing data.²² Five imputations were performed. All analyses were conducted using Stata 13.0 (College Station, TX).

Results

In total, 871 of 1665 eligible physicians responded to the survey for an adjusted response rate of 52.3%. Physicians were excluded if they did not provide primary care or general gynecologic care to women 40 years and older (N=157) and for undeliverable mail (N=178). Responders were more likely to be family medicine/general practitioners and female compared to non-responders (Table A.1). Average age of respondents was 52.9 years (SD 10.5) (Table 1). The majority were white (70.6%) and worked in a physician-owned practice (50.9%). Nearly thirty percent of the respondents were internists, while 44.2% were family medicine/general practitioners and 26.1% were gynecologists. Over a quarter of physicians (26%) reported trusting ACOG guidelines the most, 23.7% ACS, and 22.9% USPSTF. ACOG was the most trusted guidelines amongst gynecologists (72.3%) while USPSTF was most trusted by family medicine/general practitioners (33.6%) and ACS by internists (34.8%). Overall, 88% of physicians recommended screening mammography to women ages 45-49 and 67% to women ages 75+. Of those physicians who recommended screening, the majority recommended yearly screening (66.7% for younger and 52.3% for older women).

Exploratory factor analysis

The principal-component factor analysis yielded two factors for physician attitudes and beliefs towards screening women ages 45-49 and four factors for women ages 75+ (Table 2; factor loadings included in Table A.2). Factors were labeled with terms that attempted to best capture the underlying themes after discussion with the team and with clinical input; however, it should be noted that there is uncertainty in this process and a single label may not perfectly align with all components comprising a factor. The first factor was common to screening both younger and older women. It comprised physician feelings of *potential regret* from not ordering mammograms, countering patient *expectations*, and reconciling *discordant guidelines* (here to referred to as 'potential regret') and included four statements concerning liability associated with not ordering mammograms, fear of missing potentially lethal cancers, patient expectations to receive mammograms, and difficulty reconciling clinical uncertainty with varying organizational guidelines.

Five items loaded onto the second factor for physician attitudes towards screening younger women but split into two factors for older women. Together, these items addressed concerns with and leading to *overuse of screening* mammograms in younger women. For physician attitudes towards screening older women, two items focused on *patient-related hazards* from screening including unnecessary follow up testing and over diagnosis of non-lethal cancers. Three items were focused on *limitations and uncertainty* physicians faced during a clinical encounter including limited time during clinic visit for risk-benefit discussions, difficulty going against another physicians' recommendation, and uncertainty regarding screening.

The fourth factor for older women was composed of two items around *rationing care*, including concerns that patients will think that the physician is cutting costs and giving up

on older patients by not ordering mammograms. These items were not asked with regards to younger patients.

Physician attitudes and beliefs about screening younger women

Unadjusted analyses showed significant variation across physician specialty and trusted guidelines for the two factors identified for younger women—potential regret and concerns with and leading to overuse of screening mammograms (Figure 1a). Compared to internists, FM/GP had lower potential regret (4.0 vs 4.2, $p=0.006$) whereas gynecologists had higher potential regret (4.4 vs. 4.2, $p=0.004$) and lower concern for overuse of screening (2.4 vs. 2.7, $p<0.001$). On average, potential regret was lower amongst those who trusted USPSTF (3.7 vs. 4.4 ACS and 4.4 ACOG, $p<0.001$) and concern for overuse of screening was higher (3.0 vs. 2.5 ACS and 2.4 ACOG, $p<0.001$). In models that simultaneously examined physician specialty and trusted guidelines, we continued to observe significantly lower potential regret and higher concern for overuse of screening among physicians who trusted USPSTF (Table A.3).

Physician attitudes and beliefs about screening older women

Similar to findings in younger women, FM/GP had lower potential regret compared to IM (3.2 vs. 3.4, $p=0.002$) whereas gynecologists had higher potential regret (3.9 vs. 3.4, $p<0.001$) with regards to older patients (Figure 1b). Concern for patient-related hazards was lower in gynecologists compared to internists (2.8 vs. 3.1, $p<0.001$). Physicians who trusted USPSTF the most had lower potential regret (3.0 vs. 3.6 vs. 3.8, $p<0.001$) and higher concern for patient-related hazards (3.5 vs. 3.0 vs. 2.8, $p<0.001$) compared to those who trusted ACS and ACOG respectively. In adjusted models, we continued to observe higher potential regret among gynecologists compared to IM and significant variation across trusted guidelines (Table A.3).

Association between physician attitudes and screening recommendations

In models that adjusted for physician specialty, guidelines, and other physician and practice factors, physicians who had increasing levels of potential regret (one point increase on a five-point scale) were more likely to recommend mammography to younger (Odds Ratio 8.68; 95% Confidence Interval 5.25-14.36) and older women (OR 4.62; 95% CI 3.50-6.11) (Figure 2) (Table A.4). Increasing concern for patient-related hazards was associated with decreased odds of recommending screening mammography to older women only (OR 0.68; 95% CI 0.56-0.83). Models excluding trusted guidelines as a covariate show qualitatively similar results (results not shown).

Discussion

In the setting of mixed physician adherence to evolving breast cancer screening guidelines and continued concerns for over-screening in younger and older women, understanding physician attitudes and beliefs that motivate screening recommendations is critically important. Our study of a large, nationally representative cohort of primary care providers and gynecologists expands upon prior research by using factor analysis to identify central factors underpinning physician attitudes and beliefs towards breast cancer screening for

average-risk younger and older women. Two factors—including potential regret and concern for patient-related hazards from screening—varied according to physician specialty and guidelines most trusted and were significantly associated with screening recommendations. Our results suggest that it is possible to disentangle physician attitudes and beliefs around breast cancer screening recommendations, and that addressing physicians' most salient concerns may be critical towards reducing cancer over-screening.

Most notably, one factor, which we labeled potential regret, encompassed the concerns physicians face when they do not order a mammogram and include fear of missing cancer, malpractice concerns, patient expectations, and divergent recommendations of organizational guidelines. This factor varied by physician specialty and which guideline physicians trusted most and was strongly associated with a higher likelihood of recommending screening to both younger and older patients. The items comprising feelings of potential regret are consistent with previously identified barriers to following guidelines.²³ Implementation of changes to breast cancer screening recommendations into clinical practice may be strongly influenced by the physician's perception of the changes.²³⁻²⁵ Physicians may not perceive the proposed benefit of reduced screening and find the risks to be greater. Further, the changes may be incompatible with physicians' values, beliefs and clinical experiences. In turn, these factors may impede the 'rolling back' of cancer screening and lead to incomplete adherence to guidelines.

In contrast, physicians who endorsed concerns for patient-related hazards associated with mammography—including unnecessary follow-up testing and over diagnosis—were less likely to recommend screening among older adults. There is considerable uncertainty about the benefits of routine screening mammography in older women.²⁶ Data increasingly suggests that screening mammograms have led to increases in over diagnosis of breast cancers.^{27,28} Further, modeling studies show that with continued screening in older women, the number of unnecessary biopsies also increases.²⁹ It may be that physicians are impacted by these factors when deciding whether to recommend routine screening to older women.

Consistent with prior studies showing different rates of screening by physicians of different specialties, we found that underlying themes in attitudes and beliefs regarding breast cancer screening also varied, with gynecologists reporting higher levels of potential regret compared to other physicians.^{4,20,30,31} While this may reflect the ACOG guidelines that the majority of gynecologists follow, which, until recently, consistently recommended annual mammography for women over the age of 40 years, differences remained significant even after adjustment for guidelines. One plausible explanation is that higher levels of potential regret found among gynecologists may reflect higher rates of malpractice risk that gynecologists routinely face compared to other physician specialties.³²⁻³⁴ Our analyses controlled for whether the physician was personally sued for failing to diagnose a cancer, but it is possible that experiences with other lawsuits or among one's peers have spillover effects on screening beliefs and attitudes.

We found that physician attitudes and beliefs towards breast cancer screening varied additionally by the guidelines physicians trusted the most. Those who trusted USPSTF guidelines had lower levels of potential regret and higher concern for overuse of screening.

These findings are in line with the more conservative approach of USPSTF guidelines which focus on trying to balance the benefits and harms of screening in younger and older women, and therefore, generally, recommend less testing. Notably, the majority of physicians in our sample trusted guidelines *other* than USPSTF which tend to emphasize strongly the potential benefits of mammography in younger and older women, and subsequently recommend more aggressive screening. Those who trusted ACS, for example, endorsed higher levels of potential regret from not ordering mammograms for older women and were more likely to recommend screening. It is plausible that these physicians consider the potential benefits of screening to their older patients more strongly than the associated risks. In this cross-sectional survey, it is unknown whether we are observing physicians gravitating towards guidelines that reflect their attitudes and beliefs or the extent to which guidelines shape these beliefs. Studies which follow physicians over time and as guidelines change may help delineate these possibilities.

Strengths of this study include innovatively describing physician attitudes and beliefs; we used factor analysis to try to group attitudes and beliefs into underlying themes, finding that endorsement of these themes varied across physician specialty and which guidelines physician reported trusted. Additional strengths include its large, national sample of primary care physicians and gynecologists. It occurred following the October 2015 American Cancer Society guidelines, the first to our knowledge.²

It is important to acknowledge limitations to our study. First, our response rate was 52.3% and it is possible that attitudes and screening patterns of physicians who did not respond differed from those who did. Our results however are in line with prior national studies for both proportions of physician types that responded and recommended screening.^{13,16,31,35} Second, we relied on physician self-report for screening behaviors which may not accurately reflect actual clinical practice and may be prone to social desirability bias. However, prior research shows that physician self-report of cancer screening recommendations was comparable to directly observed practice.³⁶ Third, we performed literature reviews and extensive pilot testing with both physicians and with a patient advisory committee to formulate our statements for physician attitudes and beliefs, however, it is possible that there are other attitudes we did not capture and which may drive practice patterns. Lastly, our study is cross-sectional which limits our ability to draw inferences about causality regarding predictors of screening recommendations.

Conclusion

An important implication of this study is that implementation of changes in guidelines that seek to reduce over-screening among younger and older patients may need to contend with underlying attitudes and beliefs of physicians. The ‘rolling back’ of breast cancer screening may raise concerns for possible potential regret from not ordering mammograms, and in turn drive physicians to recommend screening to younger and older women. Addressing physician fears of missing cancer diagnoses and malpractice risk may present important opportunities in future approaches towards maximizing guideline adherence and improving delivery of cancer screening.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1. mean physician attitudes scores by physician specialty and guidelines most trusted for women (a) ages 45-49 and (b) ages 75+.

*Error bars represent 95% confidence interval around the mean

Figure 2.

Adjusted odds ratio of recommending mammography screening for women ages 45-49 and women ages 75+ associated with physician attitudes.

*Reference group: did not recommend screening

†Separate models were run for each age group. Models simultaneously included all factors and adjusted for gender, age, specialty, race/ethnicity, full time, personally sued for failing to diagnose a cancer, practice size, employer type, % of uninsured patients, and guidelines most trusted

Table 1
Physician and practice characteristics (N=871)

	N (%)
Gender	
Male	476 (54.7)
Female	395 (45.4)
Specialty	
Internal Medicine	259 (29.7)
Family Medicine/General Practice	385 (44.2)
Gynecology	227 (26.1)
Age (years)	
<40	99 (11.4)
40-49	241 (27.7)
50-59	286 (32.8)
60	245 (28.1)
Race/ethnicity	
Non-Hispanic White	615 (70.6)
Asian	115 (13.2)
Other	105 (12.1)
Missing	36 (4.1)
Fulltime outpatient status	
<36 hours	442 (50.8)
36 hours	394 (45.2)
Missing	35 (4.0)
Employer	
Physician-owned	443 (50.9)
HMO	60 (6.9)
Medical school/university	49 (5.6)
Hospital affiliated	191 (21.9)
Other	115 (13.2)
Missing	13 (1.4)
Practice size (physician)	
Solo	188 (21.6)
2 - 10	456 (52.4)
11 - 49	126 (14.5)
50+	93 (10.7)
Missing	8 (0.9)
% of uninsured patients	
<5	393 (45.1)
5	412 (47.3)

	N (%)
Missing	66 (7.6)
Personally sued for failing to diagnose cancer	
Yes	63 (7.2)
No	788 (90.5)
Missing	20 (2.3)
Guidelines most trusted	
ACS	207 (23.7)
ACOG	226 (26.0)
USPSTF	199 (22.9)
Other/No preference	218 (25.0)
Missing	21 (2.4)

ACS=American Cancer Society; ACOG=American Congress of Obstetricians and Gynecologists; USPSTF=US Preventive Services Task Force

Table 2
Description of physician attitudes and beliefs based on factor analysis results for each age group

Underlying physician attitude and belief (factor)		Items comprising factor	Mean scores about patients ages 45-49*	Mean scores about patients ages 75+*
Potential regret		-I am concerned that not ordering mammograms would put me at higher risk for malpractice liability -I worry that not ordering a mammogram could miss potentially lethal cancer -The majority of my patients expect to get mammograms -Until guidelines agree with one another, I will continue screening women the way I always have	4.2 (0.8)	3.5 (0.9)
Concerns with and leading to overuse of screening**	Limitations and uncertainty [†]	-I do not have the time to discuss the risks and benefits of screening, so it is easier just to recommend screening -My patients have been told by other doctors to get a mammogram and I'm reluctant to go against their advice -I feel uncertain about whether I should screen women for breast cancer	2.6 (0.8)	2.3 (0.9)
	Patient-related hazards [†]	-I am concerned that patients who get screened will need to undergo additional tests and in most cases they do not end up having cancer -I worry that too often in patients who get screened, we find cancers that would never have caused problems		3.1 (1.0)
Rationing care		-I am concerned if I stop ordering mammograms, my older patients will think I am trying to cut costs -I am concerned if I stop ordering mammograms, my older patients will think I am giving up on them	N/A	2.4 (1.2)

* Range of possible scores from 1 to 5. Higher scores indicate greater concern with the attitude or belief

** Attitude and belief comprise one factor when describing screening younger patients (concerns with and leading to overuse of screening) and two factors

[†] for screening older patients (limitations and uncertainty and patient-related hazards)