An Assessment of the Likelihood, Frequency, and Content of Verbal Communication Between Radiologists and Women Receiving Screening and Diagnostic Mammography

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Abstract

Rationale & Objective—Research on communication between radiologists and women undergoing screening and diagnostic mammography is limited. We describe community radiologists' communication practices with patients regarding screening and diagnostic mammogram results and factors associated with frequency of communication.

Materials & Methods—We received surveys from 257 radiologists (70% of those eligible) about the extent to which they talk to women as part of their healthcare visit for either screening or diagnostic mammograms, whether this occurs if the exam assessment is positive or negative, and how they use estimates of patient risk to convey information about an abnormal exam where the specific finding of cancer is not yet known. We also assessed characteristics of the radiologists to identify associations with more or less frequent communication at the time of the mammogram.

Results—Two hundred and forty-three radiologists provided complete data (95%). Very few (<6%) reported routinely communicating with women when screening mammograms were either normal or abnormal. Less than half (47%) routinely communicated with women when their diagnostic mammograms were normal, while 77% often or always communicated with women when their diagnostic exams were abnormal. For positive diagnostic exams, female radiologists were more likely to be frequent communicators compared to males (87.1% to 72.8%; p-value = 0.02) and those who

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spend 40-79% of their time in breast imaging (94.6%) were more likely to be frequent communicators compared to those who spend less time (67.2%-78.9%; p-value = 0.02). Most radiologists convey risk information using general rather than numeric statements (57.7% vs. 28.5%).

Conclusions—Radiologists are most likely to convey information about diagnostic mammographic findings when results are abnormal. Most radiologists convey risk information using general rather than numeric statements.

Introduction

Communication is a key aspect of quality healthcare, as it fosters trust in the physician-patient relationship (1,2). Several studies have focused on patient communication in healthcare in general (3-5) and in cancer care (6-8). Overall, there is consensus that physician patient communication could be improved (9). For example, patients often leave healthcare visits confused about the need for further work-up and the therapeutic value of what was done at their last procedure (11). Another study found that a high degree of physician-initiated communication is associated with patients' perception of having a treatment choice, and higher satisfaction with their cancer care in the 3-6 months following breast surgery (10).

Though this body of literature is expanding, much less is known about the communication that occurs between radiologists and women undergoing mammography. This is in part due to the fact that the person directly interacting with the patient to obtain the exam is the radiologic technologist rather than the radiologist, but evidence regarding the anxiety women experience when undergoing mammography (12) underscores the need for effective communication. In fact, some research indicates that women experience significant dissatisfaction with the communication they have with radiologists (13), with one study showing that poor communication between physicians and patients at the time of the mammogram reduced adherence to follow-up examinations (14). Important limitations exist with the studies conducted on this issue to date, which include assessments done only at academic medical centers and communication that occurs between trainees and patients (15).

Currently, we do not know the extent to which radiologists talk to women about the results of either screening or diagnostic mammography examinations and whether this occurs if the outcome of the exam is positive or negative. We also do not know if radiologist characteristics, such as age, gender and percent of time devoted to breast imaging are associated with more or less frequent communication of mammogram results. Lastly, we know little about the content of the conversations and how radiologists use estimates of patient risk to convey information to patients about an indeterminate exam. The purpose of this paper is to describe community radiologists' current practices of talking with patients about their screening and diagnostic mammogram results. In addition, we explore what radiologist characteristics appear to be associated with frequent versus infrequent communication, how this may differ by the type of mammogram (screening versus diagnostic) and whether radiologists use numbers and statistics in their discussion with patients.

Methods

Study population

Seven mammography registries that are part of the National Cancer Institute-funded Breast Cancer Surveillance Consortium (http://breastscreening.cancer.gov) contributed data for this study: 1) Carolina Mammography Registry, North Carolina; 2) Colorado Mammography Project, Denver, Colorado; 3) Group Health Cooperative, Washington; 4) New Hampshire Mammography Network, New Hampshire; 5) New Mexico Mammography Project, Albuquerque, New Mexico; 6) San Francisco Mammography Registry, San Francisco,

California; and 7) Vermont Breast Cancer Surveillance System, Vermont. Women are included in a registry if they receive a screening or diagnostic mammogram at a participating facility, and participant radiologists are those who interpret these exams. The Institutional Review Boards (IRB) of all participating sites approved all study activities. Each BCSC registry, as well as the BCSC Statistical Coordinating Center, also received IRB approval either for active or passive consenting processes or for a waiver of consent to enroll women who obtained mammograms at BCSC sites, to link data, and to perform analytic studies. All procedures were HIPAA-compliant, and all registries and the Statistical Coordinating Center received a Federal Certificate of Confidentiality and other protection for the identities of women, physicians, and facilities who are subjects of this research (16).

Radiologists who interpreted mammograms at a facility contributing to any of the seven registries were invited to participate in a mailed survey in 2006/07, using survey methods that we have described previously (17). Over 250 (n=257) radiologists responded to the survey (70% response rate) from 332 facilities, and of these, 243 provided complete data for use in analyses. Data from the radiologist surveys were pooled at the Statistical Coordinating Center for analysis.

Measurements—The radiologist survey included questions about demographic and clinical practice characteristics, such as experience in breast imaging, features of clinical training, time spent in breast imaging, and affiliation with academic medical centers. A copy of the survey is available on the Internet:
http://breastscreening.cancer.gov/collaborations/
favor_ii_mammography_practice_survey.pdf. The survey included four questions about radiologists' communication with patients using a 5-point Likert scale (never, rarely, sometimes, often, always): 1) when screening exams were normal, 2) when screening exams were abnormal, 3) when diagnostic exams were normal, and 4) when diagnostic exams were abnormal. The American College or Radiology (ACR) considers a screening mammogram as one performed on for screening purposes only on asymptomatic women and a diagnostic mammogram as one performed to evaluate a breast problem or as a follow-up to a prior abnormal exam (18). The ACR also considers a normal assessment as normal [Breast Imaging Assessment and Data Systems™ (BI-RADS) 1], benign finding (BI-RADS 2) or probably benign finding (BI-RADS 3) and an abnormal assessment as suspicious abnormality (B-RADS 4) or highly suggestive of malignancy (BI-RADS 5). For each of the four communication questions, we classified the frequency of communication. We denoted a frequent communicator as radiologists responding on the survey that they often or always communicate with women, and an infrequent communicator as responding on the survey as never, rarely, or sometimes communicating with women.

The survey additionally included a question asking radiologists the extent to which they use numbers and statistics, such as "your chance of having cancer is less than 2%" versus general statements, such as, "your chance of having cancer is extremely low" when discussing a positive mammogram, also using a 5-point Likert scale (never, rarely, sometimes, often, always). Responses to this question were collapsed into three categories: never/rarely sometimes, and often/always. Lastly, we asked radiologists about their levels of confidence in understanding numbers and statistics when they interpret the medical literature, interpret their audit reports, when presenting mammography information to colleagues and when presenting information to patients regarding mammography using a 5-point Likert scale (not at all confident, not very confident, neutral, confident, and very confident). We considered a radiologist to be "confident" in understanding numbers and statistics if they responded confident or very confident and we considered them to be "not confident" if they responded not at all confident, not very confident, or neutral.

Statistical Analyses—We calculated frequencies for all radiologist characteristics and survey questions about communication style. We evaluated the relationship between radiologist characteristics and the probability of a radiologist being a frequent versus infrequent communicator separately by mammogram type and result. All statistical comparisons were made using chi-square score tests from logistic regression models unless otherwise specified.

We evaluated the relationship between how a radiologist uses numbers and statistics to discuss abnormal mammography exams when the radiologist is either confident in their own use of statistics or a radiologist is a frequent communicator for abnormal diagnostic exams. We fit logistic regression models to examine the association of the outcome being a frequent versus infrequent communicator of abnormal diagnostic exams and each of the questions about using numbers and statistics. We tested for interactions with the radiologist's confidence in use of statistics to assess for a differential effect. All data analyses were conducted using SAS® software, Version 9.1 of the SAS system for Windows (SAS Institute Inc., Cary, NC). All p-values and confidence intervals are two-sided.

Results

Nearly 72% of the study sample was male, and 82% were community-based radiologists (Table 1). The vast majority of radiologists in the sample did not have fellowship training in breast imaging and had been interpreting mammograms for more than 10 years. More than half spent less than 40% of their professional time in breast imaging. Very few communicated results of either normal screening exams (2%) or abnormal screening exams (5%). Less than one-half communicated results of normal diagnostic exams, while 77% reported often or always communicating results of abnormal diagnostic exams (Table1). Despite the fact that 79% of radiologists expressed being confident or very confident in their understanding of numbers and statistics when presenting information on cancer risk to their patients (Table 1), only 29% often or always use numbers and statistics, such as "your chance of having cancer is less than 2%," while 58% often or always use general statements, such as, "your chance of having cancer is very low" when discussing abnormal mammography exams with women. Figure 1 illustrates the frequency distribution of verbal communication according to type of mammogram and mammogram result.

There were no statistically significant associations between radiologist characteristics and being a frequent compared to infrequent communicator of results for either normal or abnormal screening mammograms. In contrast, the probability of being a frequent communicator of normal diagnostic exams was associated with years of mammography interpretation (Table 2). Those with <10 years of experience were less likely to be frequent communicators than either those with 10-19 (29.4% to 50.6%: p-value=0.02) or those with 20 or more years of experience (29.4% to 53.9%: p-value<0.01). Those with 10-19 years of experience did not have significantly different frequency of communication compared to those with 20 or more years of experience (p-value = 0.64). Females were more likely to be frequent communicators about abnormal diagnostic exams compared to males (87.1% and 72.8%, respectively; p-value = 0.02). Being a frequent communicator of the results of abnormal diagnostic exams was significantly associated with percent time spent working in breast imaging (p-value = 0.02). Those who spend 40-79% of their time in breast imaging were significantly more likely to be frequent communicators of abnormal diagnostic exams compared to those that spend <20% (94.6% to 67.2%: p-value<0.01), 20-39% (94.6% to 75.8%: p-value=0.03), and 80-100% (94.6% to 78.9%: p-value=0.05).

Radiologists who report never using numerical statements such as, "your chances of having cancer is less than 2%" when discussing positive exams were less like likely to be frequent communicators of abnormal diagnostic exams compared either to those who rarely or

sometimes used numerical statements (60.0% to 81.4%: p-value<0.01) or to those who often or always use numbers and statistics (60.0% to 88.1%: p-value <0.001) (Table 3). Those who often or always use numerical statements were more likely to report confidence in the use of statistics compared to those who rarely or sometimes use them (89.6% to 76.0%: p-value = 0.02) and compared to those who never use numbers when communicating with patients (89.6% to 76.0%: p-value = 0.05). Radiologists who report never using general statements, such as "your chance of having cancer is extremely low" were less likely to be frequent communicators compared either to those who rarely or sometimes use such statements (20.0% to 79.1%: p-value<0.01) or to those who often or always use such statements (20.0% to 81.2%: p-value<0.001). We found no significant interactions in the probability of being a frequent communicator by either confidence in use of statistics or type of statement used to discusses abnormal exams (Interaction p-values: use numbers and statistics, p=0.67, use general statements, p=0.88).

Discussion

In 1992, the Mammography Quality Standards Act mandated that mammography facilities send each patient a summary of the mammographic report written in lay terms within 30 days of the exam. If assessments are suspicious or highly suggestive of malignancy, the facility is required to make reasonable attempts to communicate these results as soon as possible (http://www.fda.gov/cdrh/mammography/frmamcom2.html). For patients who name a primary care provider, the facility must similarly convey the same results sent to patients to their primary care providers following the same time period requirements (http://www.fda.gov/cdrh/mammography/frmamcom2.html). Despite these requirements, little has been published about the efficacy of these written reports and how often radiologists communicate results verbally to patients.

Our nationally representative sample of community-based radiologist indicates that very little verbal communication occurs about the results of screening mammography even when the results were abnormal. Only about half to three quarters of radiologists discuss the results of diagnostic exams with patients, with most frequent communication occurring when a diagnostic mammogram is abnormal. Communicating a clear explanation of imaging results and the follow-up management plan to both women and their primary care providers is a critical element of the imaging process. In particular, for abnormal results, good communication of both the results and the need for further tests improves receipt of appropriate follow-up care (14). Production and interpretation of high quality images and a subsequent written report of findings are insufficient, if the patient does not understand or appreciate the ramifications of the findings and subsequent recommendations.

Many women have a heightened anxiety about the results from breast imaging (19,20). This is particularly true if they have breast symptoms such as a mass or thickening or if they have been recalled for additional breast imaging based on the interpretation of a mammographic screening examination. The discussion of results from breast imaging may presumably be deferred to the primary care provider, but very little is known about this communication and there may be an initial delay of several days or longer between the completion of the examination and the transmission of results to the patient and primary care provider. Not all patients have access to a primary care provider and can self-refer for screening mammography. Thus, relying on the primary care provider to explain the results for all patients may either postpone the communication even longer or result in no communication between a trained clinician and patients following mammography.

Although this study does not specifically address the levels of patient satisfaction with communication of results by the radiologist, most patients prefer timely and face-to-face

explanation of the results from a breast-imaging provider (21-23). In addition, women who receive their abnormal mammogram results either in person or over the phone are more likely to understand that their results are abnormal compared to women who receive their results in writing (21). We found radiologists verbally communicated results from screening examinations very infrequently (<6%). In most radiologic practices, this is standard practice, as screening examinations are usually batch read, sometimes as many as 100 a day, and in-person communication of the results would take a significant amount of time. Most busy community practices do not have the personnel and/or technical support to provide real time interpretation of screening mammography with immediate communication to the women. In most patient populations, ~90% of screening mammograms will be normal and will not require additional imaging (24) and the results are most commonly communicated by mail in concordance with MQSA (http://www.fda.gov/cdrh/mammography/frmamcom2.html). In this study, we were unable to determine whether batch readings were done, though we believe it is it is very common for screening mammography. On-line versus batch interpretation of mammograms offer very different communication experiences with patients; unfortunately, we were unable to examine the affect of these different interpretations methods on communication with patients in our study

We found verbal communication between radiologists and women was considerably more frequent for abnormal diagnostic exams compared to normal diagnostic exams. Unfortunately, these data suggest that in some radiologic practices more than 1 out of 4 patients with an abnormal diagnostic mammogram, who may require a breast biopsy or additional imaging, such as breast MRI or ultrasound, leave the radiology department without knowledge of results or follow-up recommendations.

Female radiologists reported being more likely to communicate results of normal and abnormal diagnostic examinations to women compared to their male counterparts. This may reflect differences in practice patterns or heightened sensitivities for distributing results to patients among female radiologists. We also found that radiologists with more years of experience reported being more frequent communicators of normal results of diagnostic mammograms. Presumably these data suggest that radiologists who have spent more time in the field of breast imaging have learned the importance of communicating results to their patients compared to those with less overall experience. Lastly, we found that radiologists who spend 80-100% of their time in breast imaging are less frequent communicators of abnormal diagnostic mammograms than radiologists who spend 40-79% of their time in mammography. This is an interesting finding that we are unsure how to interpret. Perhaps radiologists who spend a significant amount of time in breast imaging have competing demands with interventional procedures, which makes it difficult to find time to talk with patients other than those receiving the interventional procedures.

We found that most radiologists use general rather than numeric statements to convey information about breast cancer risk, but that radiologists who do use numeric statements are more confident in their use of statistics than those who do not use numeric statements. Conveying risk information to patients is complicated (25-27), and at least one recent study found that pictorial, graphical and general statements all had limitations in conveying risk information to patients in a way that they can accurately recall (25), but that accurate recall was more likely to be associated with conveying numeric risk values using gambling odds (e.g., '1 chance in X'). We know of no studies that specifically assessed how to convey risk of breast cancer at the time of an abnormal mammogram, although one study found that having discussions with a healthcare provider about family history of breast cancer increased perceived risk of developing breast cancer and was associated with improved adherence to screening, but did not promote knowledge of personal risk factors. Clearly, much more information is needed

about how best to inform women about their risk of breast cancer especially around the time they receive abnormal mammography results.

An important strength of our study is the significant response rate by community-based radiologists to a mailed survey about their approaches in conveying information to patients at the time of mammography. The population of radiologists eligible to take part in our study included those who are active members of a federally funded consortium of radiologists who are not likely associated with tertiary care centers and thus are representative of the majority of radiologists interpreting mammography around the country. A limitation is that we did not conduct this assessment at the time of the mammogram, but relied on physician self-report, which may be affected by recall bias.

In summary, nearly all patients will reap benefits from conversations about results and recommendations of their screening and diagnostic mammograms, especially when the results are abnormal. Radiologists who are directly and frequently involved in the imaging and management of breast diseases are well positioned to provide this information directly to patients, rather than health care providers who episodically deal with breast related issues. Experienced radiologists can answer questions and ensure the patient understands the recommendations spanning from yearly screening mammography to the necessity for breast biopsy and they can more accurately describe next steps. If at all possible, this information can be most efficiently delivered while the patient is still in the radiology department and can often incorporate the actual radiologic images as part of the discussion. This approach may not be practical for screening mammography but should be part of routine practice for diagnostic mammograms as we know these patients have a higher frequency of breast disease than the screening population and a higher percentage of these patients will need either additional imaging such as MRI or a breast biopsy. Some of the anxiety associated with these mammograms can be allayed with a timely and informed discussion of results with the patient. To ensure both knowledge and comfort with communicating results to patients, we need to develop training programs for providers including radiologists, physician's assistants, nurse navigators and others involved with breast disease. Lastly, more research is needed to identify how best to convey patient risk at the time of an abnormal mammogram.

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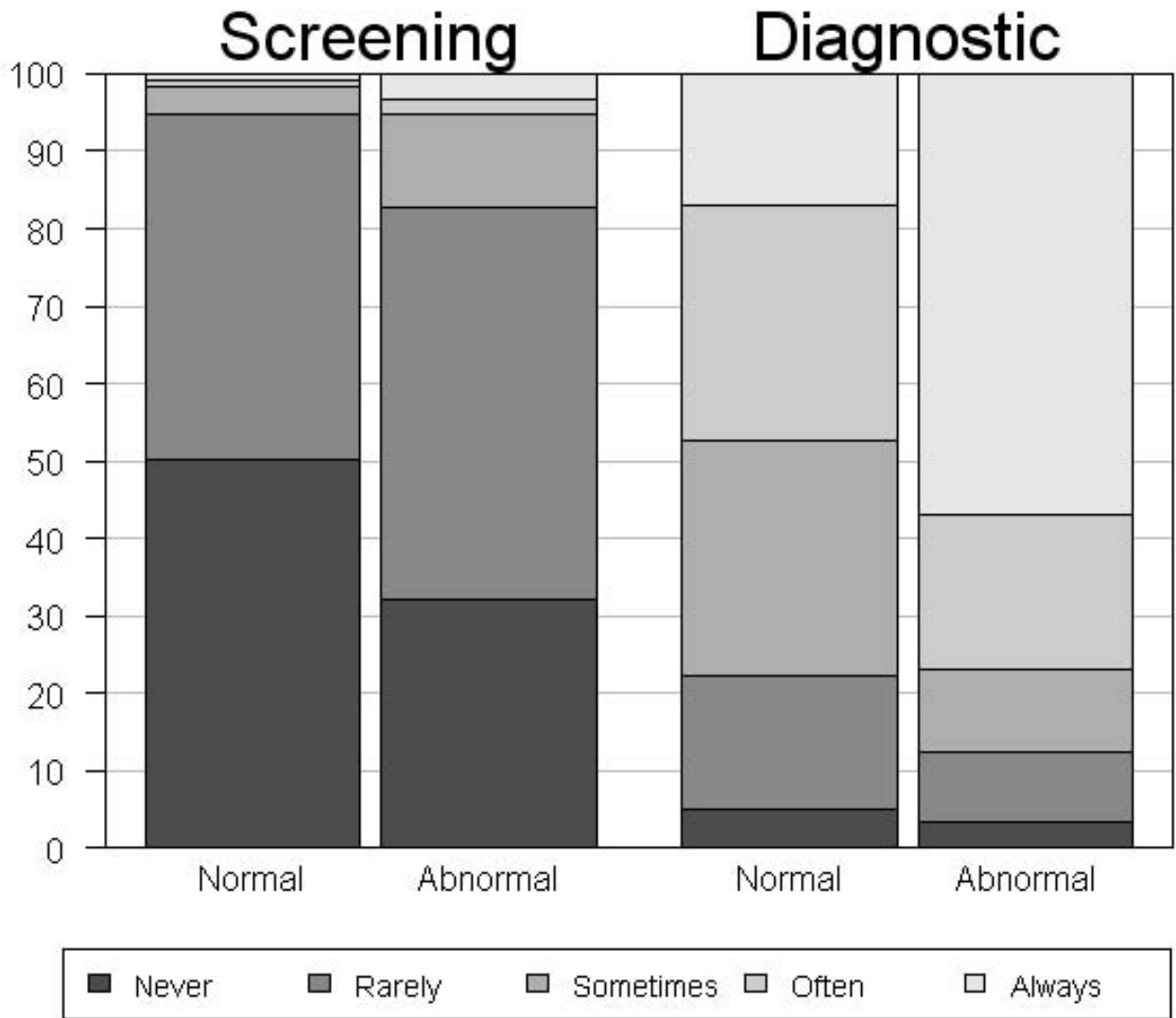
Figure 1.
Frequency Distribution of Verbal Communication According to Type of Mammogram and Mammogram Result

Table 1

Radiologist Characteristics

Characteristics	N	(%)
TOTAL	**243**	(100.0)
Demographics		
Sex		
Male	173	(71.2)
Female	70	(28.8)
Practice Type		
Primary Affiliation with Academic Medical Center		
No	196	(81.7)
Adjunct	22	(9.2)
Primary	22	(9.2)
Breast Imaging Experience		
Fellowship Training		
No	222	(91.4)
Yes	21	(8.6)
Years of mammography interpretation		
<10	51	(21.1)
10-19	89	(36.8)
≥20	102	(42.1)
Percent of time spent in breast imaging		
<20%	61	(25.8)
20-39%	62	(26.3)
40-79%	37	(15.7)
80-100%	76	(32.2)
Communication Styles		
Screening Exams		
When Screening Exam is Normal		
Infrequent Communicator (Never/Rarely/Sometimes)	239	(98.4)
FrequentCommunicator (Often/Always)	4	(1.6)
When Screening Exam is Abnormal		
Infrequent Communicator (Never/Rarely/Sometimes)	230	(94.7)
FrequentCommunicator (Often/Always)	13	(5.3)
Diagnostic Exams		
When Diagnostic Exam is Normal		
Infrequent Communicator (Never/Rarely/Sometimes)	128	(52.7)
Frequent Communicator (Often/Always)	115	(47.3)
When Diagnostic Exam is Abnormal		
InfrequentCommunicator (Never/Rarely/Sometimes)	56	(23.0)
FrequentCommunicator (Often/Always)	187	(77.0)
When Discussing Positive mammography exams with a patient would you use:		

Characteristics	N	(%)
Numbers and statistics such as "your chances of having cancer is less than 2%"		
Never	50	(21.3)
Rarely	67	(28.5)
Sometimes	51	(21.7)
Often	66	(28.1)
Always	1	(0.4)
General statements such as "your chance of having cancer is extremely low"		
Never	10	(4.2)
Rarely	20	(8.4)
Sometimes	71	(29.7)
Often	120	(50.2)
Always	18	(7.5)
Confident in my understanding of numbers and statistics when presenting information on mammography with patients		
Not at all confident	2	(0.8)
Not very Confident	9	(3.7)
Neutral	41	(16.9)
Confident	156	(64.2)
Very Confident	35	(14.4)

Missing Data: Practice type is missing 3 responses; years interpreting mammography is missing 1 response; percent of time spent in breast imaging is missing 7 responses; use of statistics when talking about positive mammograms is missing 8 responses; and use of general statements when talking about positive mammograms is missing 4 responses.

Table 2

Characteristics of Radiologists Who Report Being Frequent(versus Infrequent) Communicators According to Screening and Diagnostic Mammograms and Their Interpretations*

	n	Screening Exams		Diagnostic Exams	
		Normal % Frequent Communicators	Abnormal % Frequent Communicators	Normal % Frequent Communicators	Abnormal % Frequent Communicators
TOTAL	243	1.6	5.3	47.3	77.0
Sex					
Male	173	1.2	5.2	44.5	**72.8**
Female	70	2.9	5.7	54.3	**87.1**
Primary Affiliation with Academic Medical Center					
No	196	2.0	6.1	45.9	77.0
Adjunct	22	0.0	0.0	63.6	77.3
Primary	22	0.0	0.0	45.5	77.3
Fellowship Training					
No	222	1.4	5.0	46.4	75.7
Yes	21	4.8	9.5	57.1	90.5
Years of mammography interpretation					
<10	51	3.9	0.0	**29.4**	72.5
10-19	89	1.1	4.5	**50.6**	76.4
≥20	102	1.0	8.8	**53.9**	80.4
Percent of time spent in breast imaging					
<20%	61	0.0	0.0	45.9	**67.2**
20-39%	62	3.2	4.8	46.8	**75.8**
40-79%	37	2.7	2.7	48.6	**94.6**
80-100%	76	1.3	9.2	48.7	**78.9**
Confident in Understanding numbers and statistics					
No (Not Confident to Neutral)	52	0.0	1.9	51.9	73.1
Yes (Confident to Very Confident)	191	2.1	6.3	46.1	78.0

Bold indicates a statistically significant difference (p-value <0.05)using a chi-square score test from a logistic regression model for the binary outcome of being a frequent communicator.

Table 3

Communication Content According to Level of Communication of Abnormal Diagnostic Exams and Confidence in Use of Statistics

	Total N	N and % who are Confident in use of Statistics		N and % who are Frequent Communicators of Abnormal Diagnostic Exams*		N and % who are Frequent Communicators of Abnormal Diagnostic Exams*			
						Among those Not Confident in use of Statistics		Among those Confident in use of Statistics	
		N	(%)	N	(%)	N	(%)	N	(%)
TOTAL	243	191	(78.6)	187	(77.0)	38	(73.1)	149	(78.0)
When Discussing Positive mammography exams with a patient would you use:									
Numbers and statistics such as "your chances of having cancer is less than 2%"									
Never	50	38	(76.0)	**30**	**(60.0)**	8	(66.7)	22	(57.9)
Rarely/Sometimes	118	88	(74.6)	96	(81.4)	23	(76.7)	73	(83.0)
Often/Always	67	**60**	**(89.6)**	59	(88.1)	6	(85.7)	53	(88.3)
General statements such as "your chance of having cancer is extremely low", N (%)									
Never	10	9	(90.0)	**2**	**(20.0)**	0	(0.0)	2	(22.2)
Rarely/Sometimes	91	74	(81.3)	72	(79.1)	12	(70.6)	60	(81.1)
Often/Always	138	105	(76.1)	112	(81.2)	26	(78.8)	86	(81.9)

Missing Data: Using numbers and statistics, such as "your chance of having cancer is less than 2%" is missing 4 responses. Using general statements such as, "your chance of having cancer is extremely low" is missing 8 responses. Using general statements such as, "your chance of having cancer is extremely low" is missing 4 responses.

Bold indicates a statistically significant difference(p-value<0.05) between the responses in a given category and all other categories