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Steven Parra
Yale University, steven.j.parra@gmail.com

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Predictors of Inadequate Follow-Up of Screening Mammograms in Hispanic/Latinas in the Northeastern United States

Steven Parra[1]

[1]Department of Epidemiology and Public Health, Yale University School of Medicine, 60, College Street, P.O. Box 208034 New Haven, CT, 06510-2084, USA

beth.jones@yale.edu, steven.parra@yale.edu

Abstract

Background: Breast cancer is the most common cause of cancer death among Hispanic/Latino patients. Similar to non-Hispanic Black women, Hispanic/Latino women are more likely to be diagnosed with later stage breast cancer and experience worse survival rates when compared to non-Hispanic White women. This study was focused on identifying predictors of inadequate follow-up of abnormal screening mammograms in this culturally diverse Hispanic/Latina population.

Methods: We studied 189 subjects with abnormal or inconclusive mammograms identified from a prospective cohort of Hispanic/Latino women (n=1570), aged 40-75, living in Connecticut and followed their cancer screening experience over a 2-4 year period. Using multivariate logistic regression, we identified independent predictors of inadequate follow-up of an abnormal mammogram.

Results: Over 31% of women requiring immediate or short-term follow-up did not receive this care within three months of the recommended return date. Patient body mass index, age, pain experienced during the mammogram, and a subject's perceived control over health outcomes were significant independent predictors of inadequate follow-up. Self-rated health was initially identified as a significant predictor, but was explained through stratification by patient comorbidities.

Conclusion: While inadequate follow-up of abnormal mammograms undermines the potential benefits of mammography screening for all women, the observed differences in this study may have implications for the persistent ethnic differences in breast cancer stage at diagnosis and survival. With few published studies that address cancer screening on Hispanic/Latinas residing in the Northeastern, US, more research is needed to identify factors that contribute to poor follow-up following cancer screening tests in this population of women who are at risk for relatively poor outcomes of breast cancer.

Background

Breast cancer is the leading cause of female cancer mortality in Hispanic/Latinas[1]. Although the mortality rates for Hispanic/Latinas are favorable compared with those reported for White women, this in part reflects the lower incidence. In fact, among Hispanic/Latina women diagnosed with breast cancer, there is a disturbing trend toward earlier age at diagnosis, later stage cancer at diagnosis, more aggressive tumor characteristics, and poorer survival[1-3]. Furthermore, the 2013 National Health Interview Survey reports that 45.9% of Hispanic/Latina women indicate receiving a screening mammogram in the past year compared to 52.1% of White women, a difference which may partially explains these trends[4]. Since the real benefit of cancer screening comes with regular screening at appropriate intervals, self-reports of low adherence to guidelines over time is of concern. While there could be many factors contributing to lower screening effectiveness in Hispanic/Latino women, the aim of this paper is to determine the predictors of inadequate follow-up for abnormal or inconclusive mammograms.

The majority of current research on this topic has been focused on specific interventions in order to address this disparity in screening. This has included a wide range of approaches, such as a text-message intervention[13], a multi-level community/home intervention[14], and a patient navigation program[15]. While there has been mixed success with these interventions, foundational research into the causes of this disparity in breast cancer screenings is lacking. To our knowledge, there are no published reports that prospectively investigate on inadequate follow-up for screening mammograms within the Hispanic/Latino population. Findings from our study may inform future interventions developed to improve the effectiveness of mammogram screening for Hispanic/Latino women and refine current intervention methods.

Methods

Study Population

Subjects were identified from a prospective cohort study of 1591 self-identifying Hispanic/Latina women, aged 40-75, presenting for health care appointments at primary care centers located in the four Connecticut cities with the largest Hispanic/Latino populations (and 4 of the 5 largest cities in CT). Study subjects participated in an hour-long phone survey conducted in either English or Spanish, based upon the subject's preference. Almost half of the cohort, 798 women, participated in a follow-up interview within 2-4 years of her entrance into the study. The average length of follow-up was 2.54 years. One thousand seven hundred and thirty of the 2,137 women meeting the eligibility criteria (must have no prior history of breast cancer, breast biopsy, or cyst aspiration; aged 40-75; and availability for study) identified as potential participants were successfully contacted and 1,600 women were interviewed. Of these, 1591 were determined to be unique study subjects. This yielded a 75% participation rate among all eligible women and a 92% participation rate among women who could be contacted based on the information provided at the time of enrollment. Furthermore, 98% of study subjects provided written consent to abstract radiology records. Medical records were obtained from the screening facility that the study subject indicated as the place that they received a previous mammogram and/or would go to for a future mammogram. If the patient could not be identified from the radiology records in either facility, all facilities in this same locale were checked. Records for approximately 15% of study subjects who were identified as previous patients in a given facility but had no screening exams during the follow-up period were also searched in facilities serving the same geographic area. If such records were incomplete, surrounding facilities were checked to obtain additional data. Participants were compensated for their time (for both interviews) with gift cards to a large retail/grocery establishment. All study activities and analyses were approved by the Yale School of Medicine Human Investigation Committee.

Inadequate Follow-Up

Patient medical records were reviewed in order to determine the timing and type of each mammogram received by a subject. Screening mammograms were classified as abnormal or normal, based on the Breast Imaging Reporting and Data System (BI-RADS) criteria developed by the American College of Radiology (ACR) [7]. Table 1 defines the BI-RADS categories used to assess mammography results and the corresponding follow-up recommendations. Abnormal results were defined as BI-RADS category 0, incomplete; category 3, probably benign; category 4, suspicious abnormality; and category 5, highly suggestive of malignancy. Follow-up recommendations included immediate imaging follow-up (category 0), short-term imaging follow-up within 6 months (category 3), and biopsy (categories 4 and 5). Normal results were defined as BI-RADS categories 1 and 2, mammograms that were negative or benign respectively, and a return to routine screening was recommended.

For the 1570 (of 1591) women in the original study who provided written consent to review of mammography records, BI-RADS categories were obtained from those records. Of these, 247 women (15.7%) had abnormal (or inconclusive) results. For 58 of these women, the abnormal or inconclusive results were associated with one or more diagnostic tests, but no screening exam, and were thus excluded from the analysis. In total, 189 women were determined to have at least one abnormal or inconclusive screening mammogram during the follow-up period. A visual representation of this exclusion criteria is outlined in Figure 1.

Outcome

The outcome variable in this study was the receipt of adequate follow-up after an abnormal or inconclusive screening mammogram, dichotomized as yes or no. For the women requiring immediate follow-up (BI-RADS categories 0,4,5), follow-up was considered adequate if the recommended diagnostic procedure was completed within three months of the screening mammogram. Subjects who received recommendations for short-term follow-up, (BI-RADS 3) were classified as receiving adequate follow-up if the recommended

tests were completed within nine months of the index exam. Thus, regardless of the specific recommendation, a three-month grace period was applied before a study subject was classified as not receiving adequate follow-up. Any subject who received an abnormal mammogram and did not receive any form of diagnostic follow-up was classified as not receiving adequate follow-up; this process is outlined in Figure 1 and the distribution of BI-RADs results is presented in Table 1.

Predictors

A wide range of factors were evaluated in this analysis. These included socio-demographic, access to care, biomedical (e.g., family history, obesity, prior history of mammography screening), psychosocial, and acculturative factors as well as a number of variables that were specific to the experience of undergoing mammography screening. The coding of these variables is detailed in Tables 2 and 3 and indicated in the reported results.

Data analysis

All statistical analyses were performed with SAS 9.4 software (The SAS System for Windows. Cary, NC: SAS Institute Inc., Copyright 2002–2012). Bivariate associations between the predictor variables and the outcome variable, adequate follow-up, were assessed with χ^2 tests ($p < 0.05$, two-sided). Independent predictors of adequacy of follow-up of an abnormal mammogram were identified using multivariate logistic regression methods; adjusted odds ratios (OR) with 95% confidence intervals (CI) are reported. All variables were modeled as categorical variables, based on results from preliminary analyses. Variables that were marginally significant in bivariate analyses ($p < 0.25$), or a priori were hypothesized to affect adequacy of follow-up and/or differ across adequacy groups based on results from previous studies, were tested in logistic regression models. Preliminary predictors were identified using the stepwise elimination method, which required a p-value ≤ 0.15 to enter the model initially and a p-value ≤ 0.10 to be retained. Variables that significantly improved the model fit using the maximum likelihood method remained in the final model[8].

Results

There were 189 women who were recommended for either immediate (98.9%) or short-term follow-up (1.1%), as shown in Table 1. Over 31% of all women with abnormal or inconclusive results did not receive (or obtain) recommended follow-up testing (n=59). Women experiencing multiple instances of inadequate follow-up were rare, occurring for 12 subjects. Only 2 women were recommended for short-term follow-up, both of whom did not receive follow-up within 9 months.

Population Characteristics

The characteristics of the study population are presented in Table 2. Approximately half (48.7%) of the population was less than the age of 50, and the majority of the population (65.1%) was unmarried. This population was relatively low socioeconomic status, with 50.8% receiving less than HS education. Most (70.4%) of the population was not employed. Health insurance was common in the population (78.7%), with 86.6% of women indicating having a usual care provider. Seventy percent of women received at least one mammogram in the past year, and 6.6% of the population had a family history of breast cancer. Self-rated health was low in the population, with 54.5% reporting a fair or poor perception of her health. Over half (50.3%) of the population had a body mass index (BMI) of over 30, classifying them as obese, and 64.2% of these women had two or more comorbidities for breast cancer (which included diabetes, heart disease, high blood pressure, and high cholesterol). Twenty percent of women experienced a lot or a fair amount of pain during her mammography screening.

The benefits of mammography screening were seen as very useful to 91.5% of the population, and 51.1% of women felt in control of her recovery if she were to be diagnosed with cancer. Almost a quarter (23.8%) of women did not perceive themselves as susceptible to breast cancer, and 25.8% of the population did not feel in control of their health outcomes overall[1]. Over half (52.4%) of the population was dependent on public transit or another driver in order to reach screening facilities; 22/3% of women needed to make special arrangements in order to make a screening appointment. These arrangements included coordinating

transportation, arranging childcare, or locating someone to accompany the subject to the appointment. The majority of the population was not born in the United States (US); 70.7% of subjects were non-native women who have lived in the US for at least ten years. English proficiency was low in this population, with only 17.2% of women expressing confidence in their self-rated English speaking skills. The population was majority Puerto Rican born, with 55% indicating it as her country of origin.

Potential Predictors

From unadjusted comparisons presented in Table 3, factors that were significantly associated with inadequate follow-up in bivariate analyses were: BMI, self-rated health (SRH), and pain experienced during a mammogram. Bivariate analysis and a priori assumptions indicated that marital status, education, income, insurance status, acculturation, patient age, comorbidities, continuity of care, self-rated health, diabetes status, perceived control[1], depression, total follow-up time, and receiving a mammogram in the past year should be assessed in multivariate analysis. Following stepwise elimination, patient age and a control over outcome[1] index were added to the model. Table 4 presents the results of the multivariate model while controlling for the a priori predictors of marital status, education, insurance status, acculturation, comorbidities, receipt of mammogram in the past year, and continuity of care.

Final Model

In the final multivariate model, age, BMI, self-rated health, pain experienced during the mammogram, and perceived control over health outcomes were all independent predictors of inadequate follow up of an abnormal or inconclusive screening mammogram. Women under 50 were more likely to have inadequate follow-up compared to women over 50 (adjusted OR 3.12, 95% CI 1.31, 7.45), and obese women were significantly less likely than overweight/normal weight women to have inadequate follow-up (adjusted OR

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[1] The index was comprised of 3 separate indicators of patient attitudes towards their health and their abilities to address health issues as an individual

0.35, 95% CI 0.16, 0.77). Women with a poor perception of self-rated health were more likely to experience inadequate follow-up than women with a positive perception of self-rated health (adjusted OR 2.42, 95% CI 1.09, 5.34), and women who experienced pain during the mammography screening were more likely to experience inadequate follow-up than women who did not (adjusted OR 2.75, 95% CI 1.11, 6.82). Women who believed they had low control over their health outcomes were less likely to have inadequate follow-up (adjusted OR 0.25, 0.10, 0.68).

Interaction Testing

Additional testing of explanatory variables were added to the model in order to assess the strength of the identified predictors. Depression was tested as a potential mediator in the model, but it did not explain the increased risk associated with poor/self-rated health or mammography pain. Education was also tested as a mediator for self-rated health, mammography pain, and perception of control; all of these interactions were deemed insignificant. Interactions with the comorbidity variable – diabetes, high blood pressure, heart disease, and high cholesterol – were tested for subject BMI and self-rated health, and a modest potential interaction was observed between comorbidities and self-rated health (p=0.0579). Due to the relatively small sample size of the study, we lacked the statistical power to provide proper testing of interactions. However, stratified analysis between comorbidities and self-rated health indicated that the increased odds of inadequate follow-up only occurred amongst subjects with a poor self-rated health and multiple comorbidities (adjusted OR 2.50, 95% CI 0.90, 6.97). The multivariate model with stratified odds ratios for self-rated health by comorbidities are presented in Table 5.

Discussion

Considering the high risk of cancer mortality in Hispanic/Latino women, it is important to ensure that women who seek screening mammograms receive its benefits. Although only 12% of women required

follow-up for a screening exam that was either abnormal or inconclusive, almost a third (59, 31.2%) of Hispanic/Latinas did not receive appropriate follow–up tests in a timely manner. This reduces the potential health benefits of screening mammograms.

It is important to note that very few women (n=2) received a BI-RADS score of 3, which recommended short-term follow-up. This made it impossible to evaluate any differences in in follow-up based on short-term or immediate follow-up recommendations. This is a significant departure from scores in our previous study focusing on Black women in 2005, in which 11.9% of abnormal BI-RADS scores recommended short-term follow-up[6]. Whether or not this is indicative of racial/ethnic differences in BI-RADS classifications or a change in physician practices over time, it is difficult to say. Regardless, it merits further investigation.

The most robust finding of this study was the relationship between a woman's BMI and inadequate follow-up (p=0.005). With studies associating post-menopausal women with an increased risk of developing breast cancer[9-11], it is interesting to note that these women are also more likely to receive adequate follow-up for an abnormal mammogram. Even after adjustment for other comorbidities and continuity of care, this result persisted. As there was no significant difference in patient knowledge of breast cancer guidelines, this could imply an effort at the physician/hospital-level to follow-up with these patients in particular.

The perceived control index used for this study, which evaluated a subject's self-perception of her control over her health outcomes, could bolster the idea of additional physician/hospital-level support in women who are seen as higher risk by the health system (p=0.0067). The data suggest that lower perceived control resulted in a higher likelihood of adequate follow-up. This lower perception of control could imply deferment to the recommendations of physicians and the health system.

Initially, women who perceived themselves as less healthy were significantly less likely to receive adequate follow-up following an abnormal screening mammogram. However, this relationship disappeared following stratification by comorbidities. Although this relationship was not statistically significant at the

p<0.05 level, the stratification revealed distinct and opposing odds ratios for self-rated health. It is likely that in a larger population this relationship would be maintained or even strengthened. Regardless, the increased likelihood of inadequate follow-up was only present for individuals with a poor perception of their own health who possessed more than one comorbidity. The number of comorbidities was not as important as how a subject felt about her comorbidities, as women with a positive perception of their health with and multiple actually experienced a lower likelihood of inadequate follow-up. As with our past study in which we examined predictors of inadequate follow up for abnormal screening exams in African American and White women[6], pain experienced during the mammogram itself was 2.24 times (statistically significant) more likely to result in inadequate follow-up for the subject. As both of these predictors are unique to each individual patient experience, it would be beneficial to obtain qualitative research in a similar population to identify the motivations behind not following up.

Patient age was also a significant predictor of inadequate follow-up (p=0.0105), with younger subjects more likely to experience inadequate follow-up. Whether this indicates that subjects are less adept at navigating the system or if they are less prioritized by the healthcare system as 'young and healthy' – as most breast cancer screening recommendations begin at age 50[12] – is difficult to say.

With our hour long interviews, we collected in-depth information on a full range of sociodemographic data that are not generally available in most studies. As such, the findings here are not related to sociodemographic variability within the study population, as is usually the case in disparities research; common findings of a lack of screening knowledge, language barriers, no insurance, and logistical obstacles were not present in our population [18-20]. This could be explained by the prospective nature of our study, or that the ethnic composition of Hispanic/Latinos in the Northeast is not generalizable. A limitation of the study was the small final sample size of abnormal mammograms within the population. This made it difficult to test for interactions between key terms in the model, though stratified analysis allowed insight into potential differences between groups.

While inadequate follow-up of abnormal exams undermines the potential benefits of mammography screening for all women, the observed differences in this study may have implications for the persistent ethnic differences in breast cancer stage at diagnosis and survival. The key predictors of this model indicate both individual and system-level influences on the mammography screening effectiveness in Hispanic/Latino women, which opens the door for further research and intervention development based on these measures. In particular, qualitative research into understanding why subjects feel low levels of self-rated health or what aspect of receiving a mammography is painful would be very helpful in crafting future studies and interventions in this population. As the first prospective cohort study in this population focusing on inadequate follow-up of screening mammograms, these findings offer robust and unique conclusions that should be taken into consideration for future research and interventions within this population.

Tables and Figures

Table 1 - Follow-up recommendation categories by adequacy of follow-up of an abnormal or inconclusive mammogram (n=189)

BI-RADS[a] Category	Follow-Up Recommendation	Adequate Follow-Up		Inadequate Follow-Up[b]	
		N	%	N	%
Incomplete BI-RADS = 0 (An additional imaging evaluation is needed)	Immediate follow-up (n = 184)	128	69.6	56	30.4
Probably benign finding BI-RADSs = 3	Short-term follow-up[c] (n=2)	0	0.0	2	100.0
Suspicious abnormality or Highly suggestive of malignancy BI-RADS = 4,5	Immediate follow-up (n=3)	2	66.7	1	33.3
Total	189	130		59	

a Breast imaging reporting and data system (BI-RADS) [7]

b Inadequate follow-up is defined as failure to receive recommended follow-up tests/procedures within three months of the recommended return date

c Recommended to return for follow-up within 6 months

Table 2 - Population Characteristics of Hispanic/Latinas living in Connecticut, US, aged 40-75 from 2009-2012 (n=189)

	N[a]	%
Characteristic		
Sociodemographic		
Age (years)		
40-49	92	48.7
50+	97	51.3
Marital status		
Single	123	65.1
Married/Partnered	66	34.9
Education Level		
<12 years	95	50.8

≥12 years	92	49.2
Income		
<$10,000	89	49.4
≥$10,000	91	50.6
Employment		
No	133	70.4
Yes	56	29.6

Access to Care

Insurance Status		
No	40	21.3
Yes	148	78.7
Usual Care Provider		
No	25	13.4
Yes	162	86.6
Full mammogram coverage		
No	17	9.7
Yes	158	90.3

Biomedical Factors

Mammogram in Last Year		
No	56	30.0
Yes	131	70.0
Family History of Breast cancer[b]		
Yes	11	6.6
No	155	93.4
Self-rated Health		
Fair/Poor	102	54.5
Good/Very Good/Excellent	85	45.5

Body Mass Index[c]

Obese	92	50.3
Overweight/Normal Weight	91	49.7

Diabetes

Yes	59	31.5
No	128	68.5

Comorbidities[d]

2+	120	64.2
0-1	67	35.8

Painful mammography

A lot/fair amount	36	20.0
No/a little	144	80.0

Frequency of Depressive Feelings

Often	46	24.6
Moderate	115	61.5
Rarely	26	13.9

Psychosocial Factors

Perceived benefit

Somewhat/a little/not useful	16	8.5
Very useful	172	91.5

Control over recovery if diagnosed with cancer

Some/a little/none	91	48.9
A lot of control	95	51.1

Perceived susceptibility to breast cancer

Not at all	45	23.8
A little/somewhat/very	144	76.2

Perceived Control[e]

Low	47	25.8

Moderate/High	135	74.2

Logistical Barriers

Transportation[f]

Dependent	99	52.4
Independent	90	47.6

Special Arrangements[g]

Yes	42	22.3
No	146	77.7

Work Barriers[h]

Yes	30	16.0
No	158	84.0

Acculturation

Acculturation

≥10 years in U.S.	133	70.7
<10 years in U.S.	24	12.8
U.S. Born	31	16.5

Self-rated Spoken English

None/not well	140	82.8
Very well	29	17.2

Country of Origin

Foreign born	54	28.5
Puerto Rico Born	104	55.0
U.S. Born	31	16.5

a Numbers for each characteristic may not total to sums due to missing data

b Categorized as yes if a mother, sister or daughter developed breast cancer

c (weight (kg)/[height (m)]^2 ; < 30 (Overweight/Normal Weight) versus ≥30 (obese)

d Includes diabetes, heart disease, high blood pressure, and high cholesterol

e Index created from subject attitudes and perceptions of control over health outcomes

f Transportation to screening mammography appointment: dependent (relied on public transportation or another

driver) versus independent (walked/drove one's self)

g Special arrangements included any of the following: coordinating transportation, arranging childcare, or finding someone to accompany on appointment

h Work barriers included any of the following: took time off work, used personal time, or lost pay

Table 3 - Population Characteristics of Hispanic/Latinas living in Connecticut, US, aged 40-75 from 2009-2012 by adequacy of follow-up: unadjusted analyses (n=189)

Characteristic	Adequate Follow-Up				Odds Ratio[a]	95% CI[a]
	No		Yes			
	N= 59 (31.2%)		N= 130 (68.8%)			
	N[b]	%	N[b]	%		
Sociodemographic						
Age (years)						
40-49	33	34.0	64	66.0	1.31	0.71, 2.43
50+	26	28.3	66	71.7	1.00	
Marital status						
Single	40	32.5	83	67.5	1.19	0.62, 2.29
Married/Partnered	19	28.8	47	71.2	1.00	
Education Level						
<12 years	30	31.6	65	68.4	1.00	0.54, 1.86
≥12 years	29	31.5	63	68.5	1.00	
Income						
<$10,000	22	24.7	67	75.3	0.55	0.29, 1.05
≥$10,000	34	37.4	57	62.6	1.00	
Employment						
No	41	30.8	92	69.2	0.94	0.48, 1.84
Yes	18	32.1	38	67.9	1.00	
Access to Care						
Insurance Status						
No	16	40.0	24	60.0	1.63	0.79, 3.36
Yes	43	29.0	105	71.0	1.00	

Usual Care Provider						
No	11	44.0	14	56.0	1.87	0.79, 4.40
Yes	48	29.6	114	70.4	1.00	
Full mammogram coverage						
No	5	29.4	12	70.6	0.96	0.32, 2.86
Yes	48	30.4	110	69.6	1.00	

Biomedical Factors

Mammogram in Last Year						
No	16	28.6	40	71.4	0.82	0.41, 1.62
Yes	43	32.8	88	67.2	1.00	
Family History of breast cancer[c]						
Yes	3	27.3	8	72.7	0.77	0.20, 3.01
No	51	32.9	104	67.1	1.00	
Self-rated Health						
Fair/Poor	39	38.2	63	61.8	2.01	1.06, 3.82
Good/Very Good/Excellent	20	23.5	65	76.5	1.00	
Body Mass Index[d]						
Obese	21	22.8	71	77.2	0.43	0.23, 0.82
Overweight/Normal Weight	37	40.7	54	59.3	1.00	
Diabetes						
Yes	17	28.8	42	71.2	0.83	0.42, 1.63
No	42	32.8	86	67.2	1.00	
Comorbidities[e]						
2+	38	31.7	82	68.3	1.02	0.53, 1.93
0-1	21	31.3	46	68.7	1.00	

Frequency of Depressive Feelings						
Often	12	26.1	34	73.9	0.96	0.32, 2.84
Moderate	40	34.8	75	65.2	1.45	0.56, 3.74
Rarely	7	26.9	19	73.1	1.00	
Painful mammography						
A lot/fair amount	15	41.7	21	58.3	1.74	0.82, 3.69
No/a little	42	29.2	102	70.8	1.00	
Psychosocial Factors						
Perceived benefit						
Somewhat/a little/not useful	7	43.8	9	56.2	1.80	0.64, 5.08
Very useful	52	30.2	120	69.8	1.00	
Control over recovery if diagnosed with cancer						
Some/a little/none	27	29.7	64	70.3	0.83	0.45, 1.54
A lot of control	32	33.7	63	66.3	1.00	
Perceived susceptibility to breast cancer						
Not at all	14	31.1	31	68.9	0.99	0.48, 2.05
A little/somewhat/very	45	31.2	99	68.8	1.00	
Control Over Outcome[f]						
Low	10	21.3	37	78.7	0.51	0.23, 1.11
Moderate/High	47	34.8	88	65.2	1.00	
Logistical Barriers						
Transportation[g]						
Dependent	34	34.3	65	65.7	1.36	0.73, 2.53
Independent	25	27.8	65	72.2	1.00	
Special Arrangements						
Yes	16	38.1	26	61.9	1.47	0.72, 3.02
No	43	29.4	103	70.6	1.00	

Work Barriers[h]						
Yes	10	33.3	20	66.7	1.11	0.49, 2.55
No	49	31.0	109	69.0	1.00	
Acculturation						
Acculturation						
≥10 years in U.S.	41	30.8	92	69.2	1.09	0.46, 2.57
<10 years in U.S.	9	37.5	15	62.5	1.47	0.47, 4.56
U.S. Born	9	29.0	22	71.0	1.00	
Self-rated Spoken English						
None/not well	46	32.9	94	67.1	1.29	0.53, 3.12
Very well	8	27.6	21	72.4	1.00	
Country of Origin						
Foreign born	15	27.8	39	72.2	0.94	0.35, 2.50
Puerto Rico Born	35	33.7	69	66.3	1.24	0.52, 2.98
U.S. Born	9	29.0	22	71.0	1.00	

a Odds ratios and 95% Confidence intervals (CI) obtained from χ^2 tests

b Numbers for each characteristic may not total to sums due to missing data

c Categorized as yes if a mother, sister, or daughter developed breast cancer

d (weight (kg)/[height (m)]^2 ; < 30 (Overweight/Normal Weight) versus ≥30 (obese)

e Includes diabetes, heart disease, high blood pressure, and high cholesterol

f Index created from subject attitudes and perceptions of control over health outcomes

g Transportation to screening mammography appointment: dependent (relied on public transportation or another driver) versus independent (walked/drove one's self)

h Work barriers included any of the following: took time off work, used personal time, or lost pay

Table 4 – Predictors associated with inadequate follow-up after abnormal screening mammography, Multivariate Logistic Regression[a] (n=166)[b]

Variable	Odds Ratio	95% CI
Age (years)		
40-49	3.12	1.31, 7.45

|		
50+	1.00	
Body Mass Index		
Obese	0.35	0.16, 0.77
Overweight/Normal Weight	1.00	
Self-rated Health		
Fair/Poor	2.42	1.09, 5.34
Good/Very Good/Excellent	1.00	
Painful mammography		
A lot/fair amount	2.75	1.11, 6.82
No/a little	1.00	
Control Over Outcome[c]		
Low Control	0.25	0.10, 0.68
Moderate/High Control	1.00	

a Additionally adjusted for marital status, education, insurance status, acculturation, comorbidities, receipt of mammogram in the past year, and continuity of care

b 23 observations were lost due to missing values for the explanatory variables

c Index created from subject attitudes and perceptions of control over health outcomes

Table 5 – Predictors associated with inadequate follow-up after abnormal screening mammography, Multivariate Logistic Regression, with comorbidity modifiers[a](n=166)[v]

Variable	Odds Ratio	95% CI
Age (years)		
40-49	3.19	1.32, 7.70
50+	1.00	
Body Mass Index		
Obese	0.30	0.13, 0.68
Overweight/Normal Weight	1.00	
Self-rated Health		

Fair/Poor	2+[c]	2.50	0.90, 6.97
	0-1	0.95	0.27, 3.29
Good/Excellent	2+	0.54	0.15, 1.89
	0-1	1.00	
Painful mammography			
A lot/fair amount		2.55	1.01, 6.42
No/a little		1.00	
Control Over Outcome[d]			
Low Control		0.27	0.10, 0.73
Moderate/High Control		1.00	

a Additionally adjusted for marital status, education, insurance status, acculturation, comorbidities, receipt of mammogram in the past year, and continuity of care

b 23 observations were lost due to missing values for the explanatory variables

c Number of comorbidities present in subject

d Index created from subject attitudes and perceptions of control over health outcomes

Figure 1- Exclusion Criteria for Inadequate Follow-Up
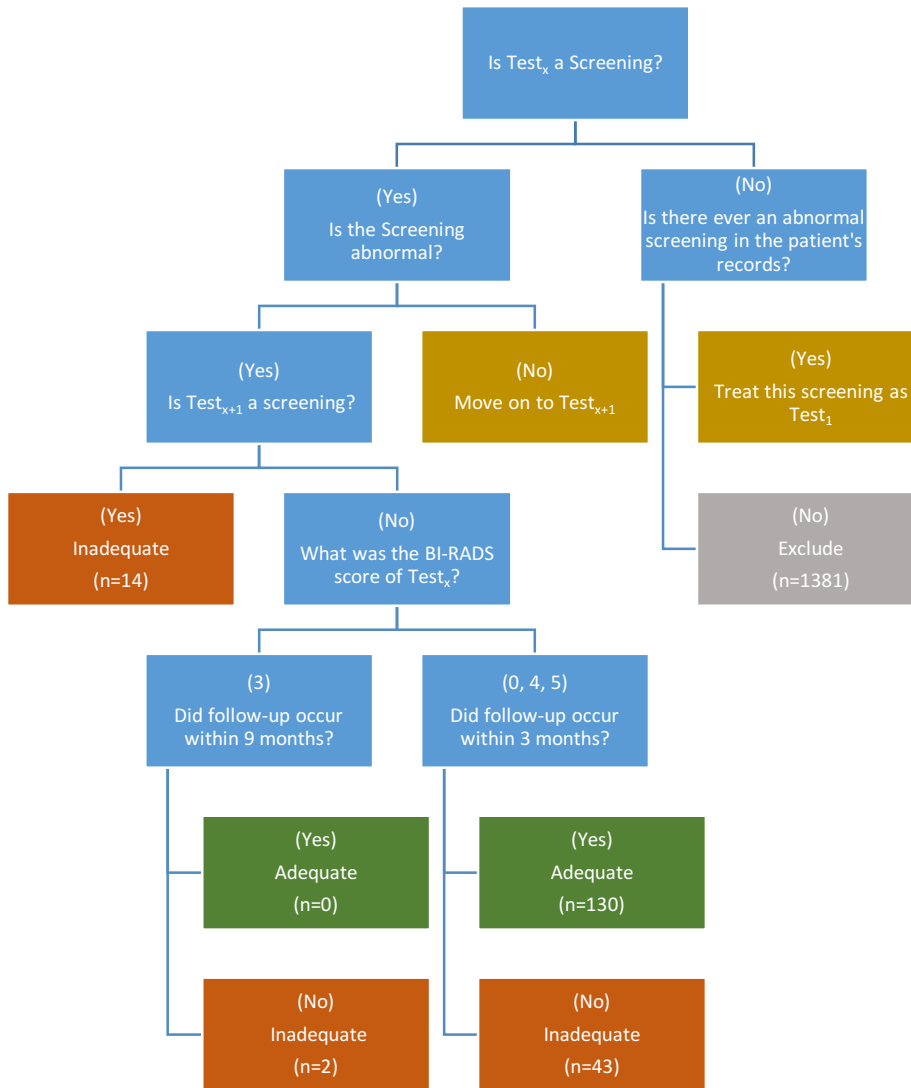
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