

Disclosing Harmful Mammography Errors to Patients¹

Thomas H. Gallagher, MD
Andrea J. Cook, PhD
R. James Brenner, MD, JD
Patricia A. Carney, PhD
Diana L. Miglioretti, PhD
Berta M. Geller, EdD
Karla Kerlikowske, MD
Tracy L. Onega, PhD
Robert D. Rosenberg, MD
Bonnie C. Yankaskas, PhD
Constance D. Lehman, MD, PhD
Joann G. Elmore, MD, MPH

Purpose:

To assess radiologists' attitudes about disclosing errors to patients by using a survey with a vignette involving an error interpreting a patient's mammogram, leading to a delayed cancer diagnosis.

Materials and Methods:

We conducted an institutional review board–approved survey of 364 radiologists at seven geographically distinct Breast Cancer Surveillance Consortium sites that interpreted mammograms from 2005 to 2006. Radiologists received a vignette in which comparison screening mammograms were placed in the wrong order, leading a radiologist to conclude calcifications were decreasing in number when they were actually increasing, delaying a cancer diagnosis. Radiologists were asked (a) how likely they would be to disclose this error, (b) what information they would share, and (c) their malpractice attitudes and experiences.

Results:

Two hundred forty-three (67%) of 364 radiologists responded to the disclosure vignette questions. Radiologists' responses to whether they would disclose the error included “definitely not” (9%), “only if asked by the patient” (51%), “probably” (26%), and “definitely” (14%). Regarding information they would disclose, 24% would “not say anything further to the patient,” 31% would tell the patient that “the calcifications are larger and are now suspicious for cancer,” 30% would state “the calcifications may have increased on your last mammogram, but their appearance was not as worrisome as it is now,” and 15% would tell the patient “an error occurred during the interpretation of your last mammogram, and the calcifications had actually increased in number, not decreased.” Radiologists' malpractice experiences were not consistently associated with their disclosure responses.

Conclusion:

Many radiologists report reluctance to disclose a hypothetical mammography error that delayed a cancer diagnosis. Strategies should be developed to increase radiologists' comfort communicating with patients.

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¹ From the Departments of Medicine and Bioethics & Humanities (T.H.G.), Biostatistics (A.J.C., D.L.M.), Radiology (C.D.L.), and Division of General Internal Medicine (J.G.E.), University of Washington, 4311 11th Ave NE, Suite 230, Seattle, WA 98105; Group Health Research Institute, Seattle, Wash (A.J.C., D.L.M.); Bay Imaging Consultants, Oakland, Calif (R.J.B.); Department of Radiology (R.J.B.) and Departments of Medicine and Epidemiology (K.K.), University of California San Francisco, San Francisco, Calif; Department of Family Medicine, Oregon Health Science University, Portland, Ore (P.A.C.); Department of Family Practice and Radiology, University of Vermont, Burlington, Vt (B.M.G.); Department of Biostatistics and Epidemiology, Dartmouth Medical School, Hanover, NH (T.L.O.); Department of Radiology, University of New Mexico, Albuquerque, NM (R.D.R.); and Department of Radiology, University of North Carolina, Chapel Hill, NC (B.C.Y.). Received December 29, 2008; revision requested January 27, 2009; revision received April 6; accepted April 30; final version accepted May 14. Supported by an American Cancer Society AIM grant (SIRSG-07-271-01, SIRSG-07-272-01, SIRSG-07-273-01, SIRSG-07-274-01, SIRSG-07-275-01, SIRSG-06-281-01, ACS A1-07-362). T.H.G. supported by grants from the Robert Wood Johnson Investigator Award in Health Policy Research Program and the Greenwall Faculty Scholars in Bioethics Program. **Address correspondence to** T.H.G. (e-mail: thomasg@u.washington.edu).

Greater openness with patients about harmful errors is recommended. Many ethicists and professional organizations endorse disclosure of harmful errors to patients (1–4). The Joint Commission's accreditation standards now require that patients be informed about unanticipated outcomes (5). In response, many hospitals are developing disclosure programs. Yet, recent studies suggest that disclosure of harmful medical errors to patients is the exception rather than the rule (6–12).

While disclosing errors is difficult for any physician, radiologists face unique disclosure challenges, especially those who interpret mammograms (13). Many women have undergone prior mammography examinations, establishing an archive that can be scrutinized when cancer is diagnosed (14). While mammograms classified as having false-negative or false-positive results on the basis of standard definitions may not represent errors in interpretation, patients may still worry that there has been a delay in diagnosis or that an unnecessary biopsy was performed (15). Furthermore, some adverse events in mammography are a result of interpretive errors (16). Talking with patients about such errors is difficult in the current medical-legal environment. Failure to accurately diagnose or a delayed diagnosis of breast cancer are the most common causes of malpractice litigation and radiologists are the most commonly named defendants (17). As a result, fear of litigation is high among breast imagers, which may be exacerbating a shortage of qualified mammographers (18–20). This fear of litigation may also inhibit physicians from communicating more openly with patients about adverse events and errors in radiology (21). Finally, many radiologists do not have the longitudinal pa-

tient-provider relationships or prior communication skills training that can help with these difficult conversations (22).

Communicating effectively with patients following errors could enhance patient satisfaction and trust in future health care encounters (23,24). While it may seem counterintuitive, effective disclosure may also reduce the likelihood of malpractice claims (25,26). Creating programs to promote communication with patients about errors in mammography requires understanding radiologists' attitudes toward disclosure. Yet, to our knowledge, no prior studies have explored radiologists' willingness to disclose errors to patients, nor has this information been linked to radiologists' personal experience with previous malpractice lawsuits. We sought to assess radiologists' attitudes about disclosing errors to patients by using a survey with a vignette involving an error interpreting a patient's mammogram, leading to a delayed cancer diagnosis.

Materials and Methods

Overview

All radiologists who interpreted screening or diagnostic mammographic examinations between 2005 and 2006 at seven geographically distinct Breast Cancer Surveillance Consortium (BCSC) sites were invited to participate in a self-administered survey through the mail. The study was approved by the institutional review boards of all seven BCSC registry sites and the BCSC Statistical Coordinating Center. All procedures were

Implications for Patient Care

- This research may help guide more appropriate discussions between radiologists and their patients in situations where errors have occurred.
- Improved understanding of physician's attitudes toward disclosure has the potential to improve physician-patient relationships in breast imaging with implications across other subspecialties in radiology.

Health Insurance Portability and Accountability Act-compliant, and all registries and the Statistical Coordinating Center received a Federal Certificate of Confidentiality and other protection for the identities of physicians and facilities who are subjects of this research (27). Radiologists were informed that their survey responses would remain confidential.

Survey Content and Validation

The survey included items on demographics, practice characteristics, and experience in general radiology and breast imaging. The survey was 10 pages long and required 10–15 minutes to complete. A copy of the survey is available online (http://breastscreening.cancer.gov/collaborations/favor_ii_mammography_practice_survey.pdf).

To assess radiologists' attitudes about disclosing errors to patients, the survey contained a vignette involving an error interpreting a patient's mammogram, leading to a delayed cancer diagnosis:

"A diagnostic mammogram for a new palpable lump shows an obvious malig-

Advance in Knowledge

- Many radiologists report reluctance to disclose a hypothetical mammography error to a patient that would have delayed a cancer diagnosis; radiologists' malpractice attitudes and experiences were not associated with their approach to disclosure.

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BCSC = Breast Cancer Surveillance Consortium

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nant lesion. You realize a mistake was made in your prior interpretation of this woman's last screening mammogram. Prior films had apparently been put up in reverse order, and you mistakenly concluded that the calcifications were decreasing in number when they were actually increasing. Your prior incorrect interpretation has resulted in a delayed diagnosis."

This vignette was chosen on the basis of our prior validated work (9,28,29), which studied how over 3000 physicians in internal medicine, surgery, and pediatrics would disclose harmful error to patients, and sought to portray a clear-cut mammography error. To address content- and criterion-related validity, the survey was developed by an expert panel of radiologists, epidemiologists, biostatisticians, health services researchers, educational psychologists, and experts in patient-provider communication, ethics, and health law. The survey was then pilot-tested to address construct validity among radiologists working in breast imaging who were not associated with the BCSC.

The vignette was followed by questions addressing two distinct constructs of physician disclosure attitudes found in our prior work (9,28):

First, general willingness to disclose the hypothetical error to the patient (disclosure willingness) was assessed. The vignette was followed by the question, "How likely would you be to disclose this error to the patient?" Four closed-ended response options were provided: (a) "Definitely not disclose," (b) "Disclose only if asked by the patient," (c) "Probably disclose," or (d) "Definitely disclose."

Second, the specific information that respondents would disclose to the patient about the event (disclosure content) was assessed by using a theory-driven approach derived from our prior work. After the disclosure willingness question above, the survey continues with the following: "You tell the patient that today's diagnostic work-up shows calcifications that are suspicious for cancer. Which of the following statements most closely resembles what you would say to the patient regarding the error in interpreting

their prior examinations?" Four closed-ended response options were provided, reflecting increasing disclosure content: (a) "I would not say anything further to the patient regarding the error," (b) "The calcifications are larger and are now suspicious for cancer," (c) "The calcifications may have increased on your last mammogram, but their appearance was not as worrisome as they are now," or (d) "An error occurred during the interpretation of your last screening mammogram, and the calcifications had actually increased, not decreased in number."

The survey included three questions exploring radiologists' experiences with and attitudes about medical malpractice: "I am concerned about the effect medical malpractice is having on how I practice mammography" (a five-point scale, ranging from strongly disagree to strongly agree), whether they had been named in a malpractice suit (yes or no), and "If you were to interpret mammograms on a regular basis, what do you think is the probability of a new medical malpractice suit being filed against you in the next 5 years?" Other relevant survey questions include practice environment, experience with interpreting mammograms, how often they personally talk with patients about positive and negative diagnostic mammographic results, administrative time, and sociodemographics (age and sex).

Radiologist Survey Data Collection

Survey mailing and collection was handled by individual BCSC sites to maintain confidentiality. Surveys were mailed to radiologists between January 2006 and September 2007, depending on each site's funding mechanism and institutional review board status. Surveys were distributed in four sites (Colorado, North Carolina, New Hampshire, and Washington) beginning in 2006, and in the remaining three sites (California, New Mexico, and Vermont) in 2007. Study managers and principal investigators at each site made a minimum of three attempts to contact radiologists through the mail and/or personal calls to maximize local study participation. Incentives to complete the survey varied among the sites, and included gift cards worth \$25–\$50

and American College of Radiology Breast Imaging Reporting and Data System manuals (30).

Survey data were double-entered at each site and discrepancies were corrected. Anonymized data were then sent to the BCSC Statistical Coordinating Center for pooled analyses.

Statistical Analysis

We calculated frequencies of radiologists' sociodemographics, practice type, practice experience, medical malpractice perceptions or experience, and frequency of talking with patients about positive or negative diagnostic mammographic results, stratified by the response to the disclosure questions.

To simplify analyses, we dichotomized the disclosure willingness and disclosure content questions. Lower disclosure willingness included the response options "definitely not disclose" and "disclose only if asked by the patient," and higher disclosure willingness included "probably disclose" and "definitely disclose." Lower disclosure content included "would not say anything further" and "the calcifications are larger and now suspicious for cancer," whereas higher disclosure content included "the calcifications may have increased" and "an error happened." We calculated χ^2 tests and tests for trends for bivariate relationships between higher and lower disclosure willingness and disclosure content and radiologist characteristics.

To evaluate the adjusted relationship between higher disclosure content and/or disclosure willingness and radiologists' characteristics, we fit multivariable log-binomial generalized linear regression models (31). Radiologist characteristics that were significant at $P = .1$ in the bivariate analysis were included in the multivariable models. Owing to missing covariate data (percentage of time spent in breast imaging [$n = 6$], talk with patient about positive diagnostic examinations [$n = 5$], and probability of being sued [$n = 3$]), this analysis was restricted to 229 radiologists. Frequency of talking with patients about positive diagnostic mammographic results was included in the model, even though it was not significant in the bivariate analysis because it

Table 1

Radiologists' Demographics and Clinical Practice Characteristics According to Response to Disclosure Questions

Characteristic	No. of Radiologists (n = 243)*	Willingness to Disclose (%)†			Disclosure Content (%)‡				
		Definitely Not (n = 9)	Only if Asked (n = 51)	Probably (n = 26)	Definitely (n = 14)	Not Say Anything Further (n = 24)	Calcifications Are Now Suspicious (n = 31)	Calcifications May Have Increased (n = 30)	Error Occurred (n = 15)
Demographic									
Age (y)									
30–44	63 (26)	11	48	22	19	25	27	30	17
45–54	84 (35)	8	58	27	6	27	40	21	11
>55	96 (40)	8	47	27	18	20	25	38	18
No. of men	173 (71)	8	50	27	15	22	33	28	17
No. of women	70 (29)	13	53	23	11	29	26	34	11
Clinical practice									
No. of hours per week									
<40	55 (23)	18	51	18	13	29	35	31	5
≥40	186 (77)	6	51	28	14	23	30	30	18
Affiliation with academic center									
None	196 (83)	9	52	26	14	21	34	28	16
Yes, as adjunct/affiliate	24 (10)	4	54	25	17	33	17	42	8
Yes, primary	18 (8)	22	44	22	11	44	6	33	17
Experience									
Time spent in breast imaging (%)									
<20	59 (25)	10	41	25	24	15	31	25	29
20–39	63 (27)	5	51	32	13	17	46	22	14
≥40	115 (49)	11	57	21	10	33	22	35	9
Mammographic interpretation (y)									
<10	50 (21)	12	44	26	18	22	22	40	16
10–19	103 (43)	7	54	24	15	27	38	21	14
≥20	89 (37)	10	51	28	11	21	28	34	17
Medical malpractice									
Concerned with the impact of malpractice									
Disagree or strongly disagree	27 (11)	4	70	22	4	30	22	41	7
Neutral to strongly agree	215 (89)	10	48	27	15	23	32	28	16
Probability of being sued in 5 years (%)									
0–10	61 (26)	11	57	18	13	25	26	33	16
11–25	58 (24)	9	47	28	17	26	29	28	17
26–50	77 (32)	9	51	34	6	29	34	29	9
51–100	43 (18)	5	49	21	26	12	35	30	23
Ever been named in medical malpractice suit									
No	119 (51)	10	50	26	13	24	31	29	15
Yes, any mammography related	33 (14)	18	45	15	21	27	24	24	24
Yes, none mammography related	82 (35)	5	51	32	12	23	33	30	13
Missing	9								

(Table 1 continues)

Table 1 (continued)

Radiologists' Demographics and Clinical Practice Characteristics According to Response to Disclosure Questions

Characteristic	No. of Radiologists (n = 243)*	Willingness to Disclose (%)†			Disclosure Content (%)‡				
		Definitely Not (n = 9)	Probably (n = 26)	Definitely (n = 14)	Not Say Anything Further (n = 24)	Calculations Are Now Suspicious (n = 31)	Calculations May Have Increased (n = 30)	Error Occurred (n = 15)	
Communication with patients									
Frequency of talking with patients about positive diagnostic mammograms									
Never	9 (4)	0	0	44	11	44	22	22	22
Rarely	23 (10)	13	39	13	17	43	30	9	9
Sometimes	25 (11)	12	28	4	28	36	24	12	12
Often	46 (19)	4	22	13	24	24	35	17	17
Always	135 (57)	10	26	13	26	30	28	16	16
Vignette questions									
Disclosure willingness									
Definitely not	22 (9)	...	...	...	55	27	18	0	0
Only if asked by patient	124 (51)	...	...	...	32	40	27	1	1
Probably	63 (26)	...	...	...	8	25	46	21	21
Definitely	34 (14)	...	...	...	3	12	18	68	68
Disclosure content									
Not say anything	58 (24)	21	9	2	...	...	...	...	...
Now are suspicious for cancer	75 (31)	8	21	5	...	...	...	...	...
May have increased	73 (30)	5	40	8	...	...	...	...	...
Error occurred	37 (15)	0	35	62	...	...	...	...	...

Note.—Missing values <10% for all questions.

* Numbers in parentheses are percentages of raw data.

† Questions fully expanded in text.

was an a priori hypothesis of interest. Since radiologists' age and years of experience interpreting mammographic examinations are highly correlated, the model included radiologists' years of experience because it was considered to be more scientifically meaningful. Adjusted relative risks and Wald 95% confidence intervals from these analyses are reported.

All analyses were performed by using software (SAS for Windows, version 9; SAS Institute, Cary, NC). All reported *P* values are two-sided, with *P* < .05 being used to assess the significance of associations.

Results

Characteristics of Participating Radiologists

Two hundred forty-three (67%) of 364 radiologists returned the survey and responded to the disclosure vignette question. The characteristics of these 243 survey respondents are provided in Table 1. Most were men (71%), practiced radiology full time (77%), and did not have a primary affiliation with an academic medical center (83%). The respondents had considerable experience in mammography: approximately one-half spent 40% or more of their time working in breast imaging, and 79% had 10 or more years of experience interpreting mammograms.

Malpractice Attitudes and Experiences

Concern regarding malpractice was high among respondents. Seventy-four percent were concerned with the effect that medical malpractice is having on how they practice mammography. Radiologists' perception of their risk was high for a malpractice lawsuit being filed against them in the next 5 years if they were to continue interpreting mammograms on a regular basis, with 50% estimating the risk as being higher than 25%. Forty-nine percent had been previously sued for malpractice; 14% had been named in a malpractice suit that was specifically related to mammography (32).

Regarding their communication with patients about diagnostic mammographic

examinations, 76% reported they “often” or “always” talked with patients about positive diagnostic mammographic results, and 46% often or always talked with patients about negative diagnostic mammographic results.

Response to the Disclosure Vignette

When asked how likely they would be to disclose this hypothetical mammography error to the patient (disclosure willingness), 9% reported they would “definitely not disclose this error,” 51% would disclose this error “only if asked by the patient,” 26% would “probably” disclose this error, and 14% would “definitely” disclose this error. When asked what language most closely resembles what they would say to the patient regarding the error once they have alerted the patient that that day’s diagnostic workup is suspicious for cancer (disclosure content), 24% would “not say anything further to the patient,” 31% would tell the patient “the calcifications are larger and now are suspicious for cancer,” 30% would state “the calcifications may have increased on your last mammogram, but their appearance was not as worrisome as they are now,” and 15% would tell the patient “an error occurred during the interpretation of your last mammogram, and the calcifi-

cations had actually increased in number, not decreased.” The Figure shows the concordance between respondents’ disclosure willingness and the disclosure content.

Predictors of Higher Disclosure Willingness and Disclosure Content

In bivariate analyses, higher disclosure willingness was strongly associated with higher disclosure content. For example, 85.3% of respondents with the highest disclosure willingness (“would definitely disclose”) chose a disclosure statement with higher disclosure content (“may have increased” or “error occurred”) compared with 18.2% of respondents with the lowest disclosure willingness (“would definitely not disclose”) (Table 2, Figure).

No consistent relationship was found between malpractice attitudes or experiences and either disclosure willingness or disclosure content. Neither the level of concern about the effect that malpractice is having on the practice of mammography nor having been sued previously were associated with disclosure willingness or disclosure content. Respondents who thought the likelihood of being sued for malpractice in the next 5 years was greater than 50% were more likely to

have higher disclosure willingness in both bivariate ($P = .07$) and multivariate analysis (relative risk, 1.65; 95% confidence interval: 0.96, 2.81) compared with those who thought the probability of being sued was less than 10% (Table 3). However, no relationship was present between respondents’ estimates of the likelihood of being sued and disclosure content in either bivariate or multivariate analysis.

A U-shaped relationship was found between respondents’ age and years of mammography experience and their self-reported disclosure content. Those who reported 10–19 years of mammographic interpretation had lower disclosure content in the bivariate analysis ($P = .02$), compared with those with less than 10 and more than 20 years of mammographic interpretation. In the multivariate analysis, those who reported 10–19 years of mammographic interpretation still had low disclosure content (relative risk, 0.57; 95% confidence interval: 0.38, 0.86), compared with those with less than 10 years of mammographic interpretation.

Discussion

Physicians worldwide are being encouraged to disclose unanticipated outcomes to patients (1). Research suggests that physicians endorse the general concept of disclosure but are unsure how to turn this principle to practice and worry about litigation (23,28). Our study of a large sample of community radiologists in seven states explores radiologists’ attitudes about disclosing harmful errors in mammography to the patient. We found relatively few radiologists would disclose a hypothetical mammography error that led to a delayed diagnosis of cancer. Surprisingly, radiologists’ malpractice attitudes and level of clinical experience were not consistently associated with their reported willingness to disclose or the information they would disclose, suggesting other factors may be more influential in radiologists’ disclosure decisions.

Only 14% of radiologists reported they would “definitely disclose” this hypothetical mammography error to a patient, and 15% would tell the patient explicitly that an error had occurred

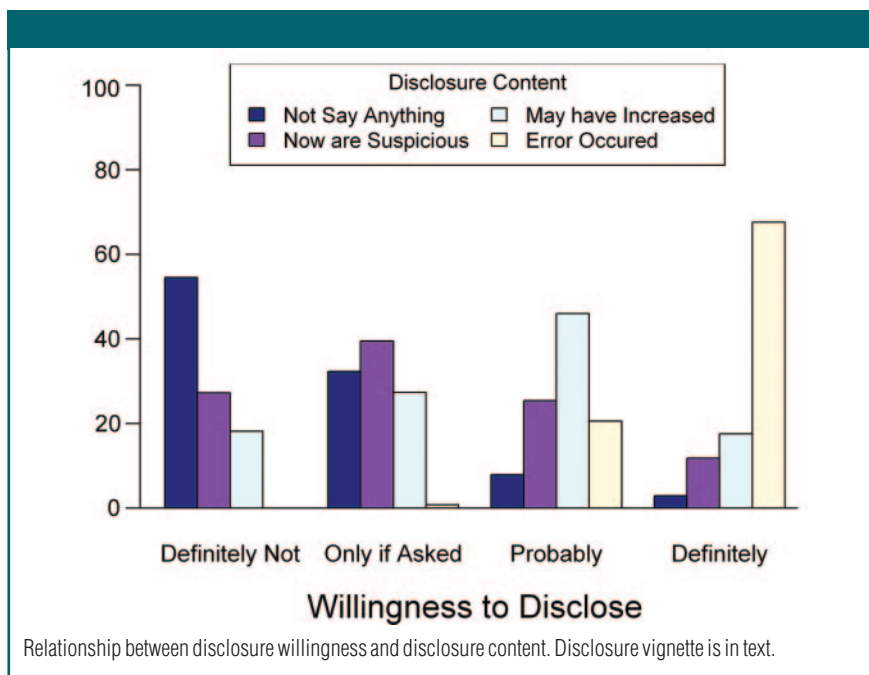


Table 2

Evaluation of Relationship between Radiologist Characteristics and Positive Response to Disclosure Questions

Characteristic	No. of Radiologists (n = 243)*	Disclosure Willingness		Disclosure Content	
		Higher Willingness (%)†	P Value	Higher Content (%)†	P Value
Demographic					
Age (y)					
30–44	63 (25.9)	41.3	.28	47.6‡	<.01‡
45–54	84 (34.6)	33.3		32.1‡	
>55	96 (39.5)	44.8		55.2‡	
No. of men	173 (71.2)	42.2	.25	45.1	.93
No. of women	70 (28.8)	34.3		45.7	
Clinical practice					
No. of hours per week					
<40	55 (22.8)	30.9	.12	36.4	.15
≥40	186 (77.2)	42.5		47.3	
Affiliation with an academic center					
None	198 (82.5)	39.9	.84	44.4	.81
Yes, as adjunct/affiliate	24 (10.0)	41.7		50.0	
Yes, primary	18 (7.5)	33.3		50.0	
Experience					
Time spent in breast imaging (%)§					
<20	59 (24.9)	49.2‡	.02‡	54.2	.34
20–39	63 (26.6)	44.4‡		36.5	
≥40	115 (48.5)	30.4‡		43.5	
Mammographic interpretation (y)					
<10	50 (20.7)	44.0	.82	56.0‡	.02‡
10–19	103 (42.6)	38.8		35.0‡	
≥20	89 (36.8)	39.3		50.6‡	
Medical malpractice					
Concerned with the impact of malpractice					
Disagree or strongly disagree	27 (11.2)	25.9	.11	48.1	.73
Neutral to strongly agree	215 (88.8)	41.9		44.7	
Probability of being sued in 5 years (%)§					
0–10	61 (25.5)	31.1	.07	49.2	.31
11–25	58 (24.3)	44.8		44.8	
26–50	77 (32.2)	40.3		37.7	
51–100	43 (18.0)	46.5		53.5	
Ever been named in medical malpractice suit					
No	119 (50.9)	39.5	.71	44.5	.9
Yes, any mammography related	33 (14.1)	36.4		48.5	
Yes, none mammography related	82 (35.0)	43.9		43.9	
Communication with patients					
Frequency of talking with patients about positive diagnostic mammograms					
Never	9 (3.8)	44.4	.62	44.4	.71
Rarely	23 (9.7)	52.2		39.1	
Sometimes	25 (10.5)	32.0		36.0	
Often	46 (19.3)	34.8		52.2	
Always	135 (56.7)	39.3		43.7	
Vignette questions					
Disclosure willingness§					
Definitely not	22 (9.1)	...		18.2‡	<.01‡
Only if asked by patient	124 (51.0)	...		28.2‡	
Probably	63 (25.9)	...		66.7‡	
Definitely	34 (14.0)	...		85.3‡	

(Table 2 continues)

Table 2 (continued)

Evaluation of Relationship between Radiologist Characteristics and Positive Response to Disclosure Questions

Characteristic	No. of Radiologists (n = 243)*	Disclosure Willingness		Disclosure Content	
		Higher Willingness (%)†	P Value	Higher Content (%)†	P Value
Disclosure content					
Not say anything	58 (23.9)	10.3‡	<.01‡	...	
Now are suspicious for cancer	75 (30.9)	26.7‡		...	
May have increased	73 (30.0)	47.9‡		...	
Error occurred	37 (15.2)	97.3‡		...	

* Numbers in parentheses are percentages of raw data.

† Higher disclosure willingness included response options “I would probably disclose this error” and “I would definitely disclose this error.” Higher disclosure content included “The calcifications have increased on your last mammogram, but their appearance was not as worrisome as they are now,” and “An error occurred during the interpretation of your last mammogram, and the calcifications had actually increased, not decreased in number.”

‡ Significant difference between groups at P = .05.

§ P value for these variables assumes linear test for trend; all other P values are calculated by using the χ^2 test.

Table 3

Analysis of Multivariate Log-Binomial Regression Models Exploring Relationship among Study Variables

Characteristic	No. of Radiologists (n = 229)*	Disclosure Willingness		Disclosure Content	
		Relative Risk	95% Confidence Interval	Relative Risk	95% Confidence Interval
Experience					
Time spent in breast imaging (%)					
<20	56 (24.5)	Ref		Ref	
20–39	60 (26.2)	0.93	0.61, 1.42	0.75	0.48, 1.18
≥40	113 (49.3)	0.67	0.45, 1.00	0.92	0.65, 1.28
Mammographic interpretation (y)					
<10	47 (19.8)	Ref		Ref	
10–19	98 (42.5)	0.99	0.64, 1.54	0.57	0.38, 0.86
≥20	84 (37.7)	1.03	0.66, 1.60	0.80	0.55, 1.16
Medical malpractice					
Probability of being sued in 5 years (%)					
0–10	55 (24.0)	Ref		Ref	
11–25	56 (24.5)	1.35	0.81, 2.24	1.04	0.68, 1.60
26–50	75 (32.8)	1.31	0.79, 2.17	0.81	0.55, 1.27
51–100	43 (18.8)	1.65	0.96, 2.81	1.04	0.69, 1.58
Communication with patients					
Frequency of talking with patients about positive diagnostic mammograms					
Never	8 (3.5)	1.30	0.62, 2.73	1.13	0.56, 2.29
Rarely	20 (8.7)	1.38	0.86, 2.22	0.72	0.39, 1.36
Sometimes	25 (10.9)	0.85	0.46, 1.59	0.84	0.48, 1.45
Often	45 (19.7)	0.95	0.61, 1.47	1.05	0.73, 1.52
Always	131 (57.2)	Ref		Ref	

Note.—Owing to missing covariate data (percent breast imaging [n = 6], talk with patient about positive diagnostic exams [n = 5], and probability of being sued [n = 3]), this analysis was restricted to 229 radiologists. Ref = reference group.

* Numbers in parentheses are percentages of raw data.

during the interpretation of prior films. Prior research has suggested that physicians from other specialties may also hesitate to discuss errors with patients (9–12,23,33). This low willingness to disclose errors to patients contrasts with national calls for disclosure of the “facts regarding the unanticipated outcome, including its preventability” (34).

Physicians’ reluctance to disclose harmful medical errors may reflect more than simple self-protection. In prior research, physicians expressed concern that in some circumstances disclosure could cause patient distress that outweighed any benefit the information might have to the patient (23). Physicians’ concern about whether disclosure is in the patient’s best interests may be especially high in cases of delayed cancer diagnosis. Cancer is treated at the stage in which it is diagnosed, and the effect of any delayed cancer diagnosis is irreversible. Thus, physicians may question whether informing this patient about the error would be helpful.

However, patients report wanting to be told about all harmful errors in their care, and consider disclosure an important part of a trusting relationship with their physicians (23). Many ethicists stress that disclosure not only enhances patients’ decision-making but is also a form of truth telling. Understanding the rationale and positive consequences for disclosure in

cases like these may help physicians feel more comfortable when sharing this information with patients. In addition, disclosing errors can educate patients that no one, including their physician, is perfect and that errors happen in all professions, including medicine (35).

Interestingly, radiologists' willingness to disclose this error and the information they would disclose was not consistently associated with their attitudes or experiences with medical malpractice. While fear of litigation is a frequently cited barrier to disclosure of errors to patients, other studies have found that physicians' malpractice attitudes, as well as differences in the malpractice climate, do not predict their willingness to disclose errors (28). While some studies (26,36) have suggested that disclosure of errors might actually reduce the chance that patients will sue, the actual effect of disclosure on litigation remains hotly contested. Many states have adopted "apology laws" to encourage disclosure, but the legal protections provided by most of these laws are minimal (21,37). Definitive research clarifying the relationship between disclosure and litigation would allow disclosure guidelines to be more firmly evidence based.

One barrier to disclosure is physicians' lack of confidence in their communication skills (23). Increasingly, radiologists are interacting directly with patients. Most (76%) respondents reported they often or always talk with patients about positive diagnostic mammographic results, but positive diagnostic mammographic results are still uncommon events. However, those physicians who communicated more frequently with patients about their diagnostic mammograms were not more likely to disclose this hypothetical error. This suggests physicians' comfort levels in communicating with patients in general may not lead directly to comfort with disclosure, highlighting the importance of communication skills training for radiologists regarding disclosure.

Radiologists who reported 10–19 years of experience interpreting mammograms were less likely to explicitly disclose this hypothetical error to the patient than were radiologists with less and with more interpretive experience. Younger

physicians may be more likely to have undergone formal disclosure training. The greater comfort of senior radiologists with disclosure may reflect their accumulated personal experience with disclosures. In other work, most physicians who reported actually disclosing medical errors to patients were satisfied with how the disclosure had gone, and these positive prior disclosure experiences were associated with a higher willingness to disclose future errors (9). Thus, senior radiologists may want to consider sharing their prior disclosure experiences with their more junior colleagues.

Limitations of our study included the use of a single, hypothetical vignette to measure respondents' disclosure attitudes, which cannot capture all of radiologists' disclosure attitudes. Also, radiologists might respond differently if faced with this dilemma in real life. However, physicians' responses to clinical vignettes have been shown to correlate with actual behaviors (38).

Other potential weaknesses related to determining what constitutes "error" and whether an error caused harm. While the vignette asks radiologists to assume that this error delayed a cancer diagnosis, some radiologists may have been unwilling to make this assumption without having images to review, or may have been unsure whether the increasing calcifications on the previous film warranted a biopsy. Our prior work with physicians in different specialties by using a variety of error vignettes revealed a similar range in physicians' willingness to disclose errors, suggesting that our results reflect radiologists' disclosure attitudes rather than uncertainty about clinical nuances of the case (9,28,29,39,40).

In conclusion, the movement toward greater openness with patients following errors is gaining momentum, yet effective disclosure remains the exception, not the rule. Closing the gap between patients' expectations that harmful errors will be disclosed to them and current practice requires understanding the unique challenges that each specialty, such as radiology, faces related to disclosure, and using this information to help physicians communicate with patients more effectively following errors.

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