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Factors Associated with Medicaid Providers Recommendation of the HPV Vaccine to Low-Income Adolescent Girls

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Abstract

Background—HPV vaccination in the US remains a public health challenge with vaccine rates of 50%. Although health care providers can facilitate HPV vaccination, several factors may impede their ability to universally recommend the vaccine. To maximize the potential of HPV vaccines, it is important to understand challenges providers face in the clinical environment.

Purpose—The study sought to identify factors associated with recommendation of the HPV vaccine for low-income adolescents in the early (9–10), target (11–12), early adolescent catch-up (13–14), and late adolescent catch-up (15–17) vaccination groups.

Methods—Surveys were mailed from October 2009-April 2010 to a random sample of Florida-based physicians serving Medicaid-enrolled adolescents. Data were analyzed in 2013.

Results—Among early adolescents, discomfort discussing sexually transmitted infections (STIs) with teens (odds ratio [OR]=1.75), difficulty ensuring vaccine completion (OR=0.73), and discomfort discussing STIs with parents (OR=0.44) were associated with recommendation. For target adolescents, discomfort discussing STIs with teens (OR=2.45), time constraints (OR=0.70),

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vaccine efficacy concerns (OR=0.65), discomfort discussing STIs with parents (OR=0.33), obstetrics/gynecology (OR=0.25) and family medicine (OR=0.24) specialty, and non-Hispanic Black patient (OR=0.15) were associated with recommendation. In early catch-up adolescents, concerns that teens will practice riskier behaviors (OR=0.57), discomfort discussing STIs with parents (OR=0.47), and family medicine specialty (OR=0.20) were associated with recommendation. For late catch-up adolescents, family medicine specialty (OR=0.13) was associated with recommendation.

Conclusion—Modifiable factors that impede or influence provider recommendations of HPV vaccines can be addressed through intervention. Overall, findings suggest that efforts should focus on sexuality communication and family medicine specialty.

Keywords

Human papillomavirus vaccines; Physicians; Adolescent; Barriers; Low-Income Population

Introduction

Human papillomavirus (HPV) vaccination rates have gradually increased in the United States. The nationwide vaccine initiation rate (i.e., at least 1 of 3 dose series administered) increased by 29 percent from 2007 (25%) to 2011 (53%) among adolescent girls aged 13–17 (1, 2). Despite this increase, the promise of HPV vaccines to effect downstream trends in racial, economic, and geographic health disparities is realized only when vaccination is maximized across populations (3). Low-income and racial/ethnic minority adolescent girls face additional vaccination challenges such as lower rates of provider recommendation for vaccination and vaccine series completion (2, 4, 5). Such findings highlight the urgent need to understand these differences in light of the disproportionate burden of cervical cancer and other HPV-associated diseases among low-income and minority groups (6).

Approximately 74% of all HPV infections occur among young adults aged 15–24 (7). As such, the Centers for Disease Control and Prevention recommends target vaccination for adolescent girls and boys aged 11–12, early vaccination for those aged 9–10, and catch-up vaccination for 13–26 year olds (8, 9). HPV vaccines have the potential to reduce HPV-related morbidity and mortality through widespread and non-disparate uptake (10, 11). Research suggests that health care provider recommendation is an important contributor to HPV vaccine initiation and completion (4, 12–14). Prior studies have found that adolescent girls who received an HPV vaccine recommendation from their health care provider were 5 to 23 times more likely to vaccinate compared to those without a recommendation (4, 13, 15).

Few studies have examined health care provider barriers to recommending the HPV vaccine. Daley et al found that the need to discuss sexuality before recommendation and prior vaccine refusals were barriers to recommendation among adolescents in the target vaccination age range (16). Another study found that inadequate reimbursement was solely related to not recommending vaccination for adolescent girls of all ages (17). Other studies found that negative parental perceptions of the vaccine, HPV knowledge deficits, lack of support for mandatory vaccination, lack of office coordination, and difficulty determining insurance coverage were barriers to recommendation (18–20).

Although some studies have outlined provider barriers to HPV vaccine recommendation, these studies did not account for differences by age and evidence-based recommendation guidelines and have not primarily focused on providers who see low-income patients (16, 17). Such an examination is important given that physicians' vaccination barriers may differ according to age. Likewise, focusing on recommendation patterns among physicians who

see low-income and minority patients is important given that these groups carry a disproportionate burden of HPV-associated disease. Thus, the purpose of this study was to assess factors related to Medicaid providers' recommendation of the HPV vaccine across all three vaccination categories: early, target, and catch-up.

Methods

Study Design

This study is part of a larger study that assessed HPV information seeking behaviors, knowledge, perceptions, vaccination barriers and practices, and sociodemographic and clinic characteristics of Florida Medicaid providers (21). Using the Dillman (22) multiphase recruitment approach, surveys were mailed to a random sample of Medicaid providers selected from the Florida Medicaid Master Provider File who had a clinical practice address in Florida. The multiphase recruitment approach consisted of mailing a: 1) postcard to introduce the study; 2) packet containing a cover letter, scannable survey, prepaid return envelope, and $15 cash incentive; 3) reminder card, followed by another copy of the survey to prompt completion by non-responders; and 4) third survey packet along with a $15 cash incentive to those who received the second survey mailing. Physicians who retuned the survey during the first mailing received a $15 cash incentive. If the survey was mailed to physicians a second time, an additional $15 cash incentive was received to equal a maximum of $30. Data were collected from October 2009 to April 2010. The study was approved by the University of South Florida and University of Florida Institutional Review Boards.

Study Setting and Population

A random sample of 800 physicians generated from the Florida Medicaid Master Provider File was recruited for the study. Physicians eligible for study inclusion included those who saw 25 or more 9–17-year-old girls in the past year, and had a primary care specialty. Of the 800 mailed surveys, 485 were completed and returned. Of those, 52 did not meet eligibility criteria. The final study sample included 433 physicians. The overall response rate of 68.3% was calculated by dividing the number of respondents by the number of surveys mailed, minus the undeliverable and ineligible surveys (485/[800–90]).

Methods of Measurement

A multi-item survey, adapted from a previous national study of HPV vaccination among physicians (23), was used to assess barriers related to HPV vaccine recommendation. Previous research reporting on physicians' barriers to HPV vaccination and recommendations from study co-investigators, who are both clinicians and experts in the field, informed the selection of barrier items for the current survey (16, 24, 25). At the time of the study, Gardasil was the only licensed HPV vaccine in the United States; therefore, items referred only to Gardasil.

HPV vaccine recommendation—Physicians were asked "In the past 12 months, how often did you recommend the HPV vaccine to your female Medicaid patients, in the following age groups". Physicians responded to the items on a 5-point Likert scale, 1= never to 5=always. Because we were interested in modeling barriers associated with recommendation, the five response categories were collapsed into two, "sometimes/often/always" (i.e., recommendation) and "never/rarely" (i.e., non-recommendation). Physicians were asked to respond to the item for four separate age groups: 9–10 (early vaccination), 11–12 (target vaccination), 13–14 (early catchup vaccination), and 15–17 (late catch-up vaccination). The age groups were categorized based on the Centers for Disease Control and Prevention HPV vaccine recommendation guidelines with further stratification in the catch-

up group (8). The catch-up group was split into two based on earlier work within the Florida Medicaid population suggesting different vaccination patterns within the two groups (26).

Barriers to HPV vaccine recommendation—Physicians were asked a series of 13 items related to their perceptions of vaccination barriers. Specifically physicians were asked, "How strongly would you agree or disagree that the following are barriers related to immunizing your Medicaid patient against HPV?" The barrier items related to vaccine safety and efficacy, sexual behavior practices of adolescents, information deficits, reimbursement and cost, time constraints, discussion of sexually transmitted infections (STIs), vaccine completion, and school mandates. Physicians were asked to respond to the items on a 5-point Likert response scale (1 = strongly disagree to 5 = strongly agree).

Clinical practice characteristics—Physicians were asked to indicate their primary clinical specialty (pediatrics, family medicine, obstetrics/gynecology), racial composition of their patients (non-Hispanic White, non-Hispanic Black, Hispanic, other), number of Medicaid patients seen on a typical day (<15, 15–19, 20–29, ≥30), whether they have a vaccine coordinator on staff (yes/no), and if they are a Vaccines for Children provider (yes/no).

Sociodemographic characteristics—Physicians' age, race, gender, and ethnicity were obtained.

Statistical Analysis

Frequency distributions and means of sociodemographic and clinical practice variables were computed. Multivariable logistic regression was used to model the probability of recommending the HPV vaccine to adolescent girls aged 9–17. First, multivariable logistic regressions were conducted to determine socioemographic and clinical practice predictors of recommending the HPV vaccine. The final multivariate regression models included significant ($p<0.05$) demographic and practices characteristics identified in the first logistic regression models and the 13 HPV vaccination barrier variables. Multivariable logistic regression models were stratified by vaccination age group: early (9–10), target (11–12), and catch-up (13–14 and 15–17). Nagelkerke R Square values provided an indication of the amount of variation in recommending the HPV vaccine explained by each regression model. All analyses were conducted in 2013 using SPSS 20.0. Statistical tests were two-tailed, with alpha level of 0.05 and 95% confidence interval (CI) for odds ratios (OR).

Results

Sample Characteristics

The largest proportion of physicians was White/Caucasian race (48%) and non-Hispanic ethnicity (65%). Physicians' age ranged from 29–79, mean age 49.76±9.89. There were slightly more males (54%) than females (45%) and 74% were pediatricians. Seventy-nine percent were Vaccines for Children providers and 83% had a vaccine coordinator on staff. When asked about the race/ethnicity of their patient population, about 20% reported that the majority of their Medicaid patients were non-Hispanic White, 22% non-Hispanic Black, 28% Hispanic, and 28% comprised other racial groups. The largest proportion of Medicaid patients seen in a typical day was 15–19 (31%) (data not shown).

Early Vaccination, 9–10

In total, 34% of physicians reported that they recommend vaccination for girls in the early (9–10 years) vaccination age group. In the first logistic regression model including sociodemographic and clinical practice characteristics, physicians' race and clinical

specialty were associated with HPV vaccine recommendation and were included in the final model (Table 1). Discomfort discussing STIs with teens (OR = 1.75; 95% CI, 1.03 – 2.97) was positively associated while difficulty ensuring vaccine completion (OR = 0.73; 95% CI, 0.58 – 0.92) and discomfort discussing STIs with parents (OR = 0.44; 95% CI, 0.25 – 0.76) were negatively associated with HPV vaccine recommendation in the final logistic regression model (Table 2). The final model explained 13% of the variance of physicians' HPV vaccine recommendation.

Target Vaccination, 11–12

Approximately 74% of physicians reported that they recommend vaccination for 11–12 year old adolescent girls. In the model including only sociodemographic and clinical practice variables, physician ethnicity, clinical specialty, and patients' race were significantly associated with HPV vaccine recommendation thus were included in the final model (Table 1). In the final model, discomfort discussing STIs with teens (OR = 2.45; CI, 1.07 – 5.62) was a positively associated and time to discuss HPV with patients/parents (OR = 0.70; CI, 0.50 – 0.99), concerns about efficacy (OR = 0.65; CI, 0.45 – 0.94), discomfort discussing STIs with parents (OR = 0.33; CI, 0.16 – 0.70) were negatively associated with vaccine recommendation. Obstetrics/gynecology (OR = 0.25; CI, 0.09 – 0.73) and family medicine specialty (OR = 0.24; CI, 0.94 – 0.63), and physicians who saw primarily non-Hispanic Black patients (OR = 0.15; CI, 0.04 – 0.52) were less likely to recommend vaccination in the final regression model (Table 2). The model explained 34% of the variance in recommending vaccination.

Catch-Up Vaccination

Eighty-six percent of physicians reported that they recommend HPV vaccination to adolescent girls aged 13–14. Having a family medicine clinical specialty was the only demographic characteristic associated with HPV vaccine recommendation in the first multivariable model thus was included in the final regression model (Table 1). Concerns that teens will practice riskier sexual behaviors (OR = 0.57; 95% CI, 0.37 – 0.87) and discomfort discussing STIs with parents (OR = 0.47; 95% CI, 0.24 – 0.93) were negatively associated with recommending the HPV vaccine. Family medicine specialty (OR = 0.20; CI, 0.06 – 0.62) were less likely to recommend vaccination in the final regression model, (Table 2). The overall model explained 29% of the variance in recommending vaccination.

A vast majority (91%) of physicians reported recommending HPV vaccination for adolescent girls aged 15–17. Being a family medicine physician was the only factor associated with recommending HPV vaccination for adolescent girls 15–17 years in the first multivariable model (Table 1). In the final model, family medicine clinical specialty (OR = 0.13; CI, 0.03 – 0.53) remained significant and compared to pediatricians were less likely to recommend the HPV vaccination for adolescent girls 15–17 years of age (Table 2). The model explained 29% of the variability in HPV vaccine recommendation. For each logistic regression model, convergence criterion for logistic regression was satisfied and likelihood ratio test indicated a good model fit.

Discussion

Although provider recommendation of the HPV vaccine does not necessarily guarantee uptake, some research suggests that such recommendations play an important role in whether an individual initiates and completes the three dose vaccine series (27, 28). Thus, identifying barriers to recommendation is vital, especially among populations at greatest risk for both non-vaccination and downstream negative health outcomes (29, 30). The focus on HPV vaccine recommendation patterns for low-income adolescents can help frame

strategies to increase recommendation, and ultimately vaccination, for this vulnerable population.

Interestingly, no factors were associated with recommendation of the HPV vaccine across all four age groups. Largely this finding is unclear, but may be related to the way in which HPV vaccine recommendations are categorized (early, target, and catch-up) and provider's perceptions of HPV risk and the appropriateness of recommending vaccination based on those age-specific categories. Common factors were found however across some groups. Discomfort discussing STIs with parents was negatively associated with HPV vaccine recommendation for all groups, except the late catch-up group. That is, the more discomfort physicians felt discussing STIs with the parents of their early, target, and early catch-up adolescent patients, the less likely they were to report recommendation of HPV vaccination. In contrast, a positive association was found for discussion of STIs with adolescent girls. The more discomfort physicians felt discussing STIs with their early and target adolescent patients, the more likely they were to report recommendation of the HPV vaccine. One possible explanation for this finding is that physicians may be more likely to incorporate the HPV vaccine into the immunization schedule for younger adolescents making discussion of HPV specifically less of a priority. Previous research suggests that being uncomfortable discussing the sexual nature of HPV infection may prevent some physicians from recommending vaccination (16). The findings of this study were mixed in that being uncomfortable discussing STIs with adolescent girls increased vaccination while discomfort with parents decreased vaccination. Nonetheless, these findings may suggest a need for patient-provider communication interventions around sexual health so that the patient and parent are fully informed about all aspects of HPV prior to vaccination, including the sexual nature of transmission.

Difficulty ensuring completion of the three-dose vaccine series, which is typically administered over a six-month period, was negatively associated with vaccine recommendation only for early adolescent girls. The more difficulty physicians perceived it was for early adolescents to complete the vaccine series, the less likely they were to recommend vaccination. According to the National Immunization Survey-Teen, HPV vaccine initiation significantly increased from 2010 to 2011, but completion rates remained stable at about 70% (2, 5). To address this challenge in the clinical environment, it may be important to have procedures in place to more readily ensure vaccine completion such as scheduling follow-up doctor visits to coincide with vaccination schedules and send parents mail, text, or e-mail reminders (23, 31, 32).

Concerns about HPV vaccine efficacy was negatively associated with HPV recommendation only among target group adolescent girls. Despite studies documenting 95–100% HPV vaccine efficacy rates, doubts remain about its usefulness (33–36). This finding is not particularly surprising given that the longest efficacy follow-up trial spans 8.5 years (37). As longer efficacy outcomes become available such concerns may be less prominent barriers to vaccine recommendation. Meanwhile, it appears that providing physicians' information about HPV vaccine efficacy is an important component of interventions to increase recommendation for adolescent females in the target group. Physicians who reported higher levels of time constraints were also less likely to recommend HPV vaccination to target group adolescent girls. In this situation, preparatory and supplemental patient-focused educational materials or training of mid-level providers to discuss vaccination may alleviate this barrier without compromising comprehensive care to patients.

Concerns that teens will practice risky sexual behaviors was negatively associated with recommendation of the HPV vaccine for early catch-up adolescent girls only. Physicians who reported higher concerns that teens would practice riskier sexual behaviors were less

likely to report vaccine recommendation. Informing providers about studies that indicate vaccinated adolescents understand the need to practice safer sex irrespective of HPV vaccination status may help to alleviate this concern (38–40).

Physicians who reported that the majority of their patients were of non-Hispanic Black race were less likely to recommend vaccination compared to those who saw a majority of non-Hispanic White patients for target adolescents only. This finding is supported by some patient-focused research demonstrating that Black/African American patients are less likely to report a provider recommendation for HPV vaccination (13). Yitalo et al. found that racial/ethnic minorities and non-Hispanic Whites who receive a provider recommendation are equally likely to vaccinate (4). This finding highlights the potential impact of non-disparate recommendation patterns among low-income adolescent girls regardless of race/ethnicity.

Lastly, family medicine physicians compared to pediatricians were less likely to report recommendation of vaccination for all groups, except the early vaccination group. This finding aligns with previous research indicating that pediatricians are more likely to recommend HPV vaccination compared to other clinical specialties (23). In general, pediatricians may have more favorable attitudes toward vaccination, because they routinely administer childhood vaccination. As family medicine physicians may see patients across the spectrum of vaccination categories, it is important that efforts to increase recommendation of HPV vaccines extend beyond the pediatrician.

There are limitations to this study that should be considered when interpreting results. First, all data were self-reported which may have introduced recall and reporting bias. Second, catch-up HPV vaccination is recommended through age 26. However, we were unable to assess factors related to recommendation of HPV vaccination in ages 18–26 as the study was restricted to adolescents up to age 17. Third, knowledge as a barrier to HPV vaccine recommendation was not assessed in the study. Fourth, the generalizability of findings to other states should be interpreted with caution given state differences in Medicaid rules and funding. Lastly, the study sample included only those providers that responded to the survey, which may have biased the results.

Conclusions

Overall, his study demonstrated that efforts to increase HPV vaccination may need to be targeted by age groups, as there was no single factor that commonly associated with recommendation across all vaccination groups. A barrier of particular concern relates to provider discussion about the sexual nature of HPV with parents. Provider-focused communication interventions can be particularly useful in building physicians' communication skills surrounding sensitive topics such as HPV. Equally, it is important to continue to identify and address HPV vaccine recommendation and administration barriers that are unique to family medicine physicians as they also have an integral role to play in efforts to maximize vaccination. Further, increasing physicians' understanding and knowledge about adolescent perceptions of sexual risk-taking post vaccination is important across all age groups, but especially for those aged 13–14 years. A communication approach in which physicians engage in active dialogue with their adolescent patients around vaccination myths and misconceptions might provide the most promise.

The barriers to HPV vaccine recommendation identified in this study explained as much as 34% of the variance in recommendation with an even lower explanatory capacity among early adolescents. Additional research is needed to identify other potentially important factors that influence provider recommendation of the HPV vaccine, particularity for low-

income adolescent girls. Future studies which attempt to elucidate reasons for racial disparities in provider HPV vaccine recommendation practices are necessary if the promise of HPV vaccines is to be fully realized. Lastly, in light of the recent recommendation of the HPV vaccine for adolescent boys, research which examines barriers to provider recommendation and ultimately vaccination is warranted as findings of this study may not be generalizable to providers' recommendation practices for adolescent boys.

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Implications and Contribution

Identifying barriers to HPV vaccine recommendation among providers who largely see low-income and minority patients is essential to reducing downstream HPV-associated health disparities. Specifically, efforts to improve recommendation practices should focus on building providers communication skills around sexual health and more readily engaging family medicine physicians in the vaccination dialogue.

Table 1

Sociodemographic and Clinical Predictors of Physician Reported Recommendation of the HPV Vaccine for Low-Income Adolescent Girls

Characteristic	Ages 9–10 Unadjusted ORs (95% CI)	Ages 11–12 Unadjusted ORs (95% CI)	Ages 13–14 Unadjusted ORs (95% CI)	Ages 15–17 Unadjusted ORs (95% CI)
Physician Age	1.01 (0.99–1.04)	0.99 (0.95–1.02)	0.96 (0.90–1.01)	0.99 (0.92–1.06)
Physician Gender				
Male (reference)	1.00	1.00	1.00	1.00
Female	0.91 (0.54–1.54)	1.53 (0.71–3.27)	2.69 (0.65–11.14)	4.90 (0.77–31.17)
Physician Race				
White (reference)	1.00	1.00	1.00	1.00
Other	1.68 (1.02–2.77)*	0.87 (0.43–1.78)	2.55 (0.72–8.99)	1.25 (0.30–5.18)
Physician Ethnicity				
Non-Hispanic (reference)	1.00	1.00	1.00	1.00
Hispanic	1.43 (0.78–2.62)	3.19 (1.09–9.35)*	1.67 (0.30–9.29)	1.12 (0.18–7.03)
Vaccine for Children Provider				
Yes (reference)	1.00	1.00	1.00	1.00
No	1.06 (0.51–2.19)	1.44 (0.48–4.33)	2.69 (0.30–24.23)	1.83 (0.12–27.55)
Vaccine Coordinator in Office				
Yes (reference)	1.00	1.00	1.00	1.00
No	0.78 (0.35–1.73)	0.62 (0.20–1.96)	0.45 (0.05–3.97)	0.90 (0.05–13.87)
Clinical Specialty				
Pediatrics (reference)	1.00	1.00	1.00	1.00
Family Medicine	1.00 (0.46–2.17)	0.13 (0.05–0.36)*	0.05 (0.01–0.26)*	0.06 (0.01–0.35)*
Obstetrics/Gynecology	3.37 (1.15–9.88)*	0.25 (0.08–0.79)*	0.37 (0.06–2.14)	0.46 (0.04–4.72)
Daily Medicaid Patients seen				
Less than 15 (reference)	1.00	1.00	1.00	1.00
15–19	1.04 (0.54–2.02)	2.11 (0.80–5.53)	1.32 (0.24–7.25)	1.44 (0.16–13.03)

Characteristic	Ages 9–10 Unadjusted ORs (95% CI)	Ages 11–12 Unadjusted ORs (95% CI)	Ages 13–14 Unadjusted ORs (95% CI)	Ages 15–17 Unadjusted ORs (95% CI)
20–29	1.32 (0.66–2.62)	1.21 (0.47–3.11)	0.32 (0.06–1.60)	0.23 (0.03–1.58)
30 or more	1.19 (0.57–2.46)	3.00 (0.97–9.26)	0.36 (0.05–2.58)	3.01 (0.20–44.04)
Race of Majority of Patients Seen				
Non-Hispanic White (reference)	1.00	1.00	1.00	1.00
Non-Hispanic Black	0.68 (0.33–1.42)	0.13 (0.03–0.47)*	0.32 (0.04–2.36)	0.20 (0.01–3.01)
Hispanic	1.28 (0.59–2.77)	0.27 (0.06–1.15)	0.58 (0.05–6.36)	0.29 (0.01–5.68)
Other	0.69 (0.34–1.41)	0.21 (0.06–0.75)*	0.18 (0.03–1.08)	0.14 (0.01–7.03)

*Significant at $p \leq .05$

CI, confidence interval

OR, odds ratios

Table 2

Physicians Reported Barriers to Recommendation of the HPV Vaccine for Low-Income Adolescent Girls

Variable	Ages 9–10[a] Adjusted ORs (95% CI)	Ages 11–12[b] Adjusted ORs (95% CI)	Ages 13–14[c] Adjusted ORs (95% CI)	Ages 15–17[c] Adjusted ORs (95% CI)
Barriers				
Concerns about safety	0.66 (0.74–1.20)	1.27 (0.90–1.79)	1.47 (0.90–2.40)	1.26 (0.68–2.32)
Concerns about efficacy	1.24 (0.96–1.61)	0.65 (0.45–0.94)*	0.63 (0.38–1.04)	0.78 (0.41–1.47)
Concern that teen will practice riskier sexual practices	1.06 (0.86–1.32)	0.82 (0.61–1.11)	0.57 (0.37–0.87)*	0.71 (0.42–1.21)
Adding another vaccine to the schedule	0.93 (0.73–1.17)	1.22 (0.87–1.70)	1.11 (0.72–1.70)	0.87 (0.49–1.55)
Lack of information about the vaccine	0.99 (0.79–1.24)	1.18 (0.85–1.64)	1.08 (0.70–1.68)	1.05 (0.60–1.83)
Cost of stocking the vaccine	1.13 (0.69–1.44)	0.87 (0.62–1.21)	1.06 (0.69–1.63)	1.07 (0.63–1.81)
Lack of adequate reimbursement for vaccination	0.73 (0.43–1.24)	0.80 (0.39–1.62)	0.69 (0.24–1.98)	0.32 (0.09–1.08)
Lack of timely reimbursement for vaccination	1.46 (0.85–2.50)	0.96 (0.46–2.01)	0.92 (0.33–2.58)	1.38 (0.50–3.79)
Time it takes to discuss HPV with patients/parents	0.89 (0.69–1.14)	0.70 (0.50–0.99)*	0.91 (0.57–1.46)	0.71 (0.39–1.13)
Discomfort discussing STIs with teens	1.75 (1.03–2.97)*	2.45 (1.07–5.62)*	1.99 (0.89–4.46)	1.41 (0.62–3.20)
Discomfort discussing STIs with parents	0.44 (0.25–0.76)*	0.33 (0.16–0.70)*	0.47 (0.24–0.93)*	0.61 (0.30–1.26)
Difficulty ensuring completion of 3-dose vaccination	0.73 (0.58–0.92)*	1.01 (0.71–1.45)	0.66 (0.40–1.09)	0.92 (0.49–1.73)
Vaccine is not required for school attendance	1.09 (0.89–1.34)	1.33 (0.97–1.83)	1.28 (0.84–1.94)	1.13 (0.67–1.88)
Physician Race				
White (reference)	1.00	-	-	-
Other	1.46 (0.90–2.39)			
Physician Ethnicity				
Non-Hispanic (reference)	-	1.00	-	-
Hispanic		1.65 (0.63–4.31)		
Clinical Specialty				
Pediatrics (reference)	1.00	1.00	1.00	1.00
Family Medicine	1.04 (0.49–2.21)	0.24 (0.09–0.63)*	0.20 (0.06–0.62)*	0.13 (0.03–0.53)*
Obstetrics/Gynecology	2.09 (0.76–5.76)	0.25 (0.09–0.73)*	0.44 (0.12–1.62)	0.20 (0.03–1.09)

Variable	Ages 9–10[a] Adjusted ORs (95% CI)	Ages 11–12[b] Adjusted ORs (95% CI)	Ages 13–14[c] Adjusted ORs (95% CI)	Ages 15–17[c] Adjusted ORs (95% CI)
Race of Majority of Patients Seen				
Non-Hispanic White (reference)		1.00		
Non-Hispanic Black	-	0.15 (0.04–0.52)*	-	
Hispanic		0.52 (0.13–2.03)		
Other		0.32 (0.10–1.07)		

*Significant at $p \leq .05$

[a]Adjusted for physician race and clinical specialty

[b]Adjusted for physician ethnicity, clinical specialty, and race of majority of patients seen

[c]Adjusted for clinical specialty

OR, odds ratios

CI, confidence interval

HPV, human papillomavirus

STIs, sexually transmitted infections