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Delay and Refusal of Human Papillomavirus Vaccine for Girls, National Immunization Survey–Teen, 2010

Christina Dorell, MD, MPH^{1,2}, David Yankey, MS¹, Jenny Jeyarajah, MS¹, Shannon Stokley, MPH¹, Allison Fisher, MPH¹, Lauri Markowitz, MD³, and Philip J. Smith, PhD¹

¹Immunization Services Division, Centers for Disease Control and Prevention, Atlanta, GA, USA

²Office of Clinical Affairs, Commonwealth Medicine, University of Massachusetts Medical School, Quincy, MA, USA

³Division of STD Prevention, Centers for Disease Control and Prevention, Atlanta, GA, USA

Abstract

Human papillomavirus (HPV) vaccine coverage among girls is low. We used data reported by parents of 4103 girls, 13 to 17 years old, to assess associations with, and reasons for, delaying or refusing HPV vaccination. Sixty-nine percent of parents neither delayed nor refused vaccination, 11% delayed only, 17% refused only, and 3% both delayed and refused. Eighty-three percent of girls who delayed only, 19% who refused only, and 46% who both delayed and refused went on to initiate the vaccine series or intended to initiate it within the next 12 months. A significantly higher proportion of parents of girls who were non-Hispanic white, lived in households with higher incomes, and had mothers with higher education levels, delayed and/or refused vaccination. The most common reasons for nonvaccination were concerns about lasting health problems from the vaccine, wondering about the vaccine's effectiveness, and believing the vaccine is not needed.

Keywords

human papillomavirus vaccine; immunization; adolescents; girls; patient compliance; cancer vaccines; refusal

Introduction

Human papillomavirus (HPV) is the most common sexually transmitted infection and is a causal factor for cervical cancer and genital warts.^{1,2} Nearly one half of adolescents in grades 9 to 12 report ever having sexual intercourse and are at risk for HPV infection.³ The prevalence of HPV among girls 14 to 19 years old is 32.9%.⁴ In 2007, routine vaccination with the quadrivalent HPV vaccine was recommended for girls 11 or 12 years and for females 13 to 26 years who were not previously vaccinated.⁵ Since 2009, either quadrivalent

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Corresponding Author: Christina Dorell, Office of Clinical Affairs, 100 Hancock Street, 6th Floor, Quincy, MA 02171, USA. christina.dorell@state.ma.us

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or bivalent HPV vaccine is recommended.⁶ As of 2010, 48.7% of girls, 13 to 17 years old, had initiated the 3-dose vaccine series; 32.0% had received 3 doses.⁷ Although vaccination rates for 1 and 3 HPV doses among girls increased in 2012 to 53.8% and 33.4%, respectively, coverage remains low.⁸

The most common reasons for parental nonintent to receive HPV vaccination for their daughters include perception that the vaccine is not needed, sexual inactivity, and lack of knowledge about the vaccine.^{9–11} Additional factors that have influenced parental acceptance of HPV vaccination include beliefs about the vaccine's safety and effectiveness, fear of condoning premarital sex, provider recommendations, as well as media coverage.^{12–14} Parental delay or refusal of HPV vaccination of their daughters may contribute to low vaccination rates. Additionally, vaccination rates may differ by the degree of delay and/or refusal. For instance, Smith et al observed decreasing vaccination rates among children 24 to 35 months old with increasing degrees of delay and/or refusal measured by parents who neither delayed or refused vaccines, parents who delayed only, parents who refused only, and parents who both delayed and refused vaccines.¹⁵ To our knowledge, the examination of delay and refusal of the HPV vaccine and its association with vaccination status has not been reported among adolescents. We hypothesize that girls whose parents report ever delaying and/or refusing HPV vaccination have lower vaccination rates compared to those who reported neither delaying or refusing the vaccine and that HPV vaccination rates decrease with increasing levels of delay and refusal. The objectives of this study were to (a) assess the prevalence of delaying or refusing HPV vaccination, (b) assess vaccination rates among girls with a history of delaying and/or refusing the vaccine, (c) describe associations between initiation of the HPV series and delay and/or refusal of the vaccine, and (d) describe reasons for delaying and refusing HPV vaccination among girls 13 to 17 years old.

Methods

We used data from the parental attitudes module of the 2010 National Immunization Survey-Teen (NIS-Teen).¹⁶ The target population of the NIS-Teen is 13- to 17-year-old adolescents. Data were collected in the NIS-Teen in 2 phases. The first phase consisted of a random-digit-dialing telephone survey of parents/guardians of adolescents; the second phase consisted of a mail survey to all vaccination providers identified by the parent and for which consent was granted. The NIS-Teen represents a stratified, national, probability sample of landline-telephone households in the United States. Cell phone households were not added to the NIS-Teen sampling frame until the 2011 NIS-Teen.⁶

During the third and fourth quarters of 2010, the NIS-Teen included a parental attitudes module, which included questions regarding parental delay or refusal of vaccinations. The parental attitudes module included 10 808 completed household interviews for a Council of American Survey Research Organizations response rate of 40.2%.¹⁷ Among those who completed the household survey and the parental attitudes module, 8652 (80.0%) had adequate provider-reported vaccination histories; 4132 were girls. Because the HPV vaccine was only routinely recommended for girls at the time of data collection, the analysis is limited to girls. Twenty-nine respondents responded “don't know” or “refused” to HPV delay and refusal questions and were excluded from the analysis, making a total sample of

4103 girls. Parents were asked, “Has there ever been a time when you delayed or put off getting a vaccination for [TEEN]” and “Has there ever been a time when you refused or decided not to get a vaccination for [TEEN]?” Parents who reported delaying or refusing a vaccination for their adolescents were then asked what vaccine they ever refused or delayed and reasons why. Several reasons were read by the interviewer. Yes, no, don’t know, refused, or verbatim responses were given by parents. Questions in the NIS-Teen parental attitudes module are available.¹⁸

Survey respondents were categorized into 4 groups consecutively ordered in increasing degrees of delay and refusal: (a) neither delayed nor refused, (b) delayed only, (c) refused only, or (d) both delayed and refused an HPV vaccination. Select sociodemographic characteristics, including some associated with HPV vaccination (ie, age, race, income, entitlement for the Vaccines for Children Program (the VFC program provides free vaccine to those who are 18 years or younger, American Indian/Alaskan Native, uninsured, Medicaid-eligible, or underinsured and receive vaccinations at Federally Qualified Health Clinics or Rural Health Clinics), maternal characteristics, provider recommendation), are reported by parents for each delay or refusal category.^{9,10} Initiation rates of the 3-dose HPV vaccine series, parental intentions to vaccinate their unvaccinated daughters within the next 12 months, and reasons for delaying and/or refusing vaccination are reported among the 4 groups. Parents reporting delaying or refusing HPV vaccine could have had their daughters initiate the HPV vaccination series by the interview date. Parents could have delayed or refused any of the three doses required to complete the series.

All vaccination coverage estimates in this study were determined from provider-reported records. Only adolescents with adequate provider data were included in the analysis, that is, those with sufficient vaccination information obtained from the provider(s) to determine vaccination status. Details of the NIS-Teen methodology, including how vaccination data are combined to produce a synthesized immunization history and weighting procedures, have previously been published.¹⁶ NIS-Teen was approved by the Centers for Disease Control and Prevention Institutional Review Board.

Statistical Analysis

Bivariate analyses were used to describe the distribution across selected sociodemographic characteristics among the 4 HPV delay and refusal categories and reasons for delaying or refusing vaccination. Approximate *t* tests were used to determine statistically significant differences. We considered differences with *P* values of <.05 as statistically significant. Data were analyzed using SAS-callable SUDAAN version 9.3 to account for the complex sampling design of the NIS-Teen (Research Triangle Institute, Research Triangle Park, NC).

Results

Self-Reported Vaccine Delay and Refusal

Participant sociodemographic characteristics are stratified by 4 delay or refusal categories: (a) neither delayed nor refused, (b) delayed only, (c) refused only, or (d) both delayed and refused HPV vaccination. Among all girls, 69% of their parents neither delayed nor refused

the HPV vaccine before the interview date (Table 1). Approximately 10% delayed only, 16.6% refused only, and 3.4% both delayed and refused HPV vaccination for their daughters. By the interview date, the percent of girls administered 1 HPV dose was: 61.8% (neither delayed nor refused), 53.2% (delayed only), 6.6% (refused only), and 10.4% (both delayed and refused). Most parents in each delay and refusal group reported receiving a provider recommendation for HPV vaccination of their daughters. Compared with those in the neither delayed or refused group, a significantly higher proportion of parents that delayed only reported intentions to have their daughters vaccinated within the next 12 months. Conversely, compared with those in the neither delayed or refused group, a significantly lower proportion of those that refused only reported intentions to have their daughters vaccinated within the next 12 months.

There were statistically significant differences in sociodemographic characteristics among the 4 delay or refusal groups. Compared with girls in the neither delayed nor refused group, girls in the delayed only group were significantly more likely to be white, live in households with incomes of 322% to <503% of the federal poverty level, not VFC-entitled, or have mothers with college degrees (Table 1). Compared with girls in the neither delayed or refused group, girls in the refused only group were significantly more likely to be not VFC-entitled, have mothers with education levels of high school or some college (nongraduate) or with college degrees, or receive all of their vaccines at mixed facilities. Compared with girls in the neither delayed or refused group, girls in the both delayed and refused group were significantly more likely to be white, live in households with incomes of 503% federal poverty level, not VFC-entitled, had all private vaccination providers, or have mothers who were 45 years old, married, or with college degrees.

Figure 1 shows the proportion of girls who initiated the HPV series and those who were unvaccinated. Among the unvaccinated girls, those with parental intentions to have their daughters receive HPV vaccination within the next 12 months are indicated. (Girls whose parents responded “unsure,” “don’t know,” or “refused” to the intent question were considered missing and not included in the figure. HPV series initiation rates differ from those reported in Table 1 because of smaller sample sizes resulting from these missing responses.) Sixty-six percent of those who neither delayed nor refused, 55.1% of those who delayed only, 6.9% of those who refused only, and 11.2% of those who both delayed and refused initiated the series by the time of interview. Fifteen percent of those who neither delayed nor refused, 28.4% of those who delayed only, 12.2% of those who refused only, and 35.0% of those who both delayed and refused were unvaccinated and intended to receive the vaccine within the next 12 months. Nineteen percent of those who neither delayed nor refused, 16.5% of those who delayed only, 81.0% of those who refused only, and 53.8% of those who both delayed and refused were unvaccinated and did not intend to receive the vaccine within the next 12 months.

Reasons for Vaccine Delay or Refusal Among Unvaccinated Girls

Parental reasons for delaying or refusing the HPV vaccine were grouped into 3 categories: (a) knowledge or vaccine necessity, (b) vaccine safety, and (c) access. Reasons for delaying or refusing HPV vaccination among unvaccinated girls were compared among the delay or

refusal groups (Table 2). The 4 most common reasons for nonvaccination among all the delay and refusal groups were concerns about lasting health problems, the vaccine is not needed, wondering about the vaccine's effectiveness, and teen is not sexually active. Among reasons related to knowledge or vaccine necessity, those who refused only and who both delayed and refused were significantly more likely than those who delayed only to report wondering about the vaccine's effectiveness, teen not sexually active, and belief that the vaccine is not needed.

Among reasons related to vaccine safety, those who refused only were significantly more likely than those who delayed only to report concerns about lasting health problems and hearing or reading bad things about the vaccine through different media. Those who both delayed and refused were significantly more likely to report concerns about lasting health problems, feeling that there are too many shots, and concerns about short-term problems like fever and discomfort. Among reasons related to vaccine access, the 2 most common reasons among the delayed only and refused only groups were inconvenience getting the vaccine and cost concerns. Reporting inconvenience of getting the vaccine was significantly more common among those who delayed only than those who refused only.

Discussion

In 2010, nearly one third of parents reported having delayed and/or refused HPV vaccination for their daughters. Among those who delayed only, approximately 83% of girls had already started the vaccination series by the interview date or had intentions to start the series within the next 12 months. However, the proportion of those vaccinated, or with intentions to receive the vaccine, was smallest among those with a history of refusing only, followed by those who both delayed and refused HPV vaccination. Having a history of ever delaying, refusing, or both delaying and refusing HPV differed by certain sociodemographic characteristics. The most common reasons for nonvaccination were generally the same among all of the delay and refusal groups, although more frequently reported among those who refused.

Parental report of HPV vaccine delay and refusal was associated with factors related to higher socioeconomic status. A significantly higher proportion of parents of girls who were non-Hispanic white, who lived in households with higher incomes, who were not VFC-entitled, who had mothers with higher education levels, 45 years old, or who were married, delayed, refused, or both delayed and refused HPV vaccination compared with those who neither delayed nor refused the vaccine. Although not extensively assessed among adolescents, studies among young children have found a similar pattern with greater vaccine refusal among parents who are white, have higher annual incomes, and are college graduates.^{19,20} Lower HPV series initiation rates among girls who are white, have mothers who are married or who are 45 years old, or who are privately insured may, in part, be because of higher rates of delay and refusal among these groups.^{10,11}

Although the most common reasons for delaying and refusing HPV vaccination (ie, concerns about lasting health problems, believing that the vaccine was not necessary, wondering about the vaccine's effectiveness, and teen is not sexually active) were the same

among all delay and refusal groups, the frequency of these reasons was significantly lower among those who delayed only compared with those who refused only and both delayed and refused. Despite delaying HPV vaccination, most girls who delayed, eventually initiated the series or had intentions to initiate it. Vaccine intentions are strong predictors of vaccine uptake among young women and changes in behavioral intention can lead to behavior change.^{21,22} Parents with intentions to vaccinate their daughters against HPV may likely vaccinate them. Yet some parents with concerns after receiving a provider recommendation may take a “wait and see” approach, delaying the vaccine to revisit the decision sometime later.^{12,23} Similarly, previous reports have found lower HPV initiation rates among those with perceived difficulties obtaining the vaccine.¹⁴ Strategies, including educating parents and providers about the benefits of vaccination and safety of vaccination during minor illnesses, vaccinating at urgent and well visits, extending office hours, reducing client out-of-pocket costs, and having standing orders, may be strategies to decrease delay of HPV vaccination for safety or logistical concerns.^{24–26}

Nearly 50% to 75% of parents among the delay and refusal categories reported concerns about long-lasting health problems. However, among the general unvaccinated population of girls in the NIS-Teen, the report of safety concerns by parents without intentions to receive the HPV vaccine was only 19.3% in 2011.²⁷ Although this proportion has increased from 5.4% in the 2008 NIS-Teen (Centers for Disease Control and Prevention unpublished data), the higher proportion of parents reporting safety concerns in this analysis may have resulted from differences in obtaining reasons for not vaccinating and limiting the analysis to parents with a history of delaying and/or refusing the vaccine. In the general NIS-Teen, parents of unvaccinated adolescents are asked an open-ended question regarding reasons for nonvaccination. Yet the parental attitudes module asked parents whether specific reasons led to their delay or refusal of the vaccine, which may have prompted parents to report reasons that they may not have otherwise reported if asked an open-ended question. As HPV vaccination rates and intent to vaccinate increases in the general population, a larger proportion of the decreasing unvaccinated group may likely express safety concerns. Reporting reasons for nonvaccination among relatively smaller proportions of the population that have delayed and/or refused the vaccine does not reflect the frequency of reasons among the general population.

Reviews by regulatory groups have concluded that almost 6 years of postmarketing safety surveillance in girls have demonstrated safety to date.²⁸ Yet half of those who only refused HPV in our study reported hearing or reading bad things about the vaccine, which may reflect the vaccine safety concerns that have been raised by a variety of antivaccination groups and some anecdotal reports that have been widely publicized.²⁹ Additionally, reports of adverse events associated with vaccination have been reported on antivaccine Web sites^{30,31} and even published in medical literature.³² Response to these reports by sources trusted by parents could help dispel safety concerns.³³

Doubts about the need for HPV vaccine and HPV vaccine effectiveness among all the delay and refusal groups suggest that additional parental education and increased provider recommendations for the vaccine would be helpful. Studies have reported lower vaccine acceptability of HPV vaccination among parents who have a lower perception of risk of

infection for their children and who doubt the vaccine's effectiveness.^{12,13} A key influencing factor of mothers' decisions to vaccinate their daughters is a clinician providing key information about the necessity, safety and efficacy of the vaccine, while eliciting and addressing a mother's concerns.³⁴ For some mothers, clinicians educating them about HPV vaccination before the 11th birthday, allowing mothers an opportunity to consider vaccination before the actual vaccination visit was an influential factor in their decision to vaccinate their daughters.³⁴ Ongoing conversations between parents and providers may foster increased trust and vaccine acceptance among parents who refuse vaccinations.³⁵ Such conversations may have contributed to the proportion of parents with intentions for vaccination among those who refused HPV vaccination in our analysis.

This analysis has some limitations. In 2010, NIS-Teen was a random-digit-dialing survey and was limited to landline households. It may not have been representative of nonlandline and wireless-only households, contributing to noncoverage bias. Nonresponse bias may remain after weighting adjustments. Provider data or vaccination histories may be incomplete. Sample sizes may have been too small to detect statistically significant differences. Parent report of provider recommendations and the name of the vaccine that they delayed or refused may be subject to recall bias. We did not assess the timing between initially delaying or refusing HPV vaccination among those who eventually initiated the series, or who may have initiated the series and delayed the second or third doses. Similarly, events or reasons that made a parent change his or her mind about vaccination is unknown. Parental intentions or non-intentions to receive the vaccine may not reflect actual vaccination practices. Some parents' affirmative responses to survey questions regarding their intent to vaccinate their adolescent may reflect their desire to provide a socially desirable reply, although actual intent to vaccinate may be different.

Conclusion

Human papillomavirus vaccination estimates lag behind those for other adolescent vaccines in the United States.⁸ Parental education about HPV and HPV-associated cancers, as well as the benefits and safety of vaccination can help increase vaccine acceptance.^{36,37} Inquiring about parents' reasons for delay or refusal and seeking opportunities to address concerns or barriers through ongoing discussions may help increase acceptance among parents who delay or refuse vaccinations. Effective strategies to increase vaccine acceptance in parents with varying degrees of HPV vaccine delay and refusal may differ. Enhanced educational efforts by multiple sources trusted by parents may be needed to increase coverage among daughters of parents who refuse HPV vaccination.

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References

1. Schiffman M, Castle PE. Human papillomavirus: epidemiology and public health. *Arch Pathol Lab Med*. 2003;127:930–934. [PubMed: 12873163]
2. Trottier H, Burchell AN. Epidemiology of mucosal human papillomavirus infection and associated diseases. *Public Health Genomics*. 2009;12:291–307. [PubMed: 19684442]
3. Eaton DK, Kann L, Kinchen S, et al. Youth risk behavior surveillance—United States, 2009. *MMWR Surveill Summ*. 2010;59(5):1–142.
4. Hariri S, Unger ER, Sternberg M, et al. Prevalence of genital human papillomavirus among females in the United States, the National Health and Nutrition Examination Survey, 2003–2006. *J Infect Dis*. 2011;204:566–573. [PubMed: 21791659]
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(RR-2):1–24.
6. Centers for Disease Control and Prevention. FDA licensure of bivalent human papillomavirus vaccine (HPV2, Cervarix) for use in females and updated HPV vaccination recommendations from the Advisory Committee on Immunization Practices (ACIP). *MMWR Morb Mortal Wkly Rep*. 2010;59(20):626–629. [PubMed: 20508593]
7. Centers for Disease Control and Prevention. National and state vaccination coverage among adolescents aged 13 through 17 years—United states, 2010. *MMWR Morb Mortal Wkly Rep*. 2011;60(33):1117–1123. [PubMed: 21866084]
8. Centers for Disease Control and Prevention. National and state vaccination coverage among adolescents aged 13–17 years—United States, 2012. *MMWR Morb Mortal Wkly Rep*. 2013;62(34):685–693. [PubMed: 23985496]
9. Dorell C, Yankey D, Strasser S. Parent-reported reasons for nonreceipt of recommended adolescent vaccinations, National Immunization Survey-Teen, 2009. *Clin Pediatr (Phila)*. 2011;50:1116–1124. [PubMed: 21856964]
10. Dorell CG, Yankey D, Santibanez TA, Markowitz LE. Human papillomavirus vaccination series initiation and completion, 2008–2009. *Pediatrics*. 2011;128:830–839. [PubMed: 22007006]
11. Dorell CG, Yankey D, Santibanez TA, Markowitz LE. Human papillomavirus vaccination series initiation and completion, 2008–2009. *Pediatrics*. 2011;128:830–839. Erratum: *Pediatrics*. 2012;130:166–168. [PubMed: 22007006]
12. Dempsey AF, Abraham LM, Dalton V, Ruffin M. Understanding the reasons why mothers do or do not have their adolescent daughters vaccinated against human papillomavirus. *Ann Epidemiol*. 2009;19:531–538. [PubMed: 19394865]
13. Dempsey AF, Zimet GD, Davis RL, Koutsky L. Factors that are associated with parental acceptance of human papillomavirus vaccines: a randomized intervention study of written information about HPV. *Pediatrics*. 2006;117:1486–1493. [PubMed: 16651301]
14. Reiter P, Brewer N, Gottlieb S, McRee A, Smith J. Parents' health beliefs and HPV vaccination of their adolescent daughters. *Soc Sci Med*. 2009;69:475–480. [PubMed: 19540642]
15. Smith P, Humiston S, Marcuse E, et al. Parental delay or refusal of vaccine doses, childhood vaccination coverage at 24 months of age, and the health belief model. *Public Health Rep*. 2011;126(suppl 2):135–146. [PubMed: 21812176]
16. Centers of Disease Control and Prevention. National Immunization Survey: A user's guide for the 2010 Public-UseDataFile. ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/NIS/NISPUF10_DUG.PDF. Accessed January 13, 2014.
17. Frankel L. The report of the CASRO Task Force on Response Rates In: Wiseman E, ed. *Improving Data Quality in Sample Surveys*. Cambridge, MA: Marketing Science Institute; 1983:1–11.
18. Centers for Disease Control and Prevention. NIS-Teen Hard Copy Questionnaire. ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/NIS/NISTEENPUF10_HHQUX.pdf. Accessed January 13, 2014.
19. Smith PJ, Chu SY, Barker LE. Children who have received no vaccines: who are they and where do they live? *Pediatrics*. 2004;114:187–195. [PubMed: 15231927]

20. Smith P, Kennedy A, Wooten K, Gust D, Pickering L. Association between health care providers' influence on parents who have concerns about vaccine safety and vaccination coverage. *Pediatrics*. 2006;118:e1287–e1292. [PubMed: 17079529]
21. Gerend M, Shepherd J. Predicting human papillomavirus vaccine uptake in young adult women: comparing the health belief model and theory of planned behavior. *Ann Behav Med*. 2012;44:171–180. [PubMed: 22547155]
22. Webb TL, Sheeran P. Does changing behavioral intentions engender behavior change? A meta-analysis of experimental evidence. *Psychol Bull*. 2006;132:249–268. [PubMed: 16536643]
23. Hughes CC, Jones AL, Feemster KA, Fiks AG. HPV vaccine decision making in pediatric primary care: a semi-structured interview study. *BMC Pediatr*. 2011;11:74. [PubMed: 21878128]
24. Community Preventive Services Task Force. Guide to Community Preventive Services. Universally recommended vaccinations: reducing out of pocket costs. <http://www.thecommunityguide.org/vaccines/clientoutofpocketcosts.html>. Accessed January 13, 2014.
25. National Center for Immunization and Respiratory Diseases. General recommendations on immunization: recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Morb Mortal Wkly Rep*. 2011;60(RR-02):1–60.
26. Community Preventive Services Task Force. Guide to Community Preventive Services. Universally recommended vaccinations: standing orders when used alone. <http://www.thecommunityguide.org/vaccines/standingorders.html>. Accessed January 13, 2014.
27. Dorell C. Human papillomavirus (HPV) vaccination coverage in the United States: National Immunization Survey-Teen, 2006–2011; Talk presented at: The Advisory Committee on Immunization Practices Meeting; October 25, 2012; <http://www.cdc.gov/vaccines/acip/meetings/downloads/min-archive/min-oct12.pdf>.
28. Food and Drug Administration Center for Biologics Evaluation and Research. Gardasil Pediatric Utilization and Safety Review for the Pediatric Advisory Committee Meeting-May 7–8, 2012 www.fda.gov/downloads/AdvisoryCommittees/CommitteesMeetingMaterials/PediatricAdvisoryCommittee/UCM302352.pdf. Accessed January 13, 2014.
29. Denise S Remark on HPV vaccine could ripple for years. *New York Times*. 9 19, 2011 <http://www.nytimes.com/2011/09/20/health/20hpv.html?pagewanted=all>. Accessed January 13, 2014.
30. Judicial Watch. Judicial Watch v. Food and Drug Administration (No. 07–1776)-Gardasil. <http://www.judicialwatch.org/cases/judicial-watch-v-food-and-drug-administration-no-07-1776-gardasil/>. Accessed January 13, 2014.
31. Tomljenovic L HPV vaccines: science versus reality. 11 26, 2012 <http://sanevax.org/hpv-vaccines-science-versus-reality/>. Accessed November 30, 2012.
32. Tomljenovic L, Shaw CA. Death after quadrivalent human papillomavirus (HPV) vaccination: causal or coincidental? *Pharmaceut Reg Affairs*. 2012;S12:001. doi:10.4172/2167-7689.S12-001.
33. Centers for Disease Control and Prevention. Review of published report of cerebral vasculitis after vaccination with the human papillomavirus (HPV) vaccine. http://www.cdc.gov/vaccinesafety/Activities/cisa/technical_report.html. Accessed January 13, 2014.
34. Griffioen AM, Glynn S, Mullins TK, et al. Perspectives on decision making about human papillomavirus vaccination among 11- to 12-year-old girls and their mothers. *Clin Pediatr (Phila)*. 2012;51:560–568. [PubMed: 22589477]
35. Diekema DS. Responding to parental refusals of immunization of children. *Pediatrics*. 2005;115:1428–1431. [PubMed: 15867060]
36. Askelson N, Campo S, Lowe J, Smith S, Dennis L, Andsager J. Using the theory of planned behavior to predict mothers' intentions to vaccinate their daughters against HPV. *JSch Nurs*. 2010;26:194–202. [PubMed: 20335232]
37. Rosenstock I, Derryberry M, Carriger B. Why people fail to see poliomyelitis vaccination. *Public Health Rep*. 1959;74:98–104. [PubMed: 13623982]

Figure 1. Human papillomavirus (HPV) vaccination and parental intent to initiate the HPV vaccination series by parental delay or refusal group among girls, 13 to 17 years, National Immunization Survey-Teen, United States, 2010.

Table 1.

Prevalence of Parental Delay or Refusal of HPV Vaccination of Their Daughters, Ages 13 to 17 Years, by Select Sociodemographic Characteristics, National Immunization Survey–Teen, 2010.

Sociodemographic Characteristic	Neither Delayed or Refused		Delayed Only		Refused Only		Both Delayed and Refused	
	Total N	n	Weighted % (95% CI)	n	Weighted % (95% CI)	n	Weighted % (95% CI)	n
Total	4103	2726	69.5 (67.2-71.8)	499	10.5 (9.1-12.1)	703	16.6 (14.8-18.5)	175
Received 1 HPV dose								
Yes	2065	1710	61.8 (58.5-65.0)	263	53.2 (46.0-60.3) ^a	62	6.6 (4.5-9.6) ^a	30
Age (years)								
13-15	2535	1648	59.7 (56.3-62.9)	331	67.7 (61.0-73.8)	443	60.2 (53.9-66.3)	113
16-17	1568	1078	40.3 (37.1-43.7)	168	32.3 (26.2-39.0)	260	39.8 (33.7-46.1)	62
Race/ethnicity								
Non-Hispanic white	2794	1792	56.2 (52.8-59.6)	377	69.8 (62.2-76.5) ^a	491	59.7 (53.2-65.9)	134
Non-Hispanic black	473	334	15.9 (13.6-18.5)	37	10.8 (7.1-16.2)	87	16.7 (12.4-22.2)	NA ^c
Hispanic	509	366	20.0 (16.8-23.6)	55	15.1 (9.7-22.9)	73	16.5 (11.4-23.4)	NA ^c
Other	327	234	7.8 (6.1-9.9)	30	4.2 (2.4-7.1) ^a	52	7.0 (4.8-10.2)	NA ^c
Federal poverty level (FPL)								
<133% FPL	841	659	24.8 (21.9-28.0)	71	18.9 (13.2-26.4)	92	13.0 (9.4-17.6) ^a	NA ^c
133% to <322% FPL	1268	841	36.0 (32.8-39.3)	132	27.9 (22.1-34.6) ^a	241	38.8 (32.8-45.1)	54
322% to <503% FPL	991	611	21.1 (18.5-24.0)	154	30.7 (24.4-37.8) ^a	185	25.7 (21.1-30.9)	41
503% FPL	1003	615	18.1 (15.9-20.4)	142	22.4 (17.7-27.9)	185	22.6 (18.2-27.6)	61
VFCentitled								
VFC-entitled—excluding uninsured	972	735	29.8 (26.7-33.0)	88	19.0 (14.2-24.9) ^a	132	22.4 (17.4-28.3) ^a	NA ^c
VFC-entitled—uninsured only	188	132	5.9 (4.4-7.9)		NA ^c		NA ^c	NA ^c
Not VFC entitled	2856	1796	64.3 (61.0-67.5)	386	72.3 (64.6-78.9) ^a	530	72.9 (66.0-78.8) ^a	144
Mother's education								

Sociodemographic Characteristic	Neither Delayed or Refused			Delayed Only			Refused Only			Both Delayed and Refused		
	Total N	n	Weighted % (95% CI)	n	Weighted % (95% CI)	n	Weighted % (95% CI)	n	Weighted % (95% CI)	n	Weighted % (95% CI)	n
Less than high school/high school graduate	1166	916	44.5 (41.1-48.0)	98	30.7 (23.8-38.5) ^a	135	26.0 (20.7-32.0) ^a	135	26.0 (20.7-32.0) ^a	NA ^c	NA ^c	NA ^c
More than high school/some college	1231	815	25.6 (23.0-28.4)	134	21.6 (16.9-27.1)	229	33.2 (27.4-39.4) ^a	53	27.3 (18.8-37.9)	53	27.3 (18.8-37.9)	53
College graduate	1706	995	29.9 (27.1-32.8)	267	47.7 (40.7-54.9) ^a	339	40.9 (35.3-46.7) ^a	105	59.7 (48.0-70.3) ^a	105	59.7 (48.0-70.3) ^a	105
Mother's marital status												
Married	3087	1982	71.8 (68.7-74.7)	391	77.4 (71.1-82.7)	559	76.6 (69.8-82.2)	155	90.1 (83.0-94.4) ^a	155	90.1 (83.0-94.4) ^a	155
Unmarried	981	722	28.2 (25.3-31.3)	101	22.6 (17.3-28.9)	138	23.4 (17.8-30.2)	20	9.9 (5.6-17.0) ^a	20	9.9 (5.6-17.0) ^a	20
Mother's age (years)												
<45	1928	1315	52.7 (49.4-56.0)	217	49.8 (42.7-57.0)	331	50.5 (44.5-56.6)	65	30.3 (21.1-41.3) ^a	65	30.3 (21.1-41.3) ^a	65
45 years	2175	1411	47.3 (44.0-50.6)	282	50.2 (43.0-57.3)	372	49.5 (43.4-55.5)	110	69.7 (58.7-78.9) ^a	110	69.7 (58.7-78.9) ^a	110
Facility types for adolescent's vaccination providers												
All private facilities	2078	1341	53.0 (49.6-56.3)	267	55.4 (48.1-62.4)	371	53.8 (47.7-59.9)	99	66.3 (55.0-76.0) ^a	99	66.3 (55.0-76.0) ^a	99
All public facilities	701	516	18.8 (16.3-21.6)	69	15.8 (11.2-21.8)	99	14.5 (9.8-20.9)	NA ^c	NA ^c	NA ^c	NA ^c	NA ^c
Other facilities ^d	434	316	11.1 (9.1-13.4)	43	5.3 (3.3-8.6) ^a	60	6.7 (4.6-9.6) ^a	NA ^c	NA ^c	NA ^c	NA ^c	NA ^c
Mixed ^e	879	551	17.2 (15.0-19.5)	120	23.5 (17.6-30.6)	168	25.0 (20.3-30.4) ^a	40	19.4 (12.3-29.3)	40	19.4 (12.3-29.3)	40
Provider recommendation for HPV vaccine												
Yes	2897	1912	70.3 (66.8-73.6)	403	83.6 (78.0-88.0) ^a	459	68.5 (62.8-73.7)	123	66.0 (53.3-76.8)	123	66.0 (53.3-76.8)	123
No	1077	711	29.7 (26.4-33.2)	88	16.4 (12.0-22.0) ^a	230	31.5 (26.3-37.2)	48	34.0 (23.2-46.7)	48	34.0 (23.2-46.7)	48
Intend to receive HPV vaccination within the next 12 months ^f												
Yes	663	366	41.3 (35.5-47.3)	144	61.7 (49.8-72.4) ^a	103	12.5 (9.4-16.4) ^a	50	38.0 (26.3-51.3)	50	38.0 (26.3-51.3)	50
No	1132	468	49.8 (44.0-55.6)	71	35.8 (25.2-48.0) ^a	508	83.5 (78.9-87.2) ^a	85	58.3 (45.0-70.5)	85	58.3 (45.0-70.5)	85
Unsure	116	83	8.9 (6.3-12.5)	NA ^c	NA ^c	NA ^c	NA ^c	NA ^c	NA ^c	NA ^c	NA ^c	NA ^c

Abbreviations: HPV, human papillomavirus; CI, confidence interval; VFC, Vaccines for Children Program; NA, not applicable.

^aStatistically significant difference from referent group (neither delayed or refused HPV vaccination) with $P < .05$.

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- b Estimates with confidence interval widths >20 might not be reliable.
- c Estimate not reported because unweighted sample size for the denominator was <30 or confidence interval half-width/estimate was greater than 0.588.
- d Hospital, school, teen, or sexually transmitted disease clinics, or other facilities.
- e Mixture of private, public, or other facilities.
- f Among unvaccinated girls.

Parental Reasons^a for Delaying or Refusing HPV Vaccination Among Unvaccinated Adolescent Girls, National Immunization Survey–Teen, 2010.

	Delayed Only		Refused Only		Both Delayed and Refused	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
Knowledge or vaccine necessity						
Wonder about the effectiveness of the vaccine	205	46.0 (38.8-53.3)	417	61.6 (55.6-67.2) ^b	117	70.7 (59.2-80.0) ^{b,c}
Lack knowledge about the vaccine	197	44.3 (37.4-51.5)	214	33.7 (27.9-40.1) ^b	69	44.5 (32.8-56.9) ^c
Teen is not sexually active	202	44.1 (36.8-51.7)	400	58.6 (52.3-64.6) ^b	125	71.1 (59.8-80.3) ^{b,c}
Believe that the vaccine is not needed	110	21.0 (16.0-27.1)	455	71.6 (66.3-76.4) ^b	116	73.2 (62.9-81.6) ^{b,c}
Vaccine was not recommended by health care provider	87	17.4 (12.8-23.2)	144	24.4 (18.8-30.9)	48	35.4 (23.9-48.9) ^{b,c}
Safety						
Concerns about lasting health problems	211	48.7 (41.5-55.9)	511	74.1 (68.6-78.9) ^b	125	74.1 (62.7-83.0) ^{b,c}
Heard or read bad things about the vaccine in the news such as on the TV, the radio, in the newspaper, or on the Internet	135	35.1 (28.2-42.7)	351	50.1 (44.1-56.1) ^b	81	45.7 (34.0-57.8) ^c
Feel that there are too many shots	102	21.9 (16.2-29.0)	195	27.3 (22.5-32.7)	71	41.4 (30.4-53.2) ^{b,c}
Have concerns about short-term problems, like fever or discomfort	82	20.6 (14.9-27.8)	132	18.6 (14.6-23.4)	48	36.4 (25.1-49.5) ^{b,c}
Teenager was ill at the time	80	16.3 (11.9-22.0)	22	2.8 (1.6-4.8) ^b	28	20.8 (12.4-32.8)
Access						
Getting the vaccine was not convenient	93	19.8 (14.9-26.0)	49	6.9 (4.5-10.4) ^b		NA ^d
Missed or couldn't get an appointment	47	12.0 (7.2-19.4)		NA ^d		NA ^d
Have concerns about cost	50	11.9 (7.2-19.1)	46	6.2 (4.2-9.1)		NA ^d
Unable to find a health care provider who had the vaccine available	41	9.5 (6.2-14.4)		NA ^d		NA ^d
Have transportation problems		NA ^d		NA ^d		NA ^d
Other	86	18.8 (13.9-24.9)	87	11.1 (8.2-14.8) ^b	40	20.7 (13.3-30.9)

Abbreviations: HPV, human papillomavirus; CI, confidence interval; NA, not applicable.

^aParents were asked, "Please tell me all the reasons why you refused or decided not to get HPV vaccine. Was it because ..." A response was given for each reason. Parents were also asked, "Please tell me all of the reasons why you delayed or put off getting HPV vaccine for [teen]. Was it because ..." A response was given for each reason.

Estimate not reported because unweighted sample size for the denominator was <30 or confidence interval half-width/estimate was greater than 0.588.

Estimates with confidence interval widths >20 might not be reliable.

Statistically significant difference from those that delayed only ($P < .05$).

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