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Research Article

Parent Attitudes about School Requirements for Human Papillomavirus Vaccine in High-Risk Communities of Los Angeles, California

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Abstract

Background: Human papillomavirus (HPV) immunization requirements for school entry could increase HPV vaccine uptake but are controversial. This study assessed parents' attitudes about HPV immunization requirements.

Methods: During October 2007 to June 2008, we conducted telephone surveys with 484 parents of girls attending middle/high schools serving communities in Los Angeles County with elevated cervical cancer rates.

Results: Parents were mostly Hispanic (81%) or African American (15%); 71% responded in Spanish. Many parents did not know if HPV vaccine works well (42%) or is unsafe (41%). Overall, 59% of parents agreed that laws requiring HPV vaccination for school attendance "are a good idea." In multivariable analysis, African Americans and Hispanics responding in English were less likely than Hispanics responding in Spanish to agree (aOR 0.1, 95% CI: 0.1–0.3; aOR 0.4, 95% CI: 0.2–0.8, respectively). Parents were less likely to agree with these laws if they did not believe the vaccine works well (aOR 0.2, 95% CI: 0.1–0.5) but more likely to agree if they believed the vaccine is not "too new for laws like these" (aOR 4.5, 95% CI: 2.6–8.0). Agreement with laws increased to 92% when including agreement that "these laws are okay only if parents can opt out."

Conclusions: In this at-risk community, more than half of the parents agreed with HPV immunization requirements generally, and the vast majority agreed when including opt-out provisions.

Impact: Support for HPV vaccine requirements may depend on race/ethnicity and inclusion of opt-out provisions. Information about vaccine efficacy and safety may increase support and reduce uncertainty about HPV vaccine in high-risk populations. *Cancer Epidemiol Biomarkers Prev; 20(7); 1421–9. ©2011 AACR.*

Introduction

Two human papillomavirus (HPV) vaccines are licensed for use in the United States (1, 2). Both protect against HPV types 16 and 18, which are responsible for up to 70% of cervical cancers (3). One vaccine also protects against HPV types 6 and 11, which cause 90% of genital warts (4). As these vaccines are most efficacious if administered before exposure to HPV through sexual contact, the Advisory Committee on Immunization Practices (ACIP) recommends routine administration of HPV vaccine to girls at ages 11 or 12 years, with catch-up vaccination through age 26 (5). With broad uptake, HPV vaccine has the potential to reduce the burden of cervical cancer and other HPV-related disease.

In the United States, cervical cancer rates vary markedly by race/ethnicity: annual incidence rates among Hispanic women (12.0 cases/100,000) and black women (10.1 cases/100,000) are higher than among white women (7.9 cases/100,000; ref 6). Because of its high primary prevention efficacy (7), HPV vaccine could narrow racial/ethnic differences in cervical cancer rates. However, its potential to decrease these disparities can only be realized if uptake is high across all groups (8, 9).

School immunization requirements enacted statewide or locally are one strategy to increase vaccine uptake uniformly across racial/ethnic groups. In general, the Task Force for Community Preventive Services recommends school immunization requirements because they have been highly effective in increasing childhood vaccine uptake (10, 11). School requirements have also been effective at narrowing racial/ethnic disparities in uptake (12). Soon after introduction of HPV vaccine,

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some jurisdictions proposed requiring it for school attendance. However, this has been controversial, in part because of concerns about requiring a vaccine against a sexually transmitted infection (STI) that is not contagious with casual classroom contact (13, 14).

A qualitative assessment of state legislators found that they consider acceptability to parents as one factor in determining whether to pursue HPV vaccine requirement laws (15). While editorials in the medical literature and popular media have highlighted potential parental concerns about HPV immunization requirements (16–18), the acceptability of requirements to parents is not well understood. Even less information exists about attitudes toward these requirements among populations at highest risk for cervical cancer. Further, few data are available about the effect of "opt-out" provisions on acceptability of such requirements. Virginia and Washington, D.C., the only jurisdictions that have passed legislation requiring HPV vaccination for school entry, have provisions that allow parents to opt out of vaccination for any reason (19). Opt-out provisions have been proposed as a method of increasing acceptability of HPV vaccine requirements, but they might lessen the effectiveness of the requirements in increasing vaccine uptake (20).

The aims of this study were to: (i) evaluate acceptability of HPV vaccine school requirements to parents of adolescents in mainly Hispanic and African American communities at elevated risk for cervical cancer, (ii) describe correlates of parental support for such requirements, and (iii) describe the effect of including opt-out provisions on acceptability of these requirements.

Methods

Procedures

A telephone survey, conducted October 2007 through June 2008, was initiated about 15 months after quadrivalent HPV vaccine was licensed and first recommended for girls (21), 9 months after the vaccine became available through the Vaccines for Children (VFC) program in Los Angeles County, CA (22), and 6 months after final ACIP recommendations were published (5). The survey was done as a part of a broader study evaluating a pregnancy and sexually transmitted infection (STI) prevention program in the Los Angeles Unified School District (LAUSD; ref 23). The study included 26 middle and high schools selected on the basis of high rates of teen pregnancy or *Chlamydia trachomatis* infection in the school attendance areas. Los Angeles County has cervical cancer rates that are higher than the national average: 9.9 cases/100,000 women annually in Los Angeles County versus 8.1 cases/100,000 women in the United States during a similar time frame (24). The higher rates in Los Angeles are driven primarily by a large Hispanic population with particularly high incidence rates, at 13.5 cases/100,000 women (24). The LAUSD study schools mainly serve racial/ethnic minorities with the highest cervical cancer risk; at the time of the study, 74% of the total student population served by these schools was Hispanic, 16% was African American, and 10% was of other races/ethnicities (25).

Survey methods are described in detail elsewhere (26). In brief, parents of students randomly selected from the study schools' student information systems, who had valid phone numbers, were invited to participate. Of an estimated 1,627 eligible participants, 776 participated in the survey (response rate = 48%; ref 26). The subset of parents with 11- to 18-year-old daughters (n = 509) received HPV vaccine-related questions; the current analysis includes 484 parents with complete data related to HPV vaccine requirement opinions. Trained bilingual interviewers obtained verbal consent and interviewed participants in their preferred language, English or Spanish. Prior to administration, Spanish surveys were back-translated to ensure accuracy. All study protocols and survey instruments were approved by the human subjects review boards of the University of Southern California/Health Research Association, Centers for Disease Control and Prevention, Los Angeles County Department of Public Health, and LAUSD Research and Planning Branch.

Outcome measures

After informing parents that "The HPV vaccine is recommended for all 11- and 12-year-old girls," interviewers stated, "Some states are trying to pass laws that would require all 11- and 12-year-old girls to get the HPV vaccine before they are allowed to start 6th grade. Please tell me how strongly you agree or disagree with the following statements about this." The statements were: "I think these laws are a good idea," followed by, "These laws are okay only if parents can opt out if they want to." Response options were: "strongly agree," "somewhat agree," "somewhat disagree," "strongly disagree." For all items, interviewers did not offer a "do not know" response option but recorded such responses if given.

To assess acceptability of HPV vaccine requirements to parents, the main outcome of the study was agreement with the statement "I think these laws are a good idea." The secondary outcome, used to assess the effect of opt-out provisions on acceptability, was agreement either with the statement "I think these laws are a good idea" or with the statement "These laws are okay only if parents can opt out if they want to."

Independent variables

We assessed demographic factors, HPV vaccine awareness, and the HPV vaccination status of the daughter. In addition, we evaluated parents' agreement with attitude statements shown to be associated with HPV vaccine uptake or described as potential barriers to enacting HPV vaccine school requirements in previous publications (14, 16–18). Parents were asked about their beliefs regarding the vaccine's efficacy and safety (e.g., "I believe the HPV vaccine works well"); perceived risk of the

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daughter acquiring HPV; negative attitudes about a vaccine against an STI (e.g., "If a teenage girl gets the HPV vaccine, she may be more likely to have sex"); and specific concerns about HPV vaccine requirement laws (e.g., "The HPV vaccine is too new to have laws like this"). For all attitude items, the survey used the same response scale as for the main outcome measures.

Statistical analyses

We calculated proportions and 95% confidence intervals (CI) for the main and secondary outcomes overall and by demographic factors, HPV vaccine awareness and uptake, and attitudes about HPV vaccine. Bivariate associations were assessed using chi-square tests. Covariates with $P < 0.10$ in bivariate analyses were entered into separate multivariable logistic regression models for each of the two outcomes. Using a backward selection process, covariates with $P < 0.05$ were retained in the final multivariable models. Preparatory analyses examining whether to use nested models to account for clustering by school estimated the intraclass correlations for both models to be less than 0.05. As the statistical significance of variables in the final models did not change with nesting by school, we present findings from the non-nested models for the sake of simplicity.

For all analyses, the 4-point response scales for outcome and attitude items were collapsed to "agree" ("strongly agree"/"somewhat agree") and "disagree" ("strongly disagree"/"somewhat disagree"). For variables with less than 25 "do not know" responses, analyses excluded these responses; otherwise, "do not know" responses were kept as a separate category. The reference group for bivariate and multivariable models was the "agree" response for all attitude questions. Data were analyzed using SAS version 9.1.

Results

Study participants

Surveyed parents ($n = 484$) were mostly female (89%) and either Hispanic (81%) or African American, non-Hispanic (15%). Seventy-one percent of parents completed the survey in Spanish (Table 1). Almost half (48%) had not begun high school. Overall, 54% had heard of HPV vaccine prior to the survey. Twenty-five percent of parents reported that their daughters had received at least 1 dose of HPV vaccine, and another 47% of parents (i.e., 62% of those with unvaccinated daughters) reported that they "definitely" or "probably" will get their daughters HPV vaccine in the next year. HPV vaccine-related attitudes are summarized in Table 1. Forty-two percent of parents stated that they did not know if the vaccine works well and 68% agreed that the vaccine is too new for school immunization requirement laws.

Agreement with laws

Fifty-nine percent of parents agreed with the statement "I think these laws are a good idea" (Table 2). Although 68% of Hispanic parents responding in Spanish agreed, fewer Hispanic parents responding in English (48%), African American parents (26%), or parents of other races (35%) agreed that the laws are a good idea ($P < 0.01$ for each comparison). College-educated parents were less likely to agree with the laws than those with 8th grade education or less (35% vs. 67%, $P < 0.001$). A greater proportion of parents whose daughters had already received at least 1 dose of the HPV vaccine (68%) or who intended to vaccinate their daughters within the next year (64%) agreed that the laws are a good idea than those whose daughters had not been vaccinated and did not intend to vaccinate in the next year (45%, $P < 0.01$ for each comparison).

Seventy percent of parents who believed the vaccine works well agreed with the laws, versus 48% of parents who did not know if it works well and only 28% who did not believe the vaccine works well ($P < 0.001$ for each comparison). Among parents who believed their daughters are at risk of acquiring HPV without the vaccine, 68% agreed the laws "are a good idea," versus 45% who did not believe their daughters are at risk ($P < 0.001$). Beliefs that the daughter is not too young for a vaccine against an STI and that the vaccine is not being pushed by drug companies were associated with increased agreement with the laws ($P < 0.01$ for each). Of parents who believed the vaccine is too new for laws like these, 49% agreed with the laws as opposed to 79% of those who did not believe the vaccine is too new ($P < 0.001$). Agreement with HPV vaccine school requirements was not significantly associated with awareness of HPV vaccine prior to the study, parents' belief that they do not have enough information to decide whether to give the vaccine to their daughter, and belief that a teenage girl would be more likely to have sex if she received HPV vaccine.

In multivariable analysis, 4 factors were significantly associated with agreement that HPV school immunization laws "are a good idea" after controlling for other variables (Table 2). Hispanic parents responding in English (adjusted odds ratio [aOR] 0.4, CI: 0.2–0.8) and African American parents (aOR 0.1, CI: 0.1–0.3) had lower odds of agreeing with the laws than did Hispanic parents responding in Spanish. Parents whose daughters had not been vaccinated and who were unsure if they would vaccinate them in the next year had lower odds of agreeing with these laws compared with parents who did not intend to vaccinate their daughters in the next year (aOR 0.4, CI: 0.2–0.95). Likewise, parents who did not believe the vaccine works well had lower odds of agreement than parents who believed the vaccine works well (aOR 0.2, CI: 0.1–0.5). Parents who did not believe that the vaccine is too new for such laws had more than 4 times the odds of agreeing with the laws (aOR 4.5, CI: 2.6–8.0).

Agreement with laws including opt-out provisions

Parental agreement with HPV vaccine requirement laws increased to 92% when including parents who

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Table 1. Characteristics of parents ($n = 484$) and their daughters and parents' attitudes about HPV and HPV vaccine

Characteristics	*n*	%
Demographics		
Parent's sex		
Female	430	89.4
Male	51	10.6
Parent's ethnicity or race/survey language		
Hispanic/Spanish	344	71.1
Hispanic/English	50	10.3
African American/English[a]	73	15.1
Other race/English	17	3.5
Parent's age, y		
≤39	203	41.9
40–49	205	42.4
≥50	76	15.7
Parent's marital status		
Married/cohabiting	331	68.5
Single/separated/divorced/widowed	152	31.5
Parent's education		
Did not enter high school	233	48.1
Some high school or high school graduate	157	32.4
Some college or greater	94	19.4
Daughter's age, y		
11–12	83	17.2
13–15	251	51.9
16–18	150	31.0
HPV vaccine awareness and uptake		
Have you ever heard of the HPV vaccine before today?		
Yes	260	54.3
No	219	45.7
During the past year, has a doctor or other health care provider recommended that your daughter get the HPV vaccine?		
Yes	145	30.9
No	325	69.2
Daughter vaccinated?/Intend to vaccinate in the next year?		
No, probably/definitely will not	65	14.0
No, unsure if will	66	14.3
No, probably/definitely will	218	47.1
Yes, had at least 1 dose	114	24.6
Attitudes towards HPV vaccine		
I believe the HPV vaccine works well		
Agree	253	52.4
Disagree	25	5.2
Do not know	205	42.4
I think the HPV vaccine is unsafe		
Agree	63	13.0
Disagree	223	46.2
Do not know	197	40.8
I do not have enough information about the HPV vaccine to decide whether to give it to my daughter		
Agree	313	67.3
Disagree	152	32.7
Without the HPV vaccine my daughter is at high risk for getting HPV some time in her life		
Agree	296	61.3
Disagree	103	21.3
Do not know	84	17.4
My daughter is too young to get a vaccine for a sexually transmitted infection		
Agree	230	48.3
Disagree	246	51.7
If a teenage girl gets the HPV vaccine, she may be more likely to have sex		
Agree	168	34.8
Disagree	284	58.8
Do not know	31	6.4
The HPV vaccine is being pushed to make money for drug companies		
Agree	113	23.4
Disagree	235	48.8
Do not know	134	27.8
The decision to give the HPV vaccine should be the parent's decision alone		
Agree	392	82.2
Disagree	85	17.8
The HPV vaccine is too new to have laws like this		
Agree	328	67.8
Disagree	129	26.7
Do not know	27	6.6

(Continued on the next column)

[a]Non-Hispanic; 2 respondents with a race/ethnicity of Hispanic/African American were included in the Hispanic category.

agreed "these laws are okay only if parents can opt out" (Fig. 1). Agreement with requirement laws increased from 26% to 75% among African American parents; however, agreement was still lower among African Americans than among Hispanics responding in Spanish (96%, $P < 0.01$). Agreement with laws increased among all vaccination status/intent groups. Among parents who had not yet vaccinated their daughters and were unsure of their intent to vaccinate within a year, agreement increased from 25% to 92%. Among parents who did not believe the vaccine works well, agreement increased from 30% to 79%; among parents unsure of vaccine efficacy, agreement increased from 47% to 89%. After including parents who agreed "these laws are okay only if parents can opt out," there was no longer a statistically significant difference in agreement between parents who did and did not believe the vaccine was too new for such laws (91% versus 94%, $P = 0.4$).

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Table 2. Parental agreement that HPV vaccine requirement laws "are a good idea," by selected characteristics

	n	Agreed with "I think these laws are a good idea." % (95% CI)	*P*	Adjusted OR (95% CI); multivariable model
Total	484	58.5 (54.1–62.9)		
Demographics				
Parent's sex			0.53	
Male	51	62.8 (49.3–76.2)		–
Female	430	58.1 (53.4–62.9)		–
Parent's ethnicity or race/survey language			<0.001	
Hispanic/Spanish	344	68.0 (63.1–73.0)		Ref
Hispanic/English	50	48.0 (34.0–62.0)		0.4 (0.2–0.8)
African American/English[a]	73	26.0 (15.9–36.2)		0.1 (0.1–0.3)
Other race/English	17	35.3 (11.0–59.7)		0.2 (0.1–0.8)
Parent's age, y			0.03	
≤39	203	65.5 (58.9–72.1)		–
40–49	205	53.7 (46.8–60.6)		–
≥50	76	52.6 (41.3–64.0)		–
Parent's marital status			0.03	
Married/cohabiting	331	61.6 (56.3–66.9)		–
Single/separated/divorced/widowed	152	51.3 (43.3–59.3)		–
Parent's education			<0.001	
Did not enter high school	233	66.5 (60.4–72.7)		–
Some or high school graduate	157	60.5 (52.8–68.2)		–
Some college or greater	94	35.1 (25.4–44.9)		–
Daughter's age, y			0.41	
11–12	83	55.4 (44.6–66.2)		–
13–15	251	61.4 (55.3–67.4)		–
16–18	150	55.3 (47.3–63.4)		–
HPV vaccine awareness and uptake				
Have you ever heard of the HPV vaccine before today?			0.19	
Yes	260	55.8 (49.7–61.9)		–
No	219	61.6 (55.1–68.2)		–
During the past year, has a doctor or other health care provider recommended that your daughter get the HPV vaccine?			0.13	
Yes	145	63.5 (55.5–71.4)		–
No	325	56.0 (50.6–61.5)		–
Daughter vaccinated?/Intend to vaccinate in the next year?			<0.001	
No, probably/definitely will not	65	44.6 (32.4–56.8)		Ref
No, unsure if will	66	30.3 (19.1–41.5)		0.4 (0.2–0.95)
No, probably/definitely will	218	64.2 (57.8–70.7)		1.7 (0.9–3.3)
Yes, had at least 1 dose	114	68.4 (59.8–77.0)		1.5 (0.7–3.2)
Attitudes towards HPV Vaccine				
I believe the HPV vaccine works well			<0.001	
Agree	253	70.4 (64.7–76.0)		Ref
Disagree	25	28.0 (9.1–46.9)		0.2 (0.1–0.5)
Do not know	205	47.8 (40.9–54.7)		0.6 (0.4–1.0)
I think the HPV vaccine is unsafe			0.01	
Agree	63	61.9 (49.8–74.0)		–

(Continued on the following page)

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Table 2. Parental agreement that HPV vaccine requirement laws "are a good idea," by selected characteristics (cont'd)

	n	Agreed with "I think these laws are a good idea." % (95% CI)	*P*	Adjusted OR (95% CI); multivariable model
Disagree	223	64.6 (58.2–70.9)		–
Do not know	197	50.8 (43.7–57.8)		–
I do not have enough information about the HPV vaccine to decide whether to give it to my daughter			0.16	
Agree	313	55.6 (50.0–61.2)		–
Disagree	152	62.5 (54.7–70.3)		–
Without the HPV vaccine my daughter is at high risk for getting HPV some time in her life			<0.001	
Agree	296	67.6 (62.2–73.0)		–
Disagree	103	44.7 (35.0–54.4)		–
Do not know	84	44.1 (33.3–54.8)		–
My daughter is too young to get a vaccine for a sexually transmitted infection			0.005	
Agree	230	51.7 (45.2–58.3)		–
Disagree	246	64.6 (58.6–70.7)		–
If a teenage girl gets the HPV vaccine, she may be more likely to have sex			0.33	
Agree	168	54.2 (46.6–61.8)		–
Disagree	284	61.3 (55.5–67.0)		–
Do not know	31	58.1 (39.5–76.7)		
The HPV vaccine is being pushed to make money for drug companies			<0.001	
Agree	113	44.3 (35.0–53.5)		–
Disagree	235	68.9 (63.0–74.9)		
Do not know	134	53.0 (44.5–61.5)		–
The decision to give the HPV vaccine should be the parent's decision alone			0.001	
Agree	392	54.3 (49.4–59.3)		–
Disagree	85	74.1 (64.7–83.5)		–
The HPV vaccine is too new to have laws like this			<0.001	
Agree	328	49.4 (43.9–54.9)		Ref
Disagree	129	79.1 (72.0–86.2)		4.5 (2.6–8.0)
Do not know	27	70.4 (51.9–88.8)		2.9 (0.9–9.3)

[a]Non-Hispanic; 2 respondents with a race/ethnicity of Hispanic/African American were included in the Hispanic category.

In multivariable analysis, when including agreement with the statement "these laws are okay only if parents can opt out," African American parents still had lower odds of agreeing with HPV vaccine requirement laws than Hispanic parents speaking Spanish (aOR 0.1, CI: 0.05–0.3). Parents with daughters who had already received 1 dose or more of HPV vaccine (aOR 6.1, CI: 1.7–22.1), who planned to vaccinate their daughter in the next year (aOR 3.4, CI: 1.3–8.7), or who were unsure whether to vaccinate in the next year (aOR 3.7, CI: 1.1–12.8) all had greater odds of agreement with laws compared with those who did not plan to vaccinate in the next year. When opt-out provisions were included, beliefs that HPV vaccine works well and that it is too new for laws were no longer associated with agreement with laws. One additional factor was associated with agreement: those who did not believe their daughters will be at risk of acquiring HPV without the vaccine had lower odds of agreement than those who believed their daughters will be at risk (aOR 0.3, CI: 0.1–0.8).

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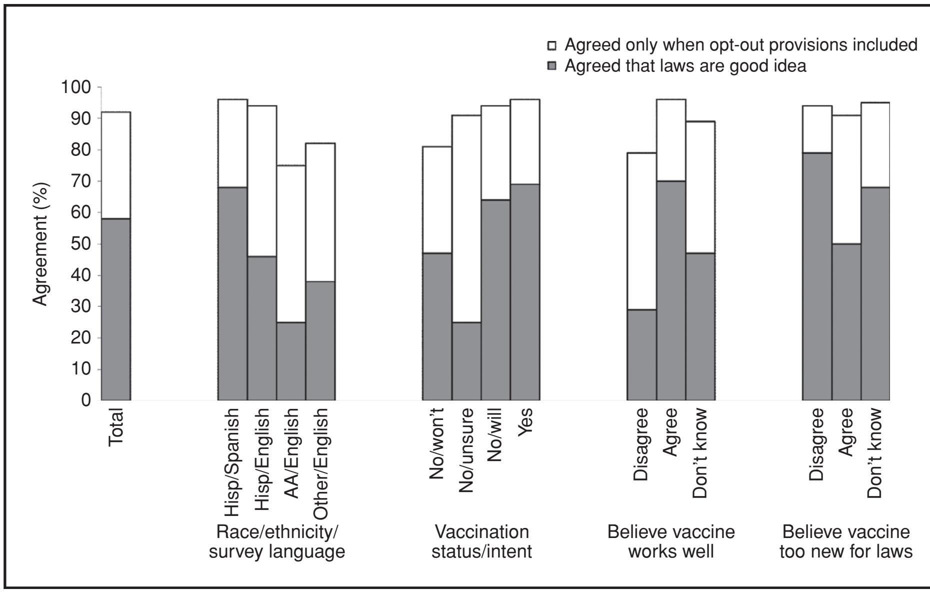

Figure 1. Parents' opinions about HPV vaccine requirements for school entry with and without inclusion of opt-out provisions, according to selected characteristics. The figure depicts the proportion of parents agreeing that HPV vaccine requirement laws "are a good idea," when opt-out provisions were not mentioned (gray bars), and the additional proportion of parents agreeing that "these laws are okay only if parents can opt out if they want to" (white bars). Parental agreement is shown overall and according to the four characteristics independently associated with agreeing the laws "are a good idea" in multivariable analysis. *AA*, African American; *Hisp*, Hispanic.

Discussion

In this population at elevated risk for cervical cancer, school requirements for HPV vaccine were acceptable to more than half of adolescent girls' parents. Parents were more likely to agree with HPV immunization requirements if they were Hispanic responding in Spanish, believed the vaccine works well, or disagreed that the vaccine is too new for laws like these. Parents whose daughters had not yet been vaccinated against HPV and were unsure of their intent to vaccinate in the next year were less likely to agree with the laws. When opt-out provisions were included, acceptability of HPV immunization requirements increased substantially, with more than 90% of all parents agreeing with requirement laws. Inclusion of opt-out provisions eliminated statistically significant differences in acceptability according to concerns about vaccine efficacy and newness; however, differences by race/ethnicity and vaccination status/intent remained.

This study found that HPV vaccine requirements for school entry were highly acceptable to Hispanics, an ethnic group with disproportionately high cervical cancer rates (6). This is consistent with a smaller study showing that such requirements are acceptable to Hispanic parents (27). Hispanics have shown high acceptability of HPV vaccine (28). The 2008 National Immunization Survey—Teen (NIS—Teen) and a study in California found higher uptake of HPV vaccine among Hispanics than among non-Hispanic whites (29, 30), although such differences were not found in the 2009 NIS—Teen (31). Higher early uptake of HPV vaccine by Hispanics and greater agreement with HPV immunization requirement laws may be related to cultural differences. In Latino culture, "respeto," or respect for authority figures, is highly valued (32). Because of this belief, Hispanic parents may be less likely to question the guidance of health care professionals, and thus more likely to agree with immunization requirements (32). If one uses language spoken as an indicator of acculturation, then English-speaking Hispanic parents might be more acculturated, and thus less likely to value the concept of "respeto" (33). This is supported by the finding that Hispanic parents responding in English were less accepting of the laws than those responding in Spanish.

While Hispanics were likely to agree with the laws, acceptability was lower among African Americans. The low level of support by African American parents might be explained by relatively high mistrust of health care in the African American community (34, 35). However, these findings could be particular to this Los Angeles community and may not reflect attitudes of African Americans elsewhere. Similar studies in North Carolina and Georgia found higher acceptability of HPV vaccine requirements among African American parents than we observed. Fifty percent of African American parents in North Carolina and 55% in Georgia agreed with HPV immunization requirements (36, 37), compared with 26% of African American parents in our study. These studies found no difference between African American and non-Hispanic white parents, but included very few Hispanic participants (36, 37).

Concerns about the efficacy and newness of HPV vaccine correlated with parents' opinions about HPV vaccine requirements, and many parents were uncertain of vaccine efficacy and safety. The media have reported on public concern about the short time between vaccine licensure and introduction of HPV vaccine legislation, which was related to perceived lack of adequate safety data (18, 38). This study was conducted relatively early after vaccine introduction, which may have contributed to uncertainty about vaccine efficacy and safety. Uncertainty may decrease over time.

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While all states allow exemptions to vaccination for medical reasons and most allow religious exemptions, less than half allow philosophical exemptions for persons who object to immunizations because of personal, moral or other beliefs (19). In contrast to exemptions, "opt-out" provisions allow parents to elect not to have their child vaccinated for any reason. However, the procedures required for parents to opt out may vary across programs (19). Mentioning an opt-out provision increased parental support of HPV immunization requirement laws; however, differences in parental agreement by race/ethnicity remained. Access to information about HPV vaccine differs among various racial/ethnic groups (39). HPV vaccine requirements for school entry could provide more equal access to information about the vaccine, even if parents ultimately decide not to vaccinate their daughters. While it makes sense that HPV vaccine requirements would increase vaccine uptake, even with opt-out provisions, it is unclear the extent to which opt-out provisions might lessen the impact of such requirements. In addition, broader opt-out provisions for HPV vaccine may lead to an environment in which broader exemptions are sought for other vaccines. This would be a concern, as broader exemptions for other vaccines have been associated with lower vaccine coverage and increases in vaccine preventable disease (20, 40, 41). Moving forward, the experiences of Virginia and Washington, D.C., which have passed HPV immunization requirements with broad opt-out provisions, can inform the ongoing discussion about this issue (19).

This study had several limitations. First, as the study was conducted in an urban setting with participants from primarily racial and ethnic minorities participating in an STI prevention study, results may not be generalizable to other settings. Also, the survey response rate was relatively low, but similar to that of other random-digit dialed telephone surveys which have been shown to be valid despite lower response rates (42, 43). The survey asked about hypothetical laws, not actual legislation, and did not specifically describe opt-out provisions; parents' opinions could differ when faced with actual legislation. Finally, while the surveys were professionally translated and given by bilingual interviewers, language and cultural differences (e.g., "respeto," as described above) might have affected how parents interpreted or responded to survey questions.

Jurisdictions considering requirements for HPV vaccine should weigh a variety of issues in addition to acceptability of the requirements to parents. The National Vaccine Advisory Committee recommends that, before introducing adolescent immunization requirements for school entry, jurisdictions consider school district support, disease burden and transmission, and existing policies and legislation, along with vaccine cost, funding, supply, safety, and efficacy (44). Our data suggest that unique characteristics of a population, such as race or ethnicity, may influence parental support for HPV vaccine requirements. Information about vaccine efficacy and safety may be important for increasing parental support for school requirement laws and reducing uncertainty about the vaccine among high-risk populations. Opt-out provisions are likely to increase acceptability of HPV vaccine requirement laws to parents; however, such provisions may affect the effectiveness of the laws.

Disclosure of Potential Conflicts of Interest

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References

1. Food and Drug Administration. FDA approves new vaccine for cervical cancer prevention. [cited 2010 Oct 27]. Available from: www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm187048.htm.
2. Food and Drug Administration. FDA licenses new vaccine for prevention of cervical cancer and other diseases in females caused by human papillomavirus. [cited 2010 Oct 27]. Available at: www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/2006/ucm108666.htm.
3. de Sanjose S, Quint WG, Alemany L, Geraets DT, Klaustermeier JE, Lloveras B, et al. Human papillomavirus genotype attribution in invasive cervical cancer: a retrospective cross-sectional worldwide study. Lancet Oncol 2010;11:1048–56.
4. Greer CE, Wheeler CM, Ladner MB, Beutner K, Coyne MY, Liang H, et al. Human papillomavirus (HPV) type distribution and serological response to HPV type 6 virus-like particles in patients with genital warts. J Clin Microbiol 1995;33:2058–63.
5. Markowitz LE, Dunne EF, Saraiya M, Lawson HW, Chesson H, Unger ER. Quadrivalent human papillomavirus vaccine: recommendations of the advisory committee on immunization practices (ACIP). MMWR Recomm Rep 2007;56:1–24.
6. National Cancer Institute. Surveillance epidemiology and end results. [cited 2011 Jan 31]. Available from: seer.cancer.gov/statfacts/html/cervix.html.
7. Ault KA. Effect of prophylactic human papillomavirus L1 virus-like-particle vaccine on risk of cervical intraepithelial neoplasia grade 2, grade 3, and adenocarcinoma in situ: a combined analysis of four randomised clinical trials. Lancet 2007;369:1861–8.

Published OnlineFirst May 6, 2011; DOI: 10.1158/1055-9965.EPI-10-1236

8. Flannery B, Schrag S, Bennett NM, Lynfield R, Harrison LH, Reingold A, et al. Impact of childhood vaccination on racial disparities in invasive Streptococcus pneumoniae infections. JAMA 2004;291: 2197–203.

9. Kim JJ, Goldie SJ. Health and economic implications of HPV vaccination in the United States. N Engl J Med 2008;359:821–32.

10. Task Force on Community Preventive Services. Recommendations regarding interventions to improve vaccination coverage in children, adolescents, and adults. Am J Prev Med 2000;18: 92–6.

11. Averhoff F, Linton L, Peddecord KM, Edwards C, Wang W, Fishbein D. A middle school immunization law rapidly and substantially increases immunization coverage among adolescents. Am J Public Health 2004;94:978–84.

12. Morita JY, Ramirez E, Trick WE. Effect of a school-entry vaccination requirement on racial and ethnic disparities in hepatitis B immunization coverage levels among public school students. Pediatrics 2008;121:e547–52.

13. Colgrove J. The ethics and politics of compulsory HPV vaccination. N Engl J Med 2006;355:2389–91.

14. Gostin LO, DeAngelis CD. Mandatory HPV vaccination: public health vs private wealth. JAMA 2007;297:1921–3.

15. Colgrove J, Abiola S, Mello MM. HPV vaccination mandates—lawmaking amid political and scientific controversy. N Engl J Med 2010;363:785–91.

16. Charo RA. Politics, parents, and prophylaxis–mandating HPV vaccination in the United States. N Engl J Med 2007;356:1905–8.

17. Haber G, Malow RM, Zimet GD. The HPV vaccine mandate controversy. J Pediatr Adolesc Gynecol 2007;20:325–31.

18. Saul S, Pollack A. Furor on rush to require cervical cancer vaccine. 2007. New York Times.

19. National Conference of State Legislatures. HPV vaccine: state legislation and statutes. [cited 2010 Oct 27]. Available from: www.ncsl.org/default.aspx?tabid=14381.

20. Salmon DA, Omer SB, Moulton LH, Stokley S, DeHart MP, Lett S, et al. Exemptions to school immunization requirements: the role of school-level requirements, policies, and procedures. Am J Public Health 2005;95:436–40.

21. Center for Disease Control and Prevention. ACIP recommends HPV vaccination. [cited 2010 Oct 2007]. Available from: http://www.cdc.gov/media/transcripts/t060629.htm.

22. Medi-Cal. HPV vaccine update. [cited 2010 Oct 27] Available at: http://www.cdph.ca.gov/programs/immunize/Documents/gm20070901.doc.

23. Dittus P, DeRosa C, Ethier K, Chung E, Martinez S, Wong K, et al. Project connect: positive effects of a multi-level social-ecological intervention for adolescents. Paper presented at: 2008 National STD Prevention Conference, Chicago, IL.

24. Keck School of Medicine at USC: Cancer surveillance program. [cited 2011 Feb 16]. Available from: http://keck.usc.edu/en/Education/Academic_Department_and_Divisions/Department_of_Preventive_Medicine/Divisions/Epidemiology/Research/Cancer_Surveillance_Program/Cancer_Statistics.aspx.

25. Los Angeles Unified School District. [cited 2011 Mar 3]. Available from: http://www.lausd.net.

26. Guerry SL, De Rosa CR, Markowitz LE, Walker S, Liddon N, Kerndt PR, et al. HPV vaccine initiation among adolescent girls in high-risk communities. Vaccine 2011;29:2235–41.

27. Yeganeh N, Curtis D, Kuo A. Factors influencing HPV vaccination status in a Latino population; and parental attitudes towards vaccine mandates. Vaccine 2010;28:4186–91.

28. Watts LA, Joseph N, Wallace M, Rauh-Hain JA, Muzikansky A, Growdon WB, et al. HPV vaccine: a comparison of attitudes and behavioral perspectives between Latino and non-Latino women. Gynecol Oncol 2009;112:577–82.

29. Centers for disease control and prevention. National, state, and local area vaccination coverage among adolescents aged 13–17 years—United States, 2008. MMWR 2009;58:997–1001.

30. Chao C, Velicer C, Slezak JM, Jacobsen SJ. Correlates for human papillomavirus vaccination of adolescent girls and young women in a managed care organization. Am J Epidemiol 2010;171:357–67.

31. Centers for disease control and prevention. National, state, and local area vaccination coverage among adolescents aged 13–17 years—United States, 2009. MMWR 2010;59:1018–23.

32. National alliance for Hispanic health. Quality health services for Hispanics: The cultural competency component. [cited 2010 Oct 27]. Available from: www.hrsa. gov/culturalcompetence/qualityhealthservices/QualityHealthServicesforHispanics.pdf.

33. Cuellar I, Arnold B, Maldonado R. Acculturation rating-scale for Mexican-Americans—II: a revision of the original arsma scale. Hispanic J Behav Sci 1995;17:275–304.

34. Boulware LE, Cooper LA, Ratner LE, LaVeist TA, Powe NR. Race and trust in the health care system. Public Health Rep 2003;118: 358–65.

35. Crawley LM. African-American participation in clinical trials: situating trust and trustworthiness. J Natl Med Assoc 2001;93:14S–7S.

36. Horn L, Howard C, Waller J, Ferris DG. Opinions of parents about school-entry mandates for the human papillomavirus vaccine. J Low Genit Tract Dis 2010;14:43–8.

37. Smith JS, Brewer NT, Chang Y, Liddon N, Guerry S, Pettigrew E, et al. Acceptability of school requirements for human papillomavirus vaccine. Paper presented at: 2009 Annual Meeting of the American Public Health Association, Philadelphia, PA.

38. Schwartz JL, Caplan AL, Faden RR, Sugarman J. Lessons from the failure of human papillomavirus vaccine state requirements. Clin Pharmacol Ther 2007;82:760–3.

39. Hughes J, Cates JR, Liddon N, Smith JS, Gottlieb SL, Brewer NT. Disparities in how parents are learning about the human papillomavirus vaccine. Cancer Epidem Biom Prev 2009;18:363–72.

40. Feikin DR, Lezotte DC, Hamman RF, Salmon DA, Chen RT, Hoffman RE. Individual and community risks of measles and pertussis associated with personal exemptions to immunization. JAMA 2000;284: 3145–50.

41. Omer SB, Pan WK, Halsey NA, Stokley S, Moulton LH, Navar AM, et al. Nonmedical exemptions to school immunization requirements: secular trends and association of state policies with pertussis incidence. JAMA 2006;296:1757–63.

42. Curtin R, Presser S, Singer E. The effects of response rate changes on the index of consumer sentiment. Public Opin Quart 2000;64: 413–28.

43. Keeter S, Miller C, Kohut A, Groves RM, Presser S. Consequences of reducing nonresponse in a national telephone survey. Public Opin Quart 2000;64:125–48.

44. National Vaccine Advisory Committee. Mandates for adolescent immunizations: recommendations from the National Vaccine Advisory Committee. Am J Prev Med 2008;35:145–51.

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