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Human Papillomavirus Vaccination Series Initiation and Completion, 2008 –2009

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WHAT'S KNOWN ON THIS SUBJECT: Routine human papillomavirus (HPV) vaccination is recommended for girls 11 or 12 years of age (catch-up vaccination through the age of 26 years). Vaccine coverage rates are low but increasing.

WHAT THIS STUDY ADDS: This report describes associations between sociodemographic characteristics and HPV vaccination series initiation and completion, information useful for targeted public health interventions to increase adolescent coverage rates. It is the first study to use a national sample with provider-reported vaccination data.

abstract

OBJECTIVE: The goal was to describe factors associated with human papillomavirus (HPV) vaccination series initiation (≥1 dose) and completion (≥3 doses) and parents' intent to have their daughters vaccinated.

METHODS: Data from the 2008 and 2009 National Immunization Survey-Teen were analyzed to estimate HPV vaccination coverage among girls 13 to 17 years of age ($N = 18\,228$) and to examine associations of vaccination coverage with demographic characteristics.

RESULTS: Overall, 40.5% of girls had received ≥1 HPV vaccine dose, and 53.3% of those girls completed the series. Factors independently associated with vaccination initiation included older age, having an 11- to 12-year preventive visit, insurance status, mother's age and marital status, not receiving all vaccines at public facilities, and provider recommendation, which was the factor most strongly associated with initiation (prevalence ratio: 2.6 [95% confidence interval: 2.4–2.9]). Compared with white girls (60.4%), black (46.0%) and Hispanic (40.3%) girls were less likely to complete the series. Lack of knowledge of the vaccine (19.4%), vaccination was not needed (18.8%), the daughter was not sexually active (18.3%), and a provider did not recommend (13.1%) were the most common reasons for parents' nonintent to have their daughters vaccinated.

CONCLUSIONS: Although HPV vaccine coverage rates are increasing, they are still below target levels. Recommendations by providers to adolescent patients and parents likely would improve vaccine uptake. Parental education regarding disease risks and benefits of HPV vaccination before exposure is needed to promote vaccine uptake. *Pediatrics* 2011;128:830–839

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KEY WORDS
immunization, human papillomavirus vaccine, adolescents, girls, patient compliance, cancer vaccines, medical home, access to health care

ABBREVIATIONS
HPV—human papillomavirus
NIS—National Immunization Survey
VFC—Vaccines for Children
FPL—federal poverty level
CI—confidence interval
SCHIP—State Children's Health Insurance Program
MSA—metropolitan statistical area

The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

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Quadrivalent and bivalent human papillomavirus (HPV) vaccines were licensed for use in 2006 and 2009 respectively. In 2006, the Advisory Committee on Immunization Practices recommended routine vaccination for girls 11 or 12 years of age and catch-up vaccination for girls 13 to 26 years of age.[1] Three years after that recommendation, nearly one-half of girls 13 to 17 years of age in the United States had received ≥1 HPV vaccine dose, and approximately one-fourth had received 3 doses.[2] This is the first analysis to assess factors associated with provider-verified HPV vaccination series initiation and completion among a nationally representative sample of adolescent girls in the United States. The objective of this study was to describe associations between certain sociodemographic characteristics and HPV vaccination series initiation and completion, to inform targeted public health interventions to increase adolescent HPV coverage.

METHODS

The National Immunization Survey (NIS)-Teen is composed of 2 phases, that is, (1) a random-digit-dialed telephone survey of parents/guardians of adolescents 13 to 17 years of age and (2) a survey mailed to all vaccination providers who were identified by the parent and for whom consent was granted. The NIS-Teen represents a stratified, national, probability sample of households in the United States, including all 50 states, the District of Columbia, and selected local areas. It is built on the sampling frame of telephone numbers used by the NIS, which seeks to identify vaccination rates for children 19 to 35 months of age. Telephone interviews for the 2008 and 2009 NIS-Teen surveys were conducted from January 2008 to February 2009 and from January 2009 to February 2010, respectively.

All HPV vaccination coverage estimates in this study were determined on the basis of provider records. Only adolescents with adequate provider data (ie, those for whom sufficient vaccination information was obtained from providers for determination of vaccination status) were included in the analysis. Details of the NIS-Teen methods, including procedures for combining vaccination data to produce a synthesized immunization history and weighting procedures, were published previously.[3,4] HPV vaccine doses were considered valid if the vaccination date was on or after June 8, 2006, the date of licensure, and if vaccination occurred before or on the date of the interview. Because the third HPV vaccine dose is recommended to be administered 24 weeks after administration of the first dose, series completion was determined among girls who had received ≥1 HPV vaccine dose ≥24 weeks before the interview date.

HPV-related questions from the household interview included parents' knowledge of HPV disease and vaccination and receipt of a provider's vaccination recommendation. Parents who reported that their daughters had not received HPV vaccine were asked, "How likely is it that [your teen] will receive HPV shots in the next 12 months?" Parents who responded "not too likely," "not likely at all," or "unsure" were asked, "What is the main reason [your teen] will not receive HPV shots in the next 12 months?" These questions were open-ended, and responses were coded into categories; multiple responses were allowed. Sociodemographic information included the parent's report of the adolescent's age, race/ethnicity, health insurance type, and health care visits during the past year, household income, mother's education level, age, and marital status, and residential location. With the use of collected data on household income and the number of persons living/staying in the household, income with respect to the federal poverty level (FPL) was determined on the basis of the 2007 and 2008 FPL thresholds defined by the US Census Bureau. Insurance status was categorized as (1) private, (2) eligible for the Vaccines for Children (VFC) program, excluding uninsured individuals, (3) eligible for the VFC program, uninsured individuals only, (4) State Children's Health Insurance Program (SCHIP), (5) military, or (6) other. VFC eligibility includes age of ≤18 years, American Indian/Alaskan Native, Indian Health Service or Medicaid coverage, or underinsured status and vaccination at federally qualified health or rural health centers. SCHIP provides health coverage for uninsured children in families whose incomes are too high for Medicaid qualification but too low for purchase of private insurance. Military insurance included military health care, Tricare, the Civilian Health and Medical Program of the Uniformed Services, and the Civilian Health and Medical Program of the Department of Veterans Affairs. Metropolitan statistical area (MSA) was determined on the basis of telephone area codes.

Data on 11- to 12-year preventive health care visits and on facility type and provider specialties for locations where adolescents received vaccinations were collected from questionnaires mailed to providers. Girls who were >12 years of age at the time of vaccine licensure and who did not have the opportunity to receive HPV at an 11- to 12-year preventive visit are indicated.

Tests of association between sociodemographic characteristics and HPV vaccination series initiation (receipt of ≥1 HPV vaccine dose) and completion (receipt of ≥3 HPV vaccine doses among individuals who initiated the se-

ries) were performed with *t* tests and logistic regression. All sociodemographic characteristics included in bivariate analyses were included in the multivariate models. Because girls who participated in the 2009 NIS-Teen had an additional year for vaccination since HPV vaccine licensure, compared with girls who participated in the 2008 NIS-Teen, survey year was included in the multivariate model. State also was included in the model, to control for differences between states in the multiple unmeasured program factors that likely were related to the outcome variable. Multivariate adjusted prevalence ratios with 95% confidence intervals (CIs) were determined for HPV vaccination series initiation and completion; *t* tests were used to test associations between sociodemographic characteristics and parents' intent toward vaccination, receipt of a provider recommendation, and insurance status. Differences in coverage were considered statistically significant at $P \leq .05$. Data were analyzed by using SAS-callable SUDAAN 9.2 (Research Triangle Institute, Research Triangle Park, NC), to account for the complex sampling design of the NIS-Teen. The NIS-Teen was approved by the Centers for Disease Control and Prevention institutional review board.

RESULTS

A total of 18 228 girls, 13 to 17 years of age, had adequate provider data in the 2008 and 2009 NIS-Teen and were included in this study. The 2008 NIS-Teen included 30 725 completed household interviews, for a Council of American Survey Research Organizations response rate of 58.7%.[5] Among subjects who completed the household survey, 58.1% had adequate provider-reported vaccination histories.[4] The 2009 NIS-Teen included 34 976 completed household interviews, for a Council of American Survey Research Organizations response rate of 58.0%.

TABLE 1 Characteristics of Participating Adolescent Girls Aged 13 to 17 Years

Sociodemographic Characteristic	*n*	Weighted Proportion, % Estimate (95% CI)
Total	18 228	
Year		
2008	8607	50.4 (49.2–51.6)
2009	9621	49.6 (48.4–50.8)
Age		
13 y	3539	18.9 (17.9–20.0)
14 y	3816	20.1 (19.0–21.3)
15 y	3747	21.1 (20.0–22.3)
16 y	3748	20.7 (19.6–21.9)
17 y	3378	19.1 (18.0–20.3)
Race		
White, non-Hispanic	12 810	60.0 (58.5–61.4)
Black, non-Hispanic	1951	15.2 (14.2–16.4)
Hispanic	2125	17.6 (16.4–18.9)
American Indian/Alaskan Native	252	0.8 (0.7–1.0)
Asian	386	2.8 (2.3–3.3)
Other	704	3.6 (3.0–4.2)
Income level		
<133% of FPL	3331	24.5 (23.2–25.9)
133% to <322% of FPL	5740	31.4 (30.1–32.7)
322% to <503% of FPL	4576	21.7 (20.7–22.7)
>503% of FPL	4581	22.4 (21.3–23.6)
Mother's education		
Less than high school	1687	13.4 (12.3–14.5)
High school	3702	27.7 (26.3–29.1)
More than high school, some college	5444	26.0 (24.9–27.2)
College graduate	7395	32.9 (31.6–34.1)
Mother's marital status		
Married	13 834	74.2 (72.9–75.4)
Divorced/widowed/separated	3076	18.0 (16.9–19.1)
Never married	1173	7.8 (7.1–8.7)
Mother's age		
≤34 y	1339	8.5 (7.7–9.3)
35–44 y	7979	47.0 (45.6–48.5)
≥45 y	8910	44.5 (43.1–45.8)
MSA		
Central city, MSA	6965	37.6 (36.3–39.0)
Non–central city, MSA	6903	45.8 (44.4–47.2)
Non–MSA	4360	16.6 (15.7–17.4)
Had 11- to 12-y preventive care visit[a]		
Yes	4520	23.4 (22.3–24.6)
No	5162	27.6 (26.4–28.8)
HPV vaccine not licensed when 11 or 12 y of age[b]	8546	49.0 (47.6–50.4)
Insurance status		
Private	12 377	63.0 (61.6–64.4)
VFC eligible, all others	3978	25.1 (23.8–26.4)
VFC eligible, uninsured only	852	6.4 (5.6–7.2)
SCHIP	486	3.7 (3.1–4.3)
Military	294	1.4 (1.1–1.6)
Other	122	0.5 (0.4–0.7)
Know of HPV		
Yes	17 082	92.0 (90.9–93.0)
No	934	8.0 (7.0–9.1)
Heard of HPV vaccine		
Yes	15 703	85.3 (84.1–86.4)
No	2195	14.7 (13.6–15.9)
Received provider recommendation for vaccine[c]		
Yes	9904	53.1 (51.6–54.5)
No	7752	46.9 (45.5–48.4)

TABLE 1 Continued

Sociodemographic Characteristic	*n*	Weighted Proportion, % Estimate (95% CI)
Facility types for adolescent's vaccination providers		
All private facilities	9544	56.1 (54.7–57.4)
All public facilities	3315	17.8 (16.8–18.9)
All hospital facilities	1490	6.8 (6.2–7.4)
All STD/school/teen clinics or other facilities	545	2.8 (2.4–3.3)
Mixed	2411	12.0 (11.1–13.0)
Unknown	852	4.5 (3.9–5.2)

STD indicates sexually transmitted disease.

[a] As reported by providers.

[b] Girls who were older than 12 years at the time of HPV vaccine licensure (June 8, 2006) and did not have the opportunity to receive HPV vaccine at an 11- to 12-year preventive visit.

[c] Parents reported whether they had received a recommendation for their daughters to receive HPV vaccinations from a health care provider.

Among subjects who completed the household survey, 57.4% had adequate provider-reported vaccination histories.[6]

Sociodemographic characteristics of the sample are presented in Table 1. Overall, 40.5% of girls received ≥1 dose of HPV; the proportion was greater in 2009 (44.1%) than in 2008 (37.0%) (Table 2). Most girls received the first HPV vaccine dose in pediatric offices (75%), and the second most common location was family practice offices (16%) (data not shown). In the multivariate model, vaccination with ≥1 HPV vaccine dose was independently associated with older adolescent age, living in a high-income household, having a mother who never married, having a younger mother, having an 11- to 12-year preventive visit, receiving a provider recommendation for HPV vaccination, insurance status, and facility type where the adolescent received all of her vaccinations (Table 2). Several variables were associated with series initiation in the bivariate analysis but were not statistically significant in the multivariate analysis.

Among girls who received ≥1 dose of HPV vaccine, 53.3% received the complete 3-dose series (Table 2). In the multivariate analysis, completion of the 3-dose series was independently associated with age of 16 years, black non-Hispanic or Hispanic race/ethnicity, a household income of 133% to <322% of FPL, having an older mother, parental knowledge about HPV, and facility type where the adolescent received all of her vaccinations. Several variables were associated with series completion in the bivariate analysis but were not statistically significant in the multivariate analysis.

Because receipt of a provider recommendation might depend on health care access and use, we performed logistic regression analyses excluding provider recommendation. Independent predictors of HPV vaccination initiation remained the same except for the addition of living in urban versus rural areas ($P = .04$), having an 11- to 12-year preventive check versus being >12 years of age at the time of vaccine licensure ($P = .01$), having private insurance versus being uninsured and VFC-eligible ($P = .01$), and having parental knowledge of HPV disease ($P < .01$) and the vaccine ($P = .03$). Independent predictors of series completion remained the same except for the addition of living in rural versus urban areas ($P = .03$) and having SCHIP versus private insurance ($P = .05$). Bivariate analyses showed statistically significant associations between provider recommendation and race/ethnicity, having an 11- to 12-year preventive visit, MSA, insurance type, and parental knowledge about HPV and the vaccine ($P < .01$ for all).We also assessed associations between selected characteristics and insurance status. Compared with other insurance categories, a larger proportion of VFC-eligible, uninsured girls had no parent-reported health care visits in the past year and received all of their vaccines at public facilities (data not shown). A smaller proportion of VFC-eligible, uninsured girls received ≥1 other adolescent vaccine, compared with girls in other insurance categories.

For girls who had not received HPV vaccine, 32.7% of parents reported that they were very likely to have their daughters vaccinated within the next 12 months, 16.5% were somewhat likely, 13.7% were not too likely, 26.8% were not likely at all, and 10.3% were unsure. Characteristics of parents who intended to have their daughters receive the HPV vaccine within the next 12 months are presented in Fig 1. Parents who responded "very likely" or "somewhat likely" were considered to have intent to receive the vaccine, whereas parents who responded "not too likely," "not likely at all," or "unsure" were considered to have nonintent to receive the vaccine. A significantly larger proportion of parents who received a provider recommendation intended to have their daughters vaccinated. Other statistically significant results are noted in Fig 1. The most commonly reported reasons given by parents for not intending to have their daughters vaccinated included lack of knowledge about the vaccine (19.4%), vaccine is not needed (18.8%), daughter is not sexually active (18.3%), and did not receive a provider recommendation (13.1%) (Table 3).

TABLE 2 HPV Vaccination Coverage Among Girls 13 to 17 Years of Age, According to Sociodemographic Characteristics

Sociodemographic Characteristic	≥1 Dose of HPV Vaccine		≥3 Doses of HPV Vaccine Among Those Who Initiated Series	
	Unadjusted Coverage Rate, % Estimate (95% CI)	Prevalence Ratio[a]	Unadjusted Coverage Rate, % Estimate (95% CI)	Prevalence Ratio[a]
Total	40.5 (39.2–41.9)	—	53.3 (51.1–55.6)	—
Year				
2008	37.0 (34.9–39.1)[b]	0.9 (0.8–1.0)	46.8 (43.3–0.4)[b]	0.8 (0.7–0.8)
2009	44.1 (42.3–46.0)[c]	Reference	58.9 (55.9–1.7)[c]	Reference
Age				
13 y	36.0 (33.2–38.9)[c]	Reference	45.8 (41.1–50.7)[c]	Reference
14 y	37.1 (34.2–40.1)	1.1 (1.0–1.2)	52.1 (47.3–56.8)	1.1 (1.0–1.2)
15 y	43.9 (40.8–47.1)[b]	1.2 (1.1–1.4)	49.1 (44.2–54.0)	1.0 (0.9–1.2)
16 y	42.9 (39.8–46.1)[b]	1.3 (1.1–1.5)	59.5 (54.4–64.3)[b]	1.2 (1.0–1.4)
17 y	42.3 (38.9–45.7)[b]	1.2 (1.1–1.4)	59.0 (53.5–64.2)[b]	1.1 (0.9–1.4)
Race				
White, non-Hispanic	39.3 (37.7–40.8)[c]	Reference	60.4 (57.8–63.0)[c]	Reference
Black, non-Hispanic	40.1 (36.1–44.2)	1.0 (0.9–1.1)	46.0 (39.1–53.0)[b]	0.9 (0.8–1.0)
Hispanic	44.5 (40.4–48.7)[b]	1.1 (1.0–1.2)	40.3 (34.8–46.0)[b]	0.8 (0.7–1.0)
American Indian/Alaskan Native	52.6 (41.4–63.5)[b]	1.2 (1.0–1.6)	47.1 (32.0–62.7)	1.0 (0.8–1.3)
Asian	41.1 (32.1–50.8)	1.0 (0.9–1.2)	43.9 (30.0–59.0)[b]	0.8 (0.6–1.2)
Other	40.9 (32.7–49.6)	0.9 (0.7–1.2)	48.5 (36.1–61.1)	0.9 (0.7–1.2)
Income level				
<133% of FPL	44.9 (41.6–48.3)	1.1 (0.9–1.2)	44.1 (39.0–49.4)[b]	1.0 (0.9–1.2)
133% to <322% of FPL	34.8 (32.5–37.2)[b]	0.9 (0.8–1.0)	49.4 (45.2–53.6)[b]	0.9 (0.8–1.0)
322% to <503% of FPL	39.6 (37.1–42.1)[b]	0.9 (0.9–1.0)	62.4 (58.5–66.2)	1.1 (1.0–1.2)
>503% of FPL	44.7 (41.8–47.6)[c]	Reference	60.0 (55.6–64.2)[c]	Reference
Mother's education				
Less than high school	42.1 (37.7–46.6)	1.0 (0.9–1.2)	38.6 (32.4–45.2)[b]	0.9 (0.8–1.1)
High school	39.0 (35.9–42.2)	1.0 (0.9–1.1)	49.3 (44.0–54.7)[b]	0.9 (0.8–1.0)
More than high school, some college	39.9 (37.5–42.3)	1.0 (1.0–1.1)	54.0 (50.0–58.0)[b]	1.0 (0.9–1.1)
College graduate	41.7 (39.7–43.7)[c]	Reference	62.0 (59.1–64.9)[c]	Reference
Mother's marital status				
Married	39.3 (37.8–40.9)[c]	Reference	56.2 (53.6–58.7)[c]	Reference
Divorced/widowed/separated	41.8 (38.4–45.4)	1.1 (1.0–1.2)	48.5 (43.1–54.0)[b]	0.9 (0.8–1.0)
Never married	47.7 (42.2–53.2)[b]	1.2 (1.0–1.3)	38.1 (31.0–45.7)[b]	0.9 (0.7–1.1)
Mother's age				
≤34 y	45.6 (40.6–50.7)[c]	Reference	36.0 (29.2–43.3)[c]	Reference
35–44 y	39.2 (37.1–41.5)[b]	0.8 (0.8–0.9)	51.2 (47.5–54.8)[b]	1.2 (1.0–1.4)
≥45 y	40.9 (39.1–42.8)	0.8 (0.7–0.9)	59.2 (56.2–62.2)[b]	1.2 (1.0–1.5)
MSA				
Urban	43.0 (40.6–45.4)[c]	Reference	49.7 (46.0–53.3)[c]	Reference
Suburban	41.3 (39.2–43.5)	1.0 (0.9–1.1)	55.9 (52.3–59.4)[b]	1.1 (1.0–1.2)
Rural	32.8 (30.4–35.2)[b]	0.9 (0.9–1.0)	55.4 (51.0–59.7)[b]	1.1 (1.0–1.2)
Had 11- to 12-y preventive care visit				
Yes	48.8 (46.1–51.5)[c]	Reference	54.6 (50.8–58.4)[c]	Reference
No	31.2 (28.9–33.6)[b]	0.8 (0.7–0.9)	45.6 (41.2–50.0)[b]	0.9 (0.8–1.0)
HPV vaccine not licensed when 11 or 12 y of age[d]	41.9 (39.7–44.0)[b]	0.9 (0.8–1.0)	55.9 (52.4–59.3)	1.0 (0.9–1.1)
Insurance status				
Private	39.0 (37.4–40.7)[c]	Reference	57.9 (55.0–60.7)[c]	Reference
VFC-eligible, all others	47.3 (44.2–50.5)[b]	1.2 (1.1–1.3)	44.9 (40.3–49.7)[b]	1.0 (0.9–1.1)
VFC eligible, uninsured only	23.7 (19.3–28.8)[b]	0.9 (0.7–1.1)	43.7 (33.7–54.2)[b]	1.0 (0.8–1.2)
SCHIP	52.4 (44.2–60.5)[b]	1.2 (1.0–1.5)	52.5 (41.3–63.4)	1.2 (1.0–1.4)
Military	35.1 (27.2–43.8)	0.8 (0.6–1.1)	57.3 (43.4–70.2)	1.0 (0.8–1.3)
Other	34.8 (21.8–50.6)	0.7 (0.4–1.2)	53.1 (31.5–73.6)	0.8 (0.5–1.3)
Know of HPV				
Yes	41.9 (40.6–43.4)[c]	Reference	55.3 (53.1–57.5)[c]	Reference
No	25.2 (18.8–32.9)[b]	1.0 (0.8–1.2)	20.2 (12.7–30.7)[b]	0.6 (0.4–0.9)
Heard of HPV vaccine				
Yes	41.8 (40.3–43.2)[c]	Reference	55.1 (52.9–57.4)[c]	Reference
No	33.7 (29.2–38.5)[b]	1.0 (0.9–1.1)	43.2 (34.3–52.5)[b]	0.9 (0.8–1.1)
Received provider recommendation for vaccine[e]				
Yes	58.3 (56.5–60.2)[b]	2.6 (2.4–2.9)	56.9 (54.3–59.3)[b]	1.1 (1.0–1.2)
No	20.7 (18.9–22.7)[c]	Reference	43.4 (38.4–48.4)[c]	Reference

TABLE 2 Continued

Sociodemographic Characteristic	≥1 Dose of HPV Vaccine		≥3 Doses of HPV Vaccine Among Those Who Initiated Series	
	Unadjusted Coverage Rate, % Estimate (95% CI)	Prevalence Ratio[a]	Unadjusted Coverage Rate, % Estimate (95% CI)	Prevalence Ratio[a]
Facility types for adolescent's vaccination providers				
All private facilities	44.7 (42.8–46.6)[c]	Reference	56.2 (53.2–59.1)[c]	Reference
All public facilities	26.5 (23.9–29.2)[b]	0.7 (0.6–0.8)	38.9 (33.8–44.2)[b]	0.8 (0.7–0.9)
All hospital facilities	44.8 (40.1–49.5)	1.0 (0.9–1.1)	53.9 (46.7–60.9)	1.0 (0.9–1.1)
All STD/school/teen clinics or other facilities	38.8 (31.0–47.2)	1.0 (0.8–1.2)	52.6 (38.9–65.9)	1.0 (0.8–1.3)
Mixed	42.4 (38.1–46.9)	1.0 (0.9–1.1)	54.6 (47.2–61.8)	0.9 (0.8–1.1)
Unknown	35.9 (29.7–42.7)[b]	0.9 (0.8–1.0)	47.1 (37.1–57.2)	0.9 (0.7–1.0)

STD indicates sexually transmitted disease.

[a] Logistic regression models were adjusted for survey year and state of residence.

[b] $P \leq .05$.

[c] Reference level.

[d] Girls who were older than 12 years of age at the time of HPV vaccine licensure (June 8, 2006) and did not have the opportunity to receive HPV vaccine at an 11- to 12-year preventive visit.

[e] Parents reported whether they had received a recommendation for their daughters to receive HPV vaccinations from a health care provider.

DISCUSSION

To our knowledge, this is the first study to examine national data on HPV vaccination initiation and completion among adolescent girls by using provider-verified vaccination records. Approximately 40% of girls received ≥1 HPV vaccine dose and, of those girls, approximately one-half completed the 3-dose vaccination series. Although some factors were associated with both vaccination series initiation and completion, there were differences. Race/ethnicity was not associated with initiation; however, black and Hispanic adolescents were less likely to complete the series, compared with white adolescents. Daughters of younger mothers were more likely to initiate the series, whereas daughters of older mothers were more likely to complete it. Although access to vaccine is provided for uninsured girls through the VFC program, the lack of a medical home might contribute to lower coverage rates among VFC-eligible, uninsured girls and girls who received all of their vaccines at public facilities. The most common reason for nonintent to vaccinate one's daughter against HPV was lack of knowledge about the vaccine. These data provide information that could help identify ways to increase HPV vaccine coverage in the United States.

One of the factors most strongly associated with HPV vaccination initiation was receipt of a provider recommendation. Previous studies showed that provider recommendations influence parental decisions to receive HPV and other vaccinations.[7–10] Various barriers at the provider level lead to missed opportunities for vaccination, including vaccine costs, insurance coverage, discomfort discussing sexuality, and a preference to vaccinate older adolescents.[11,12] To address cost and reimbursement barriers, the National Vaccine Advisory Committee recommended improving business practices to ensure vaccine reimbursement, participating in vaccine-purchasing pools, and improving reimbursement through the VFC program.[13,14] Similar to previous studies, we found that older adolescents were most likely to have initiated HPV vaccination.[15–17] Although HPV vaccination is recommended for girls at 11 or 12 years of age, pediatricians and family medicine physicians are more likely to recommend HPV vaccination strongly for older adolescents.[12] Strong provider recommendations for HPV vaccination likely would improve vaccine uptake at the recommended age.[8] Limited health care access might hinder receipt of a provider recommendation. In the model without inclusion of provider recommendation, a few additional variables reflecting access to care became significant. Therefore, increasing access to health care, removing provider barriers, and encouraging stronger provider recommendations all could increase vaccine uptake.

Higher coverage rates among older adolescent girls might reflect more opportunities for catch-up vaccination as adolescents grow older. The adolescent platform promotes an 11- to 12-year preventive health check for vaccination and health screening.[18–20] We found that girls who underwent an 11- to 12-year preventive check were more likely to have initiated vaccination than were those without such a visit. However, there was no difference in coverage rates among girls who underwent an 11- to 12-year preventive check and those who were >12 years of age at the time of vaccine licensure, which indicates that older adolescents were being vaccinated during subsequent health care encounters. Approximately 50% of girls were >12 years of age at the time of HPV vaccine licensure, and

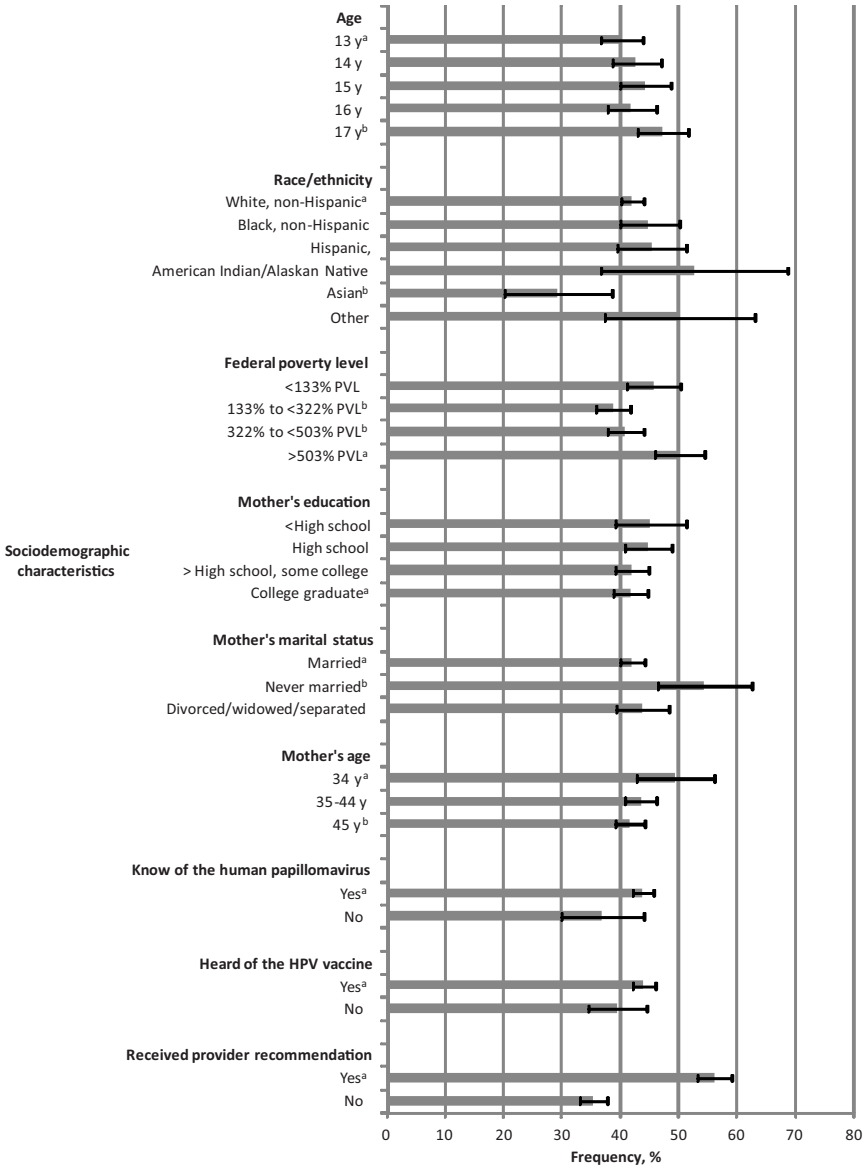

FIGURE 1

Characteristics of parents who intended to have their daughters receive the HPV vaccine within the next 12 months. Parents who responded "very likely" or "somewhat likely" were considered to have intent to receive the vaccine, whereas parents who responded "not too likely," "not likely at all," or "unsure" were considered to have nonintent to receive the vaccine. Black bars indicate 95% CIs. [a] Reference level. [b] Significantly different from reference group estimate ($P \leq .05$). FPL indicates poverty level.

the 2009 NIS-Teen 1996 birth cohort is the first full cohort that can be assessed for receipt of the HPV vaccine by the 13th birthday.[21] Continued monitoring of subsequent birth cohorts will be needed to assess receipt of the HPV vaccine by the 13th birthday. Efforts to promote an 11- to 12-year preventive check and annual health care visits, as well as use of all visits as opportunities for vaccination, likely will increase HPV vaccination initiation at the recommended age and catch-up vaccination.

There were no differences in HPV vaccination initiation rates according to racial/ethnic group; however, income and insurance status were significantly associated with beginning the vaccine series. The HPV vaccination initiation rate was highest among girls from households with the lowest incomes, the majority of whom were Medicaid-eligible, had SCHIP, or were VFC-eligible and insured; the initiation rate was lowest among VFC-eligible, uninsured girls. The VFC program might be providing better access to HPV vaccination for VFC-eligible, insured girls, compared with girls with other forms of insurance held by non–VFC-eligible girls (ie, private, military, or other insurance). The HPV vaccine is one of the most expensive vaccines, costing $130 per dose in the private sector, and requires a 3-dose series.[22] Because of costs and concerns about reimbursement, some providers might not stock or offer the vaccine,[11,23] which might contribute to lower vaccination rates among non–VFC-eligible girls. However, HPV vaccination is a covered benefit in the military health system. Few preventive visits, few provider recommendations, and parent and provider attitudes about vaccination might contribute to lower vaccination rates for this group.

Despite VFC eligibility, uninsured girls had the lowest vaccination initiation rate. Lack of insurance is a known risk factor for lack of preventive health care among adolescents[24] and low vaccination rates among young children.[25] For uninsured individuals, health care access is limited to public health facilities or services for which they can self-pay. With insurance, there are more opportunities to access a medical home or usual sources of care,[26,27] which have been associated with higher vaccination rates.[28] A previous study demonstrated that VFC-eligible children with no medical home were less well vaccinated than VFC-eligible children with a medical home.[29] These observations might explain the higher initiation rate among VFC-eligible, insured girls, compared with

TABLE 3 Main Reported Reasons Parents Did Not Intend for Their 13- to 17-Year-Old Daughters to Receive HPV Vaccination in Next 12 Months

Reasons for Not Intending to Receive HPV Vaccine[a]	*n*	% (95% CI)
Lack of knowledge	1089	19.4 (17.3–21.8)
Vaccination not needed or not necessary	1189	18.8 (17.0–20.7)
Daughter not sexually active	1171	18.3 (16.6–20.2)
Did not receive provider recommendation	742	13.1 (11.6–14.8)
Daughter not appropriate age	473	7.3 (6.2–8.5)
Safety concerns/adverse effects	478	7.3 (6.3–8.5)
More information/new vaccine	321	4.2 (3.5–5.1)
Family/parents' decision	238	3.9 (3.2–4.8)
Already up to date	257	3.3 (2.7–4.1)
Costs	162	3.2 (2.5–4.2)
Child should make decision	92	1.3 (0.9–2.0)
Child fearful	59	1.2 (0.8–1.9)
No doctor or doctor's visit not scheduled	48	1.1 (0.7–1.7)
Other[b]	92	1.1 (0.9–1.3)
Handicapped/special needs/illness	66	1.0 (0.6–1.7)

[a] Among adolescents whose parents responded "not too likely," "not likely at all," or "unsure" to the question, "How likely is it that [your teen] will receive HPV shots in the next 12 months?" Missing responses were excluded (6.3%).
[b] Other responses included vaccine effectiveness concerns, college shot, do not believe in immunizations, religion/orthodox, time, vaccine not available, not a school requirement, increased sexual activity concern, no obstetrician/gynecologist, or daughter already sexually active.

VFC-eligible, uninsured girls and girls who received all of their vaccines at public facilities. Increasing the proportion of adolescents with health insurance, a primary care physician, and a usual source of care likely would improve health care access and continuity of services.[30] Improved outreach to uninsured adolescents and referrals to VFC providers also might improve vaccination coverage among uninsured girls.

Approximately one-half of the girls who initiated the HPV vaccination series completed it. Reasons for low completion rates might include poor communication of the need for a 3-dose series, failure of patients and parents to return for subsequent doses, fewer health care visits made by adolescents, and lack of a regular source of care. Although VFC-eligible, insured girls were more likely to initiate the HPV vaccination series than were girls with private insurance, fewer completed the series, compared with girls with private insurance. Implementing clinical practice guidelines to use reminder/recall systems likely would increase HPV vaccination series completion rates,[32] particularly for girls who are VFC-eligible and insured or who receive vaccinations in public settings. There were no differences in HPV vaccination initiation rates according to race/ethnicity; however, we found disparities in HPV vaccination completion rates for some racial/ethnic groups. Black and Hispanic girls were less likely than white girls to complete the series. Higher completion rates among black and Hispanic girls might decrease disparities in cervical cancer morbidity and mortality rates,[33] which emphasizes the need for targeted efforts to increase HPV vaccination completion rates; however, additional research is needed for an understanding of the reasons for disparate completion rates for some groups.

Among unvaccinated girls, ~40% of parents reported that they were unlikely to have their daughters vaccinated in the next 12 months and 10% were unsure. The lack of knowledge about the HPV vaccine and reports of daughters not being sexually active demonstrate the need for parental education on adolescent risks for HPV infection, stressing the benefits of vaccination and promoting the importance of vaccination before exposure. As in previous studies, few parents (<1%) reported concerns about increased sexual activity by their daughters after vaccination.[34,35]

This analysis has some limitations. NIS-Teen is a random-digit-dialed survey and is limited to households with landlines. Findings might not be representative of households without landlines and households with only wireless telephones, which would contribute to noncoverage bias. According to data from the 2009 National Health Interview Survey, the number of wireless-only households is increasing; 25.9% of children currently live in wireless-only households.[36] Only 2.4% of children live in households without telephone service.[36] The National Health Interview Survey, a face-to-face household survey that includes landline, nonlandline, and wireless-only households, has been assessed for sociodemographic and health-related variables among adolescents. Benchmark comparisons of these variables for adolescents in the NIS-Teen and the National Health Interview Survey showed no significant evidence of coverage bias with adjustment of sampling weights for noncoverage of nonlandline and wireless-only households in the NIS-Teen.[37] Nonresponse bias might remain after weighting adjustments. Provider data or vaccination histories might be incomplete. We did not analyze other factors that might influence vaccine coverage, such as state policies. However, state was included in our analyses, to control for multiple unmeasured program factors likely related to the outcome variable. Further analyses will evaluate these program factors.

CONCLUSIONS

Although HPV vaccination coverage is increasing in the United States, it is still below target levels. Provider recommendations are strongly associated with HPV vaccination initiation; recommendations by providers to their adolescent patients and parents likely would improve vaccine uptake. Participating in registries and implementing clinical practice guidelines to use reminder/recall systems to re-

mind parents, patients, and vaccination providers when subsequent HPV vaccine doses are due and to recall persons who are overdue for vaccinations likely would increase HPV vaccination series completion rates.[31] Parental education on disease risks and the benefits of HPV vaccination before exposure is needed to promote vaccine uptake. Increasing access to health insurance and a usual source of care and knowledge of and linkage to the VFC program likely would improve vaccination rates among uninsured girls.

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IN SEARCH OF PERFECT FRUIT: *A friend of mine and I play a game in which we exchange photographs of raw food products and ask each other to guess what it is. As she lives in Thailand, I have had to bone up on SE Asian fruits, vegetables, and herbs. Recently, however, I was flummoxed by an unusual cross between an apple and a pear. As reported in* The Wall Street Journal *(Food & Drink: September 7, 2011), breeders in the U.S. have for years crossed different fruit species in search of the perfect fruit. It is usually a painstaking process. First, all the flowers of the "mother tree", the one which will produce the desired fruit, are stripped of petals and pollen producing anthers. Workers then touch each of the remaining pistils with pollen taken from a donor fruit tree. Alternatively, bees are released into an enclosed area that contains the mother tree and a sample of pollen from the donor fruit. The fruit produced by the mother tree is then harvested and planted. Not until this seedling bears fruit will the breeder have any idea whether the experiment has worked. The goal is to produce a fruit that is sweet, hardy, and easy to grow, survive shipping, and have a long harvest season. If the fruit meets all these criteria, farmers will be able to charge a premium price, up to 50 cents or $1.00 a pound. However, only about 1/1000 of the new fruits make it to market. Recent interspecies fruits that have made it to the U.S. market include the Pluot and Aprium, both of which are crosses between plums and apricots, and the Peacharine, which is a cross between a peach and a nectarine. Interestingly, despite the fact that these new fruits are the product of genetic modification, they have not generated the same concern or controversy as other genetically modified foods. This may be because everything is done by hand and mimics to a large extent, what could happen in nature. As for me, I am still disappointed that I lost the challenge. I think I will send her a photo of a Pluerry (a cross between a plum and cherry under development) and see how she does with that.*

Noted by WVR, MD

Dorell CG, Yankey D, Santibanez TA, Markowitz LE. Human Papillomavirus Vaccination Series Initiation and Completion, 2008–2009. *Pediatrics*. 2011;128 (5):830–839

An error occurred in the article by Dorell et al titled "Human Papillomavirus Vaccination Series Initiation and Completion, 2008–2009" published in the November 2011 issue of *Pediatrics* (2011;128[5]:830–839; originally published online October 7, 2011; doi:10.1542/peds.2011-0950). The error concerned rates of HPV vaccination completion among girls. On page 831, under the methods section, second paragraph, lines 19–26 read: "Because the third HPV vaccine dose is recommended to be administered 24 weeks after administration of the first dose, series completion was determined among girls who had received ≥1 HPV vaccine dose ≥24 weeks before the interview date." However, on page 834, under Table 2 of the results section, the vaccination coverage estimates reported in the column '3 doses of HPV vaccine among those who initiated series' were not reported among girls who had received ≥1 HPV vaccine dose ≥24 weeks before the interview date. They were reported among girls who received ≥1 HPV vaccine dose any time before the interview date and received the third HPV dose at least 6 months after the first HPV dose. The intention of the authors was to report completion rates among girls who received ≥1 HPV dose at least 6 months previous to the date of interview to reflect completion rates among girls who had sufficient time to complete the 3 dose HPV vaccination series. Corrected completion rates among girls who received ≥1 HPV vaccine dose at least 6 months before the interview are reported in the table. We found that HPV vaccination series completion estimates increased after limiting the analysis only to girls who had sufficient time to complete the series before the interview date. On page 833, under the results section, paragraph 3, lines 3–13 read: "In the multivariate analysis, completion of the 3-dose series was independently associated with age of 16 years, black non-Hispanic or Hispanic race/ethnicity, a household income of 133% to <322% of FPL, having an older mother, parental knowledge about HPV, and facility type where the adolescent received all of her vaccinations." This should have read, "In the multivariate analysis, completion of the 3-dose series was independently associated with ages 14 or 16 years, Hispanic race/ethnicity, a household income of 133% to <322% of FPL, having an older mother, having SCHIP, parental knowledge about HPV, receipt of a provider recommendation, and facility type where the adolescent received all of her vaccinations." On page 837, under the discussion section, paragraph 6, lines 27–29 read: "Black and Hispanic girls were less likely than white girls to complete the series." This should have read, "Black, Hispanic, and Asian girls were less likely than white girls to complete the series; after controlling for other characteristics, these differences were statistically significant only for Hispanic girls." We regret the error.

doi:10.1542/peds.2012-1013

TABLE 2 HPV Vaccination Coverage Among Girls 13 to 17 Years of Age, According to Sociodemographic Characteristics

Sociodemographic Characteristic	≥1 Dose of HPV Vaccine		≥3 doses of HPV Vaccine Among Those Who Initiated Series	
	Unadjusted Coverage Rate, % Estimate (95% CI)	Prevalence Ratio[a]	Unadjusted Coverage Rate, % Estimate (95% CI)	Prevalence Ratio[a]
Total	40.5 (39.2-41.9)	—	64.0 (61.5-66.5)	—
Year				
2008	37.0 (34.9-39.1)[b]	0.9 (0.8-1.0)	59.5 (55.4-63.4)[b]	0.9 (0.8-0.9)
2009	44.1 (42.3-46.0)[c]	Reference	67.6 (64.4-70.6)[c]	Reference
Age				
13 y	36.0 (33.2-38.9)[c]	Reference	56.9 (51.4-62.2)[c]	Referent
14 y	37.1 (34.2-40.1)	1.1 (1.0-1.2)	65.0 (59.8-69.9)	1.1 (1.0-1.2)
15 y	43.9 (40.8-47.1)[b]	1.2 (1.1-1.4)	58.3 (52.8-63.6)	1.0 (0.9-1.1)
16 y	42.9 (39.8-46.1)[b]	1.3 (1.1-1.5)	69.4 (63.5-74.8)[b]	1.2 (1.0-1.3)
17 y	42.3 (38.9-45.7)[b]	1.2 (1.1-1.4)	69.4 (63.9-74.4)[b]	1.1 (0.9-1.3)
Race				
White, non-Hispanic	39.3 (37.7-40.8)[c]	Reference	71.2 (68.3-73.9)[c]	Reference
Black, non-Hispanic	40.1 (36.1-44.2)	1.0 (0.9-1.1)	54.1 (46.7-61.3)[b]	0.9 (0.8-1.0)
Hispanic	44.5 (40.4-48.7)[b]	1.1 (1.0-1.2)	52.7 (46.1-59.1)[b]	0.9 (0.8-1.0)
American Indian/Alaskan Native	52.6 (41.4-63.5)[b]	1.2 (1.0-1.6)	54.2 (36.5-70.9)	1.0 (0.8-1.2)
Asian	41.1 (32.1-50.8)	1.0 (0.9-1.2)	52.4 (34.7-69.6)[b]	0.8 (0.6-1.2)
Other	40.9 (32.7-49.6)	0.9 (0.7-1.2)	59.4 (45.1-72.2)	0.9 (0.8-1.1)
Income level				
<133% of FPL	44.9 (41.6-48.3)	1.1 (0.9-1.2)	54.0 (48.3-59.6)[b]	1.0 (0.8-1.1)
133% to <322% of FPL	34.8 (32.5-37.2)[b]	0.9 (0.8-1.0)	59.9 (54.8-64.7)[b]	0.9 (0.8-1.0)
322% to <503% of FPL	39.6 (37.1-42.1)[b]	0.9 (0.9-1.0)	72.7 (68.5-76.5)	1.0 (0.9-1.1)
>503% of FPL	44.7 (41.8-47.6)[c]	Reference	71.8 (67.3-75.9)[c]	Reference
Mother's Education				
Less than high school	42.1 (37.7-46.6)	1.0 (0.9-1.2)	47.9 (40.4-55.4)[b]	0.9 (0.8-1.0)
High school	39.0 (35.9-42.2)	1.0 (0.9-1.1)	60.3 (54.3-66.0)[b]	0.9 (0.8-1.0)
More than high school, some college	39.9 (37.5-42.3)	1.0 (1.0-1.1)	65.2 (60.8-69.4)[b]	1.0 (0.9-1.1)
College graduate	41.7 (39.7-43.7)[c]	Reference	72.3 (69.2-75.2)[c]	Reference
Mother's marital status				
Married	39.3 (37.8-40.9)[c]	Reference	66.9 (64.1-69.5)[c]	Reference
Divorced/widowed/separated	41.8 (38.4-45.4)	1.1 (1.0-1.2)	60.5 (53.8-66.8)[b]	0.9 (0.9-1.0)
Never married	47.7 (42.2-53.2)[b]	1.2 (1.0-1.3)	46.0 (37.9-54.2)[b]	0.9 (0.8-1.0)
Mother's age				
≤34 y	45.6 (40.6-50.7)[c]	Reference	47.9 (39.8-56.2)[c]	Reference
35-44 y	39.2 (37.1-41.5)[b]	0.8 (0.8-0.9)	61.8 (57.6-65.8)[b]	1.1 (1.0-1.3)
≥45 y	40.9 (39.1-42.8)	0.8 (0.7-0.9)	69.3 (66.2-72.4)[b]	1.2 (1.0-1.3)
MSA				
Urban	43.0 (40.6-45.4)[c]	Reference	60.2 (56.3-64.0)[c]	Reference
Suburban	41.3 (39.2-43.5)	1.0 (0.9-1.1)	66.2 (62.1-70.1)[b]	1.0 (1.0-1.1)
Rural	32.8 (30.4-35.2)[b]	0.9 (0.9-1.0)	67.9 (63.4-72.1)[b]	1.1 (1.0-1.2)
Had 11- to 12-year preventive care visit				
Yes	48.8 (46.1-51.5)[c]	Reference	64.9 (60.7-68.8)[c]	Reference
No	31.2 (28.9-33.6)[b]	0.8 (0.7-0.9)	57.3 (52.2-62.2)[b]	1.0 (0.9-1.1)
HPV vaccine not licensed when11 or 12 y of age[d]	41.9 (39.7-44.0)[b]	0.9 (0.8-1.0)	66.3 (62.4-69.9)	1.0 (0.9-1.1)
Insurance status				
Private	39.0 (37.4-40.7)[c]	Reference	68.3 (65.1-71.4)[c]	Reference
VFC-eligible, all others	47.3 (44.2-50.5)[b]	1.2 (1.1-1.3)	55.1 (50.0-60.2)[b]	1.0 (0.9-1.1)
VFC-eligible, uninsured only	23.7 (19.3-28.8)[b]	0.9 (0.7-1.1)	53.0 (41.9-63.9)[b]	1.0 (0.8-1.2)
SCHIP	52.4 (44.2-60.5)[b]	1.2 (1.0-1.5)	69.5 (57.8-79.2)	1.2 (1.1-1.4)
Military	35.1 (27.2-43.8)	0.8 (0.6-1.1)	68.9 (55.3-79.8)	1.0 (0.8-1.3)
Other	34.8 (21.8-50.6)	0.7 (0.4-1.2)	64.5 (36.6-85.1)	0.9 (0.6-1.3)
Know of HPV				
Yes	41.9 (40.6-43.4)[c]	Reference	66.2 (63.9-68.4)[c]	Reference
No	25.2 (18.8-32.9)[b]	1.0 (0.8-1.2)	24.4 (14.7-37.6)[b]	0.6 (0.4-0.9)
Heard of the HPV vaccine				
Yes	41.8 (40.3-43.2)[c]	Reference	66.3 (63.9-68.6)[c]	Reference
No	33.7 (29.2-38.5)[b]	1.0 (0.9-1.1)	50.5 (40.2-60.8)[b]	0.9 (0.8-1.0)

TABLE 2 Continued

Sociodemographic Characteristic	≥1 Dose of HPV Vaccine		≥3 doses of HPV Vaccine Among Those Who Initiated Series	
	Unadjusted Coverage Rate, % Estimate (95% CI)	Prevalence Ratio[a]	Unadjusted Coverage Rate, % Estimate (95% CI)	Prevalence Ratio[a]
Received provider recommendation for vaccine[e]				
Yes	58.3 (56.5-60.2)[b]	2.6 (2.4-2.9)	68.4 (65.8-70.9)[b]	1.1 (1.0-1.2)
No	20.7 (18.9-22.7)[c]	Reference	51.5 (45.6-57.3)[c]	Reference
Facility types for adolescent's vaccination providers				
All private facilities	44.7 (42.8-46.6)[c]	Reference	66.9 (63.6-70.0)[c]	Reference
All public facilities	26.5 (23.9-29.2)[b]	0.7 (0.6-0.8)	49.0 (43.0-55.1)[b]	0.9 (0.8-1.0)
All hospital facilities	44.8 (40.1-49.5)	1.0 (0.9-1.1)	61.7 (53.6-69.2)	0.9 (0.8-1.1)
All STD/school/teen clinics or other facilities	38.8 (31.0-47.2)	1.0 (0.8-1.2)	61.5 (44.8-75.8)	1.0 (0.8-1.2)
Mixed	42.4 (38.1-46.9)	1.0 (0.9-1.1)	68.0 (60.5-74.7)	1.0 (0.9-1.1)
Unknown	35.9 (29.7-42.7)[b]	0.9 (0.8-1.0)	56.8 (44.5-68.3)	0.9 (0.7-1.0)

STD indicates sexually transmitted disease.

[a] Logistic regression models adjusted for survey year and state of residence.

[b] $P \leq .05$.

[c] Reference level.

[d] Girls who were older than 12 years of age at the time of HPV vaccine licensure (June 8, 2006) and did not have the opportunity to receive HPV vaccine at an 11- to 12-year preventive visit.

[e] Parents reported whether they had received a recommendation for their daughters to receive HPV vaccinations from a health care provider.

Kiang et al. Outbreak of Osteomyelitis/Septic Arthritis Caused by *Kingella kingae* Among Child Care Center Attendees. *Pediatrics*. 2005;116(2):e206–e213

An error occurred in this article by Kiang et al, titled "Outbreak of Osteomyelitis/Septic Arthritis Caused by *Kingella kingae* Among Child Care Center Attendees" published in the August 2005 issue of *Pediatrics* (2005;116[2]:e206–e213; originally published online July 15, 2005; doi:10.1542/peds.2004-2051). On page e207, under Intervention, lines 7–9, this reads: "a short prophylactic course of rifampin (**2 mg/kg/dose** up to 600 mg per dose for adults, twice daily for 2 days)". This should have read: "a short prophylactic course of rifampin (**10 mg/kg/dose** up to 600 mg per dose for adults, twice daily for 2 days)".

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Hayes et al. A Multicenter Collaborative Approach to Reducing Pediatric Codes Outside the ICU. *Pediatrics*. 2012;129(3):e785–e791

An error occurred in the article by Hayes et al, titled "A Multicenter Collaborative Approach to Reducing Pediatric Codes Outside the ICU" published in the March 2012 issue of *Pediatrics* (2012;129[3]:e785–e791; originally published online February 20, 2012; doi:10.1542/peds.2011-0227). Heather Richard was omitted from the author list. The complete list of authors should read as follows**:**

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