2009

HPV Vaccine Acceptance Among Latina Mothers by HPV Status

Maureen Sanderson
Meharry Medical College, msanderson@mmc.edu

Ann L. Coker
University of Kentucky, ann.coker@uky.edu

Katherine S. Eggleston
University of Kentucky

Maria E. Fernandez
University of Texas Health Science Center at Houston, maria.e.fernandez@uth.tmc.edu

Concepcion D. Arrastia
University of Texas Medical Branch

See next page for additional authors

JOURNAL OF WOMEN'S HEALTH
Volume 18, Number 11, 2009

DOI: 10.1089/jwh.2008.1266

HPV Vaccine Acceptance among Latina Mothers by HPV Status

Maureen Sanderson, Ph.D.,[1] Ann L. Coker, Ph.D.,[2] Katherine S. Eggleston, M.P.H.,[2] Maria E. Fernandez, Ph.D.,[3] Concepcion D. Arrastia, M.D.,[4] and Mary K. Fadden, M.P.H.[1]

Abstract

Objective: We investigated whether Latina mothers who were and were not human papillomavirus (HPV) positive differed in their knowledge and acceptance of the HPV vaccine for their children.
Methods: We conducted a cross–sectional survey among women aged 18–64 years between April 2007 and April 2008. Data collectors conducted in-person interviews in community clinics with 215 HPV-negative women and 190 HPV-positive women (with respective response rates of 64% and 84%). Most (83%) HPV-positive women were recruited at dysplasia clinics. Although no HPV-negative women were recruited at dysplasia clinics, they were recruited at other low-income public and private clinics.
Results: After adjustment for age, marital status, and health insurance, women who were HPV positive were more likely than HPV-negative women to have heard about the HPV vaccine, to indicate they would have their daughters and sons vaccinated against cervical cancer even if they had to pay themselves, and to be in favor of the proposed Texas law requiring girls to receive the HPV vaccine before entry into sixth grade but less likely to be in favor of girls receiving the vaccine at age $\geq$13.
Conclusions: Our findings indicate that >90% of Latinas living on the Texas-Mexico border find the HPV vaccine acceptable for their own daughters and sons.

Introduction

The finding that human papillomavirus (HPV) is a necessary cause of cervical cancer has led to the development of vaccines against HPV types 16 and 18, which have been found in 70% of cervical cancers.[1] A phase II clinical trial of the monovalent HPV type 16 vaccine showed 100% efficacy against cervical intraepithelial neoplasia (CIN) in low-risk women over an 18-month period.[2] Preliminary analyses from a recent phase III clinical trial reported the bivalent HPV types 16/18 vaccine was 90.4% efficacious against CIN2+ in high-risk women over a 14.8-month period.[3] In June 2006, the quadrivalent HPV types 6/11/16/18 vaccine was approved by the Food and Drug Administration (FDA) for prophylactic use by girls and women aged 9–26 years in the United States. If a majority of young women receive the recently available HPV vaccine, CIN and cervical cancer incidence and mortality rates should dramatically decline.

The development of the vaccine is especially important in such areas as the Lower Rio Grande Valley (LRGV) of Texas, the four southernmost counties on the Mexico border, which has much higher cervical cancer incidence and mortality rates than the rest of the United States.[4,5] From 2001 through 2005, the average annual age-adjusted cervical cancer incidence rate for the LRGV among Latinas (14.3 of 100,000), the predominant ethnic group, was higher than the rate among Latinas in the United States (13.2 of 100,000). The difference in mortality rates between the LRGV and the United States was even more pronounced (LRGV 4.9 of 100,000 vs. United States 3.2 of 100,000). A possible explanation for the higher rates among Latinas is their higher prevalence of correlates of HPV positivity relative to women of other ethnicities. Giuliano et al.[6] conducted a study of Mexican American women in Tucson and found the highest prevalence of HPV in women who had more than one lifetime sexual partner, women $\leq$ 25 years of age, single women, women born in Mexico, and women who did not use oral contraceptives.

In its current formulation, the HPV vaccine's effectiveness depends greatly on uptake of the vaccine by parents for their children. Two large quantitative studies of HPV vaccine acceptability showed greater acceptance among parents with a history of genital warts[7] or HPV infection[8] themselves, but

[1]Department of Obstetrics and Gynecology, Meharry Medical College, Nashville, Tennessee.
[2]Department of Obstetrics and Gynecology, University of Kentucky, Lexington, Kentucky.
[3]University of Texas-Houston School of Public Health, Houston, Texas.
[4]University of Texas Medical Branch, Galveston, Texas.

two small qualitative studies did not find greater acceptance among parents with a history of sexually transmitted infections (STI).[9,10] Two large[8,11] and one small study[9] reported no association between history of abnormal Pap tests and greater HPV vaccine acceptability. The question remains whether a woman's diagnosis with HPV or an abnormal Pap test is associated with her decision on HPV vaccine acceptability. The purpose of the present study was to determine if there are differences in knowledge and acceptability of the HPV vaccine for their children between HPV-positive and HPV-negative Latinas living on the Texas-Mexico border.

Materials and Methods

As part of a larger clinic-based cohort study to investigate knowledge gaps and information needs of women who are HPV positive, we conducted in-person interviews in two Texas-Mexico border counties from April 2007 through April 2008. Two groups of Latina women aged 18–64 years were recruited: women who were HPV positive ($n = 190$), and women who were HPV negative ($n = 215$). Response rates were 84% and 64%, respectively. Clinic gynecologists identified HPV-positive women shortly after an HPV diagnosis and prior to treatment. The majority of HPV-positive subjects were recruited from the dysplasia clinic that provided diagnosis and treatment for women participating in the Texas Breast and Cervical Cancer Screening Program. HPV-negative women were recruited in the waiting rooms of community health centers, Planned Parenthood clinics, and private clinics. HPV negative women with an abnormal Pap test in the past 5 years or history of treatment for an abnormal Pap test were excluded.

Trained data collectors asked women about their knowledge of HPV and the HPV vaccine, their concerns about the HPV vaccine, and their intention to have their children vaccinated against HPV. Initially, women were asked the closed-ended questions: Have you ever heard of human papillomavirus, sometimes referred to as HPV? and Have you ever heard of a vaccine for HPV? All women, regardless of their HPV knowledge, were then provided with the following information about the HPV vaccine: A vaccine for certain types of HPV is available. Right now, the vaccine is only for girls and women between the ages of 9 and 26 who do not already have HPV. The vaccine will help to stop people from getting HPV, genital warts, and cervical cancer but will not treat or cure people who already have HPV. HPV is a sexually transmitted infection. The vaccine is given in a series of 3 shots, and may cost between $30 and $150 per shot.

We recognize that women who already have HPV can get vaccinated, as there are no requirements for HPV testing prior to vaccination; however, we found in focus groups that women were confused about the purpose of vaccination without the qualifier that the vaccine is meant for girls and women who do not already have HPV. An open-ended question on HPV vaccine concerns was used: What concerns, if any, do you have about the current HPV vaccine, called Gardasil [Merck, Rahway, NJ]? You may have seen television commercials called "One less" or "Tell someone" about the HPV vaccine. A series of closed-ended questions were then asked about HPV vaccine acceptability: If you are a parent or became a parent, do you think that you would have your teenage daughter get the HPV vaccine to prevent cervical cancer? If you are a parent or became a parent, do you think that you would have your teenage son get the HPV vaccine to prevent cervical cancer in a partner? If you are a parent or became a parent, do you think you would have your teenage daughter get the HPV vaccine even if you had to pay for the vaccine yourself because your insurance or other public funds did not cover the cost? Are you in favor of Texas state law requiring all girls get the vaccine before entry into sixth grade? and At what age do you think girls should be vaccinated against HPV? The questions about prevention of cervical cancer were also asked about genital warts; however, the results were identical and are not presented. Two additional closed-ended questions were asked of the subset of women who had daughters in the 9–18 age range about HPV vaccine behavioral intentions and knowledge: How likely are you to have your daughter get the vaccine? and Do you know where you could go to get the vaccine?

We used stratified analysis to assess the associations between HPV status and HPV vaccine characteristics. Although this was a cross-sectional survey, we calculated relative risks (RR) using stratified analysis in order to compare two cohorts of women. Because 100% of HPV-positive women reported that they were likely to have their daughter vaccinated (among women with daughters aged 9–18), we were unable to calculate RRs. In order to calculate RRs, we added 0.5 to a zero cell for this variable. We examined confounding by age, birthplace, language used for the interview, educational level, marital status, health insurance, whether they had children, time between vaccine approval and interview, and recruitment site.

Results

Table 1 shows the demographic characteristics of HPV-positive and HPV-negative women. HPV-positive women were more likely than HPV-negative women to be younger, to be unmarried, to have Medicaid, and to have been interviewed more months after the vaccine was approved but less likely to be recruited from a private clinic. Subsequent analyses are adjusted for age, marital status, and health insurance. Additional adjustment for time since vaccine approval and recruitment site did not materially change the RRs.

Table 2 presents HPV vaccine knowledge and acceptance among HPV-positive and HPV-negative women and RRs for these HPV vaccine characteristics by HPV status. A greater percentage of HPV-positive women than HPV-negative women had heard of HPV (positive, 67%, vs. negative, 61%) and of the HPV vaccine (positive, 73%, vs. negative, 58%); however, only the difference in knowledge of the HPV vaccine was significantly different (RR 1.45, 95% confidence interval [CI] 1.09–1.93). A total of 71% of HPV-positive and 77% of HPV-negative women reported they had no concerns about the HPV vaccine. Of those women reporting a concern, the most frequent concern among both groups was long-term side effects, and the second most frequent concern differed by HPV status (positive, effectiveness, vs. negative, short-term side effects).

Nearly all HPV-positive women stated they would have their daughters and sons vaccinated against HPV to prevent cervical cancer, in comparison with a slightly lower percentage of HPV-negative women (Table 2). The majority of women in both groups were in favor of the Texas law mandating the

Table 1. Demographic Characteristics of Study Participants

Characteristic	*HPV positive* n = *190*		*HPV negative* n = *215*		*Chi-square*	p *value*
	n	*(%)*	n	*(%)*		
Age, years						
18–24	61	(32.1)	53	(24.6)	17.77	0.0005
25–34	82	(43.2)	74	(34.4)		
35–44	37	(19.5)	50	(23.3)		
45–64	10	(5.3)	38	(17.7)		
Birthplace						
United States	74	(39.0)	88	(40.9)	0.17	0.68
Mexico	116	(61.0)	127	(59.1)		
Amount of time in United States, years						
<2	6	(5.2)	17	(13.4)	15.76	0.008
2–5	23	(19.8)	25	(19.7)		
6–10	28	(24.1)	30	(23.6)		
11–15	27	(23.3)	17	(13.4)		
16–20	21	(18.1)	12	(9.5)		
>20	11	(9.5)	26	(20.5)		
Language used to complete interview						
English	85	(44.7)	79	(36.7)	2.67	0.10
Spanish	105	(55.34)	136	(63.3)		
Marital status						
Unmarried	67	(35.3)	59	(27.6)	11.25	0.004
Married/living with partner	88	(46.3)	133	(62.1)		
Divorced/widowed/separated	35	(18.4)	22	(10.3)		
Missing	0		1			
Educational level						
Less than high school	91	(47.9)	110	(51.4)	0.67	0.72
High school graduate	59	(31.1)	59	(27.6)		
More than high school	40	(21.0)	45	(21.0)		
Missing	0		1			
Health insurance						
Private insurance	6	(3.3)	36	(16.9)	46.85	<0.0001
Medicaid	81	(44.5)	35	(16.4)		
Self-pay	95	(52.2)	142	(66.7)		
Missing	8		2			
Have children						
No	43	(22.6)	37	(17.2)	1.87	0.17
Yes	147	(77.4)	178	(82.8)		
Gender and age of children (years)						
Female						
9–18	41	(28.5)	63	(35.4)	24.01	0.0002
<9	45	(31.3)	29	(16.3)		
>18	3	(2.1)	25	(14.0)		
Male						
9–18	22	(15.3)	31	(17.4)		
<9	29	(20.1)	25	(14.0)		
>18	4	(2.8)	5	(2.8)		
Missing	3		0			
Time between vaccine approval and interview, months						
10–12	34	(17.9)	33	(15.4)	143.28	<0.0001
13–15	66	(34.7)	182	(84.7)		
>15	90	(47.4)	0	(0.0)		
Recruitment site						
Dysplasia clinic	157	(82.6)	0	(0.0)	297.15	<0.0001
Community health center	7	(3.7)	123	(57.2)		
Planned Parenthood	12	(6.3)	47	(21.9)		
Private clinic	14	(7.4)	45	(20.9)		

Table 2. Comparison of HPV-Positive and HPV-Negative Women for HPV Vaccine Characteristics

	HPV positive n = *190*		*HPV negative* n = *215*			
Characteristic	n	*(%)*	n	*(%)*	*RR*[a]	*(95% CI)*
Heard about HPV						
No	63	(33.2)	84	(39.1)	1.00	Referent
Yes	127	(66.8)	131	(60.9)	1.08	(0.87-1.35)
Heard about HPV vaccine						
No	51	(27.0)	90	(42.1)	1.00	Referent
Yes	138	(73.0)	124	(57.9)	1.45	(1.09-1.93)
Missing	1		1			
Concerns about HPV vaccine						
None	134	(70.5)	166	(77.2)	1.00	Referent
Any	56	(29.5)	49	(22.8)	1.15	(0.92-1.43)
Side effects						
Long-term side effects	22	(30.6)	33	(41.3)		
Cost/covered by Medicaid	11	(15.3)	10	(12.5)		
Short-term side effects	6	(8.3)	24	(30.0)		
Safety	11	(15.3)	7	(9.7)		
Effectiveness	14	(19.4)	3	(3.8)		
Increase sexual activity	6	(8.3)	2	(2.5)		
Age limit	2	(2.8)	1	(1.3)		
Daughter vaccinated to prevent cervical cancer						
No	1	(0.5)	9	(4.3)	1.00	Referent
Yes	187	(99.5)	203	(95.7)	5.14	(0.82-32.30)
Missing	2		3			
Daughter vaccinated if pay yourself						
No	1	(0.6)	11	(5.1)	1.00	Referent
Yes	182	(99.4)	203	(94.9)	5.86	(0.91-37.79)
Missing	7		1			
Son vaccinated to prevent cervical cancer in partner						
No	1	(0.5)	10	(4.9)	1.00	Referent
Yes	186	(99.5)	194	(95.1)	5.32	(0.89-31.95)
Missing	3		11			
Texas law mandating HPV vaccine						
Unsure/opposed					1.00	Referent
Unsure	6	(3.3)	17	(9.0)		
Somewhat opposed	4	(2.2)	9	(4.2)		
Strongly opposed	0	(0.0)	19	(8.0)		
In favor					2.47	(1.36-4.48)
Strongly in favor	157	(85.3)	129	(60.9)		
Somewhat in favor	17	(9.2)	38	(17.9)		
Missing	6		3			
Age to vaccinate girls against HPV						
< 11 years					1.09	(0.82-1.45)
Infancy	11	(6.1)	24	(11.5)		
5–10 years	25	(13.8)	16	(7.7)		
11–12 years	77	(42.5)	68	(32.7)	1.00	Referent
>12 years					0.76	(0.60-0.97)
13–26 years	68	(37.6)	97	(46.6)		
>26 years	0	(0.0)	3	(1.4)		
Missing	9		7			
Likely to get daughter vaccinated[b]						
Unsure/unlikely					1.00	Referent
Unsure	0	(0.0)	2	(3.4)		
Somewhat unlikely	0	(0.0)	2	(3.4)		
Very unlikely	0	(0.0)	2	(3.4)		
Likely					2.02	(0.57-7.13)
Somewhat likely	6	(15.0)	17	(28.8)		
Very likely	34	(85.0)	36	(61.0)		
Missing	1		4			
Know where to get vaccine[b]						
No	7	(17.5)	35	(59.3)	1.00	Referent
Yes	33	(82.5)	24	(40.7)	2.93	(1.46-5.90)
Missing	1		4			

(Continued)

Table 2. (Continued)

Characteristic	HPV positive n = 190		HPV negative n = 215		RR[a]	(95% CI)
	n	(%)	n	(%)		
Where						
Clinic	9	(52.9)	8	(40.0)		
Pediatrician	5	(29.4)	7	(35.0)		
Private doctor	3	(17.7)	5	(25.0)		
Missing	16		4			

[a]RR, relative risk adjusted for age, marital status, and health insurance; CI, confidence interval.
[b]Among women with daughters aged 9–18 years.

HPV vaccine for girls prior to entry into the sixth grade; however, HPV-positive women were more than twice as likely as HPV-negative women to be in favor of the law (RR 2.47, 95% CI 1.36-4.48). Fewer HPV-positive women than HPV-negative women were in favor of vaccinating girls against HPV at age >12 years (RR 0.76, 95% CI 0.60-0.97). Among women with girls in the 9–18-year age range, which qualifies them for the Vaccines for Children campaign, 85% of HPV-positive women were very likely to have their daughters vaccinated compared with 61% of HPV-negative women. Similarly, 83% of HPV-positive women with adolescent daughters knew where to get the vaccine compared with 41% of HPV-negative women (RR 2.93, 95% CI 1.46-5.90).

Discussion

Most Latinas living on the Texas-Mexico border find the HPV vaccine acceptable for their daughters and sons, with nearly all women indicating they would have their children vaccinated against HPV. Finding high proportions of Latina women reporting HPV vaccine acceptability for their children is consistent with the existing literature. The HPV vaccine acceptance for children in the current published literature ranges from 68%[12] to 100%,[9] with several studies noting acceptance between 75% and 90%.[13–16] In a Cuernavaca, Mexico, study, Lazcano-Ponce et al.[17] reported that 84% of women would allow their daughters to participate in an HPV vaccine trial. Constantine and Jerman[18] conducted a telephone survey representative of California and reported that Hispanic parents were more likely than non-Hispanic parents to accept vaccination of their daughters before age 13. In focus groups conducted in Alabama, Scarinci et al.[19] found that Latina immigrants unanimously indicated they would get the vaccine for their daughters.

Our findings that more HPV-positive women had heard of the HPV vaccine than had heard of HPV was somewhat surprising; however, these percentages may have been similar had we asked women about their awareness of the HPV vaccine before we asked them about their awareness of HPV. Both of these percentages were higher than the percentage of HPV-negative women who reported they had heard of HPV and the HPV vaccine; however, the difference was statistically significant only for the HPV vaccine. During in-depth interviews we conducted with 45 HPV-positive women in 2004, a lower percentage of women indicated they had heard of HPV (53%) than either group of women in the current study.

Although rates of vaccine acceptability were high in this study, we did find that HPV-positive women were more likely to endorse vaccination for their children than were HPV-negative women. Further, among women with adolescent daughters, women with HPV were significantly more likely to report that they were "very likely to get daughter vaccinated" compared with HPV-negative women and to know where they could get the vaccine. This finding is consistent with reports of greater vaccine acceptance in mothers who had a history of genital warts[7] or HPV infection[8] or had experienced cancer in the family.[13] HPV-positive women may have higher levels of perceived susceptibility and severity related to cervical cancer (constructs from the Health Belief Model) than HPV-negative women.[20,21] Consistent with the Health Belief Model, these beliefs would influence intention to vaccinate. Fazekas et al.[22] found that parents who believed the HPV infection and cervical cancer were both likely and would have negative consequences among their adolescent daughters were more likely to report intending vaccination of an adolescent daughter. This result is consistent with our finding that HPV-positive women are more likely to understand the risk and consequences of HPV infection and, therefore, to intend to take preventive steps for their children.

We found no difference in parent's acceptability of the HPV vaccine for their children based on gender. This finding is consistent with several small cross-sectional studies and one qualitative study,[8,10,11,23,24] yet a large intervention study found parents more in favor of vaccinating their adolescent daughters than their sons.[7] HPV vaccine acceptability did not differ by parent's gender in the current study. We conducted interviews with 62 men aged 18–64 years in the waiting rooms of community health centers and private clinics from June through November 2007. Over 90% of men reported they would have their daughters and sons vaccinated against HPV (data not shown).

The cost of the HPV vaccine has been noted as a barrier.[25] Sauvageau et al.[14] found that among respondents aged ≤25 years, 91% indicated they would receive the vaccine if it was publicly funded, but only 72% indicated they would pay $100 per dose. In the current study, cost did not appear to be a barrier, as nearly all HPV-positive woman and HPV-negative women indicated they would get their daughter vaccinated even if they had to pay for the series themselves. However, just over 5% of all women indicated that cost or Medicaid coverage was a concern for vaccination.

In the current study, women with HPV were significantly more likely than women without HPV to strongly favor the proposed Texas vaccine requirement. Although this law was withdrawn because of both political and financial concerns, the majority of women in this study favored the law. Because

HPV is an STI, there has been concern, especially among racial/ethnic minorities, that encouragement of the HPV vaccine during adolescence may encourage early sexual activity.[26] In the four studies that investigated this issue,[8,10,18,24] however, a range of 6%–12% of parents worried that adolescent HPV vaccination may promote early sexual activity. Our finding that <5% of all women in our study were concerned about increased sexual activity among vaccinated daughters is similar to this range.

Our study had limitations. The differing response rates between HPV-positive and HPV-negative women may have introduced selection bias. The cross-sectional nature of the study prevented the establishment of a temporal relationship between HPV status and HPV acceptability. Because only around two thirds of participants had heard of the HPV vaccine, we had to provide a description, which may have encouraged participants to respond affirmatively; however, when we restricted the analysis to women who had heard of HPV, our results were similar. We do not know if the women had gotten the HPV vaccine themselves or had gotten the vaccine for their daughters, which will be addressed in future studies.

In addition, HPV-negative women were more likely to have been interviewed sooner after approval of the vaccine and from private clinics than HPV-positive women; however, these variables did not confound the associations of interest. We were unable to control for other potential confounders, such as lifetime number of sexual partners, age at first intercourse, and the sexual behavior of a woman's partner. Because HPV infection is an STI HPV positivity can be viewed as a proxy for the range of sexual behaviors of the woman and her partner. These sexual behaviors may be associated with vaccine acceptability and not necessarily with HPV positivity. However, it is more likely that fear of cancer is the more important motivator for vaccine acceptance than sexual behavior because, as we observed during in-depth interviews, women with HPV identify more with their risk of cancer than with having an STI.

Strengths of our study include the focus on an understudied population in which cervical cancer incidence and mortality are quite high, the fairly large sample size that increased the precision of estimates, and the assessment of confounding by known correlates of HPV positivity. The HPV vaccine, in combination with HPV prevention and cervical cancer screening, presents an unprecedented opportunity to drastically reduce cervical cancer incidence and mortality. The risk of short-term increases in cervical cancer incidence and mortality that may result from emphasizing HPV vaccine receipt without emphasizing HPV prevention and cervical cancer screening has been noted.[27] In order to reduce the risk of increases in cervical cancer incidence and mortality, additional studies should assess the impact of receipt of the HPV vaccine on sexual practices and cervical cancer screening.

Conclusions

We found that HPV-negative women may be slightly less interested in vaccinating their children than are HPV-positive women. This finding may be explained by the woman's perceived lower risk of cervical cancer for herself and her children relative to HPV-positive women. Educational efforts to inform all women of the benefits of HPV vaccination for their daughters need to indicate clearly that (1) the vaccine protects girls and women against both cervical cancer and genital warts and (2) as with the other vaccination against an STI that can cause cancer (hepatitis B), it is the child's risk of HPV and cancer that needs to be carefully considered. These educational efforts may lead to reductions in cervical cancer incidence and mortality in high-risk populations, such as Latinas living on the Texas-Mexico border.

Acknowledgments

This research was supported by grant number MD000170P20 from the National Center on Minority Health and Health Disparities. M.S. was partially supported by career development award DAMD-17-00-1-0340 from the U.S. Army Medical Research and Materiel Command.

We thank the subjects, providers (Drs. Osvaldo Cantu, Manuel Guajardo, Charles Rurangirwa, Ruben Molina Maldonado, Octavio Olivares Ornelas), Brownsville Community Health Center, Clinica Santa Maria, COFAC Matamoros, IMSS Matamoros, Planned Parenthood of Cameron and Willacy Counties, University of Texas Medical Branch Dysplasia Clinic), and study staff (Adela Rodriguez, Elena Garcia, Yolanda Beltran, Dr. Alberto Diaz de Leon, Dra. Lucera Vasquez) for their invaluable assistance with the project.

Disclosure Statement

The authors have no conflicts of interest to report.

References

1. Walboomers JMM, Jacobs MV, Manos MM, et al. Human papillomavirus is a necessary cause of invasive cervical cancer worldwide. J Pathol 1999;189:12–19.
2. Koutsky LA, Ault KA, Wheeler CM, et al. A controlled trial of a human papillomavirus type 16 vaccine. Engl J Med 2002;347:1645–1651.
3. Paavonen J, Jenkins D, Bosch FX, et al. Efficacy of a prophylactic adjuvanted bivalent L1 virus-like-particle vaccine against infection with human papillomavirus types 16 and 18 in young women: An interim analysis of a phase III double-blind, randomised controlled trial. Lancet 2007;369:2161–2170.
4. Ries LAG, Melbert D, Krapcho M, et al., eds. SEER cancer statistics review, 1975–2005. Bethesda, MD: National Cancer Institute, 2008.
5. Texas Cancer Registry. Cancer Epidemiology and Surveillance Branch, Texas Department of State Health Services, Austin, Texas. Available at www.dshs.state.tx.us/tcr/default.shtm or (512) 458–7523.
6. Giuliano AR, Papenfuss M, Schneider A, et al. Risk factors for high-risk type human papillomavirus infection among Mexican-American women. Cancer Epidemiol Biomarkers Prev 1999;8:615–620.
7. Dempsey AF, Zimet GD, Davis RL, Koutsky L. Factors that are associated with parental acceptance of human papillomavirus vaccines: A randomized intervention study of written information about HPV. Pediatrics 2006;117:1486–1493.
8. Davis K, Dickman ED, Ferris D, Dias JK. Human papillomavirus vaccine acceptability among parents of 10- to 15-year-old adolescents. J Low Genit Tract Dis 2004;8:188–194.
9. Gerend MA, Lee SC, Shepherd JE. Predictors of human papillomavirus vaccination acceptability among underserved women. Sex Transm Dis 2007;34:468–471.

10. Mays RM, Sturm LA, Zimet GD. Parental perspectives on vaccinating children against sexually transmitted infections. Soc Sci Med 2004;58:1405–1413.
11. Slomovitz BM, Sun CC, Frumovitz M, et al. Are women ready for the HPV vaccine? Gynecol Oncol 2006;103:151–154.
12. Hopenhayn C, Christian A, Christian WJ, Schoenberg NE. Human papillomavirus vaccine: Knowledge and attitudes in two Appalachian Kentucky counties. Cancer Causes Control 2007;18:627–634.
13. Marlow LA, Waller J, Wardle J. Parental attitudes to pre-pubertal HPV vaccination. Vaccine 2007;25:1945–1952.
14. Sauvageau C, Duval B, Gilca V, Lavoie F, Ouakki M. Human papilloma virus vaccine and cervical cancer screening acceptability among adults in Quebec, Canada. BMC Public Health 2007;7:304.
15. Dinh TA, Rosenthal SL, Doan ED, et al. Attitudes of mothers in Da Nang, Vietnam, toward a human papillomavirus vaccine. J Adolesc Health 2007;40:559–563.
16. Sperber NR, Brewer NT, Smith JS. Influence of parent characteristics and disease outcome framing on HPV vaccine acceptability among rural, Southern women. Cancer Causes Control 2008;19:115–118.
17. Lazcano-Ponce E, Rivera L, Arillo-Santillan E, Salmeron J, Hernandez-Avila M, Munoz N. Acceptability of a human papillomavirus (HPV) trial vaccine among mothers of adolescents in Cuernavaca, Mexico. Arch Med Res 2001;32:243–247.
18. Constantine NA, Jerman P. Acceptance of human papillomavirus vaccination among Californian parents of daughters: A representative statewide analysis. J Adolesc Health 2007;40:108–115.
19. Scarinci IC, Garces-Palacio IC, Partridge EE. An examination of acceptability of HPV vaccination among African American women and Latina immigrants. J Womens Health 2007;16:1224–1233.
20. Becker MH, ed. The Health Belief Model and personal health behavior. Health Educ Monogr 1974;2:324–473.
21. Glanz K, Rimer BK, Lewis FM. Health behavior and health education. Theory, research and practice. San Fransisco: Wiley & Sons, 2002.
22. Fazekas KI, Brewer NT, Smith JS. HPV vaccine acceptability in a rural Southern area. J Womens Health 2008;17:539–548.
23. Olshen E, Woods ER, Austin SB, Luskin M, Bauchner H. Parental acceptance of the human papillomavirus vaccine. J Adolesc Health 2005;37:248–251.
24. Zimet GD, Mays RM, Sturm LA, Ravert AA, Perkins SM, Juliar BE. Parental attitudes about sexually transmitted infection vaccination for their adolescent children. Arch Pediatr Adolesc Med 2005;159:132–137.
25. Brewer NT, Fazekas KI. Predictors of HPV vaccine acceptability: A theory-informed, systematic review. Prev Med 2007;45:107–114.
26. Adams M, Jasani B, Fiander A. Human papillomavirus (HPV) prophylactic vaccination: Challenges for public health and implications for screening. Vaccine 2007;25:3007–3013.
27. Kulasingam SL, Pagliusi S, Myers E. Potential effects of decreased cervical cancer screening participation after HPV vaccination: An example from the U.S. Vaccine 2007;25:8110–8113.

Address correspondence to:
Maureen Sanderson, Ph.D.
Department of Obstetrics and Gynecology
Meharry Medical College
1005 Dr. D.B. Todd Jr. Boulevard
Nashville, TN 37208

E-mail: msanderson@mmc.edu