J Canc Educ (2016) 31:742–748
DOI 10.1007/s13187-015-0938-5

Evaluation of the Effect of a Promotora-led Educational Intervention on Cervical Cancer and Human Papillomavirus Knowledge Among Predominantly Hispanic Primary Care Patients on the US-Mexico Border

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Published online: 27 October 2015

Abstract Despite declining cervical cancer rates, ethnic minorities continue to bear an unequal burden in morbidity and mortality. While access to screening is a major barrier, low levels of knowledge and cultural influences have been found to play a part in underutilization of preventive services. The aim of our study was to evaluate the effect of a promontora-led educational intervention on cervical cancer and human papillomavirus knowledge in mainly Hispanic females attending a primary care clinic. One hundred ten females were recruited from the waiting room of a busy primary care clinic and invited to attend individual or small group educational sessions. Participants completed knowledge surveys pre- and post-intervention. An overall evaluation of the educational session was also completed. Following the educational intervention, participants showed an improvement in knowledge scores from a mean score of 10.8 (SD 3.43) out of a possible score of 18 to a mean score of 16.0 (SD1.51) ($p<0.001$). 94.5 % of participants rated as excellent, the presentation of information in a way that was easy to understand, most reported that it was a good use of their time and that it lowered their anxiety about testing for early detection of cervical cancer. An educational intervention delivered by well-trained Promotora/Lay health care worker significantly improves patient's cervical cancer and HPV knowledge and can be a useful tool in patient education in the clinical setting especially with high risk populations.

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Keywords Cervical cancer screening · Promotora · Patient education · Human papiloma virus · HPV · Primary care setting

Introduction

Despite advances in cervical cancer prevention over the last several decades, disparity in cervical cancer incidence and mortality in ethnic minorities remain [1]. While rates of cervical cancer have continued to decline following the introduction of the Papanicolaou smear (Pap smear) as a screening tool, ethnic minorities continue to bear an unequal burden of this disease. Most recent data shows incidence rates for human papillomavirus (HPV)-associated cervical cancer at 11.3 per 100,000 for Hispanic women versus 7.4 per 100,000 in white non-Hispanic females [1]. In Texas, the incidence rates of cervical cancer are higher than the national average (14.2 versus 8.9 per 100,000) and for Hispanic women living along border communities, these rates are even higher (16.6 per 100,000) [24,26].

Pap smears remain an important screening tool in the prevention of cervical cancer. Cervical cancer screening when completed appropriately, allows providers the ability to identify pre-cancerous lesions and offer appropriate follow-up and treatment. The majority of cervical cancers diagnosed in the USA occur in women who have never had a Pap smear or have not had one in the last 5 years [15]. This illustrates the importance of appropriate and regular screening for reduction in cervical cancer rates and mortality. Unfortunately, there is an underutilization of preventive health services by low income and minority women in the USA.

Hispanic women in the USA are less likely than white or African American women to have ever had a Pap smear [19]. Several reasons have been postulated for these disparities including poverty, lack of access, and differences in the utilization of cancer screening services by ethnic minorities [3,5].

Factors influencing underutilization of cervical cancer screening services among Hispanic women include low levels of knowledge, limited access to medical care, and cultural influences [2,4,6]. While access to care is an important barrier in obtaining cervical cancer screening, there are some cultural barriers as well as knowledge gaps that affect utilization of screening services among minority women. Hispanic women attending a safety net clinic were found to have significantly less odds of ever having had a pap smear (79.3 % for Hispanic Americans and 77.3 % for Hispanic immigrants) when compared to their non-Hispanic white counterparts despite similar access to these services [19].

With evidence for the efficacy of cervical cancer screening in the prevention of advanced disease and the documented underutilization of these services by low income and minority women, it is important that we develop educational tools in the clinical setting to assist in reaching out to high-risk individuals. Anecdotally educational programs occurring in the clinical setting involve information provided directly by health providers, e.g., written information in the way of pamphlets or condition-specific clinical summaries printed out from the electronic health records. The promotora (lay health worker) approach, started in Latin America in the 1950s. This approach bridges a gap between the community and health care providers to promote health; this model is based on peer health education that is culturally and linguistically appropriate [22]. This approach works well in Hispanic communities and can lead to increased screening rates for cervical cancer in community-based settings in women of mostly Mexican American descent [7]. Integration of a promotora for health education in a clinic setting could be a way to improve knowledge about HPV and cervical cancer screening.

The aims of our study were to evaluate the effect of a promotora-led educational program on HPV and cervical cancer screening knowledge and to ascertain the receptivity of this type of program by patients in a busy primary care clinic setting.

Materials and Methods

Participants

A total of 347 women were approached and invited to participate in the study over a period of 8 months from January 2014 to August 2014. Women were approached about this study while waiting to receive care at two primary care clinic sites. One hundred ten participants (31.7 %) met the inclusion criteria and agreed to participate in the study.

Clinics used as sites for this study are university-affiliated clinics located on the US-Mexico border. Physicians and staff at the clinics were also informed about the study so they could refer their patients. Flyers were also posted in the clinic to advertise the study. Inclusion criteria were as follows: females aged 30 to 65 years, patients who received care in these primary care clinics, and had a uterus. Participants were excluded if they had a history of cervical cancer, a hysterectomy, or were pregnant. The Institutional Review Board approved the study, and written informed consent was obtained prior to participation.

Educational Program

Materials for the educational session were developed based on literature review [2–4] and findings from focus groups conducted in a similar clinical setting [20],

The one hour educational session covered information on important basic cervical cancer facts and also addressed pertinent questions previously identified in previous focus groups. The following topics were addressed in the session: what is cervical cancer, who gets cervical cancer, how do women get cervical cancer, causes of cervical cancer, role of HPV in causing cervical cancer, symptoms of cervical cancer, risk factors for cervical cancer, screening guidelines for cervical cancer, and prevention of HPV. Participants were also encouraged to ask questions and discuss openly with the promotora.

Procedure

Participants were approached in the waiting room as they waited for appointments with clinic providers. Once participants met inclusion criteria and agreed to participate in study, their preferred language was determined. Our trained promotora is bilingual; in addition, all survey and consent materials were available in both Spanish and English. Following consent, participants completed an initial demographic survey that included questions on age, marital status, income, health insurance status, educational level, and country of birth (see Table 1). Those participants that self-identified as having a Hispanic background also completed a five-item acculturation survey.

Study participants partook in an hour long educational session with a trained promotora. Educational sessions were carried out on an individual or small group (2–3 individuals) basis. Sessions were also held in English or Spanish based on participants identified preferred language. Following completion of sessions, participants completed a post-education survey reassessing their level of knowledge using the same set of knowledge questions used prior to intervention. They were also asked to evaluate the session based on the following measures: was the information presented in a way that was easy to understand, did the promotora answer their questions, did the information provided lower their anxiety about testing for early detection for cervical cancer, and did they feel the session was a good use of their time.

Table 1 Demographic characteristic of the sample

Variable	N (110)	Mean (SD) or %
Age	110	48.2 (9.3)
Marital Status		
Never married	19	17.3
Married or living in a marriage—like relationship	55	50.0
Separated /divorce/widowed	36	32.7
Health		
Excellent	4	3.6
Very good	21	19.1
Good	35	31.8
Fair	42	38.2
Poor	8	7.3
Type of health coverage		
No	12	10.9
Discount program	27	27.8
Medicaid/medicare	42	43.3
Private	28	28.9
Education, mean (SD)	109	11.6 (2.9)
<9th	14	12.8
9–12th	58	53.2
13th or more	37	33.9
Country–Born		
Mexico	55	50.0
USA	46	41.9
Other	8	8.1
Acculturation index, mean (SD)	87	2.3 (0.77)
Low (1.00–2.39)	45	51.7
Medium (2.40–3.69)	39	44.8
High (3.70–5.00)	3	3.44
Heard about cervical cancer : yes	87	79.1
Heard about pap smear : yes	107	97.3
Had a pap smear : yes	109	99.1
Pap due >3 years: yes	18	16.4

Measures

The consents, surveys, and educational material were initially developed in English. We had a trained Spanish translator transcribe all materials into Spanish. Two of our coauthors, who are bilingual, reviewed the Spanish material for accuracy and comprehension.

We assessed study participant's knowledge level at baseline and subsequent to the educational sessions using a survey that evaluated their awareness level of Pap smear, cervical cancer screening, and HPV. The survey included questions based on knowledge gaps identified in a previous study with a similar population [6] as well as information obtained from focus group sessions that were held prior to onset of the intervention [20]. The survey contained a total of 18 true/false type questions that covered knowledge of cervical cancer, Pap smear, and HPV. Eight of the questions focused on cervical cancer/Pap screening, while the other 10 questions were focused on HPV. See Table 2 for knowledge measures.

The acculturation index was determined using a five-question survey covering language spoken at home, language participant reads in, where early life was spent, what circle of friends they kept, and how proud they were of their Hispanic background. This scale has been validated for use in the Hispanic population [9]. The acculturation index was computed as the raw sum of the Likert scores for each item (maximum score of 25, minimum score 5) divided by 5 to obtain the Acculturation Index (AI). Acculturation is defined as Low if scores are between 1.00 and 2.39, Medium =2.40–3.69 and High if scores are ≥3.709. There were no missing data in our sample to account for.

Promotora Training

The promotora's training consisted of three initial sessions followed by continued review and supervision during the study period. The promotora participated in the initial focus group as an observer, to expose her to attitudes and barriers expressed by the target population towards screening for cervical cancer screening and HPV. The second session involved a review of several topics including the cause of cervical cancer, risk factors, basic pathophysiology, as well as disease progression. This provided her with baseline cervical cancer and HPV knowledge. This session also included training in communication skills to help improve her ability to deliver the educational sessions in both English and Spanish. The third session allowed her to practice delivering the educational material and received feedback from other staff members and the study coordinator. An initial pilot phase with 10 participants was carried out which allowed her to refine her presentation. To reinforce the community outreach worker skills, every week she met with the study coordinator and clinicians to discuss specific problems or issues related to the participants and address questions that came up during the educational sessions.

Analysis

Baseline characteristics were evaluated using descriptive statistics. Knowledge questions were true/false type questions, and participants were scored as to whether or not their response was correct. Final knowledge scores were determined by the sum of correct answers. Participants received one point (1) for each correct answer and zero (0) for incorrect answers or no response (don't know). Mean and SD scores for the overall knowledge scale were then calculated. The maximum possible score for the knowledge section is 18. For each

Table 2 Comparison of women's knowledge about cervical cancer and HPV before and after the educational intervention (n=110)

	Items	Correct response pre-intervention n (%)	Correct response post-intervention n (%)	Difference	McNemar test P value
1	A lack of hygiene can cause cervical cancer	54 (49.1)	101 (92.7)	43.6	<0.001
3	Pap testing is done by drawing your blood	106 (96.4)	108 (98.2)	1.8	0.687
3	Women who have gone through menopause still need Pap tests	98 (89.1)	102 (92.7)	3.6	0.289
4	If women have regular Pap tests, advanced cervical cancer is unlikely	48 (43.6)	68 (61.8)	18.2	<0.001
5	A Pap test is important for a woman under 65 years	106 (96.4)	107 (97.3)	0.9	1.00
6	Only women who have had many sex partners need to get a Pap test	100 (90.9)	107 (97.3)	6.4	0.065
7	A Pap test can only detect advanced (invasive) cervical cancer	75 (68.2)	78 (70.9)	2.7	0.629
8	I need a Pap test only when I experience problems like pain or vaginal bleeding that is not my period	96 (87.3)	100 (90.9)	3.6	0.424
9	HPV can cause cervical cancer	66 (60.0)	105 (95.5)	35.5	0.008
10	HPV can be spread by sexual intercourse	69 (62.7)	108 (98.2)	35.5	0.001
11	HPV is a rare infection	47 (42.7)	71 (64.5)	21.8	0.169
12	HPV can cause abnormal Pap tests	64 (58.2)	100 (90.9)	32.7	0.027
13	A woman can usually tell if she is has HPV	52 (56.4)	103 (93.6)	37.2	0.003
14	A doctor can check if you have HPV infection while doing the Pap test	61 (55.5)	100 (90.9)	35.4	0.023
15	A vaccine can protect you from infection against types of HPV	54 (49.1)	105 (95.5)	46.4	<.001
16	Infection with HPV can go away without treatment	6 (5.5)	72 (65.5)	60.0	<.001
17	Condoms protect you from infection against HPV	20 (18.2)	104 (94.5)	76.3	<.001
18	A person's chances of getting HPV increases with the number of sexual partners they have	65 (59.1)	109 (99.1)	40.0	<.001
	Total knowledge score 0–18	10.8 (3.43)	16.0 (1.51)	+5.20	<.001&
	Hispanic	11.96 (3.30)	15.95 (1.49)	+3.99	<.001&
	Non-Hispanic	10.60 (3.40)	16.01 (1.52)	+5.41	<.001&

&Wilcoxon signed-rank test

knowledge question, the percentage of participants responding correctly to the question was reported. The differences in knowledge pre- and post-educational intervention were assessed using the Wilcoxon signed-rank test for continuous data and the McNemar $x2$ test for categorical data for non-parametric distribution. The p level was set at .05 for all comparisons. To assess the acceptability of the educational session, the participants answered a total of eight questions on a four-point Likert scale ranging from "Excellent" to "Poor". The percentages of participant's responses on the Likert scale were reported. Analysis was carried out using SPSS version 22.0 software package (SPSS Inc., Chicago, IL, USA).

Results

One hundred ten participants (31.7 %) met the inclusion criteria and agreed to participate in the study. Most of the participants who declined cited fear of missing their doctor's appointment or not having time to wait following the visit. Baseline characteristics are described in Table 1. The mean age of participants was 48 (SD 9.3). Half of the participants were either married or living with a partner. Most women had some form of health insurance coverage and majority self-reported their health status as fair (38 %) or good (32 %). A majority of the participants (79 % N=87) self-identified as being of Hispanic origin. The mean number of years of education was 11 and majority reported were high school graduates. Fifty percent of the women were born in Mexico. At baseline, 99 % reported ever having had a Pap test and 16 % were due for Pap (last Pap 3 years or more).

The comparison between baseline knowledge about cervical cancer and HPV infection and post-education intervention knowledge score is shown in Table 2. The pre-test and post-test scores were compared based on the number of correct answers. At baseline, the respondents seemed more likely to respond correctly to questions on Pap smear (questions 1–8) that they did on questions relating to HPV knowledge. Five of the eight Pap questions had at least 80 % of the participants responding correctly at baseline while none of the HPV knowledge questions had 80 % of the participants responding correctly at baseline. Of the 18 knowledge questions, participants had a statistically significant improvement in knowledge score on 13 questions (see Table 3). The question with the least number of people responding correctly was regarding HPV: "Infection with HPV can go away without treatment" with only 5.5 % of respondents answering correctly and this

Table 3 Participant's view of the promotora-delivered educational session

Variable	n=110	%
How well did the promotora present information in a way that was easy to understand?		
Excellent	104	94.5
Good	6	5.5
Fair	0	0
Poor	0	0
Answer your questions in a way that was easy to understand?		
Excellent	101	91.8
Good	8	7.3
Fair	0	0
Poor	1	0.9
Lower your anxiety about test for early detection of cervical cancer?		
Excellent	92	83.6
Good	18	14.5
Fair	1	0.9
Poor	1	0.9
Make good use of your time?		
Excellent	91	82.7
Good	18	16.4
Fair	0	0
Poor	1	0.9
The amount of information provided was:		
Too much	15	13.6
About right	94	85.5
Too little	1	0.9
During the learning session, how often did you feel embarrassed?		
Often	2	1.8
Rarely	11	10.0
Not at all	97	88.2
The promotora presenting the information was knowledgeable about the topic.		
Strongly agree	88	91.8
Agree	9	8.2
Strongly disagree	0	0
Disagree	0	0
The promotora was friendly.		
Strongly agree	101	91.8
Agree	9	8.2
Strongly disagree	0	0
Disagree	0	0

improved to 65 % (p<0.001) after education. Following the educational intervention, participants showed an improvement from a mean score of 10.8 (SD 3.43) out of a possible score of 18 to a mean score of 16.0 (SD1.51) (p<0.001).

Table 4 shows the comparison between Hispanic and non-Hispanic participants. Participants were similar in regards to marital status and perceived health status but significantly differed in educational status and insurance status (p 0.004; p 0.008). Baseline knowledge scores were similar in both groups 10.60 versus 11.96 (p 0.09). Both Hispanics and non-Hispanics had a statistically significant increase in knowledge post-educational session +3.99 (p<0.001) and +5.41 (p<0.001)

In general, participants viewed the promotora-delivered educational session positively. The majority of participants felt the information was presented in a way that made it easier to understand (Excellent: 94.5 %), and felt that the promotora answered their questions in a way that was easy to understand. Also, 83 % of the participants rated the educational session's impact in reducing their anxiety about testing for early detection of cervical cancer as excellent. In regards to the time spent to receive the education, the majority agreed it was a good use of their time. Fifteen women reported that the amount of information was too much, and the majority didn't feel embarrassed during the presentation of information. Most of them felt the promotora knew the topic well and was friendly (Table 3).

Table 4 Demographic characteristics and knowledge scores among Hispanic and non-Hispanic population

	Non-Hispanic n=23	Hispanic n=87	X^2 p value
Age			
Marital Status			0.169
Never married	7 (30.4)	12 (13.8)	
Married or living in a marriage—like relationship	10 (43.5)	45 (51.7)	
Separated/divorce/widowed	6 (26.1)	30 (34.5)	
Health			0.347
Excellent/VG/good	15 (65.2)	45 (51.7)	
Fair/poor	8 (34.8)	42 (48.3)	
Type of health coverage			0.008
No/discount program	3 (13.0)	36 (41.9)	
Medicaid/medicare	15 (65.2)	27 (31.4)	
Private	5 (21.7)	23 (26.7)	
Education, mean (SD)			0.004
<9th	0	14 (16.3)	
9–12th	9 (39.1)	49 (57.0)	
13th or more	14 (60.9)	23 (26.7)	
Cervical cancer and HPV knowledge			
Knowledge pre-intervention, mean (SD)	10.60 (3.40)	11.96 (3.40)	0.092
Knowledge post-intervention, mean (SD)	16.01 (1.52)	15.95 (1.49)	0.875

Discussion

Improving cervical cancer knowledge and screening in high-risk populations is an important step towards reduction of disparities in cervical cancer. While access remains an important barrier to cervical cancer screening, knowledge deficits and cultural barriers also play an important role in the persistence of disparities in cervical cancer [2,4].

Our findings demonstrate that a promotora-led educational session in the clinical setting resulted in a significant increase in participants' knowledge of cervical cancer screening as well as HPV. While all of our participants had access to regular care and were mostly up to date with recommended cervical cancer screening, they still demonstrated poor knowledge about the link between HPV and cervical cancer. This raises the concern that traditional patient education methods used in clinic settings such as provider education and printed patient materials may not be adequate for all populations. HPV knowledge has previously been documented to be very poor in a population of Hispanic females attending a health fair on the US-Mexico border [16], and our low HPV knowledge scores prior to the intervention corroborate the finding in that study that there was no association between having a regular physician and HPV knowledge in our population.

Several studies have demonstrated the effectiveness of community health workers or promotoras in improving knowledge and preventive health screening in community-based settings [7,10,25] . Interventions using a "promotora" or community health worker for group or one-to-one education have effectively increased cervical cancer screening rates among Hispanics by 30 to 50 % [11,17,18,23]. Byrd et al. demonstrated the positive effect of promotora-led education on cervical cancer screening uptake in Hispanic women in a randomized controlled trial where promotoras did outreach, recruitment, and delivery of the education about cervical cancer. Women who received the promotora-led education were significantly more likely to have reported being screened than those in the usual care group [8].

Multiple studies have reported the use of community health workers/promotoras in the clinical setting for cancer screening and prevention [12–14,21]. Most often, the use of promotoras in the clinic setting documented in the literature have been mainly for the purposes of navigation and patient reminders [12]. The majority of the participants in our promotora-led educational session rated the session good to excellent in almost all aspects of the educational session. Almost all (99 %) of the participants felt that this was a good use of their time and that the session lowered their anxiety about tests for early detection of cervical cancer

The strength of our study is the number of Hispanic women we were able to recruit. The study's main weakness was that participation was on a voluntary basis, participants were approached while waiting for their doctors' appointments and invited to participate in the educational session. This may have resulted in self-selection of participants who were motivated to obtain more information on cervical cancer screening. It is possible that this could cause an underestimation of their baseline knowledge (i.e., people who had poor knowledge who wanted to learn more). We also did not look at behavior change outcomes such as screening behavior, as a majority of the women were up to date in their screening.

In conclusion, an educational intervention delivered by a well-trained promotora significantly improves patient's cervical cancer and HPV knowledge and can be a useful tool in patient education in the clinical setting especially with high risk populations. Patients also enjoy the ability to have more tailored educational sessions where they feel comfortable and able to ask questions. Further studies will be needed to look at long-term behavior changes with education as well as the cost effectiveness of this model.

Compliance with Ethical Standards The Institutional Review Board approved the study.

Informed Consent Written informed consent was obtained prior to participation.

References

1. Centers for Disease Control and Prevention (CDC), 'Human Papillomavirus–Associated Cancers— United States, 2004–2008.' (MMWR, 2012), 258–61.
2. Ackerson K (2010) Personal influences that affect motivation in Pap Smear testing among African American women. J Obstet Gynecol Neonatal Nurs 39:136–46
3. Ackerson K, Gretebeck K (2007) Factors influencing cancer screening practices of underserved women. J Am Acad Nurse Pract 19:591–601
4. Asiedu GB, Breitkopf CR, Breitkopf DM (2014) Perceived risk of cervical cancer among low-income women. J Low Genit Tract Dis 18:304–8
5. Bazargan M, Bazargan SH, Farooq M, Baker RS (2004) Correlates of cervical cancer screening among underserved hispanic and African-American women. Prev Med 39:465–73
6. Byrd TL, Chavez R, Wilson KM (2007) Barriers and facilitators of cervical cancer screening among Hispanic women. Ethn Dis 17: 129–34
7. Byrd TL, Wilson KM, Smith JL, Coronado G, Vernon SW, Fernandez-Esquer ME, Thompson B, Ortiz M, Lairson D, Fernandez ME (2013) Amigas: a multicity, multicomponent cervical cancer prevention trial among Mexican American women. Cancer 119:1365–72
8. T.L. Byrd, K.M. Wilson, J.L. Smith, A. Heckert, C.E. Orians, S.W. Vernon, M.E. Fernandez-Esquer, and M.E. Fernandez, 'Using Intervention Mapping as a Participatory Strategy: Development of a Cervical Cancer Screening Intervention for Hispanic Women', Health Education & Behavior (2012)
9. F. Castro, H Balcazar, and M Cota, 'Health Promotion in Latino Populations: Program planning, Development and Evaluation', in

Promoting Health in Multicultural populations: A Handbook for Practitioners, edited by R. Huff and M Klein2008)
10. Fernandez ME, Gonzales A, Tortolero-Luna G, Williams J, Saavedra-Embesi M, Chan W, Vernon SW (2009) Effectiveness of cultivando la salud: a breast and cervical cancer screening promotion program for low-income Hispanic women. Am J Public Health 99:936–43
11. Hansen LK, Feigl P, Modiano MR, Lopez JA, Escobedo Sluder S, Moinpour CM, Pauler DK, Meyskens FL (2005) An educational program to increase cervical and breast cancer screening in Hispanic women: a southwest oncology group study. Cancer Nurs 28:47–53
12. Hou SI, Roberson K (2014) A systematic review on US-based community health navigator (Chn) interventions for cancer screening promotion-comparing community—versus clinic-based navigator models, J Cancer Educ
13. Jandorf L, Cooperman JL, Stossel LM, Itzkowitz S, Thompson HS, Villagra C, Thelemaque LD, McGinn T, Winkel G, Valdimarsdottir H, Shelton RC, Redd W (2013) Implementation of culturally targeted patient navigation system for screening colonoscopy in a direct referral system. Health Educ Res 28:803–15
14. Lasser KE, Murillo J, Lisboa S, Casimir AN, Valley-Shah L, Emmons KM, Fletcher RH, Ayanian JZ (2011) Colorectal cancer screening among ethnically diverse low-income patients: a randomized controlled trial. Arch Intern Med 171:906–12
15. Leyden WA, Manos MM, Geiger AM, Weinmann S, Mouchawar J, Bischoff K, Yood MU, Gilbert J, Taplin SH (2005) Cervical cancer in women with comprehensive health care access: attributable factors in the screening process. J Natl Cancer Inst 97:675–83
16. Molokwu J, Fernandez NP, Martin C (2013) HPV awareness and vaccine acceptability in Hispanic women living along the Us-Mexico Border', J Immigr Minor Health
17. Nuno T, Martinez ME, Harris R, Garcia F (2011) A promotora-administered group education intervention to promote breast and cervical cancer screening in a rural community along the U.S.-Mexico border: a randomized controlled trial. Cancer Causes Control 22:367–74
18. O'Brien MJ, Halbert CH, Bixby R, Pimentel S, Shea JA (2010) Community health worker intervention to decrease cervical cancer disparities in hispanic women. J Gen Intern Med 25:1186–92
19. Owusu GA, Eve SB, Cready CM, Koelln K, Trevino F, Urrutia-Rojas X, Baumer J (2005) Race and ethnic disparities in cervical cancer screening in a safety-net system. Matern Child Health J 9: 285–95
20. Penaranda E, Molokwu J, Hernandez I, Salaiz R, Nguyen N, Byrd T, Shokar N (2014) Attitudes toward self-sampling for cervical cancer screening among primary care attendees living on the US-Mexico border. South Med J 107:426–32
21. Percac-Lima S, Ashburner JM, Bond B, Oo SA, Atlas SJ (2013) Decreasing disparities in breast cancer screening in refugee women using culturally tailored patient navigation. J Gen Intern Med 28: 1463–8
22. Pérez LM, Martinez J (2008) Community health workers: social justice and policy advocates for community health and well-being. Am J Public Health 98:11–4
23. 'Texas Cancer Registry. (2010). Age-Adjusted Invasive Cancer Incidence Rates in Texas Cervix Uteri, 2005–2008. By County', <http://www.cancer-rates.info/tx/index.php> [Accessed April 5, 2011].
24. Watson M, Saraiya M, Benard V, Coughlin SS, Flowers L, Cokkinides V, Schwenn M, Huang Y, Giuliano A (2008) Burden of cervical cancer in the United States, 1998-2003. Cancer 113: 2855–64
25. White K, Garces IC, Bandura L, McGuire AA, Scarinci IC (2012) Design and evaluation of a theory-based, culturally relevant outreach model for breast and cervical cancer screening for Latina Immigrants. Ethn Dis 22:274–80
26. MA Williams, B Mokry, D Risser, P Betts, and NS Weiss, 'Cervical Cancer in Texas', (Austin, TX, 2006)