Guideline-Inconsistent Breast Cancer Screening for Women over 50: A Vignette-Based Survey

Hajar Kadivar, MD, MPH³, Barbara A. Goff, MD², William R. Phillips, MD, MPH¹,
C. Holly A. Andrilla, MS¹, Alfred O. Berg, MD, MPH¹, and Laura-Mae Baldwin, MD, MPH¹

¹Department of Family Medicine, University of Washington, Seattle, WA, USA; ²Department of Obstetrics and Gynecology, University of Washington, Seattle, WA, USA; ³University of Florida College of Medicine, Gainesville, FL, USA.

BACKGROUND: Professional organizations have issued guidelines recommending breast cancer screening for women 50 years of age.

OBJECTIVE: This study examines the percent of U.S. primary care physicians who report breast cancer screening practices that are not consistent with guidelines, and the characteristics of physicians who reported offering extra test modalities.

DESIGN: We analyzed a subset of a 2008 cross-sectional Women's Health Care survey sent to primary care physicians randomly selected from the national American Medical Association (AMA) Physician Masterfile. A subset of physicians received a survey that presented a vignette of a health maintenance visit for an asymptomatic 51-year-old woman who was not at high risk for breast cancer. Responses were weighted to represent physicians nationally.

PARTICIPANTS: 1,654 U.S. family physicians, general internists, and obstetrician-gynecologists under age 65, who practiced in office or hospital based settings (62.8 % response rate). After exclusions, 553 study physicians remained for analysis.

MAIN MEASURE: Physician self-report of breast cancer screening practices that are not consistent with the recommendations of the U.S. Preventive Services Task Force (USPSTF), the American College of Obstetrics and Gynecology (ACOG), and the American Cancer Society (ACS), defined as almost always offering mammography.

KEY RESULTS: 36.0 % (95 % CI: 31.8 %–40.5 %) of physicians reported offering breast cancer screening tests inconsistent with national guidelines, with most offering extra tests (magnetic resonance imaging [MRI] and/or ultrasound) (33.2 %, 95 % CI 29.1 %–37.6 %). In adjusted analysis, risk-averse physicians and those who believed in the clinical effectiveness of MRI were more likely to offer extra breast cancer screening tests.

CONCLUSIONS: Physicians often report offering breast cancer screening test modalities beyond those recommended for a 51-year-old woman. Strategies, such as

academic detailing regarding appropriate use of technology and provision of clinical decision support for breast cancer screening, could decrease overuse of resources.

KEY WORDS: breast cancer; cancer screening; guidelines; physician behavior; primary care; prevention; malpractice; risk assessment.

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INTRODUCTION

Breast cancer is the second leading cause of cancer death among women.¹ For women ≥ 50 years of age, breast cancer screening tests are beneficial and decrease mortality.^{2–6} Physicians' cancer screening recommendations are a key factor that determines whether women actually receive cancer screening tests.^{7–11} Major guidelines, including those written by the U.S. Preventive Services Task Force (USPSTF), the American College of Obstetrics and Gynecology (ACOG), and the American Cancer Society (ACS), recommend mammography as the only routine screening test for women ≥ 50 years of age who are not at high risk of breast cancer.^{12–15} The ACS and ACOG recommend magnetic resonance imaging (MRI) as an adjunct to mammography for high-risk women, i.e., those facing a lifetime risk of $>20\%$.^{16,17} While in 2009 the USPSTF updated their breast cancer screening guidelines, they still only recommend routine mammography for women ≥ 50 years of age.¹⁵ Physicians who do not offer mammography or who offer extra, non-recommended breast imaging modalities for screening women not at high risk of breast cancer, such as MRI or ultrasound, are providing care that is inconsistent with these recommendations. Numerous studies have assessed how often women are receiving age-appropriate breast cancer screening,^{18–20} and a national survey has assessed physician mammography and breast exam recommendations,²¹ but to our knowledge, no previous study has examined how often physicians offer breast cancer screening via modalities other than mammography.

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Both offering insufficient screening tests and offering extra screening tests for breast cancer are problematic. Failure to routinely offer breast cancer screening places women at greater risk of breast cancer mortality; offering extra breast cancer screening tests via non-recommended modalities represents overuse of resources and is associated with unnecessary risks and costs. The objectives of this study were: 1) to calculate the percentage of U.S. primary care physicians who report breast cancer screening practices for a non-high-risk 51-year-old woman that are inconsistent with guidelines (either due to not offering mammography or offering other breast cancer screening modalities than mammography); 2) to describe the modality of screening tests offered; and 3) to determine the physician and practice characteristics associated with offering extra screening tests.

METHODS

Survey Design and Sample

This study uses data gathered in 2008 from a Women's Health Survey, for which the details and methods have been previously published.^{22–25} The survey used vignettes, which are accurate and validated tools for measuring preventive care practices.^{26–28} The Women's Health Survey was sent to 3,200 physicians under age 65 who practiced in either an office or hospital based setting; it achieved a 61.7 % response rate. Using stratified random sampling, these physicians were selected from the 2008 American Medical Association (AMA) Physician Masterfile, a national list of all licensed physicians, in roughly equal numbers of family physicians, general internists, and obstetrician-gynecologists to ensure adequate numbers of respondents from each specialty type. The study included family physicians, general internists, and obstetrician-gynecologists, because they often provide primary preventive services to women, particularly cancer screening.^{29,30}

This study includes only those 1,654 physicians who were sent the vignette portraying an asymptomatic 51-year-old woman presenting for a routine health maintenance visit; 986 physicians responded (62.8 %). After exclusions, the study analysis included 553 respondents (see Fig. 1 for delineation of exclusions). Respondents did not differ from non-respondents by specialty, sex, age, or present employment. This study was approved by the University of Washington Institutional Review Board.

Vignette

This study assessed the responses to a vignette portraying a routine health maintenance visit of an asymptomatic 51-year-

Figure 1. Study flow diagram. *Physician responses were weighted to their representative numbers in the practicing U.S. physician population using the proportionately reduced 2008 AMA physician masterfile counts based on the study exclusions.

old woman, whose personal and family history did not put her at high risk for breast cancer. The vignettes used in this study varied the woman's: 1) race (Caucasian or African American); 2) insurance (Medicaid or private); 3) family history of cancer (i. a mother with breast cancer at age 70, or ii. a mother who died of ovarian cancer at age 65); and 4) request for ovarian cancer screening (request: "She requests cancer screening, especially for ovarian cancer," or no request: "She wants to be sure she is up to date on all appropriate cancer screening tests"). Physicians received one version of this vignette at random. The vignette stated that the woman had not received any cancer screening tests in the prior 3 years and had an unremarkable physical examination. The vignette was followed by a list of tests, and asked, "for a patient like this," how often would the physician "offer or order" (from here on referred to as "offer") these tests: "almost always," "sometimes," or "almost never." The vignette was written to assess a physician's typical screening practices at the time the 51-year-old woman was seen, and not to assess for abnormal screening follow-up, for special circumstances such as very dense breasts, or for screening interval frequency. The response categories "almost always" and "almost never," however, allowed for some flexibility to account for rare situations in which physicians might choose to order or forego a screening test outside of their usual practice due to special circumstances.

Outcomes of Interest

The listed test options related to breast cancer screening in the vignette were: mammography, breast ultrasound, and breast MRI. Physicians could choose to offer none, any one, or a combination of these tests. The primary outcome of interest was offering guideline-inconsistent breast cancer screening (either not offering mammography or offering other breast cancer screening modalities than mammography). Following the recommendations of the United States Preventive Services Task Force (USPSTF), the American College of Obstetricians and Gynecologists (ACOG), and the American Cancer Society (ACS), guideline-consistent breast cancer screening was defined as “almost always” offering mammography only since the patients in the vignette were not high risk for breast cancer.^{14,15,17} The Breast Cancer Risk Assessment Tool (aka Gail model) estimated the lifetime risk for the vignette patients with the greatest breast cancer risk (i.e., vignette that included family history of mother with post-menopausal breast cancer) as 10.4 % for the African American woman vs. 8.7 % for the average (age and race/ethnicity matched) woman and 14.5 % for the Caucasian woman vs. 11 % for the average (age and race/ethnicity matched) woman.^{31–33}

There were three categories of guideline-inconsistent breast cancer screening: 1) extra testing (offering a non-recommended screening modality [breast ultrasound and/or breast MRI] “almost always” or “sometimes” in addition to offering mammography “almost always”); 2) insufficient testing (“almost never” or “sometimes” offering mammography, and “almost never” offering a non-recommended screening modality); and 3) wrong testing (offering a non-recommended screening modality “almost always” or “sometimes”, and “almost never” offering mammography).

Independent Variables

The Theory of Reasoned Action and Theory of Planned Behavior helped guide the selection of physician/practice study variables because they have been used previously to examine physician behaviors, including cancer screening.^{34–37} These variables included the patient characteristics from the vignette (described above), as well as characteristics of the physicians and their practices.

Physician characteristics included gender, self-reported specialty (if physicians listed two specialties, the one consistent with the AMA Physician Masterfile was used), years in practice, involvement in clinical teaching, and board certification. Physicians reported their agreement with the clinical effectiveness of tests for cancer screening among an average risk population, and their non-professional experience with cancer (i.e., none, experience in family member/close friend/coworker, or physician's own experience). Variables noting if the physician listed the

USPSTF, the ACOG, or the ACS among the top three organizations that influenced their cancer screening recommendations were created. Additionally, physicians provided their estimate of the patient's “level of risk” for breast and colorectal cancer as being “the same as,” “somewhat higher,” or “much higher than the general population.” The physician's personal risk taking level was determined using a previously published six-question, Likert response (6 point-strongly disagree to strongly agree) measure that determines physician personal attitudes and preference regarding risk taking in their lives (e.g., “I rarely, if ever, take risks when there is another alternative.”) (Cronbach's alpha 0.77, in our study).³⁸ Fear of malpractice was measured using two of six questions from a previously published measure (Q1:I feel pressured in my day-

Table 1. Physician and Practice Characteristics of Survey Respondents

Physician and Practice Characteristics	%
Race	n=535*
Caucasian	71.9
Asian/Pacific Islander	18.0
African American	5.0
Other	5.2
Hispanic ethnicity	n=547
Female gender	n=553
Primary specialty	n=553
Family medicine	41.9
General internal medicine	41.3
Obstetrics-gynecology	16.8
Years in practice	n=553
0–10	19.8
11–20	38.4
21+	41.8
Practice type	n=549
Solo practice	23.3
Single specialty group	42.3
Multi-specialty group	29.6
Other	4.8
Physician personal risk taking level	n=509
Low (6–17)	57.2
Medium (18–24)	33.8
High (25+)	9.0
Fear of malpractice	n=511
Low (2–4)	13.8
Medium (5–7)	27.0
High (8+)	59.2
Listed organization among top 3 organization that influence cancer screening recommendations	n=550
U.S. Preventive Services Task Force (USPSTF)	53.1
American Cancer Society (ACS)	63.3
American College of Obstetrics and Gynecology (ACOG)	31.7
Estimation of patient's breast cancer risk	n=543
Same as general population	30.3
Somewhat higher than general population	57.9
Much higher than general population	11.8
Belief in clinical effectiveness of Breast MRI	n=522
	33.5

CI confidence interval; MRI magnetic resonance imaging

*Percent based on weighted sample to provide nationally representative figures; 553 total physicians were included in the analysis. Number less than 553 are due to missing responses

We also assessed: Age, Board certification, Primary practice setting, Geographic location, Weekly average number of patients, Involved in clinical teaching (yes/no), Non-professional experience with cancer, Census division. Please refer to online Appendix A, Table 1a

to-day practice by the threat of malpractice litigation, Q2:I order some tests or consultations to reduce by risk of being sued; 5 point-strongly disagree to strongly agree;Cronbach's alpha 0.76, in our study).^{39,40}

Physicians reported practice characteristics, including the average number of outpatients seen weekly and practice type (i.e., solo, single specialty group, multispecialty group). Practice census division and rurality were determined from the mailing ZIP codes, using Rural Urban Commuting Area (RUCA) codes to designate level of rurality.^{41,42}

Analysis

Physician responses were weighted to their representative numbers in the practicing U.S. physician population using the 2008 AMA Physician Masterfile counts. Using SUDAAN 10.0 (RTI International, Research Triangle Park, NC), guideline inconsistent breast cancer screening types and percentages were calculated. The specialty specific unadjusted percentage of physicians offering guideline inconsistent breast cancer screening was calculated. The results of the three specialties were combined because there were no significant differences in screening practices between the specialties. The unadjusted percentages of extra testing, the most common inconsistency, were stratified by physician and practice characteristics and tested for statistical significance using chi-square tests ($P \leq 0.01$). Stepwise multivariate logistic regression analysis identified the physician and practice characteristics significantly ($P \leq 0.05$) associated with extra testing after patient charac-

teristics were included in the regression analyses. Risk ratios were calculated based on predicted marginals.⁴³

RESULTS

Physician respondents were primarily Caucasian (71.9 %) and male (60.9 %) (Table 1). A majority of respondents practiced in single-specialty group practices (42.3 %), in urban areas (84.5 %), and were in practice for more than 21 years (41.8 %).

A sizeable percentage of physicians (36.0 %, 95 % CI, 29.1 %–37.6 %) reported offering guideline-inconsistent breast cancer screening for the vignette's asymptomatic 51-year-old woman presenting for a health maintenance visit (Table 2). The most common type of reported guideline inconsistency was offering extra testing (33.2 %, 95 % CI, 29.1 %–37.6 %). The most commonly reported extra testing combinations were breast ultrasound plus mammography (16.6 % of all physicians [95 % CI, 13.5 %–20.2 %]), and breast MRI plus breast ultrasound plus mammography (13.7 % of all physicians [95 % CI, 10.9 %–17.1 %]). A much smaller percentage of physicians reported offering breast MRI plus mammography (2.9 % of all physicians [95 % CI, 1.8 %–4.5 %]).

Physicians' personal risk taking level was significantly associated with extra testing, with the highest percent of extra testing among physicians who were low risk takers, (i.e., risk-averse) ($P=0.0027$) (Table 3). Physicians who believed in the clinical effectiveness of MRI as a breast cancer screening test for the average risk population were also more likely to report extra testing (53.0 % vs. 26.4 %, $P<0.00005$). Stepwise multivariable analysis, controlling

Table 2. US Physicians Reported Breast Cancer Screening Practices for a 51-Year-Old Asymptomatic Woman

% (95% CI)*			
Guideline Consistent Screening		Guideline Inconsistent Screening	
64.0 (59.5-68.2)		36.0 (31.8-40.5)	
Categories of Guideline Inconsistent Screening			
Extra Testing	Insufficient Testing	Wrong Testing†	
33.2 (29.1-37.6)	2.5 (1.4-4.4)	0.4 (0.1-1.6)	
Screening Tests Offered			
Mammo + US	Mammo + US + MRI	Mammo + MRI	
16.6 (13.5-20.2)	13.7 (10.9-17.1)	2.9 (1.8-4.5)	

CI confidence interval; Mammo Mammogram; MRI Breast Magnetic Resonance Imaging; US Breast Ultrasound

*Percent based on 553 respondents, weighted to 54,106 respondents nationally

†Physicians not offering mammography and instead offering breast ultrasound and/or breast MRI.

Table 3. Percent of U.S. Physicians Offering Extra Tests for Breast Cancer Screening by Varying Characteristics

		% (95 % CI)
Vignette Patient Characteristics		
Race	<i>n</i> =538*	
Caucasian		30.7 (24.8–37.5)
African American		36.9 (31.2–42.9)
Insurance	<i>n</i> =538	
Private		34.9 (28.9–41.3)
Medicaid		33.5 (27.7–39.8)
Family history	<i>n</i> =538	
Mother with Breast CA at 70 years of age		34.5 (28.4–41.3)
Mother died of Ovarian CA at 65 years of age		33.8 (28.3–39.9)
Patient request for Ovarian CA screening	<i>n</i> =538	
Yes		33.6 (28.1–39.6)
No		34.7 (28.5–41.6)
Physician/Practice Characteristics		
Gender	<i>n</i> =538	
Female		33.7 (27.2–40.9)
Male		34.4 (29.1–40.2)
Primary specialty	<i>n</i> =538	
Family medicine		33.3 (27.2–40.1)
General internal medicine		34.7 (27.4–42.8)
Obstetrics-gynecology		34.7 (28.4–41.7)
Years in practice	<i>n</i> =538	
0–10		31.1 (22.6–41.0)
11–20		30.4 (24.1–37.6)
≥21		39.2 (32.4–46.4)
Practice type	<i>n</i> =535	
Solo practice		41.6 (32.5–51.4)
Single specialty group		35.5 (29.2–42.3)
Multi-specialty group		27.8 (20.7–36.2)
Physician personal risk taking level	<i>n</i> =497	
Low (6–17)		36.0 [†] (30.1–42.3)
Medium (18–24)		31.4 (24.4–39.4)
High (≥ 25)		12.8 (5.67–26.3)
Fear of malpractice	<i>n</i> =499	
Low (2–4)		17.7 (9.9–29.7)
Medium (5–7)		33.1 (25.4–41.9)
High (≥ 8)		35.2 (29.5–41.4)
Organization listed among top three sources that influence cancer screening recommendations	<i>n</i> =536	
USPSTF		
Yes		31.7 (26.1–37.9)
No		37.3 (31.2–43.9)
ACS		
Yes		34.2 (29.0–39.9)
No		34.5 (27.7–42.0)
ACOG		
Yes		32.9 (26.8–39.5)
No		35.0 (29.6–40.9)
Estimation of patient's breast cancer risk	<i>n</i> =531	
Same as general population		28.5 (21.7–36.5)
Somewhat higher than general population		36.3 (30.7–42.3)
Much higher than general population		40.7 (28.0–54.7)
Belief in clinical effectiveness of Breast MRI as a cancer screening tests for average population	<i>n</i> =508	
Agree		53.0 [‡] (45.0–60.7)
Disagree		26.4 (21.6–31.9)

CI confidence interval; CA cancer; USPSTF U.S. Preventive Services Task Force; ACS American Cancer Society; ACOG American College of Obstetrics and Gynecology; MRI magnetic resonance imaging

*Percent based on 538 respondents who offered extra testing weighted to provide nationally representative figures, number less than 538 are due to missing responses

[†]*P*≤0.01 based on chi-square test

[‡]*P*≤0.001 based on chi-square test

The association of the following variables was also assessed: Board certification, Weekly average number of patients, Involved in clinical teaching (yes/no), Non-professional experience with cancer, Geographic location, Census division. All were found to be non-significant. Please refer to online Appendix A, table 3a

for patient characteristics, confirmed the findings of the unadjusted analysis (Table 4). Physicians who were the most risk averse had the largest relative risk of offering extra testing (RR 2.60, 95 % CI, 1.21–5.58).

COMMENT

A third (33.2 %) of U.S. physicians reported offering one or more extra breast cancer screening test modalities for an asymptomatic woman with an unremarkable exam. Additional breast cancer screening tests represent overuse of resources that could be directed toward the 20.3 % of women 50–74 years of age who have not received age-appropriate breast cancer screening.⁴⁴ These extra breast cancer screening tests are particularly concerning as there is no evidence of their efficacy for routine screening, and rising U.S. health care costs are, in part, due to the purchase and use of medical technologies.^{16,45,46}

As in other studies, physicians who reported taking low levels of personal risk were also more likely to offer extra testing.^{38,47,48} Fear of malpractice, however, was not significantly associated with extra testing, consistent with studies that suggest that malpractice concerns either do not influence physician testing practice patterns or play a relatively minor role.^{47–51} All of these findings suggest that physicians' cancer screening practices may be associated with risk-aversion of negative medical outcomes (e.g. undiagnosed breast cancer), as opposed to fear of malpractice (e.g. fear of getting sued due to undiagnosed breast cancer). This is consistent with Klingman et al.'s vignette-based study recreating clinical situations with high mal-

Table 4. Adjusted Relative Risk of Physicians Offering Extra Tests for Breast Cancer Screening

	RR (95 % CI)
Vignette Patient Characteristics	
Race	
Caucasian	ref.
African American	1.11 (0.85–1.45)
Insurance	
Private	ref.
Medicaid	0.82 (0.63–1.08)
Family history	
Mother with Breast CA at 70 years of age	ref.
Mother with Ovarian CA at 65 years of age	0.94 (0.72–1.23)
Patient request for Ovarian Cancer screening	
No	ref.
Yes	0.91 (0.69–1.18)
Physician/Practice Characteristics	
Belief in effectiveness of MRI for Screening	
Disagree	ref.
Agree	1.96 (1.50–2.57)
Level of Risk Taking	
High	ref.
Medium	2.04 (0.94–4.44)
Low	2.69 (1.26–5.73)

CI confidence interval; CA Cancer

practice risk, in which a majority of physicians who ordered various tests reported that they primarily felt they were medically indicated as opposed to ordering them due to malpractice concerns.⁴⁹ However, it is also possible that fear of malpractice could be indirectly associated with breast cancer screening practices by changing community standards of care. This might occur when some physicians initially order extra tests due to fear of malpractice, but over time their behaviors became assimilated into the communities' standard of care, so that eventually groups of physicians start ordering these tests primarily because they believe the tests are effective and medically indicated, and not due to fear of litigation.^{49,52}

While we did not measure physicians' perceptions regarding their medical communities' standard of care, we did measure physician belief in the clinical effectiveness of breast MRI for an average risk population, which was significantly associated with offering extra breast cancer screening tests. This is consistent with other published literature that found an association between primary care physician belief in the usefulness of MRI and increased utilization of MRI.⁵³ It is concerning that 33.5 % of primary care physicians nationally agree that breast MRI is clinically effective for breast cancer screening, given that this opinion has no supporting literature. Furthermore, the literature notes disadvantages such as poor specificity, discrepancies in interpretation (with some community practice groups noting call back rates over 50 %), high cost, and no proven decrease in mortality.^{12–16,54–56} Belief in the clinical effectiveness of MRI could help explain the significant increase in the use of MRI throughout the U.S., with some studies noting an almost three fold increase across a large integrated health system over a 9-year period, to a fivefold increase among primary care physicians over a 3-year period.^{53,57} Consistent with this study, others have found that newer imaging modalities, such as MRI, are being used as extra tests and not as replacements for older test modalities, and that a significant percent of these imaging tests may be inappropriately ordered.^{57,58}

This study is limited by its reliance on vignettes with a defined set of patient characteristics. All vignette versions included a woman with a family history of cancer. However, none of the family histories are indicators for extra testing,¹⁶ and a substantial proportion of physicians who felt the patient was at the same risk as the general population offered extra tests. This study may overestimate physicians' offering of extra breast cancer screening tests, as extra testing was defined as either "sometimes" or "almost always" offering these tests. However, physicians who offer an extra test in rare cases had the option of the "almost never" category.

Strategies to decrease unwarranted use of extra testing could include academic detailing, use of audit and feedback, and local champions educating physicians about the clinical effectiveness and costs of various screening modalities for the general population, and making physicians aware that

their risk-aversion may lead them to offer tests that are not evidence-based.⁵⁹ With the growth in the utilization of electronic medical records, computerized clinical decision support systems (CCDSS) might play a significant role in decreasing guideline-inconsistent cancer screening. CCDSS have been shown to be effective in increasing preventive screening, specifically for mammography and in the diagnosis and treatment monitoring of diseases.^{60–63} A variety of studies have assessed CCDSS ability to decrease use of diagnostic testing, but additional research is needed to assess its ability to decrease the use of extra screening tests, particularly via non-recommended modalities.^{60,62,64} Features of effective CCDSS include providing advice to patients in addition to providers and requiring providers to note reasons for over-riding advice.⁶⁵ Furthermore, strategies such as using CCDSS to raise awareness of charges for tests can be effective.⁶⁶

This study shows that a high percentage of U.S. primary care physicians report offering extra breast cancer screening test modalities. Future research also should confirm this study's findings by using claims or electronic health record data to assess the percentage of U.S. women over 50 who are receiving extra breast cancer screening tests and the medical indications for using these additional modalities.

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Corresponding Author: Hajar Kadivar, MD, MPH; University of Florida College of Medicine, PO Box 100177, Gainesville, FL 32610-0177, USA (e-mail: kadivar@ufl.edu).

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