Original Article Open Access

Archives Of Breast Cancer

DOI: 10.32768/abc.202512123-30

# Previniendo el Cáncer de las Mamas: Addressing Breast Cancer Screening Disparities in Spanish-Preferred Populations

Brittany Strelow[a], Anne Carmean[b], Sofia Fuentes-Camacho[b], Abby Gilliland[b], Allison Moysis[b] Rhiannon Weston[b], Justine Herndon[b,c], Alan Brokenicky[b], Rachel Olson[d], Danielle O'Laughlin[a,b]

[a]*Division of Community Internal Medicine, Geriatrics, and Palliative Care, Mayo Clinic, Rochester, MN, USA*

[b]*Mayo Clinic Physician Assistant Program, Rochester, MN, USA*

[c]*Division of Endocrinology, Department of Medicine, Mayo Clinic, Rochester, MN, USA*

[d]*Center for Learning Innovation, University of Minnesota, Rochester, MN, USA*

ARTICLE INFO

**Received:**
15 August 2024
**Revised:**
30 November 2024
**Accepted:**
4 December 2024

**Keywords:**
Breast cancer screening, prevention, health literacy, Mammogram, Spanish, women's health

ABSTRACT

**Background**: Breast cancer is the leading cause of death among Hispanic/Latina women. Screening mammograms reduces morbidity and mortality, although Spanish-preferred patients face linguistic barriers, with 61% of patients in an Internal Medicine (IM) clinic being up to date on screenings. The study aimed to increase breast screening rates among Spanish-preferred IM patients by 12% within six weeks using culturally tailored Spanish-language educational materials.

**Methods**: Spanish-preferred patients were identified by language preference, age, and breast cancer screening status. Thirty-six women IM patients (intervention) and twenty-six Family Medicine (FM) patients (control) were selected. The IM patients received a link to a Spanish screening education video via an electronic portal message or mailed letter. If no screening was completed, patients were then called by a native Spanish speaker. FM patients received no intervention. Screening rates were compared to evaluate the efficacy of the video in increasing screening.

**Results**: Nine IM patients were excluded due to relocation or receiving care elsewhere. Post-intervention, screening adherence improved in both groups; the IM group improved by 25.9% (7 patients, $P = 0.007$) and 15.4% in the FM group (4 patients, $P = 0.04$). The change was significantly higher in the intervention group, $P < 0.001$.

**Conclusion**: Providing screening education in Spanish significantly improved adherence. Incorporating culturally tailored education in clinical practice mitigates language-related health disparities and improves screening rates. Further research is needed on a larger scale with education in other languages to determine the effects on screening rates when patients have education in their preferred language.



## INTRODUCTION

Mammography can detect cancer years before signs and symptoms become apparent, reducing the need for aggressive treatments, including mastectomy and chemotherapy.[1] Despite national prevention initiatives, which include strategies that target public awareness and access, breast cancer remains the second leading cause of death amongst women of all races and ethnicities.[1] Nearly a quarter (23%) of eligible women globally have never had a mammogram. Although breast cancer is most common in non-Hispanic black and white women, it is the leading cause of cancer death among Hispanic/Latina women, and invasive cancers occur

***Address for correspondence:**
Brittany Strelow, DMSc, MS, PA-C,
Division of Community Internal Medicine, Geriatrics, and Palliative Care, Mayo Clinic, Rochester, MN, USA
Email: strelow.brittany@mayo.edu

at younger ages compared to non-Hispanic white women.[2-4] Higher breast cancer mortality rates are, in part, related to breast cancer screening practices; Hispanic/Latina women are less likely to maintain breast cancer screening compliance.[4,5] Barriers and behaviors contributing to routine breast cancer screening non-adherence in Hispanic/Latina populations are complex; they are more likely to be underinsured, have limited transportation, experience higher rates of poverty, have lower health literacy, are less likely to have a primary care provider, and culturally may be hesitant to discuss breast cancer and engage in cancer fatalism.[3,5-7] These barriers increase the need for patient-centered care as culturally sensitive interventions are necessary in settings of cancer fatalism. A total of 19% of the United States (U.S.) population and 44% of the U.S. immigrant population identify as Hispanic/Latinx, so it is imperative to reduce barriers and access to preventative care screenings.[8]

Although Spanish is the second most common language in the U.S., Spanish patient education materials – written and spoken – are lacking. Individuals who prefer to speak and/or read Spanish, especially those with limited English proficiency, may experience these linguistic barriers when seeking preventative care.[3] As a result, Spanish-speaking populations—regardless of race/ethnicity—are less likely to pursue routine mammography, possibly due to an insufficient understanding of breast cancer screening guidelines.[5,9] To address these barriers, crucial interventions such as developing diverse, accessible online patient education materials (OPEMs) are needed.[7,10,11] Documented benefits of OPEMs include increased patient knowledge and positive behavioral changes, resulting in better health outcomes.[7,10,11] Theoretical frameworks for developing OPEMs also stem beyond appropriate readability but include imagery or video education to improve understanding and retention of the presented materials.[12-14] However, most OPEMs are in the English language and many English and Spanish-language OPEMs are not at a recommended readability level.[15-17] Currently, there is a lack of literature on the efficacy of reducing healthcare disparities regarding preventative care screenings using Spanish-language OPEMs developed explicitly in a readable, multimedia format. This study is among the first to assess the effectiveness of culturally and linguistically tailored multimedia OPEMs in reducing breast cancer screening disparities in Spanish-preferred populations. Within the IM department, there was an 85.95% mammogram compliance rate in female patients aged 50-74, which met the academic institution screening and the Minnesota Community Measure goals of 81% and 83.3%.[18] However, despite meeting these overall goals, the IM department had only a 63% breast cancer screening compliance rate among Spanish-preferred patients aged 50-74. As the compliance (as defined by the USPSTF) for breast cancer screening within an IM clinic was lower in Spanish-preferred patients (63% compared to 85.95% overall), the primary aim of our study was to develop a multimedia, Spanish-language OPEM at an appropriate comprehensive level to determine its impact on increasing breast cancer screening compliance.[19] The secondary aims of the study were to 1) compare changes in compliance to a control group (Spanish-preferred patients in a FM clinic) who did not receive the intervention and 2) determine if there were factors that indicated possible non-compliance with breast cancer screenings.

## METHODS

*Study Design: Quasi-experimental study*

A quasi-experimental two-group pretest-posttest design was used to determine the outcome before and after the intervention at a single institution. This design was selected to establish a possible link between cause and effect, specifically, whether the OPEM given as a quality improvement measure to the intervention group increased compliance more than the control group.[20] While group randomization was not feasible, as the groups were defined by their practice setting (IM and FM) leading to a limitation in the study design, the groups were assessed for baseline characteristic similarities to avoid potential biases from the intervention. This study was deemed exempt from the Mayo Clinic Institutional Review Board because it pertained to quality improvement. Results are reported in accordance with the Standards for Quality Improvement Reporting Excellence (SQUIRE) guidelines.

*Participants*

Participants were selected from a pool of IM and FM patients receiving care at the same academic medical center with similar patient demographics (race, ethnicity, and age). Inclusion criteria included self-reported Spanish-language preference as documented in the patient's electronic medical record (EMR) and screening non-compliance as defined per the 2023 USPSTF breast cancer screening guidelines.[19] Exclusion criteria included individuals under age 50 and over age 75 (as breast cancer screening in these age groups is not reportable according to Minnesota Community Measures quality reporting guidelines), those with screening compliance, those seeking healthcare elsewhere due to possible missing data, inability to provide follow-up care, and the inability to distribute institutional internal-only use OPEM.

A total of 99 patients from IM and 54 patients from FM met the inclusion criteria. The final sample of those non-compliant with screening included 36 patients (36.4%) from IM and 26 patients (48.1%) from FM. Power analysis was not completed, considering that the study intervention being performed at a single institution would likely not meet statistical power, and the goal was to provide the intervention to all non-compliant IM patients regardless of the final sample size.

*Intervention*

*OPEM Development*

A video-recorded presentation with Spanish voiceover OPEM was created to educate patients regarding breast cancer screening guidelines and highlight the importance of early intervention. The voiceover script, based on a previously developed English breast cancer screening patient education material, was developed and translated by the Mayo Clinic Patient Education Services. The script's contents included the purpose and process of a mammogram and highlighted the importance of early detection. The script was written at a 5th-grade U.S. Spanish reading level to ensure readability and educational inclusivity, which the Patient Education Services specialists verify. To ensure cultural inclusivity, the script was reviewed and edited by Patient Education, Translation Services, and several native Spanish-speaking individuals and contained diverse imagery. Subtitles for the video were also reviewed and edited by several Spanish-speaking individuals. The video created was a total of 3 minutes and 5 seconds.

*Distribution of the OPEM to IM Patients*

The intervention was implemented between January and May 2024. The video was first distributed as a QR code and website link for patients to access through their online patient portal system or mailed letter (depending on their communication preference) with a standard message, written in both Spanish and English, explaining that the patient was due for a mammogram, how to access the QR code and link, and encouraging them to schedule their mammogram. Two weeks after initial patient contact, all patients who received the online patient portal message and did not complete screening were also sent a physical letter. If an appointment for a mammogram was not scheduled within two weeks, a phone call in Spanish was made during normal business hours (around 10 am). Patients who expressed interest in scheduling a mammogram were connected to scheduling services. Those who did not answer the phone were left a voicemail in Spanish and were called again about four days later during normal business hours (at 6 pm).

*Quality Improvement Goal*

Our goal was to improve the breast cancer screening non-compliance rate in IM patients by 12% (4 patients) within six weeks of the intervention. Breast cancer compliance rates after the intervention were compared to the control (FM) patients.

*Data Collection*

EMR data collection of study patients involved demographic characteristics of self-reported race/ethnicity, age, preferred language, insurance type, primary care provider gender, and previous breast cancer screening history/compliance. Data was collected by study authors AC, SF, AG, AM, and RW, trained by the primary author BS. Quality was reviewed by data-checking selected patients and identifying discrepancies, which were later adjusted by authors JH, DO, and BS. Further statistical assessment of inter-rater reliability was not completed.

*Data Analysis*

Descriptive statistics are presented as median [range] for continuous variables and number (percentage) for categorical variables. A comparison analysis of demographic variables between the intervention and control groups pre- and post-intervention was performed using the Mann-U-Whitney test for continuous variables and the Chi-Square or Fisher's Exact Test for categorical variables. Effect sizes calculated were point-biserial for Mann-Whitney-U and Cramer's V for Chi-Square.[21,22] Comparison of compliance pre- vs. post-intervention was completed with a paired t-test, reported as mean change [95% CI], with an effect size of Cohen's d.[23] Regression analyses were to be performed if there were statistically significant differences in demographics between the groups to account for those differences. Logistic regression analysis was also to be performed if there was a significant difference between the groups in the compliance pre-vs post-intervention. P values $\leq 0.05$ were considered statistically significant. Most statistical analyses were conducted using BlueSky Statistics v 10.3.1 (Chicago, IL, USA), with effect sizes for the non-parametric tests analyzed using Intellectus Statistics (Palm Harbor, FL, USA).

## RESULTS

*IM and FM Group Characteristics*

Of the 36 Spanish-preferred IM patients identified for the study, 9 (25%) were found to no longer receive care at the institution or had relocated and were excluded from the study, leaving a final intervention sample of 27 patients out of 90 (non-compliance rate 30%). The control group, FM, remained at 26

Spanish-preferred patients. The age, race, ethnicity, primary care provider gender, health insurance, and prior history of mammography were statistically similar between the groups (Table 1). Effect sizes were generally small, except for a moderate association for self-reported race and ethnicity.

**Table 1.** Baseline Patient Demographic Comparison, Spanish-Preferred Patients Non-Compliant with Breast Cancer Screening

| Variable | Clinic | | P-Value | Effect Size |
|---|---|---|---|---|
| | IM (n = 27) | FM (n = 26) | | |
| Age, years | 59 [50-74] | 59.5 [50-72] | 0.98 | -0.02 |
| Self-Reported Race | Black: 1 (3.7%)<br>Other: 10 (37.0%)<br>White: 10 (37.0%)<br>Not Disclosed: 6 (22.2%) | Black: 0 (0%)<br>Other: 8 (30.8%)<br>White: 14 (53.8%)<br>Not Disclosed: 4 (15.4%) | 0.56 | 0.21 |
| Self-Reported Ethnicity | Central American: 0 (0%)<br>Hispanic/Latino: 20 (74.1%)<br>Mexican: 2 (7.4%)<br>Not Hispanic/Latino: 2 (7.4%)<br>Puerto Rican: 1 (3.7%)<br>South American: 1 (3.7%)<br>Spanish Culture of Origin: 1 (2.7%)<br>Not Disclosed: 0 (0%) | Central American: 2 (7.7%)<br>Hispanic/Latino: 14 (53.8%)<br>Mexican: 6 (23.1%)<br>Not Hispanic/Latino: 2 (7.7%)<br>Puerto Rican: 0 (0%)<br>South American: 0 (0%)<br>Spanish Culture of Origin: 1 (3.8%)<br>Not Disclosed: 1 (3.8%) | 0.20 | 0.48 |
| Primary Care Provider Gender | Female: 16 (59.3%)<br>Male: 11 (40.7%) | Female: 16 (61.5%)<br>Male: 10 (38.5%) | 0.99 | 0.05 |
| Health Insurance | Yes: 22 (81.5%)<br>No: 5 (18.5%) | Yes: 21 (80.8%)<br>No: 5 (19.2%) | 0.99 | 0.03 |
| Health Insurance Type[1] | None: 5 (18.5%)<br>Government: 13 (48.1%)<br>Private: 9 (33.3%) | None: 5 (19.2%)<br>Government: 12 (46.2%)<br>Private: 9 (34.6%) | 0.99 | 0.02 |
| Prior history of mammogram | Yes: 14 (51.9%)<br>No: 9 (33.3%)<br>Unknown: 4 (14.8%) | Yes: 11 (42.3%)<br>No: 9 (34.6%)<br>Unknown: 6 (23.1%) | 0.76 | 0.05 |
| Patients who received intervention | 27 (100%) | 0 (0%) | n/a | n/a |

Data is presented as n (%) for categorical variables and median [range] for continuous variables.
[1]Patients who have government insurance are those with Medicare or Medicaid.
[2]Effect size is calculated as Cramer's V for categorical variables and point biserial for continuous variables.

*Intervention*

Due to the exclusion of 9 patients in the study group during data collection, the new quality improvement goal metric was to improve the non-compliance rate in IM by three patients to maintain the increase in compliance by 11%.

As a result of the intervention, seven (25.9%) IM patients scheduled and completed their mammograms, increasing breast cancer screening adherence, a statistically significant improvement, to 77.8% (mean difference 7.8 [95% CI 2.1, 13.4], P = 0.007, Cohen's d = 0.29), or a 23% increase (Figure 1). When compared to the control group (FM), four (15.4%) patients scheduled and completed their mammograms, which increased screening adherence to 32 patients, a statistically significant improvement to 59.3% (mean difference 7.4 [95% CI 0.2, 14.6], P = 0.04, Cohen's d = 0.28), or a 13% increase (Figure 1). The difference between the groups showed that the IM group had a significantly higher increase in compliance ($X^2_{df(1)}$= 33.43, P < 0.001), Figure 1. However, logistical regression analysis showed a non-significant higher odds of IM patients being more likely to become compliant (OR 2.2 [95% CI 0.6, 9.4], P = 0.25).

In analyzing factors associated with compliance vs non-compliance, all factors (age, primary care provider gender, health insurance, and prior mammogram history) within each subgroup and between the groups were non-significant (Table 2).

**Table 2.** Factors Associated with Compliance vs Non-Compliance with Mammography Post-Intervention

| Variable | IM Clinic | | | | FM Clinic | | | | IM vs FM, Compliant | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Compliant (n = 7) | Non-Compliant (n = 20) | *P* | *ES*[2] | Compliant (n = 4) | Non-Compliant (n = 22) | *P* | *ES*[2] | *P* | *ES*[2] |
| Age, years | 60 [50-71] | 59 [50-74] | 0.82 | -0.10 | 54.5 [52-59] | 61.5 [50-72] | 0.21 | 0.29 | 0.40 | -0.37 |
| Primary Care Provider Gender | Female: 3 (42.9%)<br>Male: 4 (57.1%) | Female: 13 (65.0%)<br>Male: 7 (35.0%) | 0.39 | 0.12 | Female: 3 (75.0%)<br>Male: 1 (25.0%) | Female: 14 (63.6%)<br>Male: 8 (36.4%) | 0.99 | 0.10 | 0.58 | 0.24 |
| Health Insurance (yes vs no) | Yes: 6 (85.7%)<br>No: 1 (14.3%) | Yes: 16 (80.0%)<br>No: 4 (20.0%) | 0.99 | 0.11 | Yes: 3 (75.0%)<br>No: 1 (25.0%) | Yes: 18 (81.8%)<br>No: 4 (18.2%) | 0.99 | 0.04 | 0.99 | 0.00 |
| Health Insurance Type[1] | None: 1(14.3%)<br>Government: 3 (42.9%)<br>Private: 3 (42.9%) | None: 4 (20.0%)<br>Government: 10 (50.0%)<br>Private: 6 (30.0%) | 0.86 | 0.15 | None: 1 (25.0%)<br>Government: 2 (50.0%)<br>Private: 1 (25.0%) | None: 4 (18.2%)<br>Government: 10 (45.5%)<br>Private: 8 (36.4%) | 0.99 | 0.09 | 0.99 | 0.14 |
| Prior history of mammogram | Yes: 5 (71.4%)<br>No: 0 (0%)<br>Unknown: 2 (28.6%) | Yes: 9 (45.0%)<br>No: 9 (45.0%)<br>Unknown: 2 (10.0%) | 0.12 | 0.39 | Yes: 2 (50.0%)<br>No: 1 (25.0%)<br>Unknown: 1 (25.0%) | Yes: 9 (40.9%)<br>No: 8 (36.4%)<br>Unknown: 5 (22.7%) | 0.99 | 0.09 | 0.38 | 0.40 |

Data is presented as n (%) for categorical variables and median [range] for continuous variables.
[1]Patients who have government insurance are those with Medicare or Medicaid.
[2]Effect size (ES) is calculated as Cramer's V for categorical variables and point biserial for continuous variables.

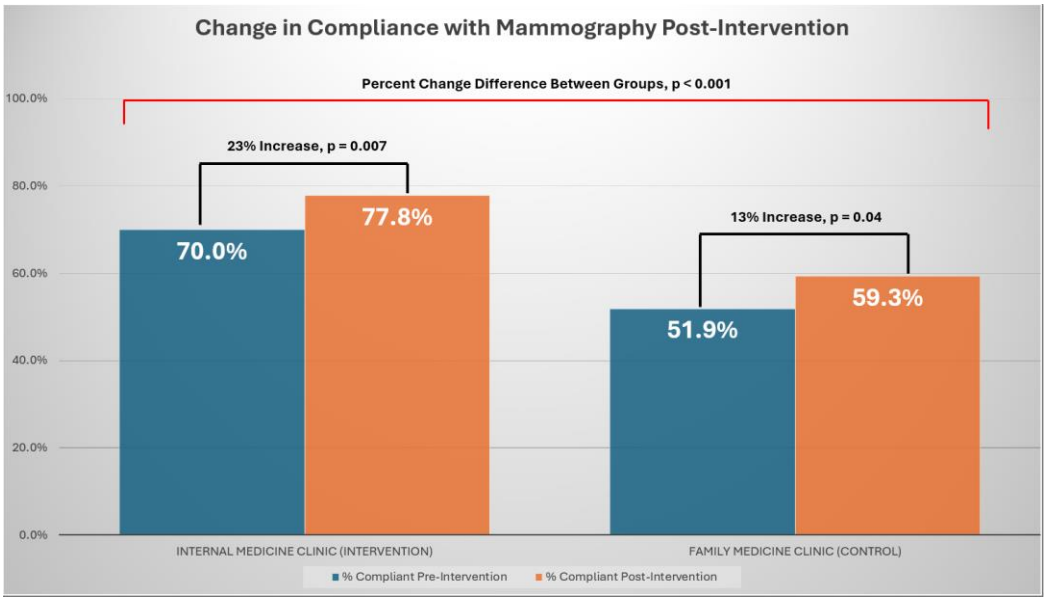


**Figure 1.** Impact of intervention – a comparison of the Center for Individualized Medicine overdue intervention group (IM OD) and the Family Medicine overdue control group (FM OD). IM OD n=36, FM OD n=24.

Effect sizes were again mostly small, with a moderate association for certain age and prior mammogram analyses, comparison of IM vs CIM compliant – provider gender. As no comparisons were statistically significant, regression analysis to correct for these factors was not completed.

## DISCUSSION

Breast cancer screening adherence after the implementation of a multimedia OPEM developed for the Spanish-preferred population significantly increased screening adherence by 23%, from 70% to 77.8% compliance in the intervention (IM) group, which superseded the goal to improve compliance by 11% and was a significantly greater change than the control group. While this did not show a significant odds ratio regarding increasing compliance on regression analysis, we highlight a positive trend in increasing compliance through the developed OPEM that warrants a larger-scale investigation.

Prior studies aiming to increase mammogram compliance in Spanish-preferred women have also created OPEMs. The creation of OPEMs has led to easy and convenient health education, improved patient knowledge, increased positive behavioral changes, and better health outcomes.[7,10,11] Our study demonstrated how multimedia presentations can mitigate language barriers for patients with a preferred language other than English. These findings stress the need for multimedia education in multiple languages for all preventative screenings. Talham *et al.* argued that interventions for preventative screening need to be culturally and linguistically appropriate.[3] By decreasing language barriers, patients are more apt to receive preventative services. Multimedia education increases person-centered care by providing patients with culturally sensitive and comprehensible information.[7,11]

Similar themes of decreased rates of breast cancer screening in patients with no insurance are demonstrated in the literature. A 2020 publication found that patients with Medicare/no insurance were more likely to get a diagnosis of locally advanced breast cancer than those who have insurance.[24] Similarly, other studies have found that older patients are more likely to get a mammogram than those younger.[25,26] Screening rates increased specifically when the patient had an in-person conversation with healthcare professionals about the procedure.[26,27] We hypothesize that an in-person appointment could explain our significant increase in our FM control group, or simply that patients sought screening over the study time period. Our findings of increased screening rates in patients who use the EHR are also supported by similar research reporting that the use of EHR leads to decreasing breast cancer screening disparities.[28] Patients in this study still received standard communication workflow for the practice in English for both IM and FM which could account for some of the increase in compliance. Our study results indicated that patients with male physicians have a higher breast cancer screening rate, which is not supported in the literature.[29] Recent literature on the Latina population reflects that women with female providers are more likely to be up to date with breast cancer screenings.[29,30]

These findings suggest that further research with a larger sample is needed to explore this relationship. Future studies should focus on expanding sample sizes, incorporating other languages, and utilizing different healthcare settings to enhance generalizability.

### *Strengths and Limitations*

The strengths of this study included creating and implementing a quick, cost-effective multimedia production OPEM for Spanish-preferred patients. The limitations include that this occurred at only one institution, where the groups were non-randomized, which can introduce bias or differences in the samples despite no statistical significance, and a lack of IM Spanish-preferred patients who used the online EMR for communication. Additionally, Hispanic/Latina patients with no Spanish-language preference were excluded, which may have altered the findings. However, they continued to receive English education as part of the usual workflow. Future research, including longer follow-up time and surveys sent to patients assessing what motivated them to schedule a mammogram, could further determine the effectiveness of the multimedia education presentation in increasing screening rates. While attrition posed threats to internal validity, no external validity issues were identified. Measures like representative sampling, control groups, and standardized procedures were implemented to enhance validity. Future studies over a longer time, across multiple medical institutions, and in a younger, more tech-savvy population could reveal more data on the strengths and limitations of this intervention.

### *Research Impact and Areas for Improvement*

Future areas of improvement include implementing multimedia presentations in primary care visits or as text messages sent to the participants. Playing the OPEM during a visit or sending it as a text message would mitigate the need to access the video via QR or EMR messages and allow the patient to ask questions in real time or see the OPEM without logging into the EMR. Messaging patients in their preferred language, in both IM and FM, could also decrease the language barriers in medicine.

## CONCLUSION

In our study, only 61% of Spanish-preferred patients were up to date with breast cancer screening, while the targeted patient demographic compliance was 85.95%. These statistics demonstrate the impact of the language barrier on healthcare practices. Post-intervention non-adherence in IM Spanish-preferred patients decreased by 25%, which showed the effectiveness of OPEMs in reducing language barriers. Future studies that involve more significant numbers of patients, other languages, and a variety of topics could help determine the scope of benefits that OPEMs may offer in advancing care for non-English speaking patients. In our study, OPEMs provided a quick, cost-effective solution to help close the gap in language barriers, which could easily be reproduced in other healthcare settings.

## ACKNOWLEDGEMENTS

The authors want to recognize Angie Bicknese and Omega Jacobson, who significantly contributed to the success of this project.

## CONFLICT OF INTEREST

None declared.

## ETHICAL CONSIDERATIONS

This was a Quality Improvement project carried out by Internal Medicine, which was approved by the institution's leadership. This study involved human participants and was a pilot for a quality improvement project; therefore, the ethics committee exempted our study.

## FUNDING

The authors have not received a specific grant for this research from any funding agency in the public, commercial, or not-for-profit sectors.

## DATA AVAILABILITY

All data relevant to the study are included in the article or uploaded as online supplemental information.

## REFERENCES

1. Society AC. Breast cancer facts and figures. Accessed January 30, 2024. Available from: http://www.cancer.org/downloads/STT/CAFF2005BrF.pdf.
2. Hendrick RE, Monticciolo DL, Biggs KW, Malak SF. Age distributions of breast cancer diagnosis and mortality by race and ethnicity in US women. *Cancer*. Dec 1 2021;127(23):4384-4392. doi:10.1002/cncr.33846.
3. Talham CJ, Montiel Ishino FA, O'Brien KM, Sandler DP, Williams F. Breast cancer screening among Hispanic and non-Hispanic White women by birthplace in the Sister Study. *Cancer Med*. Apr 2022;11(8):1913-1922. doi:10.1002/cam4.4563.
4. Stapleton SM, Oseni TO, Bababekov YJ, Hung YC, Chang DC. Race/Ethnicity and Age Distribution of Breast Cancer Diagnosis in the United States. *JAMA Surg*. Jun 1 2018;153(6):594-595. doi:10.1001/jamasurg.2018.0035.
5. Cataneo JL, Meidl H, Ore AS, Raicu A, Schwarzova K, Cruz CG. The Impact of Limited Language Proficiency in Screening for Breast Cancer. *Clin Breast Cancer*. Feb 2023;23(2):181-188. doi:10.1016/j.clbc.2022.11.008.
6. Moreno PI, Yanez B, Schuetz SJ, et al. Cancer fatalism and adherence to national cancer screening guidelines: Results from the Hispanic Community Health Study/Study of Latinos (HCHS/SOL). *Cancer Epidemiol*. Jun 2019;60:39-45. doi:10.1016/j.canep.2019.03.003.
7. Villa Camacho JC, Pena MA, Flores EJ, et al. Addressing Linguistic Barriers to Care: Evaluation of Breast Cancer Online Patient Educational Materials for Spanish-Speaking Patients. *J Am Coll Radiol*. Jul 2021;18(7):919-926. doi:10.1016/j.jacr.2021.02.001.
8. Institude MP. Frequently Requested Statistics on Immigrants and Immigration in the United States. Migration Policy Institude. Accessed January 30, 2024. http://www.migrationpolicy.ord/article/frequently-requested-statistics-immigrants-and-immigration-united-states#:~:text=Of%2062.5%20million%20people,42.6%20million)%20were%20native%20born.
9. Li Y, Carlson E, Hernandez DA, et al. Patient Perception and Cost-Effectiveness of a Patient Navigation Program to Improve Breast Cancer Screening for Hispanic Women. *Health Equity*. 2019;3(1):280-286. doi:10.1089/heq.2018.0089.
10. Schnitman G, Wang T, Kundu S, et al. The role of digital patient education in maternal health: A systematic review. *Patient Educ Couns*. Mar 2022;105(3):586-593. doi:10.1016/j.pec.2021.06.019.
11. Lamb LR, Baird GL, Roy IT, Choi PHS, Lehman CD, Miles RC. Are English-language online patient education materials related to breast cancer risk assessment understandable, readable, and actionable? *Breast*. Feb 2022;61:29-34. doi:10.1016/j.breast.2021.11.012.
12. Monteiro Grilo A, Ferreira AC, Pedro Ramos M, Carolino E, Filipa Pires A, Vieira L. Effectiveness of educational videos on patient's preparation for diagnostic procedures: Systematic review and Meta-Analysis. *Prev Med Rep*. Aug 2022;28:101895. doi:10.1016/j.pmedr.2022.101895.
13. Houts PS, Doak CC, Doak LG, Loscalzo MJ. The role of pictures in improving health communication: a

review of research on attention, comprehension, recall, and adherence. *Patient Educ Couns*. May 2006;61(2):173-90. doi:10.1016/j.pec.2005.05.004.
14. Goolsby RS, Mark. A Theoretical Approach to Improving Patient Education through Written Materials. *Annals of Behavioral Science and Medical Education*. 2013;19:14-18. doi:10.1007/BF03355232.
15. Aponte J, Tejada K, Figueroa K. Readability Level of Spanish Language Online Health Information: A Systematic Review. *Hisp Health Care Int*. Oct 3 2024:15404153241286720. doi:10.1177/15404153241286720.
16. Hernandez Alvarez A, Escobar-Domingo MJ, Lee D, et al. Beyond the language barrier: Assessing health literacy of Spanish breast cancer surgery resources. *Surgery*. Oct 2024;176(4):1029-1035. doi:10.1016/j.surg.2024.06.025.
17. Gu JZ, Baird GL, Escamilla Guevara A, et al. A systematic review and meta-analysis of English language online patient education materials in breast cancer: Is readability the only story? *Breast*. Jun 2024;75:103722. doi:10.1016/j.breast.2024.103722.
18. Measurement MC. *Minnesota Health Care Quality Report: Part 2: Clinical Quality Measures Reported by Payers*. 2023. https://mncmsecure.org/website/Reports/Community%20Reports/Health%20Care%20Quality%20Report/2022%20MY%20HCQR%20Chartbook%20Pt%202%20-%20FINAL.pdf.
19. Taskforce USPS. Breast Cancer: Screening. Accessed April 30, 2024. https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/breast-cancer-screening.
20. Siedlecki SL. Quasi-Experimental Research Designs. *Clin Nurse Spec*. Sep/Oct 2020;34(5):198-202. doi:10.1097/NUR.0000000000000540.
21. Bonett DG. Point-biserial correlation: Interval estimation, hypothesis testing, meta-analysis, and sample size determination. *Br J Math Stat Psychol*. Nov 2020;73 Suppl 1:113-144. doi:10.1111/bmsp.12189.
22. McHugh ML. The chi-square test of independence. *Biochem Med (Zagreb)*. 2013;23(2):143-9. doi:10.11613/bm.2013.018.
23. Cohen J. *Statistical Power Analysis for the Behavioral Sciences*. 2nd ed. Routledge; 1988.
24. Ko NY, Hong S, Winn RA, Calip GS. Association of Insurance Status and Racial Disparities With the Detection of Early-Stage Breast Cancer. *JAMA Oncol*. Mar 1 2020;6(3):385-392. doi:10.1001/jamaoncol.2019.5672.
25. Ferreira CS, Rodrigues J, Moreira S, Ribeiro F, Longatto-Filho A. Breast cancer screening adherence rates and barriers of implementation in ethnic, cultural and religious minorities: A systematic review. *Mol Clin Oncol*. Jul 2021;15(1):139. doi:10.3892/mco.2021.2301.
26. Gathirua-Mwangi W, Cohee A, Tarver WL, et al. Factors Associated with Adherence to Mammography Screening Among Insured Women Differ by Income Levels. *Womens Health Issues*. Sep-Oct 2018;28(5):462-469. doi:10.1016/j.whi.2018.06.001.
27. Zafar N, Wolf AB, Kepniss JL, Teal AC, Brem RF. Effectiveness of Community Education for Breast Cancer Screening. *J Breast Imaging*. Apr 1 2024;6(2):166-174. doi:10.1093/jbi/wbae002.
28. Bayard S, Fasano G, Tamimi RM, Oh PS. Leveraging Electronic Health Records to Address Breast Cancer Disparities. *Curr Breast Cancer Rep*. 2022;14(4):199-204. doi:10.1007/s12609-022-00457-z.
29. Lurie N, Margolis KL, McGovern PG, Mink PJ, Slater JS. Why do patients of female physicians have higher rates of breast and cervical cancer screening? *J Gen Intern Med*. Jan 1997;12(1):34-43. doi:10.1046/j.1525-1497.1997.12102.x.
30. Mendoza-Grey S, Ramos-Muniz J, Armbrister AN, Abraido-Lanza AF. Mammography Screening Among Latinas: Does Gender and Ethnic Patient-Physician Concordance Matter? *J Immigr Minor Health*. Oct 2021;23(5):986-992. doi:10.1007/s10903-021-01170-2.

**How to Cite This Article**

**Strelow B, Carmean A, Fuentes-Camacho S, Gilliland A, Moysis A, Weston R, et al. Previniendo el Cáncer de las Mamas: Addressing Breast Cancer Screening Disparities in Spanish-Preferred Populations. Arch Breast Cancer. 2025; 12(1):23-30.**
Available from: https://www.archbreastcancer.com/index.php/abc/article/view/989