

PRIMARY CARE & HEALTH SERVICES SECTION

Original Research Article

The Effect of Initiatives to Overcome Language Barriers and Improve Attendance: A Cross-Sectional Analysis of Adherence in an Inner City Chronic Pain Clinic

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Abstract

Language barriers can prevent pain physicians and patients from forming meaningful rapport and drive health care disparities. Non-adherence with scheduled pain clinic appointments deprives patients with chronic pain of needed specialist care.

Objective. We evaluated the benefit of comprehensive initiatives to overcome language barriers to improve patient adherence with initial scheduled chronic pain clinic appointments.

Design. After implementation of our initiative, we performed a retrospective cross-sectional analysis and fit logistic regression models to investigate the

association between demographic factors and adherence.

Setting. We collected retrospective data from an observational cohort with a scheduled appointment at the adult inner-city underserved outpatient Pain Center at Montefiore Medical Center, Bronx, New York.

Patients. Between March 2012 and March 2014, 14,459 appointments were scheduled; 3,035 of these appointments represented initial first visits; patients had a mean age of 53 years; 15% were predominantly Spanish-speaking, 65% were female.

Interventions. Our initiative to overcome language barriers in our pain clinic included appointment reminders in the patient's preferred language, Spanish-speaking staff, and unified locations with equitable access.

Outcome Measures. Our dependent variable was adherence with a first scheduled pain clinic appointment.

Results. We found that after implementation of our initiative, speaking Spanish was now statistically significantly associated with higher rates of adherence with appointments (Odds Ratio 1.32, 95% confidence interval [1.06–1.64]).

Conclusions. We infer from our results that coordinated initiatives to overcome language barriers can be beneficial in improving appointment adherence and access to care by enhancing rapport and communication between pain physicians and their patients.

Perspective. The results of this retrospective cross-sectional analysis of patients' adherence with scheduled appointments in an inner-city chronic

pain clinic suggests that targeted initiatives including a pre-clinic reminder phone call in the patient's own language may help to overcome language barriers and improve access to care.

Key Words. Health Care Disparity; Pain Medicine; Language Barrier; Spanish; Language; Telephone Reminder; Clinic Appointment; Access to Care

Introduction

The health care disparities in the United States of America described decades ago by Gornick [1], continue to persist [2] and are linked to social determinants of health and inequality [3,4]. A systematic review and meta-analysis by Meghani raised alarm regarding persistent racial and ethnic disparities specifically in the treatment of pain [5]. English fluency may be the most important factor for ethnic disparity to access of health care in the United States [6]. Language barriers are associated with reduced health care use [7–10]. More than 48 million in the United States do not speak English as their primary language, and about 21 million speak English less than “very well” [11]. As providers, we experience every day how patients who cannot speak the same language cannot effectively communicate their needs, form meaningful relationships, or comprehend complex treatment regimens; this leads to poor compliance, poor satisfaction, and suboptimal disease management [12–17]. Specifically, we previously identified language as a barrier to access chronic pain services for underserved inner-city populations [17].

Patients' adherence with their initial clinic appointments is often unsatisfactory, with attendance rates as low as 42%; non-adherence rates can reach as high as 80% [18–20]. Furthermore, patients often do not notify the clinic of their cancellation. This leads to inefficient scheduling and overbooking [21,22], increased wait time for appointments, underutilization of clinic resources, and escalating costs. Most importantly, it deprives patients with chronic pain, who may be waiting one to two months for a chronic pain clinic appointment, of proper and prompt specialist care [23,24].

Studies have shown that as many as 40% of patients do not attend scheduled appointments solely due to forgetfulness; in order to improve attendance, clinics have begun utilizing pre-clinic phone calls to remind patients of appointments [25]. One study showed that the use of reminder phone calls over a 6 month period caused the no show rates to drop from 50% to 4% [26]. Generally, these techniques, though time-consuming, have been shown to improve attendance rates by as much as 50% [27–30]. However, they are likely less effective in reaching out to patients who do not speak the language the call is made in.

After our prior study that showed that Spanish spoken as a primary language was associated with reduced

odds of adherence with a clinic appointment [16], we undertook several specific initiatives to overcome language barriers for our Spanish-speaking clientele, including: 1) reaching out to Spanish-only speaking patients with pre-appointment phone calls in their native language; and 2) appointing native or certified Spanish speakers as front desk staff. We hypothesized that calling patients in their respective language can decrease language barriers and facilitate patients' timely attendance.

To date, there has not been consistent evidence to demonstrate how effective language-specific telephone calls are and, more precisely, how language-specific interventions enhance attendance at a scheduled chronic pain clinic appointment [31]. We evaluate our efforts to overcome language barriers in a retrospective observational cohort, using regression analysis [32]. After the implementation, what is the association between self-identification as Spanish speakers and adherence for initial scheduled appointments in our inner-city chronic pain clinic in the Bronx, New York?

Methods

We collected retrospective data from an observational cohort of patients with a scheduled appointment at the adult outpatient Pain Center at Montefiore Medical Center located in the Bronx, New York, from March 2012 to March 2014. Following institutional review board approval, the study subjects were selected from the clinic's administrative billing database; our analyses utilized retrospective de-identified data and accordingly the informed consent requirement was waived by our institutional review board. Data collection was implemented through chart review. All patients who were scheduled for an appointment during this time period were included in our analysis, regardless of race, ethnicity, and insurance status or if they attended, did not attend, or canceled the appointment. We limited our analysis to initial (first) scheduled appointments in the hope that by doing so we would be able to focus on patient characteristics for determining arrival status and to minimally bias our results by prior patient-clinic doctor interactions that could have occurred at past clinic visits. All patients scheduled for an appointment received a pre-appointment reminder phone call. This phone call was administered either in English, for patients who self-identified as English speakers or non-English non-Spanish speakers; or in Spanish, for patients who self-identified as Spanish speakers. Front desk staff who administered the Spanish-speaking phone calls was either a native Spanish speaker or has received credentials certifying their ability to communicate in Spanish.

The following self-identified (where appropriate) demographic data were collected for each patient at the time of initial appointment booking: appointment date; patient age; patient gender; insurance type: commercial, Medicaid, Medicare, Managed Care (the data we had did not differentiate between type of managed care plan

be it commercial, Medicaid, or Medicare as indicated by enrollment in a Health Management Organization (HMO) or Preferred Provider Organization (PPO), self-pay); ethnicity (asked as: “Do you self-identify as Hispanic?,” with responses of yes or no); race (White, Black, Other Race, Declined); primary spoken language (English, Spanish, Other Language); marital status; employment status (employed, unemployed, retired, on disability, or unknown); patient reported home zip code same as pain clinic’s zip code (10467) as a measure of “closeness” to pain clinic (with responses of yes or no); and was a procedure scheduled to be performed during the clinic visit. Our outcome (dependent) variable of interest was appointment status (arrived, canceled, no adherence), as observed at the scheduled appointment. Patient past medical history was not transcribed. A total of 3,035 patient scheduled initial encounters were included in this analysis.

Statistical Analysis

Analyses were performed using STATA software, version 13.1 (StataCorp LP, College Station, TX). Characteristics were compared separately for the dichotomous outcome variables arrival to clinic appointment vs non-adherence; and for non-adhering patients, a subgroup analysis was performed for cancellation call vs no call. Continuous variables were compared using two-sample t-tests, or, when the variables had a distribution far from normal, by Mann-Whitney Wilcoxon tests. Categorical variables were compared using the Pearson chi-square test or Fisher’s exact test.

Logistic Regression

To examine the effect of demographic factors on appointment status, we fit logistic regression models to our data reporting odds ratios (OR) and 95% confidence intervals (CI). We developed separate models for arrival to clinic appointment vs non-adherence; and for the subset of non-adhering patients investigating if they made a cancellation call vs no call. We included in our models variables with bivariate baseline testing results of $P \leq 0.25$; or variables, such as age, race, and gender, that were selected *a priori*. These variables are frequently included in health webcare disparity analysis, as their omission can lead to confounding [33]. For nominal variables including language spoken, race, and employment status, the reference group in the logistic regression models was assigned based on sample size with largest serving as reference (e.g., English language for language, Other Race for race, Unknown employment status for employment, Managed Care for insurance type). We tested for interactions. We assigned statistical significance at an alpha level of 0.05.

Elevated odds ratios indicate the increased likelihood of arrival to clinic appointment or increased likelihood of making a cancellation call, respectively, for the separate models. The odds ratio for continuous variables such as age represents the change in odds for each additional

unit change (for example year of age). Model assumptions of normality and linearity were assessed both graphically and statistically; goodness of fit testing was performed.

Hierarchical Mixed (Random) Effects Model

We explored an additional hierarchical model to control for clustering by geography. We hoped to address potential confounding by known important mediators like medical mistrust, social support, and transportation barriers. We fitted a Bayesian hierarchical mixed logistic regression model to investigate the effect of clustering by neighborhood [34] (i.e., zip code) as a proxy for correlation of unmeasured confounders like medical mistrust, (lack of) social support, and transportation barriers that we had not measured directly, as explicated below in the discussion [35]. Our mixed model was formulated analogously as logistic regression model described above with identical fixed effects but adding a random intercept for zip code.

We fitted our mixed models in the statistical software environment R [36]. We used the R package rstanarm [37] as an interface to the Stan statistical programming language to implement our model with Stan’s Hamiltonian Monte Carlo algorithms [38]. We used the R package shinystan [39] to explore the Monte Carlo Markov Chain output, render some graphs, and confirm model convergence, and used Rhat as a convergence diagnostic [40].

Fitting advanced hierarchical models with classical software packages can be challenging, so we used a Bayesian hierarchical modelling approach with the default priors of the software package rstanarm [37]. The models were run with 2000 iterations and six chains in parallel and converged quickly as evidenced by the Rhat convergence diagnostic being smaller than 1.05 for all parameters, evidence for good mixing in graphical plots of the Markov chain Monte Carlo (MCMC) chains. Our model was robust to changes in our prior specification. We explored our model assumptions, recognizing that our inferences of the mean effect of treatment will likely be robust to minor violations of normality and homoscedasticity in our mixed effects model.

Sensitivity Analysis

Logistic regression may not adequately control for confounding when the outcome is not rare as in our case. As a sensitivity analysis of our model assumptions, we repeated the regression analysis with a log link rather than a logit link; with a different link function, we would expect risk ratios to be different from the odds ratios, but to come to similar overall inferences.

Results

Between March 2012 and March 2014, 14,459 appointments were scheduled at the Outpatient Pain Center at

Table 1 Characteristics of study participants by appointment status (non-adherence vs arrived for appointment)

Variable	Total (N = 3035)	Non-Adherence N = 1363)	Arrived (N = 1672)	P values
Demographics				
Age, M (SD)	53.62 (15.04)	52.52 (14.20)	54.51 (15.63)	< 0.001
Female, n (%)	1973 (65.01)	863 (63.32)	1110 (66.39)	0.078
Married, n (%)	767 (25.27)	309 (22.67)	458 (27.39)	0.003
Primary language, n (%)				
English	2466 (81.25)	1134 (83.20)	1332 (79.67)	0.009
Spanish	479 (15.78)	185 (13.57)	294 (17.58)	
Other language	90 (2.97)	44 (3.23)	46 (2.75)	
Race, n (%)				
White	439 (14.46)	180 (13.21)	259 (15.49)	0.009
Black	1011 (33.31)	476 (34.92)	535 (32.00)	
Other race	1152 (37.96)	537 (39.40)	615 (36.78)	
Decline	433 (14.27)	170 (12.47)	263 (15.73)	
Hispanic	1456 (47.97)	651 (47.76)	805 (48.15)	0.83
Insurance type, n (%)				
Commercial	291 (9.73)	102 (7.64)	189 (11.41)	0.005
Medicare	444 (14.84)	217 (16.25)	227 (13.71)	
Medicaid	134 (4.48)	63 (4.72)	71 (4.29)	
Managed care*	2111 (70.58)	947 (70.94)	1164 (70.29)	
Self pay	11 (0.37)	6 (0.45)	5 (0.30)	
Employment status, n (%)				
Employed	520 (17.13)	233 (17.09)	287 (17.17)	0.041
Unemployed	314 (10.35)	165 (12.11)	149 (8.91)	
Retired	73 (2.41)	29 (2.13)	44 (2.63)	
Disability	26 (0.86)	14 (1.03)	12 (0.72)	
Unknown	2102 (69.26)	922 (67.64)	1180 (70.57)	
Zip code, n (%)	326 (10.74)	154 (11.31)	172 (10.29)	0.37
Procedure performed, n (%)	19 (0.59)	11 (0.81)	7 (0.42)	0.17

The characteristics of study participants at their first visit. All data are presented as n (%), unless otherwise specified. Continuous variables were compared using two-sample t-tests; categorical variables analyzed using Pearson chi-square test or Fisher exact test. P values refer to comparisons between non-adherence and adherence with first clinic appointment. Zip code refers to the number of patients who live in the same neighborhood (zip code), our clinic is located in. M = mean; SD = standard deviation.

*2017 HMO patients, 9 PPO patients.

Montefiore Medical Center; 3,035 of these appointments represented initial first visits. Table 1 shows descriptive characteristics of this cohort, grouped according to clinic appointment status: arrived to clinic for initial appointment vs non-adherence with initial appointment. Individuals (1,672) arrived for their clinic appointment (average age 54.5 years; 66.39% female) and 1,363 did not adhere with their clinic appointment (average age 52.5; 63.32% female). Persons who arrived to clinic were more likely to be older, married, primary Spanish speakers, be white, have commercial insurance, and be employed or retired.

Bivariate Analysis

Table 2 shows the descriptive characteristics of the 1,363 patients who did not present for their initial clinic appointment grouped according to their cancellation call

status. Some patients (756) provided a cancellation call (average age 54.4; 65.87% female) and 607 patients did not provide a call (average age 50.1; 60.13% female). Persons who were provided cancellation calls were more likely to be older, female, married, white, or have a procedure scheduled.

Logistic Regression

Some individuals (3,002) had complete covariate data and were able to be included in the logistic regression model for arrival vs non-adherence with scheduled appointment (Table 3). Spanish spoken as a primary language (as compared with English), age, white race, and commercial insurance were associated with greater odds of arriving to initial clinic appointment. Being unemployed and having Medicare were associated with reduced odds of arriving to the initial clinic appointment.

Table 2 Characteristics of study participants who did not adhere with their initial visit (no cancellation call vs cancellation call)

Variable	Total (N = 1363)	No cancellation (N = 607)	Cancellation call (N = 756)	P values
Demographics				
Age, M (SD)	52.52 (14.20)	50.14 (13.32)	54.43 (14.59)	< 0.001
Female, n (%)	863 (63.32)	365 (60.13)	498 (65.87)	0.029
Married, n (%)	309 (22.67)	118 (19.44)	191 (25.26)	0.011
Primary language, n (%)				
English, n (%)	1134 (83.20)	501 (82.54)	633 (83.73)	0.76
Spanish, n (%)	185 (13.57)	87 (14.33)	98 (12.96)	
Other language, n (%)	44 (3.23)	19 (3.13)	25 (3.31)	
Race, n (%)				
White	180 (13.21)	61 (10.05)	119 (15.74)	0.020
Black	476 (34.92)	215 (35.42)	261 (34.52)	
Other race	537 (39.40)	251 (41.35)	286 (37.83)	
Decline	170 (12.47)	80 (13.18)	90 (11.90)	
Hispanic	651 (47.76)	229 (49.26)	352 (46.56)	0.32
Insurance type, n (%)				
Commercial	102 (7.64)	40 (6.72)	62 (8.38)	0.20
Medicare	217 (16.25)	88 (14.79)	129 (17.43)	
Medicaid	63 (4.72)	35 (5.88)	28 (3.78)	
Managed care*	947 (70.94)	429 (72.10)	518 (70.0)	
Self pay	6 (0.45)	3 (0.50)	3 (0.41)	
Employment status, n (%)				
Employed	233 (17.09)	133 (21.91)	100 (13.23)	<0.001
Unemployed	165 (12.11)	94 (15.49)	71 (9.39)	
Retired	29 (2.13)	13 (2.14)	16 (2.12)	
Disability	14 (1.03)	12 (1.98)	2 (0.26)	
Unknown	922 (67.64)	355 (58.48)	567 (75.00)	
Zip code, n (%)	154 (11.31)	72 (11.86)	82 (10.86)	0.56
Procedure performed, n (%)	11 (0.81)	1 (0.16)	10 (1.32)	0.018

Among the study patients who did not adhere with their first pain clinic appointment, the characteristics of patients who called to cancel versus those who did not. All data are presented as n (%), unless otherwise specified. Continuous variables were compared using two-sample t-tests; categorical variables analyzed using Pearson chi-square test or Fisher exact test. P values refer to comparisons between not making a cancellation call and making the call. Zip code refers to the number of patients who live in the same neighborhood (zip code), our clinic is located in. M, mean; SD, standard deviation.

*942 HMO patients, 5 PPO patients.

These inferences are the same as from our bivariate comparison (Table 1).

Hierarchical Mixed Effects Model

Our hierarchical mixed effects model clustering patients geographically by patient home zip code gave the same inferences and almost identical regression coefficients for the population averaged mean effects, which are provided in the supplemental regression table online (Supplemental Table 1).

Subgroup Analysis

A cancellation call matters financially because it allows the appointment slot to be utilized by another patient and improves clinic workflow, but equally important it allows the patient to reschedule another appointment to

gain access to needed pain services. We therefore explored the predictors of cancellation calls in a secondary analysis to generate new hypothesis for subsequent research. Some individuals (1,339) had complete covariate data and were able to be included in the logistic regression model for cancellation call vs no cancellation call. Older age, being female, being married, being white, and having a procedure performed were associated with increased odds of making a cancellation call. Being employed, unemployed, on disability, and being retired (all when compared with unknown employment status), and having Medicaid insurance were associated with reduced odds of making a cancellation call.

Sensitivity Analysis

In our sensitivity analysis, (using a log link function instead of a logit function for the regression analysis as

Table 3 Logistic regression model for arrival vs non-adherence with initial appointment (OR refer to odds of arriving to clinic; N = 3002)

Variable	Odds ratio	95% CI	P values
Language			
English language (reference)	1	N/A	N/A
Spanish language	1.32	1.06–1.64	0.014
Other language	0.86	0.55–1.34	0.51
Age			
Age	1.01	1.00–1.01	0.011
Female			
Female	1.16	1.00–1.41	0.061
Married			
Married	1.18	0.99–1.41	0.061
Race			
Other race (reference)	1	N/A	N/A
White	1.27	1.01–1.61	0.043
Black	1.06	0.89–1.27	0.51
Decline	1.39	1.10–1.75	0.005
Employment status			
Unknown employment status (reference)	1	N/A	N/A
Employed	0.88	0.72–1.08	0.21
Unemployed	0.72	0.56–0.92	0.009
Disability	0.72	0.33–1.59	0.42
Retired	1.09	0.67–1.80	0.72
Insurance status			
Managed care (reference)	1	N/A	N/A
Medicare	0.78	0.63–0.97	0.028
Medicaid	0.94	0.66–1.34	0.72
Commercial insurance	1.43	1.13–1.81	0.003
Self pay	0.63	0.19–2.10	0.45
Procedure performed	0.46	0.17–1.20	0.11

OR, CI, and P values for association between patient characteristics and arrival at the pain clinic in a logistic regression model including variables with bivariate baseline testing results of $P \leq 0.25$; or variables, such as age, race, and gender, that were selected *a priori*. For nominal variables like language spoken, race, and employment status, the reference group in the logistic regression models was assigned based on sample size with largest serving as reference (e.g., English language for language, Other race for race, Unknown employment status for employment, Managed care for insurance type). CI = confidence interval; N/A = not applicable.

justified in the *Methods* section), we came to similar inferences (albeit obviously with different risk ratios): As with the logistic regression reported above, Spanish spoken as a primary language (as compared with English), age, being white, declining to provide racial identity information, and having commercial insurance were associated with greater odds of arriving to initial clinic appointment also in our sensitivity analysis using a log link function (data available on request).

Discussion

In contrast to prior studies that identified Spanish as a primary language as a barrier to access health care [13,17,41–43], in our cohort Spanish speakers were associated with increased timely attendance at their first scheduled appointment in an intercity chronic pain clinic. We would like to attribute this to our efforts to overcome language barriers, specifically the implementation of language-specific phone calls to remind patients of their appointment; we started a randomized trial as the only means to refute or confirm this hypothesis. The present study suggests that pre-clinic language-specific phone calls may serve as an intervention to improve timely clinic attendance. In particular, among Spanish speakers, phone calls in Spanish may have resulted in increased initial clinic visits when compared with English speakers and non-English non-Spanish speakers who received calls in English.

In our logistic regression analysis, receiving a pre-clinic appointment phone call in Spanish was statistically significantly associated with increased odds of arriving to an initial pain clinic appointment. This association remained significant when age, gender, race, marital status, employment status, insurance status, and whether or not a procedure was scheduled to be performed were included as covariates in the model. We tested all available measured variables to control for confounding. Fixed employment with excessive unpredictable hours could for example limit the flexibility of patients to adhere to scheduled appointments. Patient insurance and or their neighborhood may code for socio-economic status and be associated with medical mistrust [34] and lack of social support which in turn may mediate adherence behavior [8]. This can lead to a vicious cycle distancing patients further from resources and support [6]. Findings of our study include that being older, being white, declining to provide racial identity information, and having commercial insurance were associated with increased odds of arriving to the clinic appointment; being unemployed and having Medicare were associated with reduced odds of arriving (Table 3). By performing a subgroup analysis for those who did not adhere with their clinic appointment (Table 4), we found that older age, being female, being married, being white, and having a procedure scheduled were associated with increased odds of making a cancellation call; while being employed, unemployed, on disability, and being retired and having Medicaid insurance were associated with reduced odds of making a cancellation call. The above findings were robust to a sensitivity analysis, [using the log link instead of the logit link to address the concern that logistic regression may not complete control for confounding when the probability of the event is not rare] and concurrent with the bivariate analysis (Table 1). We addressed one primary hypothesis, (the influence of interventions to overcome language barriers on the association between the primary language spoken and non-adherence with appointment) and discounted

additional findings. We earmarked several variables (age, race.) *a priori* for inclusion regardless of the strength of the statistical association (*P* values) to counter the impression of data mining. We therefore felt that a (Bonferroni) correction for multiple comparisons was not necessary, in particular as the direction of the association of the primary outcome changed sign.

Context and Comparison with Literature

Previous studies, including our own, have shown that the lack of English fluency is associated with reduced health care use [7–10,17]. If we believe that our efforts to overcome language barriers may have led to a reversal of odds of adhering for Spanish only speakers, then, *ex juvantibus*, from the observed influence of our intervention we may infer that language fluency is a primordial factor in health care disparity [6]; while fortunately it seems this factor can be overcome, our findings await confirmation in our ongoing randomized controlled study. However, to our knowledge, this is the first study to investigate the influence of language-specific phone calls on adherence with scheduled clinic visits, certainly in pain medicine.

Details of the Implementation to Enhance Adherence

This study serves as a follow-up to our prior work [17]. Our previous cross sectional regression analysis suggested that Spanish spoken as a primary language is associated with reduced odds of showing up for pain clinic appointments. We have modified our clinic in an effort to increase appointment adherence. We previously had two different practice locations with different practice models and staffing models. One practice was an office-based location and one was in an outpatient hospital location. Patients with charity care and Medicaid (and occasionally Medicare) were primarily seen in the outpatient hospital one day per week (Wednesday) and the rest of the patients were seen in the office the other four days of the week. Now, we see all patients in the same outpatient hospital location with equal availability access. Additionally, we have modified all of the front desk staff to be native Spanish speakers or certified Spanish speakers only. The job description for new hires was changed to include Spanish as a requirement and existing employees were encouraged to become certified. Salaries were increased as reward for the additional or official certification; for example, by the National Board of Certification for Medical Interpreters. Lastly, we called everyone in advance in English (English speakers and non-English non-Spanish speakers) or Spanish for Spanish speakers. These modifications have increased our clinic's presence in the Spanish-speaking community.

It is important to note that the patient population was different in our earlier study establishing language as a barrier to attend a pain clinic appointment [17], (which precluded a time-series modelling approach). Our previous study was conducted in Newark, New Jersey, and

our current study is conducted in Bronx, New York. In Newark, 33.8% of the population identified themselves as Hispanic or Latino, 49.4% as Black or African American, and 11.6% as White [44]. In the Bronx, 53.5% of the population identified themselves as Hispanic or Latino (many of them second or third generation), 30.1% as Black or African American, and 10.9% as White [45]. About 62% of Bronx Hispanics are born in the United States, but that includes Puerto Rico. Of those, 82% either are bilingual and speak English “very well” or don’t speak any language other than English. Of the Bronx Hispanics born outside the United States, 3% speak only English and 23% of the bilinguals speak English “very well.” Overall, 61% of Bronx Hispanics either speak only English or speak English “very well” [46]. The Bronx has a slightly larger Hispanic population than Newark, which if based on our previous study, should suggest that the Bronx clinic would have a lower attendance rate.

Strength and Limitations

Strengths of our study are the size and characteristics of its population. The Bronx is inhabited with a diverse and chronically medically underserved population, making our inferences relevant for other similar settings serving indigent populations. With 3,000 individual patient visits analyzed, our study has a large sample size allowing for increased study power. We evaluated our *a priori* defined hypothesis, which was an established hypothesis based on previous similar work in related populations [2,17]. Retrospective studies are always suspect of data mining and we would not have convinced ourselves of the relevance of our initiatives if they had merely mitigated the association of speaking Spanish with non-adherence with scheduled appointments. The reversal of the odds to now suggest that Spanish speakers are more likely to show supports our hypothesis that our initiatives were beneficial. While logistic regression may be only partially effective in controlling for confounders, in cases like this where the probability of an event is around 0.5, the stratified analysis; for example, shown in the bivariate comparisons in Tables 1 and 2, told the same story that speaking Spanish increases the odds of arrival at the appointment. The inferences from an additional hierarchical mixed effects model clustering patients geographically were the same. We considered more complex models, but the real threat to the validity of our inferences comes from unmeasured variables leading to confounding not from lack of model sophistication.

Indeed, this study has several limitations. This study is of retrospective design and data collection. We do not know for sure that the language-specific phone call drove patients to attend their clinic appointments more frequently. While our results demonstrated unequivocally that the use of language-specific pre-clinic phone calls is associated with increased attendance, we cannot specifically measure that the pre-clinic phone calls led to this improvement. Another limitation is that we utilized

Table 4 Logistic regression model for cancellation call vs no call for patient who did not adhere with their initial appointment visit (OR refer to odds of cancellation call; N = 1339)

Variable	Odds ratio	95% CI	P values
Age	1.02	1.01–1.03	< 0.001
Female	1.37	1.08–1.74	0.009
Married	1.33	1.00–1.77	0.048
Race			
Other race (reference)	1	N/A	N/A
White	1.60	1.09–2.33	0.015
Black	1.06	0.82–1.38	0.64
Decline	0.83	0.58–1.20	0.33
Employment status			
Unknown employment status (reference)	1	N/A	N/A
Employed	0.42	0.31–0.57	<0.001
Unemployed	0.48	0.34–0.69	<0.001
Disability	0.09	0.02–0.42	0.002
Retired	0.43	0.19–0.96	0.041
Insurance status			
Managed care (reference)	1	N/A	N/A
Medicare	0.87	0.62–1.20	0.39
Medicaid	0.54	0.32–0.92	0.024
Commercial insurance	1.37	0.92–2.05	0.13
Self pay	0.71	0.14–3.66	0.68
Procedure performed	6.45	0.80–51.91	0.08

Note: OR, CI, and P values for subgroup analysis for making cancellation call versus not making call to the pain clinic in a logistic regression model including variables with bivariate baseline testing results of $P \leq 0.25$; or variables, such as age, race, and gender, that were selected a priori. For nominal variables like language spoken, race, and employment status, the reference group in the logistic regression models was assigned based on sample size with largest serving as reference (e.g., English language for language, Other race for race, Unknown employment status for employment, Managed care for insurance type). CI = confidence interval; N/A = not applicable.

billing data from a sample of underserved patients attending an academic chronic pain clinic in Bronx, New York. The majority of our patients are Medicaid insured, so our observations likely pertain specifically to an underserved resource-poor minority/immigrant population and may not be generalizable to other settings. In addition, for many patients insurance was identified as managed care with no additional data to further differentiate this group into Medicaid, Medicare, or Commercial.

Caution must be used in interpreting our results as they show only associations and do not prove causality; additionally, our study was observational in nature and potential confounders or mediators may not have been

controlled or accounted for. Lack of social support and/or financial resources to overcome transportation barriers is but one example of potential unmeasured mediators that could have confounded our results. Our ongoing trial, randomizing patients to receive a pre-clinic phone call in Spanish or not, should answer the question more definitively.

Conceptual Framework

What is the active ingredient, when a pre-clinic phone call in the language of the patient improves his or her attendance for the scheduled appointment? [31] Beyond the reminder, in a language the patient understands, we hypothesize that a human rapport is established even before the actual encounter by reaching out to the individual at eye level in his or her language [47]. Beyond the implied promise that there will also be somebody during the visits to facilitate communication in Spanish, the patient may feel the personal touch and interest by the clinic personnel in addressing his or her specific needs. At present these hypotheses are pure conjecture.

Conclusions

In conclusion, our regression analysis of a retrospective observational cohort of pain patients showed a surprising reversal of odds: while previously Spanish as primary language was established as a predictor of health care disparities and specifically as a predictor of non-adherence with scheduled appointments in an inner-city chronic pain clinic [17,42], we found Spanish speakers to be more likely to attend. Our findings are encouraging. We know language barriers exist in our community and are a driving factor for health disparity [48]. Language barriers prevent physicians and patients to form meaningful relationships [42], leading to non-adherence with clinic appointments [17] and associated complications of overbooking and stress. However, in the face of persistent health care disparities [2], also in pain medicine [5,49], determined and coordinated initiatives to overcome barriers to access can help to improve access to care, especially when they are sensitive to the population concerned and engage and involve their representatives. Results of our ongoing randomized controlled trial will be informative.

Supplemental Data

Supplemental Data may be found online at <http://pain.medicine.oxfordjournals.org>.

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