Published in final edited form as:

J Low Genit Tract Dis. 2015 October ; 19(4): 323–328. doi:10.1097/LGT.0000000000000134.

Women's Attitudes towards cervico-vaginal Self-Sampling for high risk HPV Infection on the U.S.- Mexico Border

Eribeth Penaranda, MD. [Assistant Professor],

Department of Family and Community Medicine. , Texas Tech University Health Sciences Center. Paul L. Foster School of Medicine., Address: 9849 Kenworthy, El Paso, TX. 79924. USA, P: 915 21155500

Jennifer Molokwu, MD MPH [Assistant Professor],

Department of Family and Community Medicine., Texas Tech University Health Sciences Center. Paul L. Foster School of Medicine., El Paso, TX. 79924. USA, P: 915 21155500

Silvia Flores, MD, MS, PhD [Research Associate],

Department of Family and Community Medicine., Texas Tech University Health Sciences Center. Paul L. Foster School of Medicine., El Paso, TX. 79924. USA, P: 915 21155500

Theresa Byrd, DrPh, PhD [Associate Dean and Chair],

Department of Public Health, Texas Tech University Health Sciences Center., Lubbock, TX. USA

Louis Brown, PhD [Assistant Professor], and

Health Promotion and Behavioral Sciences, The University of Texas Health Science Center at Houston, School of Public Health, El Paso, TX. USA, (915) 747-8506

Navkiran Shokar, MD, MPH [Professor]

Vice chair for Research, Department of Family and Community Medicine., Texas Tech University Health Sciences Center. Paul L. Foster School of Medicine., El Paso, TX. 79924. USA P: 915 21155500

Eribeth Penaranda: Eribeth.penaranda@ttuhsc.edu

Abstract

Corresponding Author: Eribeth Penaranda, MD. Department of Family and Community Medicine Texas Tech University Health Sciences Center. Paul L. Foster School of Medicine, Address: 9849 Kenworthy, El Paso, TX. 79924. USA, P: 915 21155500. Eribeth.penaranda@ttuhsc.edu.

STATEMENT OF AUTHORSHIP

All the authors have made substantial contributions to the conception, design of the work; or the acquisition, analysis, or interpretation of data for the work. They have also participated in drafting the manuscript and approval of the version to be published.

ETHICAL ADHERENCE

All the authors report adherence to ethical standards in the conception of the work, data collection and writing the manuscript. The Texas Tech University Health Sciences Center. Paul L. Foster School of Medicine Institutional Review Board (IRB) granted approval before the study began. Signed patient consents were obtained and maintained by the investigators.

DISCLOSURE OF SOURCE OF FINANCIAL SUPPORT

This study was grant funded by the American Academy of Family Physicians Foundation Joint Grant Award Program **G1204** to Dr. Penaranda and Dr. Molokwu. Dr. Brown was supported in part by the National Cancer Institute through grant U54 CA153505 from the Community Networks Program Center.

Objective—The purpose of this study is to assess the acceptability and intention to use cervico-vaginal self-sampling for hrHPV infection after receiving an educational intervention among the predominantly Hispanic population residing along the U.S.-Mexico border.

Methods—Women received an educational intervention about cervical cancer prevention through screening with conventional cytology and with self-sampling for hrHPV. After the educational intervention women performed the self-sampling test. Women's attitudes towards the self-sampling test and cervical cytology were assessed and compared.

Results—A total of 110 women aged 30 – 65 years completed the study. The mean age of the population was 48 years (SD 9.3); most (87%) self-identified as being Hispanic and half were born in Mexico; 16% had not had cervical cytology done in 3 years. Self-sampling was more acceptable than cervical cytology; acceptability scores were 25.0(SD 2.9) and 22.7(SD 3.0) respectively, with the maximum possible score being 28. ($p < .001$). A large proportion of women (42.7%) preferred both tests equally. We found high intention to use and recommend self-sampling. Contrary to previous studies, there were no differences between cervical cytology and self-sampling regarding women's concerns about performing the test well and the accuracy of the test, which we attribute to the educational intervention.

Conclusion—The high acceptability of self-sampling after participants received education about the test and the reported intention to use it if made available adds to the evidence on the feasibility of integrating self-testing within cervical cancer screening guidelines.

Keywords

hrHPV; self-sampling; Cervical cancer screening; Hispanic; US-Mexico border

Introduction

Racial and ethnic disparities exist regarding the burden of cervical cancer; Hispanic women have a higher rate of cervical cancer incidence at 11.8 versus 7.2 per 100,000 (age adjusted to the 2000 US standard population) than non-Hispanic whites.¹ Furthermore, Hispanic women along the U.S.-Mexico border have the highest cervical cancer mortality rate in the country at 5.6 per 100,000 compared to Hispanics in non- border areas at 4.7 and all U.S. women at 2.6, per 100,000.² Cervical cancer incidence has been decreasing in the U.S. due to the introduction of screening with cervical cytology, Papanicolaou (Pap) smear and testing for the high risk Human Papilloma (hrHPV) virus which is known to be the infectious etiologic factor that leads to cervical cancer.³ Despite the effectiveness of screening in decreasing cervical cancer morbidity and mortality, only 75% of Hispanic women report use of cervical cytology, compared to 82% of non-Hispanic white women aged 18 – 44 years.² Half of diagnosed cervical cancers occur in women without regular screening attendance.⁴ Barriers to screening reported by Hispanic women include the requirement of a doctor's appointment and the fear and embarrassment related to the pelvic examination.⁵

In recent years, hrHPV testing has become increasingly important in cervical cancer screening given that it has been found to be more sensitive than cytology in detecting Cervical Intraepithelial Neoplasia (CIN) 2 or higher which are the immediate precursors of

cervical cancer.⁶ In 2012, the United States Preventive Services Task Force added the recommendation of co-testing for hrHPV genotypes in addition to cervical cytology for screening in women older than 30 years of age. In 2014, the Food and Drug Administration approved a hrHPV DNA test to be used for cervical cancer in women aged 25 and older instead of cervical cytology.⁷ Women who test positive for HPV 16 or 18 genotypes need to be followed with colposcopy.⁸

Although currently not approved for cervical cancer screening in the US, a modality of hrHPV testing is self-sampling, where women can collect their own cervico-vaginal specimens with a swab, tampon or brush.⁹ The sensitivity and specificity of hrHPV self-sampling compared to clinician-collected sampling to detect CIN2 or higher depends upon the technique and device used.⁹ Although some studies have not found it to be equivalent in sensitivity and specificity, Polymerase Chain Reaction (PCR)-based testing has demonstrated similar results to physician-collected samples.^{10–12} Women who do not attend regular cervical cancer screening programs are more likely to perform self-sampling than to attend screening with cervical cytology when both methods are offered; with increased participation rates ranging from 8 – 39 percentage points.^{13–15} Self-sampling has had high acceptability within diverse populations;^{16–23} however, women have cited barriers to intention to use it such as low self-efficacy about performing self-sampling correctly, fear of self-harm, not having enough knowledge on the test, and the lack of confidence about the test's accuracy.^{16,18}

The purpose of this study is to assess acceptability and intention to use cervico-vaginal self-sampling for hrHPV infection after providing education about cervical cancer and self-sampling to predominantly Hispanic women living along the U.S.-Mexico border. This population has one of the highest cervical cancer morbidity and mortality in the country which makes them the more likely beneficiaries of an alternative to current cervical cancer screening methods. The educational intervention was theory-based, tailored to women's concerns regarding self-sampling and culturally sensitive provided by a community health worker known as a *promotora*

Methods

The Institutional Internal Review Board approved the study. This one-group experimental design study took place within two university-affiliated primary care clinics located on the US-Mexico border, between January and November 2014. Participants eligible were women aged 30 – 65 years who were registered as clinic patients. Women who self-reported current pregnancy, history of hysterectomy or history of cervical cancer were excluded from participation. Recruitment methods included face-to-face invitation by study personnel, referrals from other physicians, and flyers posted at recruitment sites for participants to self-refer.

Once recruited, women were asked to schedule an educational session with a bilingual *promotora*, while being off their menstrual period and refraining from sexual activity 24 hours prior to the session. The sessions were generally conducted individually, with a few participating in group educational sessions consisting of two or three women. Depending on

language preference, the education sessions were provided in English or Spanish, and lasted approximately 30 to 40 minutes. The educational material consisted of a PowerPoint presentation developed using information from focus groups done in this population,²⁴ literature,²⁵ and instructions on how to collect self-sampling provided by the manufacturer. The presentation included the Health Belief Model constructs of seriousness and susceptibility of the hrHPV infection, natural history of infection with hrHPV, as well as cervical cancer prevention through immunization, safe sex practices and cervical cancer screening. In regards to self-sampling, we explained women how to collect the test, we reassured them that women can collect good samples, and we described to them that the performance of self-sampling to detect cervical lesions is comparable to that of physician – collected samples. The presentation material was also provided as a leaflet for participants to keep. At the end of the presentation we prompted women to get screened by their physicians with conventional cytology if they were due.

The *promotora* instructed participants how to collect self-samples using a commercial pelvis model: *[while in a squat position, insert the swab into the vagina towards the vault and gently rotate about 10 times, then place the device into the transport media, bend the stick of the swab through the scored area and discard it while leaving the swab in the media]*. Participants then proceeded with their self-sampling in a bathroom. All samples were tested for hrHPV using the hybrid capture II assay (Digene Corp., Silver Spring, Md.) with a probe for 14 carcinogenic types. All self-sampling test results (positive, negative and indeterminate) were reported to women's primary care physicians via letter and were made part of women's medical records. Primary care physicians were providers at the clinic where the research took place had been instructed to repeat hrHPV to confirm positive research results, and to perform cervical cytology in women who were due as per standard of care. Indeterminate results were repeated once by the laboratory on a new sample provided by women; if the results remained indeterminate, women were informed of the results and were asked to follow-up with their primary care physician.

Measures

Information that was collected included: health care coverage, education level, country of birth, parents' country of birth, marital status, date of birth, years living in the US, and language of preference, cervical cancer screening history and self-reported health status information. Acculturation information, which is the degree of adoption of a foreign culture was collected based on the General Acculturation Index²⁶ [5 items; e.g., what language do you usually speak at home?]. Responses were rated on a Likert scale [1 = only Spanish, 2 = Spanish more than English, 3 = both equally, 4 = English more than Spanish, and 5 = only English]. With a minimum score of 5 and maximum of 25 that is then divided by five to create three categories: Low (1.00–2.39), Medium (2.40 n(%)3.69) and High (3.70–5.00).

In order to examine women's attitudes towards self-sampling, we developed survey items measuring constructs identified as being significant in previous focus groups²⁴ and existing literature.^{16,19} We used the term "Pap smear" referring to cervical cytology in all communication with subjects including surveys given that the former is more familiar term for lay public. Women rated self-sampling and cervical cytology tests on ease, convenience,

pain, privacy, embarrassment, accuracy of the test, confidence that the test is properly conducted, and confidence in the accuracy of the test, and fear of harm.

Response options for test attributes were structured as a 4-point Likert scale: 1 = strongly agree, 2 = agree, 3 = disagree, 4 = strongly disagree. The survey also included a question on test preference between cervical cytology and self-sampling; response options were: 1 = definitively prefer Pap, 2 = somewhat prefer Pap, 3 = Prefer both equally or unsure, 4 = somewhat prefer self-sampling, 5 = definitively prefer self-sampling. Test characteristics that influenced their test of preference from a list that included: easier to do, less painful, more private, less embarrassing, more confident that the test is performed correctly, more confident that the test is good at finding cancer, less fear of hurting myself, and more convenient were also elicited. Participants' intention to use self-sampling was assessed with five questions about: cost, doctors' recommendation, availability over-the-counter, would recommend to others, and would use if friends or family were using it. Response options were structured as a 4-point Likert scale; for example, "Cost would be important in deciding to get the self-sampling test": 1 = strongly agree, 2 = agree, 3 = disagree, 4 = strongly disagree.

Data Analysis

Descriptive statistics detail the characteristics of the population. Missing data was excluded from analysis. Acceptability of each test characteristic was defined a priori as the highest score for the most desirable test characteristics (e.g. ease: 1 = least ease, 4 = easiest; pain: 1 = more pain, 4 = least pain) and raw sum of the Likert scores used for each of the seven test characteristics (ease, confidence, accuracy, convenience, pain, embarrassment, fear of harm) allowed for an overall acceptability score to be produced. Using a paired sample t-test, mean scores for each test characteristic and the overall acceptability indices for self-sampling and cervical cytology were compared.

Reasons for participants' preference for either self-sampling or Pap smears was reported as a proportion, with significant differences in preferences between self-sampling and Pap smears being determined using a Chi square test. Reasons for test preference were reported as a raw sum of each reason since women were allowed to select more than one reason. Furthermore, participant's intention to use self-sampling responses were dichotomized as agree and disagree and reported as a proportion for each item. An alpha of 0.05 was used for all hypotheses and all data analyses were conducted in IBM SPSS version 22.0.

Results

The final sample included 110 women out of the 347 eligible patients that were approached; with a description of their characteristics provided in table 1. Among patients who refused, demographic information or reason for refusal was not collected. A description of self-sampling and cervical cytology tests' characteristics along with the overall acceptability scores can be found in table 2. The acceptability index was significantly greater for self-sampling at 25.0 (SD=2.9) than it was for Pap smear at 22.7(SD=3.0). The proportion of women's endorsement of each test characteristic is found in table 3. A hundred percent of the participants found self-sampling testing to be easy and convenient, compared to 87.9%

and 90.8% for Pap smear respectively. Only 15% indicated that self-sampling testing was painful vs. 29% of participants who believed that Pap was painful. Regarding feeling of embarrassment with the tests, many more women (31%) reported this feeling with Pap vs. only 8% with self-sampling. Fourteen per cent of participants reported fear of harm with Pap smear testing compared to 9% who reported similar fears from self-sampling testing. The perception that the test is performed properly, and the perception that the test is accurate to detect cancer were not statistically significant ($p = .17$) different between Pap smear and self-sampling.

The majority of participants (42.7%) stated no preference for either test (“unsure or both equally preferable”); however, among those who stated a preference, a slightly higher percentage (30%) preferred self-sampling testing versus 26% for Pap smear testing ($p < .001$). Figure 1 shows the frequency with which participants endorsed various reasons for their test preference. Among participants who preferred self-sampling, ease, privacy, and convenience were the key reasons behind their preference as each was selected 30 times. Among participants who preferred Pap smear, the most frequently mentioned reasons were confidence in proper testing (20 times), confidence in detecting cancer (20 times) and more convenient (16 times).

Table 4 reports factors related to intention to use self-sampling. Sixty five percent of participants reported that cost would be an important factor in deciding to use self-sampling; 99.1% would recommend it to friends or family, 99.1% would use it if doctors recommend it, and 94% would use it if made available over-the counter. A total of 15% of women tested positive for high risk HPV infection.

Discussion

We found high acceptability for self-sampling, which is consistent with reports from other studies in the developing and developed countries.^{19–21} Participants rated more favorably positive test characteristics such as ease and convenience of self-sampling as compared to cervical cytology. Similar to our findings, De Alba et al¹⁷ found high satisfaction rates with unsupervised self-sampling for hrHPV among 1,213 Hispanic women in the community setting due to ease and convenience of the test. We also found high intention to use self-sampling if it was made available; it was discovered that participants would recommended it to their family and friends, would perform the test if it was doctor recommended, would use self-sampling if it was available over –the –counter and that cost would influence their decision about which test they would prefer. Our findings are important because given the disproportionally high cervical cancer burden that women living in this border region bear, alternatives to traditional cervical cancer screening are needed to increase women’s screening rates. Self-sampling circumvents the need for a pelvic exam, which has been a deterrent for Hispanic women to attend regular screening.⁵ Furthermore, self-sampling has the potential of reducing cost when used at home with a return-mail kit.²⁷

Surprisingly, despite the high acceptability of the self-sampling in our population, a significant proportion of women (42.7%) preferred both tests equally or were unsure of which test they preferred. A pair of studies,^{22,23} one²³ done among women at high risk for

cervical cancer and the other done within a large Mexican population, ²² reported self-sampling to be preferable over clinician testing due to less embarrassment and being more comfortable with the test. Contrary to most studies ^{16,18,28–30} that have shown that women preferred clinician-collected samples over self-sampling, we found that among participants who stated a preference for either test, self-sampling was more preferable. We did not find differences between tests in participants' perception of test accuracy or participants' perception that the test is performed correctly. Concerns about the accuracy of the test, ²⁹ uncertainty over performing the test correctly ^{18,31} and fear of harm ¹⁸ had been the most commonly cited factors for participants not preferring self-sampling over cervical cytology testing in other settings. The difference between our finding and those of others may be due to providing education in which concerns were addressed before having participants collect their own cervico- vaginal samples. During the educational sessions, participants were reassured that self-sampling is accurate ⁹ and that in the US there is evidence that Hispanic women are able to collect adequate self-sampled specimens.¹⁷

In our study, less acculturated women were less likely to prefer self-sampling over cervical cytology nationwide, Hispanic women were less likely to prefer self-sampling compared to non-Hispanics (28% vs. 49% in non-Hispanic women);¹⁶ however, Anhang did not assess acculturation. The role of acculturation in screening behaviors has been debatable in the literature; although an association between screening and years living in the US has been described, ³² the opposite has also been described.³³ Further studies may be needed to evaluate the significance of our finding.

There are some limitations to the study worth noting. First, this is a one-group experimental design study without baseline assessment self-sampling acceptability; therefore there was not pre and post-intervention comparison. Baseline assessment of self-sampling acceptability was deemed not appropriate given that women did not have information about self-sampling prior entering the study.

Furthermore, without a control group the effect of the intervention could not be completely assessed. The study sample size was modest; a study with a larger number of participants may elicit more information about predictors for test preference. There is the risk of selection bias since participants were self-referred to the study and the majority had had cervical cytology done in the last three years; women who participated in our study might be more accepting of novel methods for cervical cancer screening. Also, women did not have their cervical cytology done at the same time of the self-sampling which could have yielded more accurate results on their attitudes towards both tests. Although women had previously had a Pap test, there may be a recall bias in our results. Another limitation could be that the education led women to have a more positive attitude towards self-sampling than towards conventional cervical cytology. During the education session we spent more time providing information on self-sampling than we did on conventional cervical cytology given that women had more questions about the former. This is not surprising given the self-sampling's novelty; however, we don't believe that the content of the education skewed women's preferences towards self-sampling because both screening methods were positively portrayed and not as antagonist methods. Furthermore, women were encouraged to get screened regularly with cervical cytology. Since only clinic patients were enrolled, this

raises questions about the generalizability of our findings to other non-health care seeking populations. There is need for further investigation about the educational content delivery platform that best suits specific populations. The promotora-led education interventions have been proven successful at increasing cancer screening rates among Hispanic populations.³⁴

Conclusions

Self-sampling circumvents barriers to regular screening attendance using the traditional cervical cytology that requires a pelvic examination and doctor's appointment. The high acceptability of self-sampling after participants received education about the test and the reported high intention to use it if made available adds to the evidence on the feasibility to integrate it within cervical cancer screening guidelines. Further studies to assess the feasibility of self-sampling in community settings in this population are needed.

List of acronyms and abbreviations

hrHPV	high risk Human Papillomavirus
Pap smear	Papanicolaou smear
CIN	Cervical Intraepithelial Neoplasia
PCR	Polymerase Chain Reaction

References

1. American Cancer Society. Cancer Facts & Figures for Hispanics/Latinos 2012–2014. Atlanta: American Cancer Society; 2012. <http://www.cancer.org/acs/groups/content/@epidemiologysurveillance/documents/document/acspc-034778.pdf> [Accessed Oct 22/, 2014]
2. Prevention CfDca. [Accessed Nov. 10, 2014] FastStats. Pap Tests and Cervical Cancer. 2014. <http://www.cdc.gov/nchs/fastats/pap-tests.htm>
3. Schiffman M, Castle PE, Jeronimo J, Rodriguez AC, Wacholder S. Human papillomavirus and cervical cancer. *Lancet*. 2007; 370(9590):890–907. [PubMed: 17826171]
4. Eggleston KS, Coker AL, Luchok KJ, Meyer TE. Adherence to recommendations for follow-up to abnormal Pap tests. *Obstet Gynecol*. 2007; 109(6):1332–1341. [PubMed: 17540805]
5. Byrd TL, Chavez R, Wilson KM. Barriers and facilitators of cervical cancer screening among Hispanic women. *Ethn Dis*. 2007; 17(1):129–134. [PubMed: 17274222]
6. Bulkman NWJ, Berkhof J, Rozendaal L, et al. Human papillomavirus DNA testing for the detection of cervical intraepithelial neoplasia grade 3 and cancer: 5-year follow-up of a randomised controlled implementation trial. *The Lancet*. 2007; 370(9601):1764–1772.
7. FDA News Release. Protecting and Promoting your health. U.S. Food and Drug Administration; 2014. FDA approves first human papillomavirus test for primary cervical cancer screening. <http://www.fda.gov/newsevents/newsroom/pressannouncements/ucm394773.htm> [Accessed Oct 28/, 2014]
8. Massad LS, Einstein MH, Huh WK, et al. 2012 updated consensus guidelines for the management of abnormal cervical cancer screening tests and cancer precursors. *Obstet Gynecol*. 2013; 121(4): 829–846. [PubMed: 23635684]
9. Arbyn M, Verdoodt F, Snijders PJ, et al. Accuracy of human papillomavirus testing on self-collected versus clinician-collected samples: a meta-analysis. *Lancet Oncol*. 2014; 15(2):172–183. [PubMed: 24433684]

10. Daponte A, Pournaras S, Mademtzi I, et al. Evaluation of HPV 16 PCR detection in self-compared with clinician-collected samples in women referred for colposcopy. *Gynecol Oncol*. 2006; 103(2):463–466. [PubMed: 16626791]
11. Dijkstra MG, Heideman DA, van Kemenade FJ, et al. Brush-based self-sampling in combination with GP5+/6+-PCR-based hrHPV testing: high concordance with physician-taken cervical scrapes for HPV genotyping and detection of high-grade CIN. *J Clin Virol*. 2012; 54(2):147–151. [PubMed: 22445557]
12. Belinson JL, Du H, Yang B, et al. Improved sensitivity of vaginal self-collection and high-risk human papillomavirus testing. *Int J Cancer*. 2012; 130(8):1855–1860. [PubMed: 21630255]
13. Gök M, van Kemenade FJ, Heideman DA, et al. Experience with high-risk human papillomavirus testing on vaginal brush-based self-samples of non-attendees of the cervical screening program. *Int J Cancer*. 2012; 130(5):1128–1135. [PubMed: 21484793]
14. Szarewski A, Cadman L, Mesher D, et al. HPV self-sampling as an alternative strategy in non-attenders for cervical screening - a randomised controlled trial. *Br J Cancer*. 2011; 104(6):915–920. [PubMed: 21343937]
15. Wikström I, Lindell M, Sanner K, Wilander E. Self-sampling and HPV testing or ordinary Pap-smear in women not regularly attending screening: a randomised study. *Br J Cancer*. 2011; 105(3):337–339. [PubMed: 21730977]
16. Anhang R, Nelson JA, Telerant R, Chiasson MA, Wright TC Jr. Acceptability of self-collection of specimens for HPV DNA testing in an urban population. *J Womens Health (Larchmt)*. 2005; 14(8):721–728. [PubMed: 16232104]
17. De Alba I, Anton-Culver H, Hubbell FA, et al. Self-sampling for human papillomavirus in a community setting: feasibility in Hispanic women. *Cancer Epidemiol Biomarkers Prev*. 2008; 17(8):2163–2168. [PubMed: 18708409]
18. Howard M, Lytwyn A, Lohfeld L, Redwood-Campbell L, Fowler N, Karwalajtys T. Barriers to acceptance of self-sampling for human papillomavirus across ethnolinguistic groups of women. *Can J Public Health*. 2009; 100(5):365–369. [PubMed: 19994740]
19. Quincy BL, Turbow DJ, Dabinett LN. Acceptability of self-collected human papillomavirus specimens as a primary screen for cervical cancer. *J Obstet Gynaecol*. 2012; 32(1):87–91. [PubMed: 22185546]
20. Virtanen A, Nieminen P, Niironen M, Luostarinen T, Anttila A. Self-sampling experiences among non-attendees to cervical screening. *Gynecol Oncol*. 2014
21. Castle PE, Rausa A, Walls T, et al. Comparative community outreach to increase cervical cancer screening in the Mississippi Delta. *Prev Med*. 2011; 52(6):452–455. [PubMed: 21497619]
22. Dzuba IG, Diaz EY, Allen B, et al. The acceptability of self-collected samples for HPV testing vs. the pap test as alternatives in cervical cancer screening. *J Womens Health Gend Based Med*. 2002; 11(3):265–275. [PubMed: 11988136]
23. Dannecker C, Siebert U, Thaler CJ, Kiermeir D, Hepp H, Hillemanns P. Primary cervical cancer screening by self-sampling of human papillomavirus DNA in internal medicine outpatient clinics. *Ann Oncol*. 2004; 15(6):863–869. [PubMed: 15151941]
24. Penaranda E, Molokwu J, Hernandez I, et al. Attitudes toward self-sampling for cervical cancer screening among primary care attendees living on the US-Mexico border. *South Med J*. 2014; 107(7):426–432. [PubMed: 25010584]
25. Schiffman M, Wentzensen N, Wacholder S, Kinney W, Gage JC, Castle PE. Human papillomavirus testing in the prevention of cervical cancer. *J Natl Cancer Inst*. 2011; 103(5):368–383. [PubMed: 21282563]
26. Castro FG, Cota MK, Vega SC. Health promotion in Latino populations: A sociocultural model for program planning, development, and evaluation. 1999
27. Haguenoer K, Sengchanh S, Gaudy-Graffin C, et al. Vaginal self-sampling is a cost-effective way to increase participation in a cervical cancer screening programme: a randomised trial. *Br J Cancer*. 2014
28. Guan Y, Castle PE, Wang S, et al. A cross-sectional study on the acceptability of self-collection for HPV testing among women in rural China. *Sex Transm Infect*. 2012

29. Oranratanaphan S, Termrungruanglert W, Khemapech N. Acceptability of self-sampling HPV testing among Thai women for cervical cancer screening. *Asian Pac J Cancer Prev*. 2014; 15(17): 7437–7441. [PubMed: 25227855]
30. Waller J, McCaffery K, Forrest S, et al. Acceptability of unsupervised HPV self-sampling using written instructions. *J Med Screen*. 2006; 13(4):208–213. [PubMed: 17217611]
31. Forrest S, McCaffery K, Waller J, et al. Attitudes to self-sampling for HPV among Indian, Pakistani, African-Caribbean and white British women in Manchester, UK. *J Med Screen*. 2004; 11(2):85–88. [PubMed: 15153323]
32. Lawsin C, Erwin D, Bursac Z, Jandorf L. Heterogeneity in breast and cervical cancer screening practices among female Hispanic immigrants in the United States. *J Immigr Minor Health*. 2011; 13(5):834–841. [PubMed: 20734140]
33. Nuno T, Castle PE, Harris R, Estrada A, Garcia F. Breast and cervical cancer screening utilization among Hispanic women living near the United States-Mexico border. *J Womens Health (Larchmt)*. 2011; 20(5):685–693. [PubMed: 21428792]
34. Byrd TL, Wilson KM, Smith JL, et al. Using Intervention Mapping as a Participatory Strategy: Development of a Cervical Cancer Screening Intervention for Hispanic Women. *Health Education & Behavior*. 2012

FIGURE 1. Reasons for test preference comparison between Pap smear and hrHPV self-sampling
hrHPV, high risk Human Papillomavirus. Columns will not add up to 100% because women identified more than one reason.

TABLE 1**Patient Characteristics (n = 110)**

Age in years, mean (SD), (range)	48.2(9.3), (33 – 65)
Marital Status	
Never married	19(17.3)
Married or living in a marriage –like relationship	55(50.0)
Separated /Divorce/Widowed	36(32.7)
Self-reported health status	
Excellent	4(3.6)
Very good /Good	56(50.9)
Fair/Poor	50(45.4)
Type of Health coverage	
No health coverage or Discount program	39(38.7)
Medicaid/Medicare	42(43.3)
Private insurance	28(28.9)
Education in years, mean(SD), (range)	11.6 (3), (2 – 16)
Less than High school	72(66.0)
High school or more	37(33.9)
Country of birth	
Mexico	55(50.0)
United States	46(41.9)
Other	8(8.1)
Acculturation Index *	2.3 (0.77)
Screening history	
Heard about cervical cancer : yes	87(79.1)
Heard about cervical cytology (“Pap smear”) : yes	107(97.3)
Previous cervical cytology : yes	109(99.1)
Previous abnormal cervical cytology: yes	27(24.5)
Previous cervical cytology > 3 years, (due for screening): yes	18(16.4)
Reasons for not having had a Pap ever or in > 3 years	
I didn’t know I needed one	1(5.6)
I haven’t had any problem	1(5.6)
I kept putting off	6(33.3)
Too expensive/cost	5(27.8)
No insurance	4(22.2)
Embarrassing	5(27.8)
I’m not sexually active	1(5.6)
Other reason (Bad experience)	1(5.6)
Plans in having cervical cancer screening in the next 6 months if due for screening: yes	15(83.3)

Self-sampling for high risk HPV result	
Positive	17(15.4)
Negative	84(76.3)
Indeterminate	9(8.1)

SD, Standard Deviation; Pap smear, Papanicolaou smear;

* Acculturation Index ranges from 1 to 5, 1= least acculturated, 5 = most acculturated.

TABLE 2

Acceptability self-sampling and Pap smear by test characteristics

Test characteristics	Self-sampling Mean(SD)	Pap smear Mean(SD)	p value *
Ease (1,less; 4, more)	3.8(0.4)	3.3(0.8)	<.001
Confidence that test is performed properly (1,less; 4, more)	3.6(0.5)	3.5(0.6)	.17
Accuracy of the test (1,less; 4, more)	3.6(0.5)	3.6(0.5)	.17
Convenience(1,less; 4, more)	3.7(0.4)	3.3(0.7)	<.001
Pain (1,more; 4,less)	3.3(0.9)	2.8(0.9)	<.001
Embarrassment(1,more; 4,less)	3.4(0.8)	2.8(0.9)	<.001
Fear of Harm (1,more; 4,less)	3.4(0.8)	3.1(0.9)	<.001
Overall Acceptability Index	25.0(2.9)	22.7(3.0)	<.001

SD, Standard Deviation; Pap smear, Papanicolaou smear.

* p value obtained by t-test.

TABLE 3

Patients' test attributes perceptions.

Test characteristic n=110	hrHPV Self-sampling n (%)	Pap smear n(%)	* p value
Ease			.01
Agree	110 (100)	95(87.9)	
Disagree	0	13(12.0)	
Self-efficacy			.19
Agree	73(98.1)	105(96.3)	
Disagree	2 (1.8)	4 (3.6)	
Test accuracy			.17
Agree	107(99.0)	109(100)	
Disagree	1(0.9)	0	
Convenience			<.001
Agree	109(100.0)	99(90.8)	
Disagree	0	10(9.2)	
Pain			<.001
Agree	16(15.0)	31(29.2)	
Disagree	90(84.9)	75(70.7)	
Embarrassment			<.001
Agree	8(7.4)	34(31.4)	
Disagree	99(92.5)	74(68.5)	
Fear of harm			<.001
Agree	9(8.5)	15(14.0)	
Disagree	96(91.4)	92(85.9)	

* p value obtained with Wilcoxon Signed Rank paired test. HrHPV, high risk Human Papillomavirus.

TABLE 4

Intention to use or recommend hrHPV self-sampling n (%)

Cost would be important in deciding the self-sampling test done	
Agree	70 (65.4)
Disagree	37(34.6)
I would use self-sampling if my friends and family were using it	
Agree	62(58.5)
Disagree	44(41.5)
I would recommend self-sampling to friends and family	
Agree	107(99.1)
Disagree	1(0.9)
I would do the self-sampling if my doctor recommends it	
Agree	109(99.1)
Disagree	1 (0.9)
I would use self-sampling if it were available over the counter	
Agree	102(93.6)
Disagree	7(6.4)

hrHPV, high risk Human Papillomavirus.