Community Health Worker Intervention to Decrease Cervical Cancer Disparities in Hispanic Women

Matthew J. O'Brien, MD, MSc[1,4], Chanita Hughes Halbert, PhD[3], Rebecca Bixby, RN[4], Susana Pimentel[4], and Judy A. Shea, PhD[2]

[1]Division of General Internal Medicine, Temple University School of Medicine, Philadelphia, PA, USA; [2]Department of Medicine, Division of General Internal Medicine, University of Pennsylvania, Philadelphia, PA, USA; [3]Department of Psychiatry, University of Pennsylvania, Philadelphia, PA, USA; [4]Puentes de Salud Health Center, Philadelphia, PA, USA.

INTRODUCTION: U.S. Hispanic women suffer a disproportionate burden of cervical cancer, with incidence and mortality rates almost twice that of whites. Community health workers, or promotoras, are considered a potential strategy for eliminating such racial and ethnic health disparities. The current study is a randomized trial of a promotora-led educational intervention focused on cervical cancer in a local Hispanic community.

METHODS: Four promotoras led a series of two workshops with community members covering content related to cervical cancer. Sociodemographic characteristics, cervical cancer risk, previous screening history, cervical cancer knowledge, and self-efficacy were measured by a pre-intervention questionnaire. The post-intervention questionnaire measured the following outcomes: cervical cancer knowledge (on a 0–6 scale), self-efficacy (on a 0–5 scale), and receipt of Pap smear screening during the previous 6 months (dichotomous). Univariate analyses were performed using chi square, t-test, and the Mann–Whitney test. Multivariate logistic regression was used to model the association between explanatory variables and receipt of Pap smear screening.

RESULTS: There were no statistically significant differences between the two experimental groups at baseline. Follow-up data revealed significant improvements in all outcome measures: Pap smear screening (65% vs. 36%, p-value 0.02), cervical cancer knowledge (5.4 vs. 3.5, p-value<0.001), and self-efficacy (4.7 vs. 4.0, p-value 0.002). In multivariate analysis, cervical cancer knowledge (OR 1.68, 95% CI 1.10-2.81) and intervention group assignment (OR 6.74, 95% CI 1.77-25.66) were associated with receiving a Pap smear during the follow-up period.

DISCUSSION: Our randomized trial of a promotora-led educational intervention demonstrated improved Pap screening rates, in addition to increased knowledge about cervical cancer and self-efficacy. The observed association between cervical cancer knowledge and Pap smear receipt underscores the importance of educating vulnerable populations about the diseases that disproportionately affect them. Future research should evaluate such programs on a larger scale, and identify novel targets for intervention.

KEY WORDS: cervical cancer; health disparities; community health worker; promotora.
J Gen Intern Med 25(11):1186–92
DOI: 10.1007/s11606-010-1434-6

INTRODUCTION

As the largest and fastest-growing minority group in the United States, Hispanics represent an important target population for health interventions[1]. The U.S. Census projects that Hispanic Americans will number 47.8 million in 2010, and will represent 25% of the U.S. population by 2050[2]. A large body of medical literature demonstrates the vulnerability of this growing population to poor health outcomes when compared to other racial and ethnic groups. Two recent reports summarize disparities between Hispanics and whites with respect to disease-specific outcomes, healthcare quality, and access to medical services and treatments[3,4]. The persistence of racial and ethnic disparities in health and health care necessitates novel strategies for reducing, and ultimately eliminating them[5].

Cervical cancer represents one of the starkest health disparities facing U.S. Hispanic women. Cervical cancer incidence among U.S. Hispanic women is nearly twice that of white women, and mortality is 42% higher in this population[6]. More recent data suggest that these disparities are increasing[7]. The excess mortality observed in U.S. Hispanics is due, in part, to low Pap smear screening rates[8]. Estimates of annual screening rates in this population vary widely—from 42% to 83%[9–11], compared with 88% among all U.S. women[12]. Disparities in cervical cancer screening and outcomes are influenced by individual factors—cultural beliefs[13,14], linguistic barriers[15], socioeconomic status[16], and levels of health literacy[17]. Systemic factors, such as low levels of insurance[18], lack of a usual source of

Electronic supplementary material *The online version of this article (doi:10.1007/s11606-010-1434-6) contains supplementary material, which is available to authorized users.*

Received January 26, 2010
Revised May 11, 2010
Accepted June 1, 2010
Published online July 7, 2010

care[19,20], and fear of discrimination[21], also play an important role in producing cervical cancer disparities. Foreign-born Hispanic women are less likely than their U.S.-born counterparts to receive Pap smears, which may partially reflect the impact of immigration status on utilization of cancer screening[22,23].

Community health workers (CHWs) may provide a novel and culturally-appropriate model for addressing such health disparities in underserved populations. CHWs are "community members who work almost exclusively in community settings and who serve as connectors between healthcare consumers and providers to promote health."[24] This lay medical workforce emerged in Latin America in the 1950s and has since performed a wide range of health promotion and disease prevention activities, both domestically and internationally[25]. Examples of CHW roles include providing health education, performing patient navigation, and directly delivering medical services, such as immunizations[26]. CHW programs have targeted many diseases—diabetes[27–30], cancer[31–35], cardiovascular disease[36–39], and asthma[40–44]—in addition to focusing on general health promotion[45] and maternal/child health[46–48].

A recent review of the domestic community health worker literature (CHW) revealed that such programs were most prevalent in Hispanic communities, where these lay workers are often called promotoras[49]. The same review reported that cancer screening was the most common focus of CHW programs[49]. The evidence base for promotora interventions in Hispanic communities is weak, with most studies using quasi-experimental designs to evaluate their effectiveness[50–52]. But despite the lack of rigorous evidence[53], many stakeholders have advocated for CHWs to help lower healthcare costs and reduce racial and ethnic health disparities[4,54,55].

In an effort to generate more rigorous evidence supporting CHW efforts to address an important health disparity, we implemented and evaluated a promotora-led educational intervention focused on cervical cancer. Based on our literature review, this study represents the first randomized trial of a promotora-led cervical cancer program involving a community-dwelling cohort. The only other previous randomized trial of a similar intervention recruited and randomized participants in a clinic setting[56]. Three previous studies randomized communities[57–59], and two studies were randomized at the level of the CHW[60,61]. Our program was adapted from a curriculum that has been previously studied and reported elsewhere[61–63]. Our primary objective was to evaluate the impact of the experimental intervention on participants' receipt of Pap smear screening, cervical cancer knowledge, and self-efficacy. We hypothesized that this educational intervention—based on the Health Belief Model[64]—would increase participants' self-efficacy and knowledge about cervical cancer, and thereby increase Pap smear screening rates. A secondary objective was to examine other predictors of Pap smear receipt among members of study cohort.

METHODS

The University of Pennsylvania institutional review board (IRB) approved the experimental protocol. The current study followed the principles of community-based participatory research, involving the South Philadelphia Hispanic community throughout[65]. An advisory board was established at the outset, consisting of representatives from the following organizations that serve the target community: the Mexican Consulate, the Catholic Archdiocese, a primary-care clinic, and a social service organization. These organizations guided the research through regular feedback provided in both formal and informal settings. This group—composed of individuals from the target population and advocates who were not community members—met quarterly and participated actively in the conceptualization, development, implementation, evaluation, and dissemination of the study.

120 Hispanic women aged 18-65 were recruited and enrolled in the community by 4 female promotoras. Exclusion criteria included age older than 65 or younger than 18, current pregnancy, prior history of cervical cancer, and prior history of hysterectomy. Recruitment and enrollment efforts took place in local faith-based and community-based organizations, the Philadelphia Mexican Consulate, and participants' homes. This sampling approach was chosen to more accurately reflect the target population, rather than recruiting subjects in healthcare institutions where baseline health knowledge and behaviors may be greater. Eligible women were invited to participate in the study, and received two $20 gift cards as an incentive.

All participants took a baseline questionnaire, which was administered in Spanish by the promotoras and lasted approximately 30 minutes. The promotoras' training in research methods has been reported elsewhere[49]. The personal and professional backgrounds of our promotoras are also described elsewhere[66]. The baseline questionnaire—previously piloted in the community—included 55 questions measuring the following constructs: health status, history of Pap smear screening and general health care use, and risk profile for cervical cancer. Sociodemographic characteristics measured in the baseline questionnaire included age, marital status, educational attainment, employment, insurance status, country of origin, length of residence in the U.S., and acculturation. Our primary outcome was receipt of cervical cancer screening following the intervention; our secondary outcomes were knowledge about cervical cancer and self-efficacy to undergo Pap smear screening. All outcome measures were assessed in the baseline questionnaire and in a 28-question follow-up questionnaire, which was also administered in Spanish by the promotoras in approximately 15 minutes.

Self-reported health status was measured with a single question using a five-point Likert scale from 1 ("Excellent") to 5 ("Poor"). Previous Pap smear screening history was assessed by asking the month and year of the participants' last Pap smear. This question was dichotomized as having received a Pap within 1 year (i.e. up-to-date) or not. Knowledge about cervical cancer was measured using a 6-item questionnaire developed by the research team. (See Online Appendix). These six questions covered the pathogenic role of HPV, methods for prevention, screening recommendations, the meaning of a positive Pap smear, the relevant epidemiology of cervical cancer in Hispanics, and anatomy of the cervix. Self-efficacy was measured using a previously validated scale that contains 19 close-ended questions with a 5-point Likert scale describing the participants' likelihood of undergoing Pap smear screening under different scenarios[67]. Responses range from 1 ("I would definitely not have a Pap smear") to 5 ("I would definitely have a Pap smear"). Acculturation was measured using the Short Acculturation Scale for Hispanics developed by Marin et al,

and is represented as a numeric average of the responses to the five questions, which range from 1 (least acculturated) to 5 (most acculturated)[68].

All 120 participants were randomized to receive a promotora-led cervical cancer educational intervention or usual care. At the suggestion of community members involved in the design of the study, control-group participants crossed over to receive the experimental intervention after completion of the follow-up evaluation. A random number sequence was generated by the PI to guide group assignment. Subjects were allocated to either the intervention or control group by the promotoras based on whether their study number was odd or even. We determined a priori that 60 participants in each group were necessary to detect a 25% difference in the percentage of women who received Pap screening between the two groups, assuming a baseline screening level of 50%, an α of 0.05, and 80% power.

The intervention consisted of two 3-hour workshops—including between 4 and 10 women in each group—which were led by a pair of promotoras. These workshops followed a previously-studied curriculum, which was modified by the study team for the purposes of the current study[62]. The curriculum employs an interactive format and includes information about female genital anatomy, risk factors for cervical cancer, common myths about cervical cancer, screening procedures and recommendations, the implications of screening, and the epidemiology of cervical cancer in Hispanic women. All participants were given a copy of this curriculum, in addition to other program materials including informational pamphlets from the American Cancer Society and U.S. Department of Health and Human Services.

The intervention was delivered in several rounds over a 4-month period. We used multiple process measures to ensure that the intervention was implemented uniformly. A basic set of questions was filled out by the promotoras at the end every workshop documenting the number of participants, the length of time spent on each portion of the curriculum, and the total time for each session. The principal investigator and study coordinator randomly observed 20% of the workshop sessions to confirm adherence to the curriculum and to verify the promotoras' responses to the process measures outlined above. Follow-up of all study participants occurred approximately 6 months following the delivery of the educational intervention, consisting of a second questionnaire that included a question about whether the participants underwent Pap smear screening during the follow-up period, and if so, where they received it. Self-reported data on Pap smear receipt were verified by chart review for 83% of participants who reported undergoing screening at three local health centers.

Baseline characteristics were compared between the two study groups using chi-square tests for dichotomous variables and t-tests for continuous variables. The Mann–Whitney test was used to compare continuous variables with non-normal distributions, which was assessed using the Shapiro–Wilk test. Receipt of Pap smear screening during the follow-up period was expressed as the percentage of women in each group that underwent Pap screening. This outcome was compared between the two groups using the chi-square test. The secondary outcome of a cervical cancer knowledge score was calculated using the number of questions answered correctly; and a self-efficacy score was expressed as the numerical average of participants' answers to the 19 self-efficacy questions. Post-intervention knowledge and self-efficacy were expressed both as t-test comparisons of these scores between the groups, and as a difference in differences from baseline scores using t-tests. We used multivariate logistic regression to estimate the influence of the following predictors on receiving a Pap smear among the follow-up cohort: age, education, having a usual source of care, parity, acculturation, self-efficacy, cervical cancer knowledge, and group assignment.

RESULTS

Figure 1 shows the flow of participants through the study. The intervention was ultimately delivered to 43 of the intervention-group participants (72%), 9 of whom were lost to follow-up at 6 months. The overall 6-month follow-up rate was 58%. The only significant difference between those who followed-up and those who did not was a slightly better self-reported health status among the follow-up cohort (3.0 vs. 3.3, P=0.04). The baseline sociodemographic characteristics of all 120 study subjects are presented in Table 1. There were no significant differences between the intervention- and control-group participants with respect to any of these factors. Overall, the study cohort consisted of young women with low levels of formal education and acculturation, who were at modest risk for developing cervical cancer. Our outcome measures demonstrated no significant differences at baseline.

Table 2 presents the 6-month follow-up results. Excluding the 17 intervention and 18 control subjects who were already

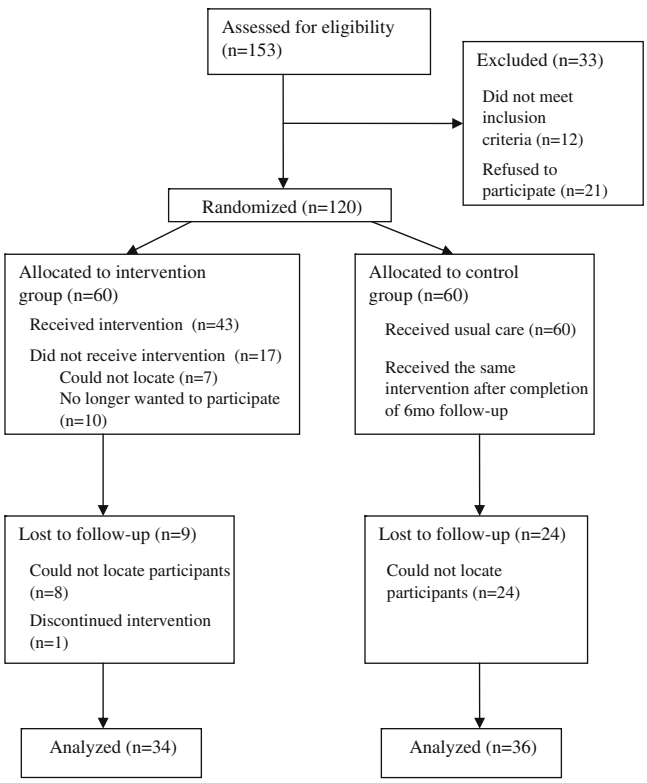

Figure 1. Flow diagram of participants through study.

Table 1. Baseline Characteristics of the Study Cohort (N=120)

Characteristic	Intervention group (N=60)	Control group (N=60)	p-value
Sociodemographics			
Age (SD)	32 (11)	31 (12)	0.49
Years education	–	–	0.64
<8, no (%)	24 (40)	28 (47)	–
8-12, no (%)	26 (43)	26 (43)	–
>12, no (%)	10 (17)	6 (10)	–
Employment status	–	–	0.40
Unemployed, no (%)	27 (45)	22 (37)	–
Employed part-time, no (%)	21 (35)	29 (48)	–
Employed full-time, no (%)	12 (20)	9 (15)	–
Foreign born, no (%)	60 (100)	60 (100)	–
Mexican country of origin, no (%)	54 (90)	53 (88)	0.57
Years of U.S. residence (mean, SD)	4.5 (3.2)	5.3 (4.2)	0.25
Acculturation* (mean, SD)	1.2 (0.3)	1.2 (0.4)	0.50
Health characteristics			
Health status† (mean, SD)	3.2 (0.9)	3.3 (0.8)	0.44
Insured, no (%)	6 (10)	4 (7)	0.77
Cervical cancer risk factors			
Smokers, no (%)	6 (10)	6(10)	0.35
Age at first intercourse (mean, SD)	18.3 (0.4)	17.4 (0.4)	0.11
Lifetime sexual partners (mean,SD)	1.9 (2.7)	2.0 (1.2)	0.12
Parity (mean, SD)	2.7 (1.5)	2.2 (1.4)	0.12
Study outcomes			
Cervical cancer knowledge‡ (SD)	3.0 (1.4)	3.3 (1.5)	0.24
Self-efficacy§ (SD)	4.0 (0.8)	3.9 (0.7)	0.87
Up-to-date Pap screening‖, no (%)	28 (47)	29 (48)	0.85

* *Acculturation was measured using the Short Acculturation Scale for Hispanics (Marin 1987)*

† *Health status was measured by a 1-question self-report with 5-point Likert scale response options*

‡ *Cervical cancer knowledge was measured by a six-question instrument developed by the study team and is expressed as the mean score of questions answered correctly*

§ *Self-efficacy for Pap smear receipt was measured by the Self-efficacy Scale for Pap Smear Screening Participation (SES-PSSP), with a maximum score of 5 (Hogenmiller 2007)*

‖ *Defined as having had a Pap smear during the 12 months prior to enrollment*

up-to-date with Pap smear screening at baseline, the difference in screening rates between the two groups was significant at 6 months (71% vs. 22%, P=0.004). Cervical cancer knowledge was significantly higher among intervention participants at 6 months, and was also significant as a difference in differences from baseline (2.2 vs. 0.2, P<0.001). Self-efficacy also demonstrated a significant increase among intervention participants.

Table 2. Study Outcomes at 6 Months

Outcome	Intervention group (N=34)	Control group (n=36)	P-value
Receipt of Pap smear, no (%)	22 (65)	13 (36)	0.02
Cervical cancer knowledge* (SD)	5.4 (0.8)	3.5 (1.0)	<0.001
Self-efficacy† (SD)	4.7 (0.7)	4.0 (0.8)	0.002

* *Cervical cancer knowledge is expressed as a mean score out of a maximum of 6*

† *Self-efficacy is expressed as a mean score out of a maximum of 5*

Table 3 displays the results from our exploratory multivariate logistic regression model describing the association of multiple predictors with Pap smear receipt in the follow-up cohort. Only post-intervention cervical cancer knowledge and group assignment were predictive of receiving a Pap smear during the 6-month follow-up period. There was an association between acculturation and Pap smear receipt, which was not statistically significant.

DISCUSSION

The study findings support our primary hypothesis, demonstrating the effectiveness of this promotora-led intervention on increasing participants' self-efficacy and knowledge about cervical cancer, in addition to significantly improving Pap smear screening rates at 6 months. Perhaps these findings reflect some of the proposed benefits of using a promotora model for cancer education[69], despite the inherent challenges of implementing and evaluating such programs[70]. This approach is culturally competent and interactive, allowing more time for learning than physicians are able to accommodate during brief office visits. Our study also provides preliminary evidence that knowledge about cervical cancer predicts receipt of Pap smear screening. Our model also revealed a significant association between group assignment and Pap receipt. The odds ratio for acculturation was large as was the CI.

There are several strengths of the current study. First, randomizing participants at the individual level represents a methodological improvement over much of the existing CHW literature, where weaker experimental designs are more prevalent[57,58,62,71–73]. Second, the community-based recruitment strategies employed here produced a study cohort that is likely more representative of the overall population than a clinic-

Table 3. Adjusted Odds Ratios of the Association between Explanatory Variables and Receipt of Pap Smear Screening in the Follow-up Cohort (N=70)

Variable	Receipt of Pap smear screening		
	Adjusted OR	95% CI	P-value
Age	0.97	0.91-1.03	0.33
Education (<8 yrs, >8 yrs)	0.78	0.23-2.68	0.70
Usual Source of Care	0.82	0.16-4.21	0.81
Parity (0 = reference)	1	–	–
1 child	0.67	0.12-3.82	0.65
≥2 children	0.47	0.09-2.48	0.37
Acculturation*	4.34	0.53-35.51	0.17
Self-efficacy†	0.82	0.32-2.10	0.68
Cervical cancer knowledge‡	1.68	1.10-2.81	0.05
Intervention group assignment	6.74	1.77-25.66	0.01

* *Acculturation was measured by the Short Acculturation Scale for Hispanics (Marin 1987)*

† *Self-efficacy was measured by the Self-Efficacy Scale for Pap Smear Screening Participation (Hogenmiller 2007)*

‡ *Cervical cancer knowledge was measured by a 6-question instrument developed by the study team*

based cohort. Our unique cohort with low levels of acculturation provides an important contribution to the existing literature, which has either studied more acculturated Hispanic women[58,61] or not reported acculturation levels[59,71,73]. Third, the current study enrolled new Hispanic immigrants, the majority of whom (92%) did not have health insurance coverage. Since lack of insurance is a well-recognized barrier to Pap smear receipt[18], our intervention might have an even larger impact on cervical cancer screening in insured populations than was observed in the current study. Finally, our validation of Pap self-report using chart data represents another strength of the current study.

There are also obvious limitations to the current study. The unique nature of our study cohort limits the generalizability of our findings to more established Hispanic immigrants and U.S.-born Hispanics. Although we did not gather data about participants' immigration status, the collective experience of the investigators and community partners suggests that a majority of the target population is undocumented. This did not affect study recruitment but likely had an impact on the large drop-out rate observed here, which was similar to other studies evaluating promotora-led cervical cancer interventions in the community setting[58,59,61]. Nevertheless, even with these small samples, we had sufficient power to detect the observed difference in Pap smear screening rates between the two groups at a significance level of P=0.1.

A sensitivity analysis was performed assuming that all participants who were lost to follow-up did not receive a Pap smear, which revealed a consistent but insignificant result for Pap receipt (37% vs. 21%, P=0.07). The participants who followed-up reported better overall health status than those who did not, which may have introduced bias away from the null since those with better health may undergo cancer screening more regularly than those who report poor health[74]. Although our 6-month follow-up period is consistent with several studies in the existing literature[58,61,72], a 1-year assessment would have provided a more medically relevant interval for follow-up. This shorter follow-up period may have underestimated the effect of the intervention on screening behavior, since it was not indicated at 6 months for many participants.

The current study is the first trial of a promotora-led cervical cancer intervention involving a randomized community-based sample. Our intervention demonstrated a larger effect on Pap smear screening rates than most previous non-randomized studies, and those that randomized either CHWs or communities[56,60,61,72,73]. Perhaps this reflects the effectiveness of the curriculum in motivating behavior change; although the original study on which our curriculum was based reported a more modest effect[61]. The promotoras' skill may also help explain our intervention's large impact on Pap screening rates, and future research might examine the effectiveness of individual CHWs to identify the qualities that promote success in this role. Our intervention also demonstrated a greater impact on the participants' knowledge about cervical cancer than others in the existing literature[58,60]. Self-efficacy was measured in only one previous study, which reported a modest, but statistically significant increase following their intervention[58].

An important finding of the current study is the observed association between knowledge about cervical cancer and receipt of Pap screening. Although the association between cervical cancer knowledge and screening is consistent with several theoretical models of health behavior[75] and has been suggested in observational studies[76–82], our study is the first to report this result in the context of an intervention trial. This finding has important implications for reducing cancer disparities in communities where cancer-related knowledge is poor. Future research should examine the impact of knowledge on screening behavior in larger, more diverse cohorts; and efforts to improve screening among the underserved must consider the importance of educational outreach as a component of such programs.

Another interesting finding from our multivariate analysis is the large, though statistically insignificant association between acculturation and receipt of Pap smear. Several observational studies have examined the impact of acculturation on Pap smear receipt in Hispanics, many using proxy measures for acculturation[83–86]. Studies analyzing NHIS data and using a modified acculturation measure similar to the current study have failed to show a consistent association between acculturation and Pap smear receipt[87–89]. Further research is necessary to clarify the relationship between acculturation and Pap smear screening, which may suggest new strategies for improving cancer screening in Hispanic women. In conclusion, our community health worker intervention carries promise to reduce cervical cancer disparities in Hispanics. Future research should both evaluate such programs in larger randomized cohorts, and help identify new intervention components to improve upon existing programs.

Acknowledgments: *The authors thank the promotoras whose work is the subject of this article, and whose dedication to this study has been essential to its success. Their names are Susana Pimentel, Irma Zamora, Bertha Gonzalez, and Guadalupe Canchola. The authors would like to thank Giselle Dutcher and Darryl Powell for their help in the implementation of this study. We also thank Dr. Steven Larson for helping conceptualize and develop our community health worker program. We acknowledge our community partners involved in the design and ongoing implementation of the study: Puentes de Salud Health Center, the Mexican Consulate of Philadelphia, the Catholic Archdiocese of Philadelphia, and Juntos Mexicanos. The current study was supported by Grant Number UL1RR024134 from the National Center for Research Resources. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Center for Research Resources or the National Institutes of Health. This paper was presented at the SGIM 33rd Annual Meeting in April 2010.*

Conflict of Interest: *None disclosed.*

Corresponding Author: *Matthew J. O'Brien, MD, MSc; Division of General Internal Medicine, Temple University School of Medicine, 3223 North Broad St, Suite 175, Philadelphia, PA 19140, USA (e-mail: dmob76@gmail.com).*

REFERENCES

1. **Guzman B.** Census 2000 brief: The Hispanic population. Washington, DC: U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census; 2001.
2. U.S. Census Bureau. U.S. Interim Projections by Age, Sex, Race, and Hispanic Origin: 2000-2050. Available from: http://www.census.gov/population/www/projections/usinterimproj/. Accessed June 11, 2010

3. National healthcare disparities report. Washington, DC: U.S. Department of Health and Human Services, Agency for Healthcare Research and Quality; 2008.
4. **Smedley B, Stith A, Nelson A, eds.** Unequal treatment: Confronting racial and ethnic disparities in health care. Washington, DC: The Institute of Medicine: The National Academies Press; 2003.
5. **Schlotthauer A, Badler A, Cook S, Perez D, Chin M.** Evaluating interventions to reduce health care disparities: An RWJF program. Health Aff. 2008;27(2):568–73.
6. **Howe H, Wu X, Ries L, Cokkinides V, Ahmed F, Jemal A, et al.** Annual report to the nation on the status of cancer, 1975-2003, featuring cancer among U.S. Hispanic/Latino populations. Cancer. 2006;107(8):1711–42.
7. Cancer facts and figures for Hispanics/Latinos 2009-2011. Atlanta, GA: American Cancer Society; 2009.
8. **Barnholtz-Sloan J, Petel N, Rollison D, Kortepeter K, MacKinnon J, Giuliano A.** Incidence trends of invasive cervical cancer in the United States by combined race and ethnicity. Canc Causes Contr. 2009;20:1129–38.
9. Cancer prevention and early detection facts and figures 2009. Atlanta, GA: American Cancer Society; 2009.
10. **Bazargan M, Bazargan S, Farooq M, Baker R.** Correlates of cervical cancer screening among underserved Hispanic and African-American women. Prev Med. 2004;39:465–73.
11. **Holschneider C, Felix J, Satmary W, Johnson M, Sandweiss L, Montz F.** A single-visit cervical carcinoma prevention program offered at an inner city church. Cancer. 1999;86(12):2659–67.
12. **Sirovich B, Welch H.** The frequency of Pap smear screening in the United States. J Gen Intern Med. 2004;19(3):243–50.
13. **Arredondo E, Pollak K, Costanzo P.** Evaluating a stage model in predicting monolingual Spanish-speaking Latinas' cervical cancer screening practices: The role of psychosocial and cultural predictors. Health Educ Behav. 2008;35(6):791–805.
14. **Johnson C, Mues K, Mayne S, Kiblawi A.** Cervical cancer screening among immigrants and ethnic minorities: A systematic review using the health belief model. J Low Genit Tract Dis. 2008;12(3):232–41.
15. **Austin L, Ahmad F, McNally M, Stewart D.** Breast and cervical cancer screening in Hispanic women: A literature review using the health belief model. Womens Health Issues. 2002;12(3):122–8.
16. **Ackerson K, Gretebeck K.** Factors influencing cancer screening practices of underserved women. J Am Acad Nurse Pract. 2007;19:591–601.
17. **Garbers S, Chiasson M.** Inadequate functional health literacy in Spanish as a barrier to cervical cancer screening among immigrant Latinas in New York City. Prev Chron Dis. 2004;1(4):1–10.
18. **Rodriguez M, Ward L, Perez-Stable E.** Breast and cervical cancer screening: Impact of health insurance status, ethnicity, and nativity of Latinas. Ann Fam Med. 2005;3:235–41.
19. **Byrd T, Chavez R, Wilson K.** Barriers and facilitators of cervical cancer screening among Hispanic women. Ethn Dis. 2007;17(1):129–34.
20. **Cadarelli R, Kurian A, Pandya V.** Having a personal healthcare provider and recepit of adequate breast and cervical cancer screening. J Am Board Fam Med. 2010;23(1):75–81.
21. **Mead H, Cartwright-Smith L, Jones K, Ramos C, Siegel B, Woods K.** Racial and ethnic disparities in U.S. health care: a chartbook. New York: The Commonwealth Fund; 2008.
22. **Flores K, Bencomo C.** Preventing cervical cancer in the Latina population. J Womens Health. 2009;18(12):1935–43.
23. **Goel M, Wee C, McCarthy E, Davis R, Ngo-Metzger Q, Phillips R.** Racial and ethnic disparities in cancer screening: The importance of foreign birth as a barrier to care. J Gen Intern Med. 2003;18(12):1028–35.
24. **Witmer A, Seifer S, Finocchio L, Leslie J, O'Neil E.** Community health workers: integral members of the health care workforce. Am J Public Health. 1995;85:1055–8.
25. **Perez L, Martinez J.** Community health workers: Social justice and policy advocates for community health and well-being. Am J Public Health. 2008;98:11–4.
26. **Love M, Gardner K, Legion V.** Community health workers: What they are and what they do. Health Educ Behav. 1997;24(4):510–22.
27. **Humphrey J, Jameson L, Beckham S.** Overcoming social and cultural barriers to care for patients with diabetes. West J Med. 1997;167:138–44.
28. **Ingram M, Torres E, Redondo F, Bradford G, Wang C, O'Toole M.** The impact of promotoras on social support and glycemic control among members of a farmworker community on the U.S.-Mexico border. Diab Educ. 2007;33(Suppl 6):172S–8.
29. **Lujan J, Ostwald S, Ortiz M.** Promotora diabetes intervention for Mexican Americans. Diab Educ. 2007;33(4):660–70.
30. **Thompson J, Horton C, Flores C.** Advancing diabetes self-management in the Mexican-American population: A community health worker model in a primary care setting. Diab Educ. 2007;33:159S–65.
31. **Campbell M, James A, Farrell M, Tessaro I.** Improving multiple behaviors for colorectal cancer prevention among African American church members. Health Psychol. 2004;23(5):492–502.
32. **Erwin D, Spatz T, Stotts R, Hollenberg J.** Increasing mammography practice by African American women. Cancer Pract. 1999;7(2):78–85.
33. **Koval A, Riganti A, Foley K.** CAPRELA (Cancer Prevention for Latinas): Findings of a pilot study in Winston-Salem, Forsyth County. NC Med J. 2006;67(1):9–15.
34. **Paskett E, Tatum C, Rushing J, Michielutte R, Bell R, Foley K, et al.** Randomized trial of an intervention to improve mammography utilization among a triracial rural population of women. J Natl Cancer Inst. 2006;98:1226–37.
35. **Welsh A, Sauaia A, Jocobellis J, Min S, Byers T.** The effect of two church-based interventions on breast cancer screening rates among Medicaid-insured Latinas. Prev Chron Dis. 2005;2(4):1–11.
36. **Balcazar H, Alvarado M, Cantu F, Pedregon V, Fulwood R.** A promotora de salud model for addressing cardiovascular disease risk factors in the U.S.-Mexico border region. Prev Chron Dis. 2009;6(1):1–8.
37. **Hill M, Han H, Dennison C, Kim M, Roary M, Blumenthal R, et al.** Hypertension care and control in underserved African American men: Behavioral and physiologic outcomes at 36 months. Am J Hypertens. 2003;16:906–13.
38. **Krieger J, Collier C, Song L, Martin D.** Linking community-based blood pressure measurement to clinical care: A randomized controlled trial of outreach and tracking by community health workers. Am J Public Health. 1999;89:856–61.
39. **Staten L, Gregory-Mercado K, Ranger-Moore J, Will J, Giuliano A, Ford E, et al.** Provider counseling, health education, and community health workers: The Arizona WISEWOMEN project. J Womens Health. 2004;13(5):547–56.
40. **Fox P, Porter P, Lob S, Boer J, Rocha D, Adelson J.** Improving asthma-related health outcomes among low-income, multiethnic, school-aged children: Results of a demonstration project that combined continuous quality improvement and community health worker strategies. Pediatrics. 2007;120:e902–11.
41. **Krieger J, Takaro T, Song L, Weaver M.** The Seattle-King County healthy homes project: A randomized, controlled trial of a community health worker intervention to decrease exposure to indoor asthma triggers. Am J Public Health. 2005;95:652–9.
42. **Martin M, Hernandez O, Naureckas E, Lantos J.** Reducing home triggers for asthma: The Latino community health worker approach. J Asthma. 2006;43(5):369–74.
43. **Parker E, Israel B, Robbins T, Mentz G, Lewis T.** Evaluation of Community Action Against Asthma: A community health worker intervention to improve children's asthma-related health by reducing household environmental triggers for asthma. Health Educ Behav. 2008;35(3):376–95.
44. **Thyne S, Marmor A, Madden N, Herrick G.** Comprehensive asthma management for underserved children. Paediatr Perinat Epidemiol. 2007;21(Suppl 3):29–34.
45. **Hunter J, De Zapien J, Papenfuss M, Fernandez M, Meister J, Giuliano A.** The impact of a promotora on increasing routine chronic disease prevention among women aged 40 and over at the U.S.-Mexico border. Health Educ Behav. 2004;31(4):18S–28.
46. **Navaie-Waliser M, Martin S, Tessaro I, Campbell M, Cross A.** Social support and psychological functioning among high-risk mothers: The impact of the Baby Love Maternal Outreach Program. Public Health Nurs. 2000;17(4):280–91.
47. **Rogers M, Peoples-Sheps M, Suchindran C.** Impact of a social support program on teenage prenatal care use and pregnancy outcomes. J Adolesc Health. 1996;19:132–40.
48. **Watkins E, Larson K, Harlan C, Young S.** A model program for providing health services for migrant farmworker mothers and children. Public Health Rep. 1990;105(6):567–75.
49. **O'Brien M, Squires A, Bixby R, Larson S.** Role Development of Community Health Workers: An examination of selection and training processes in the intervention literature. Am J Prev Med. 2009;37(6S1):S262–9.
50. **Martinez-Donate A.** Using lay health advisors to promote breast and cervical cancer screening among Latinas: A brief qualitative review. Wis Med J. 2009;108(5):49–51.

51. **Rhodes S, Foley K, Zometa C, Bloom F.** Lay health advisor interventions among Hispanics/Latinos: A qualitative systematic review. Am J Prev Med. 2007;33(5):418–27.
52. **Swider S.** Outcome effectiveness of community health workers: An integrative literature review. Public Health Nurs. 2002;19(1):11–20.
53. **Lewin S, Dick J, Pond P, Zwarenstein M, Aja G, van Wyk B, et al.** Lay health workers in primary and community health care. Cochrane Database of Systematic Reviews 2005(1):1-104.
54. Community health worker national workforce study. Washington, DC: U. S. Department of Health and Human Services, Health Services and Resource Administration; 2007.
55. NIH. Cervical cancer consensus statement. 1996;14(1):1-38.
56. **Margolis K, Lurie N, McGovern P, Tyrrell M, Slater J.** Increasing breast and cervical cancer screening in low-income women. J Gen Intern Med. 1998;13:515–21.
57. **Bird J, McPhee S, Ha N, Le B, Davis T, Jenkins C.** Opening pathways to cancer screening for Vietnamese-American women: Lay health workers hold a key. Prev Med. 1998;27:821–9.
58. **Fernandez M, Gonzales A, Tortolero-Luna G, Williams J, Saavedra-Embesi M, Chan W, et al.** Effectiveness of Cultivando la Salud: A breast and cervical cancer screening promotion program for low-income Hispanic women. Am J Public Health. 2009;99:936–43.
59. **Jandorf L, Bursac Z, Pulley L, Trevino M, Castillo A, Erwin D.** Breast and cervical cancer screening among Latinas attending culturally specific educational programs. Progress in Community Health Partnerships. 2008;2(3):195–204.
60. **Lam T, McPhee S, Mock J, Wong C, Doan H, Nguyen T, et al.** Encouraging Vietnamese-American women to obtain Pap tests through lay health worker outreach and media education. J Gen Intern Med. 2003;18:516–24.
61. **Navarro A, Senn K, McNicholas L, Kaplan R, Roppe B, Campo M.** Por la Vida model intervention enhances use of cancer screening tests among Latinas. Am J Prev Med. 1998;15(1):32–41.
62. **Navarro A, McNicholas L, Cruz M, McKennett M, Sanchez O, Senn K, et al.** Development and implementation of a curriculum on cancer screening for small groups of Latino women. J Cancer Educ. 2007;22:186–90.
63. **Navarro A, Senn K, Kaplan R, McNicholas L, Campo M, Roppe B.** Por la Vida intervention model for cancer prevention in Latinas. J Natl Cancer Inst Monogr. 1995;18:137–45.
64. Theory at a glance: A guide for health promotion practice (2nd edition). Washington, DC: U.S. Department of Health and Human Services, National Institutes of Health; 2005.
65. **Israel B, Eng E, Schultz A, Parker E, eds.** Methods in community-based participatory research for health. San Francisco: John Wiley & Sons; 2005.
66. **Squires A, O'Brien M.** Becoming a promotora: a transformative process for female community health workers. under review Jan 2010
67. **Hogenmiller J, Atwood J, Lindsey A, Johnson D, Hertzog M, Scott J.** Self-efficacy scale for Pap smear screening participation in sheltered women. Nurs Res. 2007;56(6):369–77.
68. **Marin G, Sobogal F, Marin B, Otero-Sabogal R, Perez-Stable E.** Development of a short acculturation scale for Hispanics. Hisp J Behav Sci. 1987;9(2):183–205.
69. **Martin M.** Community health advisors effectively promote cancer screening. Ethn Dis. 2005;15(suppl 2):S214–6.
70. **Berman PG.** DR, Burger S. Community-based health workers: head start or false start towards health for all? Soc Sci Med. 1987;25(5):443–59.
71. **Bullock K, McGraw S.** A community capacity-enhancement approach to breast and cervical cancer screening among older women of color. Health Soc Work. 2006;31(1):16–25.
72. **Hansen L, Feigl P, Modiano M, Lopez J, Sluder S, Moinpour C, et al.** An educational program to increase cervical and breast cancer screening in Hispanic women. Cancer Nurs. 2005;28(1):47–53.
73. **Larkey L.** Las Mujeres Saludables: Reaching Latinas for breast, cervical, and colorectal cancer prevention and screening. J Community Health. 2006;31(1):69–77.
74. **Park K, Park J, Park J, Kim H, Park B.** Does health status influence intention regarding screening mammography? Japanese Journal of Clinical Oncology;Jan 2010 [ePub ahead of print]
75. **Glanz K, Rimer B, Viswanath K, eds.** Health behavior and health education: theory, research, and practice. 4th ed. San Francisco: John Wiley & Sons; 2008.
76. **Ackerson K, Pohl J, Low L.** Personal influencing factors associated with Pap smear testing and cervical cancer. Policy Polit Nurs Pract. 2008;9(1):50–60.
77. **Anya S, Oshi D, Nwosu S.** Knowledge, attitudes, and practice of female health professionals regarding cervical cancer and Pap smear. Niger J Med. 2005;14(3):283–6.
78. **Kim K, Yu E, Chen E, Kim J, Kaufman M, Purkiss J.** Cervical cancer screening knowledge and practices among Korean-American women. Cancer Nurs. 1999;22(4):297–302.
79. **Mutyaba T, Mmiro F, Weiderpass E.** Knowledge, attitudes, and practices on cervical cancer screening among the medical workers of Mulango Hospital, Uganda. BMC Med Educ. 2006;6:13–9.
80. **Nelson W, Moser R, Gaffey A, Waldron W.** Adherence to cervical cancer screening guidelines for U.S. women aged 25-64: Data from the 2005 Health Information National Trends Survey. J Womens Health. 2009;18 (11):1759–68.
81. **Sait K.** Attitudes, knowledge, and practices in relation to cervical cancer and its screening among women in Saudi Arabia. Saudi Med J. 2009;30 (9):1208–12.
82. **Uysal A, Birsel A.** Knowledge about cervical cancer risk factors and Pap testing behavior among Turkish women. Asian Pac J Cancer Prev. 2009;10(3):345–50.
83. **Abraido-Lanza A, Chao M, Gates C.** Acculturation and cancer screening among Latinas: Results from the National Health Interview Survey. Ann Behav Med. 2005;29(1):22–8.
84. **Fernandez-Esquer M, Espinoza P, Ramirez A, McAlister A.** Repeated Pap smear screening among Mexican-American women. Health Educ Res. 2003;18(4):477–87.
85. **McDonald J, Kennedy S.** Cervical cancer screening by immigrant and minority women in Canada. J Immigr Minor Health. 2007;9:323–34.
86. **Watts L, Joseph N, Velasquez A, Gonzalez M, Munro E, Muzikansky A, et al.** Understanding barriers to cervical cancer screening among Hispanic women. Am J Obstet Gynecol. 2009;201:199.e1–8.
87. **Echeverria S, Carrasquillo O.** The roles of citizenship status, acculturation, and health insurance in breast and cervical cancer screening among immigrant women. Med Care. 2006;44:788–92.
88. **Gorin SH.** JE. Cancer screening among Latino subgroups in the United States. Prev Med. 2005;40:515–26.
89. **Shah M, Zhu K, Wu H, Potter J.** Hispanic acculturation and utilization of cervical cancer screening in the US. Prev Med. 2006;42:146–9.