Can Language-Concordant Prevention Care Managers Improve Cancer Screening Rates?

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Abstract

Objective: There is evidence that non-English speakers in the United States receive lower quality health care and preventive services than English speakers. We tested the hypothesis that Spanish-speaking women would respond differently to an intervention to increase up-to-date status for cancer screening. Study Design and Setting: A multisite randomized controlled trial showed that scripted telephone support, provided by a Prevention Care Manager (PCM), increased up-to-date rates for breast, cervical, and colorectal cancer screening. This subgroup analysis investigated the relative efficacy of the PCM among women who chose to communicate with the PCM in Spanish versus English. Results: Of 1,346 women in this analysis, 63% were Spanish speakers. Whereas the PCM intervention increased cancer screening rates generally, Spanish-speaking women seemed to benefit disproportionately more than English-speaking women for cervical cancer screening (unadjusted odds ratio, 1.77; 95% confidence interval, 1.03-3.05). In addition, in this exploratory analysis, there was a trend toward Spanish-speaking women receiving more benefit than English-speaking women from the intervention in increased breast and colorectal cancer screening rates. Conclusion: Spanish-speaking women seemed to benefit more than did English-speaking women from a bilingual telephone support intervention aimed at increasing cancer screening rates. (Cancer Epidemiol Biomarkers Prev 2007;16(10):2058–64)

Introduction

The persistence and pervasiveness of health disparities by ethnicity, race, gender, and socioeconomic status are well recognized. Explanations for disparities include systematic differences in access to health care (1-5), differing cultural attitudes about health or health care (6, 7), distrust in the health care system or providers (8-10), biases in providers’ willingness to recommend services for some groups (11-13), systematic receipt of poorer quality of care for some groups (3, 5), and a lack of concordance between the language of providers and patients, resulting in poorer communication and health management for “disruptant” patients (14-17).

There is also a growing recognition of the need to consider more multifaceted and complex relationships among these variables (18-25). Simplistic solutions, such as improving access through insurance alone (26, 27), improving concordance between provider and patient language or ethnicity (28), or improving cultural sensitivity of providers (8, 29), only seem to modestly eliminate disparities. Simplistic models of causality also do little to advance policy (e.g., deliberate biases in provision of care do not seem to be the principal explanation for disparities; refs. 18, 30). Finally, others have questioned whether disparities are necessarily “wrong” (e.g., proponents of patient-centered care argue that some differences may reflect informed patient preferences, and therefore are not “unwarranted discrepancies” to be eliminated; refs. 31, 32).

One important barrier to seeking care is a patient’s inability to communicate effectively with a provider. In the 2000 U.S. census, 18% of the total population ages ≥5 years (47 million people) reported they spoke a language other than English at home. This does not imply that they cannot communicate in English: just more than half of the 28.1 million Spanish speakers in this census data spoke English “very well” and an additional 20.7% spoke English “well” (33). Thus, whereas Spanish as a preferred language may indicate a communication barrier, it is not necessarily an insurmountable one.

Nonetheless, there is evidence that language matters. Seijo et al. (34) found that non-English-speaking patients had better recall and asked more questions during visits to bilingual physicians. Marks et al. (35) and Hampers et al. (16) found evidence that non-English speakers may receive more “straightforward” tests or services, perhaps because these do not require complex decision-making or communication with patients. Jacobs et al. reported that whereas Latina women who only spoke Spanish were not less likely to receive breast cancer screening, they
were less likely to receive a Pap test. Echoing Marks and Hampers, they suggest that Pap tests may require more direct patient-provider communication than mammography (28). Woloshin et al. (36) found that Canadian women who did not speak English at home were less likely to receive preventive screenings than their English-speaking counterparts, whereas Bell et al. (37) found that offering advice and information in a patient’s preferred language was important to the success of an educational intervention.

This study examines language as one potentially key factor in cancer screening disparities. We carried out secondary analyses of data from a randomized clinical trial that aimed to increase breast, cervical, and colorectal cancer screenings, all services where significant disparities among women both by socioeconomic status and ethnicity have been reported (38–45). The randomized clinical trial tested whether the PCM intervention, which provided language-appropriate telephone support to help patients overcome barriers to cancer screening, was effective in helping women become up-to-date on these screening tests. Up-to-date status was based on recommendations of the U.S. Preventive Services Task Force (46–48). Because the U.S. Preventive Services Task Force recommends screening mammography with or without clinical breast exam, we did not include clinical breast exams in our determination of up-to-date status for breast cancer screening.

The intervention improved women’s up-to-date status on all three screening tests, as reported elsewhere (49). Here we carry out subgroup analyses designed to examine the association between a woman’s preferred language (restricted to Spanish or English) and her receipt of cancer screenings, looking at both the likelihood of her being up-to-date at baseline and the likelihood of her responding to the intervention.

Materials and Methods

The data come from a multisite randomized clinical trial. Details of the methods and main results supporting the efficacy of this intervention were reported elsewhere (49); we review the most salient details briefly. The project was approved by the Committee for the Protection of Human Subjects at Dartmouth College, the Institutional Review Board at Clinical Directors Network, and all relevant review bodies at participating Community/Migrant Health Centers (C/MHC); informed consent was obtained from all participating women.

Study Population. The 11 participating Federally Qualified C/MHCs in New York City serve a primarily low-income and minority population (50) and are members of Clinical Directors Network, a Practice-Based Research Network (51). Patients eligible for the randomized clinical trial included women ages 50 to 69 years who had received care for at least 6 months at a participating C/MHC and whose medical charts indicated they were not up-to-date at baseline for screening for at least one of the three study cancers. Patients were recruited from C/MHC waiting rooms, and after consent was received, their eligibility for up-to-date status was checked through medical record review. Women were excluded if they were acutely ill at the baseline visit, under active cancer treatment, or if their chart revealed an unresolved abnormal screening result that required immediate follow-up. Because language concordance between the Prevention Care Manager (PCM) and woman was part of the intervention design, eligible women needed to speak English, Spanish, or Haitian Creole as their preferred language.

The study took place between November 1, 2001 (first date women were approached for consent) and April 23, 2004 (last date women were followed post-consent). A total of 3,312 women were assessed for eligibility, of whom 1,413 were eligible and consented to be randomized to receive Usual Care or to participate in the PCM intervention. Twenty-three women were subsequently dropped because their medical charts, which were needed to provide screening data and other information, could not be found during the post-intervention record review.

The PCM Intervention. During the intervention, the PCM made periodic telephone calls to remind women about being overdue for targeted screenings, help overcome screening barriers, provide emotional support, and schedule primary care and screening appointments. Each woman was followed by the PCM for 18 months after consent or until she was fully up-to-date, whichever came first. Women in the PCM intervention received an average of four calls during the intervention; 91% were successfully reached at least once during the study. Frequently reported barriers to screening included no clinical recommendation, a lack of information or misinformation, and difficulty accessing preventive health care for reasons such as transportation or scheduling issues. Educational materials and reminders, available in English and Spanish, were also mailed to patients, and almost half of the women received at least one mailing. Most PCMs were college educated and bilingual; all were female. Each woman was assigned a PCM who could communicate in her preferred language.

Principal Outcome Measure. The primary outcome of interest was up-to-date status for screening for breast cancer (mammography within 18 months), cervical cancer (Pap test within 18 months), and colorectal cancer (colonoscopy within 10 years, sigmoidoscopy or barium enema within 5 years, or home fecal occult blood test within 18 months). The time frames for determining up-to-date status were based on 2001 U.S. Preventive Services Task Force recommendations. Eighteen months is the midpoint of the mammography recommendation of every 1 to 2 years; it provides a 6-month buffer for the recommended annual home fecal occult blood test and is within the Pap test recommendation of at least once every 3 years. We did not accept an office-based fecal occult blood test as evidence of colorectal cancer screening (52). A review of medical records, completed 3 months after the end of the intervention to allow time for records to be updated, provided the data on screenings received during the baseline and intervention periods, which were used in the analysis.

Methods and Adaptations for the Reported Analyses. Medical chart data extracted include (a) characterizations of the woman’s age, marital status, smoking status, height, weight, chronic illness (i.e., any diagnosis of asthma, hypertension, or diabetes), prior total...
hysterectomy, personal and family history of any of the three cancers, and insurance status; and (b) screening dates and results. Race and ethnicity data were collected during approximately half of the initial interviews and supplemented by medical chart data where missing. Analysis is based on the intention-to-treat principle (i.e., all women were analyzed within their randomly assigned group regardless of whether those assigned to the intervention group were successfully reached by the PCM).

For all analyses reported here, we dropped 44 additional women. We dropped the four Creole speakers because they were too few in number for this language-based subgroup analysis. To eliminate the effect of a woman’s cancer history on obtaining other preventive cancer screenings, we dropped women with a personal history of cervical, breast, or colorectal cancer (5, 26, and 9, respectively), leaving 1,346 women in our basic analyses.

Finally, we systematically dropped women from selected analyses. For all analyses involving cervical cancer (including bundling with other tests), we dropped women with a total hysterectomy ($n = 379$) because they were not eligible for a Pap test. Similarly, for all analyses involving colorectal cancer screening, we dropped women who had received a baseline colorectal cancer screening test that was valid for 5 or more years (barium enema, sigmoidoscopy, or colonoscopy) because the majority of these women would not be eligible to be rescreened during the 18-month intervention period ($n = 276$).

The principal effect of interest in this article is the impact of being Spanish or English speaking on baseline up-to-date rates and on the effect of the intervention. Odds ratios (OR) are reported, as are 95% confidence intervals (95% CI). $P < 0.05$ was taken to indicate statistical significance. Binary variables were analyzed by corrected $\chi^2$ tests and continuous variables by Student’s $t$ tests. A multivariate model using logistic regression was used to adjust for patient characteristics including age, chronic disease, family cancer history, and insurance status, as well as for up-to-date screening status at baseline. Because women who were up-to-date on colorectal screening at baseline through a barium enema, sigmoidoscopy, or colonoscopy were excluded from colorectal analyses (see above), the only test included in our adjustment for baseline colorectal screening status is home fecal occult blood test.

### Results

Randomization was not intended to create a balance between Spanish- and English-speaking women, so we first describe these two groups of patients, focusing on variables others have found to affect screening behavior. Table 1 presents baseline patient characteristics for the 63% of our analytic sample who were Spanish speakers versus the 37% who were English speakers. Spanish-speaking women were more likely to be insured with Medicaid, more likely to be married, and less likely to smoke. In addition, they were slightly older (58.5 versus 57.5 years; $P < 0.001$) and had a lower body mass index (31.5 versus 33.2; $P < 0.001$) than English-speaking women (not shown in Table 1). Nearly all Spanish speakers, but only a quarter of English speakers, were recorded as Latina (irrespective of race), whereas about half of English speakers but very few Spanish speakers were recorded as non-Latina Blacks (44 of the 958 Latina

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**Table 1. Baseline comparisons of Spanish and English speakers on selected characteristics**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Spanish speaking $(N = 548)$, %</th>
<th>English speaking $(N = 498)$, %</th>
<th>Spanish vs English, OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicaid*</td>
<td>82.0</td>
<td>72.5</td>
<td>1.72 $^1$ (1.31-2.26)</td>
</tr>
<tr>
<td>Uninsured*</td>
<td>5.3</td>
<td>5.4</td>
<td>0.98 (0.58-1.66)</td>
</tr>
<tr>
<td>Currently married</td>
<td>28.9</td>
<td>21.9</td>
<td>1.45 $^1$ (1.11-1.90)</td>
</tr>
<tr>
<td>Currently smoking</td>
<td>12.5</td>
<td>25.7</td>
<td>0.41 $^1$ (0.31-0.56)</td>
</tr>
<tr>
<td>Latina/race status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latina (any race or unknown race)</td>
<td>98.3</td>
<td>24.9</td>
<td>179.68 $^1$ (100.91-340.59)</td>
</tr>
<tr>
<td>Non-Latina Black</td>
<td>0.2</td>
<td>52.8</td>
<td>0.00 $^1$ (0.00-0.01)</td>
</tr>
<tr>
<td>Neither Latina nor Black</td>
<td>1.4</td>
<td>22.3</td>
<td>0.05 $^1$ (0.02-0.09)</td>
</tr>
<tr>
<td>Personal and family history of diseases</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any of 3 chronic diseases</td>
<td>82.7</td>
<td>83.3</td>
<td>0.95 (0.70-1.29)</td>
</tr>
<tr>
<td>Family history of breast cancer</td>
<td>10.5</td>
<td>12.2</td>
<td>1.84 (0.59-1.21)</td>
</tr>
<tr>
<td>Cervical cancer</td>
<td>0.8</td>
<td>0.4</td>
<td>2.06 (0.39-20.43)</td>
</tr>
<tr>
<td>Colorectal cancer</td>
<td>4.6</td>
<td>8.2</td>
<td>0.54 $^1$ (0.33-0.87)</td>
</tr>
<tr>
<td>Any of these 3</td>
<td>14.6</td>
<td>18.9</td>
<td>0.74 $^4$ (0.54-1.00)</td>
</tr>
</tbody>
</table>

**NOTE:** Percentages and ORs are reported; statistical tests for $P$ level are based on corrected $\chi^2$. Data reported and tests are based on $n = 1,346$. Missing values occurred in insurance status, marital status, smoking status, and family history; as reported in detail previously (ref. 26, p. 694), these involved few cases. All data are derived from post-intervention review of patient medical records, excepting race and Latina status.

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1Percents do not add to 100% because not all categories of insurance are reported here.

$^1P < 0.01$.

1Race and Latina status (independent variables) were collected from patient self-report data, supplemented when missing with chart data. We report here a combined Latina/race variable, using Latina when available, supplemented by race. For the combined sources of Latina status or race, we have data for 97% of women; however, race data were missing for 435 Spanish-speaking and 97 English-speaking women, and Latina status was missing for 9 Spanish-speaking and 97 English-speaking women. Spanish-speaking women seemed to be more likely to have Latina status known but not race, and Latina women seemed in general to be less likely to have race reported.

1Chronic disease includes any diagnosis of asthma, diabetes, or hypertension.

$^*P < 0.05$.  

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women were also recorded as Black). Finally, English-speaking women were more likely to have a family history of colorectal cancer or of any of the three study cancers.

Baseline screening rates are reported in Table 2. Within this population, Spanish-speaking women were more likely than English-speaking women to be up-to-date on breast cancer screening at baseline (62.3% versus 53.0%; OR, 1.19 [0.90-1.56]). Whereas Spanish-speaking women also had higher baseline cervical cancer screening rates (60.9% versus 56.8%; OR, 1.18 [0.82-1.71]), and lower colorectal cancer screening rates (20.7% versus 23.9%) than English-speaking women, neither of these differences was statistically significant.

Spanish-speaking women were more likely than English-speaking women to be up-to-date for two or three of the tests at baseline (53.8% versus 45.9%; OR, 1.37), and this difference was statistically significant.

In Table 3, we examine whether a woman’s language influenced her cancer screening up-to-date status 18 months after the intervention began. Results, reported separately depending on whether the woman received Usual Care or the PCM intervention, are provided in three ways: unadjusted; adjusted for selected patient characteristics; and adjusted for these characteristics as

### Table 2. Baseline comparisons of up-to-date status on cancer screening between Spanish and English speakers

<table>
<thead>
<tr>
<th>Screening test</th>
<th>Spanish speaking, n (%)</th>
<th>English speaking, n (%)</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up-to-date for breast cancer test</td>
<td>528/848 (62.3)</td>
<td>264/498 (53.0)</td>
<td>1.46* (1.16-1.84)</td>
</tr>
<tr>
<td>Cervical cancer test</td>
<td>365/599 (60.9)</td>
<td>209/368 (56.8)</td>
<td>1.19 (0.90-1.56)</td>
</tr>
<tr>
<td>Colorectal cancer test †</td>
<td>140/676 (20.7)</td>
<td>94/394 (23.9)</td>
<td>0.83 (0.61-1.14)</td>
</tr>
<tr>
<td>Up-to-date for †, † any (1, 2, or 3 tests)</td>
<td>370/487 (76.0)</td>
<td>216/290 (74.5)</td>
<td>1.08 (0.76-1.54)</td>
</tr>
<tr>
<td>Most (2 or 3 tests)</td>
<td>262/487 (53.8)</td>
<td>133/290 (45.9)</td>
<td>1.37 (1.02-1.86)</td>
</tr>
<tr>
<td>All (3 tests)</td>
<td>54/487 (11.1)</td>
<td>31/290 (10.7)</td>
<td>1.04 (0.64-1.72)</td>
</tr>
</tbody>
</table>

**NOTE:** Statistical tests for P level are based on corrected \( \chi^2 \). Data reported and tests are based on \( n = 1,346 \) unless otherwise noted below. Data are derived from post-intervention review of patient medical records. Women were considered up-to-date for breast cancer screening if they had received a mammogram within 18 mo, for cervical cancer screening if they had received a Pap test within 18 mo, and for colorectal cancer screening if they had received a home fecal occult blood test within 18 mo. *P ≤ 0.01.

†Women with a hysterectomy \( (n = 379) \) were excluded from analyses of baseline cervical cancer screening rates. These women were also excluded from analyses of the number of tests up-to-date at baseline because they were not eligible to receive all three cancer screenings.

‡Women were excluded from the colorectal cancer screening analysis in Tables 3 and 4 if they were up-to-date at baseline on any screening test valid for \( ≥5 \) y (i.e., colonoscopy, barium enema, or sigmoidoscopy; \( n = 276 \)) because they were unlikely to be “eligible” to be rescreened during the intervention period for this cancer. They are excluded here to provide the appropriate comparison for the same women.

### Table 3. Response to intervention: up-to-date status at follow-up by study group and preferred language

<table>
<thead>
<tr>
<th>Screening test</th>
<th>Preferred language subset</th>
<th>Usual care, n (%)</th>
<th>PCM intervention, n (%)</th>
<th>OR (95% CI), comparing intervention to usual care</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Unadjusted</td>
<td>Adjusted for patient characteristics*</td>
</tr>
<tr>
<td>Breast cancer ( (N = 1,346) )</td>
<td>Spanish</td>
<td>243/417 (58)</td>
<td>310/431 (72)</td>
<td>1.83 † (1.38-2.44)</td>
</tr>
<tr>
<td></td>
<td>English</td>
<td>144/239 (60)</td>
<td>144/239 (60)</td>
<td>1.21 (0.85-1.73)</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>387/676 (57)</td>
<td>454/670 (68)</td>
<td>1.57 † (1.26-1.96)</td>
</tr>
<tr>
<td></td>
<td>Interaction, language/study group</td>
<td>1.52 (0.96-2.39)</td>
<td>1.56 (0.98-2.49)</td>
<td>1.57 (0.98-2.49)</td>
</tr>
<tr>
<td>Cervical cancer ( (N = 967) )</td>
<td>Spanish</td>
<td>173/289 (60)</td>
<td>237/310 (76)</td>
<td>2.18 † (1.53-3.10)</td>
</tr>
<tr>
<td></td>
<td>English</td>
<td>100/187 (53)</td>
<td>106/181 (59)</td>
<td>1.23 (0.81-1.86)</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>273/476 (57)</td>
<td>343/491 (70)</td>
<td>1.72 † (1.32-2.25)</td>
</tr>
<tr>
<td></td>
<td>Interaction, language/study group</td>
<td>1.77 (1.03-3.05)</td>
<td>1.76 (1.02-3.05)</td>
<td>1.77 (1.02-3.05)</td>
</tr>
<tr>
<td>Colorectal cancer ( (N = 1,070) )</td>
<td>Spanish</td>
<td>126/338 (37)</td>
<td>184/338 (54)</td>
<td>2.01 † (1.48-2.73)</td>
</tr>
<tr>
<td></td>
<td>English</td>
<td>79/204 (39)</td>
<td>95/190 (50)</td>
<td>1.58 † (1.06-2.36)</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>205/542 (38)</td>
<td>279/528 (53)</td>
<td>1.84 † (1.44-2.35)</td>
</tr>
<tr>
<td></td>
<td>Interaction, language/study group</td>
<td>1.27 (0.77-2.10)</td>
<td>1.30 (0.78-2.17)</td>
<td>1.31 (0.78-2.19)</td>
</tr>
</tbody>
</table>

**NOTE:** Women were considered up-to-date for breast cancer screening if they received a mammogram within 18 mo; for cervical cancer screening if they had received a Pap test within 18 mo; and for colorectal cancer screening if they had received a home fecal occult blood test within 18 mo, a barium enema or sigmoidoscopy within 5 y, or a colonoscopy within 10 y. *ORs adjusted for patient characteristics: age (years); chronic disease including asthma, diabetes, or hypertension (yes, no); family history of breast, cervical, or colorectal cancer (yes/no); and insurance level (insured vs uninsured).

†ORs adjusted for patient characteristics (see footnote †) as well as patient up-to-date status at baseline (see Table 2).

‡Patients were excluded from the analysis of cervical cancer screening analysis if they had a hysterectomy \( (n = 379) \).

# Additional note on the data:

The data presented in the tables indicate that Spanish-speaking women were more likely to be up-to-date on breast cancer screening at baseline compared to English-speaking women. However, there was no significant difference in cervical cancer screening rates between the two groups. For colorectal cancer screening, English-speaking women were more likely to be up-to-date compared to Spanish-speaking women. The study also found that women who received a mammogram within 18 months were more likely to be up-to-date for breast cancer screening compared to those who did not receive the mammogram.

The tables further show that the intervention, which included patient-centered medical home (PCM) and usual care, had a significant impact on increasing the up-to-date status for breast and cervical cancer screenings but not for colorectal cancer screenings. The ORs for these comparisons were higher than 1, indicating a positive effect of the intervention. However, the differences were not statistically significant.

Overall, the study emphasizes the importance of language and cultural factors in cancer screening adherence and highlights the need for culturally competent interventions to improve screening rates among different ethnic groups.
well as baseline screening status. The estimated effects did not change dramatically with adjustment; for all three cancer screening tests and in all of the unadjusted and adjusted analyses, the subgroup of Spanish-speaking women had significantly higher cancer screening rates at follow-up with the intervention. It is possible that women may have responded differently to colorectal cancer screening based on the type of test done, so we conducted a separate analysis (not shown in Table 3) that examined colorectal up-to-date status based solely on home fecal occult blood test screenings received. We obtained similar results as for colorectal up-to-date status based on receiving any of the colorectal screening tests. The unadjusted OR favoring the intervention for home fecal occult blood test was 2.12 (95% CI, 1.53-2.96) for Spanish-speaking women and 1.40 (95% CI, 0.90-2.17) for English-speaking women.

Table 3 also addresses the interaction between language preference and study group for all three tests. A statistically significant interaction was found for cervical cancer screening (unadjusted OR, 1.77; 95% CI, 1.03-3.05). Whereas the interaction terms for breast or colorectal cancer screening were not statistically significant, the OR and 95% CI for these suggested a trend toward more intervention impact among Spanish-speaking women.

Table 4 presents data showing the influence of language on the number of cancer screening tests received at follow up. We compare rates of being up-to-date for PCM and Usual Care women in terms of all three screenings, again adjusting first for selected patient characteristics and then for these same characteristics together with baseline up-to-date status. For all women in the analysis to be eligible for all three screening tests, we dropped women who would remain up-to-date for colorectal cancer screening during most or all of the intervention period (because they had a baseline test valid for 5 or more years), and we dropped women with a hysterectomy (not eligible for cervical cancer screening).

The first set of rows examines women who were up-to-date for any (i.e., one, two, or three) screenings at follow-up. The second set includes women who were up-to-date for any two or all three tests, whereas the last set addresses women who became up-to-date on all three tests. As expected, the percentage of up-to-date women decreases for all comparisons as the indicated number of tests increases.

We again found strong evidence in all three sets of comparisons that Spanish-speaking women in the PCM intervention were more likely to become up-to-date than those in Usual Care. Unadjusted ORs were 2.25 (95% CI, 1.39-3.62) for at least one test, 2.42 (95% CI, 1.65-3.54) for two or three tests, and 1.95 (95% CI, 1.33-2.88) for all three tests. For English speakers, the unadjusted OR of being up to date for all three tests was 1.75 (95% CI, 1.01-3.04); other comparisons were not significant. We also examined the interaction between language and intervention. Although not statistically significant, for each subset of tests and for each unadjusted and adjusted model, there was a trend for Spanish-speaking women to benefit more from the intervention.

We also explored whether women received different kinds of support depending on their preferred language. The provision of appointment reminders, access advice, and help making primary care appointments reported is reported elsewhere (49), and did not vary significantly between English and Spanish speakers. However, for the subgroup whose preferred language was Spanish, 70.2% were mailed printed educational and motivational materials versus 60.6% of women in the preferred English subgroup ($P = 0.0105$) and 26.5% in the

<p>| Table 4. Number of tests up-to-date at follow-up, by study group and preferred language |
|------------------------------------------|--|------------------------------|-------------------------------------|-------------------|
| No. tests up-to-date | Language spoken subset | Usual care, | PCM intervention, | OR (95% CI), comparing intervention to usual care |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th>$n$ (%)</th>
<th>$n$ (%)</th>
<th>Unadjusted</th>
<th>Adjusted for patient characteristics + baseline status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up-to-date for any or all (i.e., 1, 2, or 3) tests</td>
<td>Spanish</td>
<td>182/241 (76)</td>
<td>215/246 (87)</td>
<td>2.25 * (1.39-3.62)</td>
<td>2.30 * (1.40-3.75)</td>
</tr>
<tr>
<td></td>
<td>English</td>
<td>111/144 (77)</td>
<td>117/146 (80)</td>
<td>1.20 (0.68-2.10)</td>
<td>1.20 (0.67-2.15)</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>293/385 (76)</td>
<td>332/392 (85)</td>
<td>1.74 * (1.21-2.49)</td>
<td>1.75 * (1.21-2.54)</td>
</tr>
<tr>
<td>Up-to-date for most (i.e., 2 or 3) tests</td>
<td>Spanish</td>
<td>129/241 (54)</td>
<td>181/246 (74)</td>
<td>1.87 (0.90-3.92)</td>
<td>1.91 (0.89-4.09)</td>
</tr>
<tr>
<td></td>
<td>English</td>
<td>66/144 (46)</td>
<td>82/146 (56)</td>
<td>2.42 * (1.65-3.54)</td>
<td>2.42 * (1.65-3.56)</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>195/385 (51)</td>
<td>263/392 (67)</td>
<td>1.51 (0.95-2.41)</td>
<td>1.53 (0.96-2.45)</td>
</tr>
<tr>
<td>Up-to-date on all (i.e., 3) tests</td>
<td>Spanish</td>
<td>61/241 (25)</td>
<td>98/246 (40)</td>
<td>1.60 (0.88-2.91)</td>
<td>1.58 (0.86-2.91)</td>
</tr>
<tr>
<td></td>
<td>English</td>
<td>27/144 (19)</td>
<td>42/146 (29)</td>
<td>1.95 * (1.33-2.88)</td>
<td>1.95 * (1.33-2.89)</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>88/385 (23)</td>
<td>140/392 (36)</td>
<td>1.88 * (1.37-2.57)</td>
<td>1.88 * (1.36-2.59)</td>
</tr>
<tr>
<td></td>
<td>Interaction</td>
<td>1.12 (0.57-2.19)</td>
<td>1.08 (0.54-2.15)</td>
<td>1.05 (0.53-2.09)</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: Women were considered up-to-date for breast cancer screening if they had received a mammogram within 18 mo; for cervical cancer screening if they had received a Pap test within 18 mo; and for colorectal cancer screening if they had received a home fecal occult blood test within 18 mo; a barium enema or sigmoidoscopy within 5 y, or a colonoscopy within 10 y. Patients with a hysterectomy or a baseline colorectal cancer screening test valid for $\geq 5$ y were excluded from all analyses ($n = 569$).

*ORs adjusted for patient characteristics: age (years), chronic disease including asthma, diabetes or hypertension (yes, no), family history of breast, cervical or colorectal cancer (yes/no), and insurance level (insured vs uninsured).

1ORs adjusted for patient characteristics (see footnote *) as well as patient up-to-date status at baseline (see Table 2).

1$P \leq 0.001$, corrected $\chi^2$ test.

1$P = 0.01$.

1$P = 0.05$. 

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Spanish-speaking subgroup received help scheduling screening appointments versus 18.4% in the English-speaking group ($P = 0.0122$).

**Discussion**

In this article, a secondary analysis of an efficacious randomized clinical trial examined the relationship between language and cancer screening rates among women seen in urban C/MHCs. We explored whether a patient’s preferred language affected her general likelihood of being screened as well as her response to the PCM intervention.

In our study population, Spanish-speaking women were more likely to be up-to-date on breast cancer screening at baseline than English-speaking women, but baseline cancer screening rates for cervical and colorectal cancer were not significantly different between the two groups. Whereas this may seem to indicate an absence of screening disparities among these Spanish-speaking women, it is important to recall that more than half of the English-speaking women in this study were non-Latina Blacks, who face screening disparities of their own.

In our analysis of how women responded to the PCM intervention, we found evidence that Spanish-speaking women in these C/MHCs were more likely to become up-to-date following our intervention. This difference remains even after adjustment for age, chronic disease, insurance status, baseline screening status, and family history. Moreover, we found that Spanish-speaking women were more likely to respond to PCM support than would be expected from a direct effect alone for cervical cancer screening (i.e., being a Spanish speaker seemed to interact with the PCM intervention to further increase a woman’s likelihood of becoming up-to-date).

Why Spanish speakers seemed to be more responsive to the intervention is not clear. It is unlikely that it was due to “pent-up demand” because baseline rates were similar. Specific PCM supports provided did differ by language group, with the preferred Spanish subgroup receiving more mailed educational materials and more help scheduling screening appointments. It should be noted that services to be provided were determined by the exploration of each patient’s perceived barriers to being up-to-date for any needed services. Perhaps barriers more common among women who preferred to speak Spanish, such as lack of information and help scheduling appointments, are more readily solved by PCMs, as opposed to more complex barriers such as discomfort receiving telephone support from a person you have not met or a general distrust in the health care system. These issues deserve exploration in future research.

Secular trends may also have accounted for differences in screening rates between baseline and the end of the intervention. The events of September 11, 2001, in NYC increased the availability of Medicaid coverage, potentially improving access, and may have brought people into C/MHCs. Other initiatives in New York City increased attention and efforts to provide colonoscopies to all New Yorkers of ages ≥50 years (53). In addition, Medicare expanded its reimbursement of colonoscopy to the average-risk population in mid-2001; however, recent evidence suggests that this did little to affect lower colonoscopy use among Latinas (54). These potential confounders were mitigated by our ability to compare Usual Care versus PCM arms of the randomized clinical trial during the same time periods.

We did not adjust for the baseline measures of marital or smoking status because these variables are moderators and not mediators of the language effect. Put another way, because marital status and smoking status are correlated with primary language without having causal links to preventive testing, inclusion of these variables would potentially underestimate the language effect.

Our study has several strengths. There is strong evidence from the randomized clinical trial that the PCM intervention positively affects cancer screening rates among underserved women. Because our intervention was made available in three languages (although only two had substantial participants), examining the effect of language is relevant and appropriate to the underlying design.

There are also limitations. Our intervention was limited to a single region/urban setting of the United States, and this analysis included only patients who spoke English or Spanish. The preventive services were all relatively uncontroversial in their advice to women in the appropriate screening group so that “shared decision making,” which arguably requires more complex communication, was not necessary. Our data did not permit a more careful examination of cultural preferences by ethnic or racial group or by immigrant status—factors that are interrelated with preferred language. Further, whereas we provide one unadjusted and two adjusted analytic models with similar results, other different or more comprehensive models of adjustment may have yielded different results. For example, our sample size at participating C/MHCs was insufficient to permit a full exploration of variations due to the specific primary care clinic that a subject attended. These clinic-based variations may have included differences across clinics in access to mammography, colonoscopy, or other services due to travel distances or scheduling; language concordance between clinic staff and patients; clinic policies about periodic health examinations; or other factors. In future work, we plan to explore a fuller range of factors that describe the environment in which patients seek health care.

In conclusion, we found evidence that Spanish-speaking women were more likely to respond to the PCM intervention. Whereas the limited nature of these data prevents a detailed explanation of why Spanish-speaking women seem to benefit more from a PCM than English-speaking women with respect to cancer screening, it is clear that language does not present an insurmountable barrier to effective patient-directed interventions to increase cancer screening rates.

**Acknowledgments**

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References

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