Published in final edited form as:

Vaccine. 2015 January 29; 33(5): 585–587. doi:10.1016/j.vaccine.2014.12.021.

Age at HPV Vaccine Initiation and Completion among US Adolescent Girls: Trend from 2008 to 2012

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Abstract

Objective—To examine the trend of provider-verified HPV vaccine initiation (1 dose) and completion (3 doses) among adolescent girls at the Advisory Committee on Immunization Practices (ACIP) recommended age (11-12 years).

Methods—We analyzed National Immunization Survey of Teens 2008-2012 data and examined the trend of provider-verified HPV vaccine initiation and completion among <13 year old girls.

Results—Data on age at HPV vaccine initiation and completion were available for 24,466 and 15,972 girls, respectively. The weighted proportion of girls who initiated the vaccine at <13 years of age was 14.1%, 24.1%, 35.9%, 47.7% and 55.9% in 2008, 2009, 2010, 2011 and 2012, respectively (p for trend <.001). The similar trend was also observed for mean age at HPV vaccine initiation and completion (p <.001).

Conclusions—Additional efforts are needed to increase HPV vaccine uptake among adolescent girls as only half of them receive this vaccine at ACIP recommended age.

Keywords

Human papillomavirus (HPV); HPV vaccine; age at vaccine initiation; age at vaccine completion; adolescent girls

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Conflict of Interest: None reported.

MR contributed toward the conception and design of the study, drafted and revised the manuscript and approved the final version.

CJM and JMH contributed toward introduction and discussion, revised the manuscript and approved the final version. **ABB** revised the manuscript and approved the final version.

Previous presentation: This study was presented at the 29th International Papillomavirus Conferences and Clinical and Public Health Workshops, Seattle, USA, August 21-25, 2014

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1. Introduction

Different strains of human papillomavirus (HPV) are responsible for 99.7% of cervical cancer cases and many vulvar, vaginal, anal, and oropharyngeal cancers [1]. Both bivalent and quadrivalent vaccines provide protection against HPV types 16 and 18, which are responsible for 70% of cervical cancers, while the latter also protects against HPV 6 and 11, which cause 90% of genital warts [2,3]. As HPV prevalence increases with each year of age between 14-24 years [4], vaccine initiation at a young age is very important. The Advisory Committee on Immunization Practices (ACIP) has recommended that the vaccine be administered at 11-12 years of age before most adolescents become sexually active as the efficacy is highest if given before the onset of sexual activity [5]. However, it is unclear what proportion of US adolescent girls actually receives the vaccine at this age and the trend over time.

2. Methods

The National Immunization Survey-Teen (NIS-Teen) is an annual cross-sectional survey conducted by the Centers for Disease Control and Prevention to obtain vaccination information from parents or household members of 13–17 year old US adolescents using (1) a random-digit-dialed telephone survey and (2) a mailed survey to adolescents' immunization providers identified during the telephone survey. Data collection in 2011-12 included both landline and cellphone interviews whereas only landline interviews had previously been conducted [6]. The overall response rate was 55% to 59% during 2008-2012 [6-10]. In this study, we considered provider-verified adolescent girls' age at initiation (1st dose) and completion (≥ 3 doses) as dependent variables and year of vaccination as the predictor variable. Between 2008 and 2012, information on HPV vaccination was available for 77,062 girls, of whom 51,285 had data verified by their providers. However, provider verified data on age at HPV vaccine initiation (n=24,466) and completion (n=15,972) for adolescent girls were considered as final sample size and used for statistical analysis.

Analyses used STATA 12 svy commands (STATA Corporation, College Station, TX) to incorporate sampling weights designed to adjust for the unequal probabilities of sample selection. Standard errors were estimated using Taylor series linearization. Multiple linear and logistic regression analyses were used to examine linear trends of age at HPV vaccine initiation/completion and the proportion of adolescent girls receiving the vaccine at the ACIP recommended age during a 5 year period (2008-2012), after adjusting for age and race/ethnicity.

3. Results

Data on age at HPV vaccine initiation and completion were available for 24,466 and 15,972 girls, respectively. The proportion of girls who initiated the vaccine at <13 years of age was 14.1% (95% confidence interval, 11.9%–16.5%) in 2008, 24.1% (22.0%–26.3%) in 2009, 35.9% (33.4%–38.5%) in 2010, 47.7% (45.3%–50.1%) in 2011 and 55.9% (53.3%–58.4%) in 2012 (P for trend <.001) (Figure 1). A similar trend was also observed for age at HPV vaccine completion (Figure 2). Over the 5-year period, mean age at HPV vaccine initiation and completion decreased from 14.2 (14.1–14.3) to 12.5 years (12.4–12.6) and from 14.7

(14.6-14.9) to 13.1 (13.0-13.2) (P for trend $<.001$ for both), respectively. By and large, trends did not differ by race/ethnicity.

4. Discussion

We observed a trend between 2008 and 2012 with HPV vaccination increasingly administered to adolescent girls at an age consistent with ACIP recommendations among adolescent girls, irrespective of race/ethnicity. Thus, vaccine uptake in the target age group has been improving over the last few years in the US. However, we observed that almost half of the adolescent girls were 13 years old at HPV vaccine initiation in 2012. A study based on 2011 data reported that 74% of 11-15 year old girls had initiated the HPV vaccine at 11-12 years of age [11]. But the authors used data from 7 US states and, thereby, the findings were not representative of all US population. Moreover, the denominator the authors used was different than that we used in our study (11-15 year vs. 13-17 year old girls).

Several studies observed knowledge, attitude and practice of parents and providers as reasons for the differences in vaccination rates between 11-12 and 13-17 year old girls. For example, Kahn et al [12] observed that parents preferred to vaccinate their older daughters than their younger ones. Providers, on the other hand, also recommended the vaccine more frequently to older adolescents as they experienced higher refusal rates when they had offered it to parents of younger girls [13,14]. As a result, younger girls experienced more missed opportunities for vaccine administration than their older counterparts [14,15]. Thus, parent and provider targeted interventions on the importance of early HPV vaccination are necessary to further increase HPV vaccine uptake at the ACIP recommended age.

Study limitations include a potential bias that may have remained, even after the weighting adjustments, due to the change in data collection from landline to dual landline and cellphones from 2011. However, the pattern of weighted point estimates in each year before and after the change in data collection system and highly significant findings in trend analyses support our overall findings and conclusion.

Acknowledgments

Funding: Dr. McGrath and Dr. Hirth are supported by a research career development award (K12HD052023: Building Interdisciplinary Research Careers in Women's Health Program – BIRCWH, PI: Berenson) from the Office of Research on Women's Health (ORWH), the Office of the Director (OD), the National Institute of Allergy and Infectious Diseases (NIAID), and NICHD at the National Institutes of Health.

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Highlights

- We analyzed National Immunization Survey of Teens 2008-2012 data to examine what proportion of adolescent girls receives HPV vaccine at <13 years of age.
- The weighted proportion of girls who initiated the vaccine at <13 years of age increased from 14.1% in 2008 to 55.9% in 2012.
- Additional efforts are needed to increase HPV vaccine uptake among adolescent girls as only half of them receive this vaccine at ACIP recommended age.

Fig 1.
Trend in the proportion of 13-17 year old US adolescent girls who initiated the HPV vaccine before 13 years of age during 2008-2012. The error bars represent 95% confidence intervals.

Fig 2.

Trend in the proportion of 13-17 year old US adolescent girls who completed the HPV vaccine before 13 years of age during 2008-2012. The error bars represent 95% confidence intervals.