Differences in Patient Screening Mammography Rates Associated With Internist Gender and Level of Training and Change Following the 2009 U.S. Preventive Services Task Force Guidelines

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Abstract

Background: Significant discordance arose between screening mammography clinical practice guidelines published by different national health care organizations following the release of the U.S. Preventive Services Task Force (USPSTF) guidelines in 2009. This allowed for greater interprovider variation in clinical practice while remaining within standard of care. The objective of this study was to determine how differences in patient screening mammography rates between internal medicine physician subgroups defined by gender and level of training changed, if at all, following the release of the new guidelines. **Methods:** The study was an observational study including all internists and internal medicine residents at a single academic medical center, Dartmouth-Hitchcock Medical Center. Screening mammography rates were determined for patients of subgroups of internists defined by gender and level of training (attending vs resident physician) for the 2 years before and after the release of the updated screening guidelines. **Results:** Patients having female attending internists as their primary care provider were more likely to undergo screening mammography than those having male attending or resident internists of either gender both before and after the release of the new guidelines, with the difference in patient screening mammography rates between physician subgroups increasing following their release (rates before and after, respectively, by subgroup: female attending = 67%, 64%; male attending = 56%, 50%; female resident = 58%, 41%; male resident = 55%, 41%; $P < .05$). **Conclusions:** Internist gender and level of training are associated with differences in patient screening mammography rates at one academic medical center, with these differences increasing following the 2009 USPSTF guidelines. These findings suggest that the correlation between provider gender/level of training and a woman's likelihood of undergoing a screening mammogram strengthened as discordance arose between clinical guidelines published by different medical and health care advocacy groups. It is important for providers and patients both to be aware of correlations that exist between provider characteristics and patient cancer screening rates and to take steps to minimize the impact of provider bias on the shared decision-making process.

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Breast cancer is currently the second greatest cause of cancer-related death in women living in the United States, with approximately 40,000 women dying annually from complications of breast cancer.¹ As a result of both earlier detection through screening mammography and the benefits of adjuvant systemic therapies, the mortality rate due to breast cancer has decreased

over the past 25 years.² Nonetheless, considerable professional disagreement exists over the most appropriate age at which to begin routine screening mammograms and how frequently they should be performed. As a landmark event in this ongoing debate, the U.S. Preventive Services Task Force (USPSTF) released updated guidelines for screening mammograms in 2009³ that differed significantly both from their own prior recommendations and from those of other major national health care organizations and advocacy groups. Specifically, the recommended age at which to initiate routine breast cancer screening in women was increased from 40 to 50 years, with the recommendation that the decision to refer women in their 40s for screening be based on

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shared decision-making (ie, a discussion of the risks and benefits of screening between physician and patient). In addition, the recommended frequency of screening in the 50- to 75-year-old female patient population was changed from annual to biannual. In contrast, NCCN and the American Congress of Obstetricians and Gynecologists continued to recommend that routine screening be initiated at age 40 years and that screening be performed annually at least until age 75 years, as did the American Cancer Society (ACS) until their recent guideline revision in October 2015,^{4,6} with the ACS more recently recommending routine screening begin at age 45 years, be performed annually between the ages of 45 and 55 years, and thereafter be performed biannually. With the updated USPSTF guidelines released in January 2016 being essentially unchanged from those released in 2009,⁷ significant differences between national organization guidelines remain.

Although the earliest studies investigating the impact of the 2009 USPSTF screening mammography guidelines did not detect a decrease in screening rates following their release,^{8,9} a later and much larger study based on data from 5.5 million women found that among non-black women, 2012 screening rates were 6% to 17% lower, depending on age and race category, than projections based on screening that occurred between 2005 and 2009.¹⁰ Furthermore, in differing substantially from those of other national medical and cancer advocacy groups, the 2009 USPSTF guidelines increased the potential for differences in screening mammogram use by patients of different provider subgroups. Differences in patient screening mammography rates based on medical provider characteristics such as gender, age, subspecialty, or professional degree have long been noted,^{11,12} observations that may reflect a combination of provider subgroup differences in attitude toward screening mammography efficacy, patient attitudes towards screening that correlate with preference for a female provider, and a tendency for female providers to provide more preventive care in general than their male counterparts, with inconsistent findings across studies.^{13,14} Discordant clinical practice guidelines inherently foster greater variation in provider clinical practice, because providers rely more heavily on their individual judgment in interpreting data supporting conflicting guidelines, and ultimately in clinical decision-making, thereby increasing the po-

tential for systematic variation in care. Introducing a recommendation for informed decision-making between providers and their patients in place of routine referral further increases the potential impact of differences in provider attitudes and practice on patient care.

Less established is whether a relationship exists between provider level of training and patient screening mammography rates. Given the nascent clinical practice of resident physicians, it was hypothesized that this group might adopt new screening guidelines more readily than their attending physician counterparts. Patterns of clinical practice by this group are of particular interest as they predict, albeit imperfectly, future medical practice.

For these reasons, patient screening mammography rates for internist subgroups defined by gender and level of training were determined in the 2 years before and 2 years after the release of the 2009 USPSTF clinical practice guidelines, to investigate how any preexisting differences may have changed following their release.

Methods

Design Overview

Rates of screening mammography among female patients aged 40 years and older by internist subgroup (female attending, male attending, female resident, and male resident) were determined for approximately 2 years before (2008 and 2009) and 2 years after (2010 and 2011) the publication of the USPSTF screening mammography clinical practice guidelines in November 2009. Using a hospital billing database, female patients aged 40 years and older attending a scheduled health maintenance visit with a specific provider during a given year were identified. It was then determined whether these identified patients underwent a screening mammogram. For each provider subgroup, patient screening mammography rates were defined as the number of patients undergoing screening mammograms divided by the number of patients who attended a scheduled health maintenance visit within a given year. There were no cases of a given patient seeing more than one physician in a given year for a health maintenance visit. Data were pooled for 2008 and 2009 to generate rates before the release of the most recent USPSTF guidelines and for 2010 and 2011 to generate rates

following the release. The study was approved by the Dartmouth-Hitchcock Medical Center (DHMC) Institutional Review Board. DHMC is the teaching hospital affiliated with the Geisel School of Medicine at Dartmouth College.

Setting

Physicians included in the study were those practicing outpatient general internal medicine at any time between January 2008 and December 2011 at DHMC clinics in Lebanon and Lyme, New Hampshire. These consisted of 73 resident physicians (38 female; 35 male), 45 attending physicians (34 female; 11 male), and 5 physicians who transitioned from resident to attending physician between 2008 and 2011 (3 female; 2 male). Resident and attending physicians in any given year were identified through consultation with the director of the internal medicine residency program.

Statistical Analysis

The Marascuilo procedure for comparison of multiple proportions was used to compare patient mammography rates between physician subgroups before and after the guideline release. A significance level of 0.05 was used in deriving critical values.

The Z-test for proportions was used to determine whether physician subgroup mammogram rates were significantly different before and after the release of the 2009 USPSTF guidelines. For each physician subgroup, comparisons were performed for all female patients older than 40 years and for 3 subgroups: women aged 40 to 49 years, 50 to 74 years, and older than 74 years. This resulted in a total of 16 comparisons. To obtain the equivalent of a *P* value of 0.05 for a single statistical test, the Bonferroni correction (*P* value divided by *n*) was applied; thus, a *P* value less than $0.05/16 = 0.003$ was considered significant.

Results

Differences Between Physician Subgroups in Patient Screening Mammography Rates

Screening mammography rates for all female patients older than 40 years were significantly greater among women seen by female attending internists than those seen by the 3 other internist subgroups, with the difference in referral rates becoming more pronounced following the USPSTF clinical practice guidelines release in November 2009 (Table 1; rates

before and after, respectively, by group: female attending = 67%, 64%; male attending = 56%, 50%; female resident = 58%, 41%; male resident = 55%, 41%; $P < .05$, data not shown).

Before the guideline release, the screening mammography rate among female patients aged 40 to 49 years seen by female attending internists (66%) was significantly higher than that among patients seen by male attending internists (47%; $P < .05$), but not higher than that of patients seen by resident physicians (57% and 49% for female and male residents, respectively; $P = .05$). In contrast, after the guideline release the screening mammography rate among 40- to 49-year-old female patients who were seen by female attending internists (55%) was significantly higher than the rate among those seen by either female residents (32%; $P < .05$) or male resident physicians (33%; $P < .05$), but not by male attending internists (46%; $P > .05$).

Change in Patient Screening Mammography Rates Following 2009 USPSTF Guidelines

Screening mammography rates decreased after the release of the 2009 USPSTF clinical practice guidelines for almost all patient subgroups defined by age within all physician subgroups, although only some of these changes were statistically significant. Among patients aged 40 to 49 years, mammography rates significantly decreased for patients of female attending internists (66% vs 55%; $P < .0001$) and female resident physicians (57% vs 32%; $P = .00015$). This decrease was not observed among patients in this age group seen by male attending (47% vs 46%; $P = .25$) or male resident physicians (49% vs 33%; $P = .035$), whose screening rates before the guidelines were already significantly lower than those of seen by female providers. Rates did not change significantly for patient subgroups other than the 40- to 49-year-old age group (Table 1).

Discussion

Associations between rates of sex-specific cancer screening for breast, cervical, and prostate cancer and primary care provider characteristics, such as gender, age, specialty, professional role, and level of training, have been reported previously.^{11,15-17} Provider gender and age-based subgroup variation in attitudes toward sex-specific cancer screening, patient attitudes towards screening correlating with a prefer-

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Table 1. Patient Screening Mammography Rates by Physician and Patient Subgroups Before and After the 2009 USPSTF Guideline Release						
Provider Group	Patient Age (y)	2008–2009		2010–2011		P Value ^b
		n ^a	% Screened	n	% Screened	
Female attending internists	All ^c	7,599	67%	8,299	64%	<.00001
	40–49	1,614	66%	1,489	55%	<.00001
	50–74	5,251	69%	5,792	68%	.061
	>74	1,022	53%	1,018	52%	.35
Male attending internists	All ^c	1,420	56%	889	50%	.007
	40–49	92	47%	52	46%	.25
	50–74	669	67%	476	61%	.036
	>74	371	35%	352	37%	.30
Female resident physicians	All ^c	254	58%	387	41%	<.00001
	40–49	86	57%	136	32%	.00015
	50–74	154	59%	227	48%	.021
	>74	16	38%	24	25%	.20
Male resident physicians	All ^c	150	55%	300	41%	.0026
	40–49	45	49%	80	33%	.035
	50–74	93	62%	190	46%	.0057
	>74	12	25%	30	33%	.30

^aTotal health maintenance visits.
^bA P value <.003 was considered significant (equivalent to <.05, after correction for multiple [n=16] tests).
^cAll indicates female patients aged ≥40 years.

ence for a provider of a given gender, and differences in rates of non–sex-specific preventive care all have been identified as contributing to these observed differences.^{13,15,18} In this study, we observed that existing differences in patient screening mammography rates associated with an internist’s gender and level of training were heightened following the revision of the USPSTF clinical practice guidelines in 2009, with patients seen by female attending physicians undergoing screening at a rate roughly 50% higher than patients of resident physicians of either gender in the 2 years following the update.

Several limitations of this study should be noted. Although we observed a correlation between physician characteristics and patient screening mammography rates, determination of causality was beyond the scope of our investigation. However, we suspect that the causes of systematic subgroup variation that have been identified previously^{13,15} likely play a role in our academic center. In addition, the trends we observed among patients of internal medicine physicians at this center may not be representative of providers at other academic centers; within community

practices, other medical disciplines or geographic locations outside the Northeast; or nonphysician providers. Finally, screening mammography shared decision aids were not available to patients at this center at the time of this study but have the potential to reduce the influence of physician bias on the shared decision-making process.¹⁹ Follow-up investigations, including additional medical centers, subspecialties, and provider types over a longer time frame, as well as exploration of the etiology of the observed relationships, would build significantly on the observations reported here.

Conclusions

Patients of female attending internists were found to undergo screening mammography at significantly higher rates than patients of other physician groups at a single academic medical center, with differences in patient screening rates between different internist subgroups becoming more pronounced in the 2 years following the 2009 USPSTF clinical practice guidelines update. Measures that make guideline develop-

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ment more systematic and transparent²⁰ will ideally lead to greater concordance in national organization guidelines moving forward. The more widespread adoption of shared decision aids and other patient education resources by physicians could play an important role in reducing differences in screening rates for patients of different provider subgroups. In the meantime, it is important for providers and patients alike to be aware of the potential for provider bias to impact patient decisions regarding screening mammography. Given that the disagreement over optimal implementation of screening mammography shows no sign of abating, all providers must strive to educate patients about differences in professional opinion and minimize the impact of their own bias on the shared decision-making process.

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