

Rates of human papillomavirus vaccine uptake amongst girls five years after introduction of statewide mandate in Virginia

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BACKGROUND: The Commonwealth of Virginia enacted statewide school-entry human papillomavirus vaccine mandate in 2008 requiring all girls to receive the vaccine before starting the 6th grade. The mandate, one of very few in the country, has been in effect for 5 years. This study assesses the impact that it has had on the rates of human papillomavirus uptake.

OBJECTIVE: The purpose of this study was to evaluate the uptake of the human papillomavirus vaccine among girls seeking well-child care 5 years after the introduction of a statewide mandate in Virginia in October 2008.

STUDY DESIGN: This prospective cohort study used the Clinical Data Repository at the University of Virginia to identify girls 11–12 years old who was seen for well-child care from January to December 2014. Billing and diagnosis codes were used to establish human papillomavirus vaccine administration. Those girls who were identified through the Clinical Data Repository were then contacted by advance letter followed by a representative from the University of Virginia Center for Survey Research who invited the responsible parent or guardian to complete a 50-item telephone questionnaire. Questionnaire results were used to inform objective findings and to assess parental attitudes that were related to human papillomavirus vaccination. Findings were compared against those of Pierce et al (2013), who evaluated human papillomavirus vaccination

levels in a similar cohort of patients in 2008, before mandate enactment, to assess relative change attributable to vaccine mandate.

RESULTS: Nine hundred eight girls were identified through the Clinical Data Repository; 50.9% of the girls received at least 1 dose of human papillomavirus vaccine. White race and private insurance coverage were found to be associated negatively with human papillomavirus vaccine uptake (relative risk, 0.74 and 0.71; 95% confidence interval, 0.64–0.85 and 0.62–0.81, respectively). Black race and public insurance coverage were found to be associated positively with vaccine uptake (relative risk, 1.35 and 1.39; 95% confidence interval, 1.17–1.55 and 1.22–1.58, respectively). In comparison with the previous study, there has been no change in human papillomavirus vaccine uptake or distribution of uptake after the introduction of the statewide mandate for human papillomavirus vaccination.

CONCLUSION: The statewide human papillomavirus vaccine mandate has had no impact on the overall rate of human papillomavirus vaccination, nor has it diminished the previously described racial or payer disparities in vaccine uptake in school-aged girls being seen for well-child care in the state of Virginia.

Key words: cervical cancer, HPV, human papillomavirus, mandate, school-entry mandate, vaccination, vaccine, Virginia

In April 2007, Virginia became the first state to enact a law mandating human papillomavirus (HPV) vaccination of girls before entry into the 6th grade. The mandate became effective in October 2008; however, given the timing of when the mandate went into effect, it did not change school admission requirements until the 2009 school year. It allowed for parental opt-out on philosophic, medical, and/or religious grounds after a review of prepared materials. In the time since enactment of

the mandate in Virginia, 42 states and territories have considered legislation regarding the administration, education, and/or funding related to HPV vaccination. At present, Virginia, Rhode Island, and the District of Columbia mandate HPV vaccination.¹

The Food and Drug Administration approved the first HPV vaccine in 2006; despite nearly a decade of availability, vaccination rates for HPV lag behind those of other childhood vaccinations. Data from the 2014 National Immunization Survey—Teen demonstrate that 60% of female adolescents aged 13–17 years have received 1 dose of the vaccine; only 39.7% of them have completed the series nationally.² Although this represents an increased rate of uptake since initial licensure, it falls short of the *Healthy People 2020* goal of 80%.³

School-entry vaccination mandates, in general, have proved beneficial at

increasing vaccine uptake by eliminating disparities among those vaccinated with regard to socioeconomic status, race, ethnicity, and insurance coverage.⁴ However, unlike many other childhood vaccinations, HPV vaccination has been the subject of much criticism and debate. Much of the discussion has focused on the potential barriers to vaccination, whether from the standpoint of both patients and providers or because of the legally allowed exemptions to vaccination in locales that require its administration.⁵

Premandate data were collected in Virginia in 2008 that demonstrated that the rate of HPV vaccine uptake among girls aged 11–12 years who sought well-child care within a large university system was significantly greater among non-white girls than white girls. Furthermore, girls with private insurance were significantly less likely to have

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been vaccinated than girls with public insurance, regardless of race.⁶

Using the same protocol as the 2008 study, this study sought to evaluate the effect that the statewide vaccination mandate has had on vaccine uptake 5 years after enactment. Additionally, a telephone survey of responsible adults who accompanied dependents for well-child care over the study period was used to assess parental attitudes regarding vaccination. This potentially could be used to help explain objective findings that are related to vaccine uptake or refusal.

Materials and Methods

The protocol for this prospective cohort study has been described previously.⁶ The University of Virginia Clinical Data Repository was searched at 3-month intervals, capturing all girls aged 11-12 years who sought well-child care from January through December 2014. Visits occurred at University of Virginia—supported Family Medicine and Pediatrics practices, which encompass urban, rural, and suburban practice settings. The primary endpoint was receipt of ≥ 1 dose of HPV vaccine ascertained from abstracted billing data. Final collection of HPV vaccine uptake and number of injections for identified girls was collected 6 months after the last-identified well-child visit. Additional collected demographic variables included age, race, and insurance status. Additionally, vaccination status for meningococcal, tetanus/diphtheria/pertussis, and varicella immunizations was collected for each identified child.

After collection of described objective data, an advance letter was sent to the parents and/or guardians of identified girls, because all were considered eligible. This letter informed them about and invited them to participate in a forthcoming telephone questionnaire about a recent well-child visit. Parents and/or guardians were then contacted by telephone within 1 week of the mailing. Questionnaires were completed by telephone by trained interviewers through the University of Virginia Center for Survey Research.

Conversion calling techniques were used to increase response rate per protocol at the Center for Survey Research. The questionnaire contained 50 items and took approximately 10 minutes to complete. Telephone consent was obtained. Included in the questionnaire were previously validated questions on HPV vaccination attitudes and behaviors that had been designed with the use of constructs from the Health Belief Model.⁷ Furthermore, additional questions addressed the status of other childhood vaccinations, relationship and trust with provider, and usual health information sources. Finally, the questionnaire assessed knowledge of HPV and HPV vaccination with the use of previously studied questions on the subject. The questionnaire was piloted in 2009 on a subset of parents whose data were not included in the final data analysis.

Data analysis included frequency of distribution of race, insurance status, and vaccination status in the original population identified by the Clinical Data Repository and in the cohort that participated in telephone questionnaire with the use of SPSS software (version 22; SPSS, Inc, Chicago, IL) and SAS software (version 9.4; SAS Institute Inc, Cary, NC). Primary outcome of ≥ 1 dose of HPV vaccination was converted to a binary variable. Chi-squared test was used for categorical variables with a probability value of $<.05$ considered to be statistically significant. Relative risk and 95% confidence intervals were calculated for all cohort data in 2×2 tables. Likert scales that were used in the questionnaire to assess vaccination attitudes were dichotomized to agree or disagree with the attitude. Demographic, knowledge, and attitude data from the telephone questionnaire were used in multivariable logistic regression. All factors that were associated significantly with HPV vaccine uptake or refusal ($P < .1$) were retained in the model. The final model was fit with backwards stepwise elimination of nonsignificant variables. Sensitivity analysis was conducted to verify the relationship between the variable and the outcome of HPV vaccine uptake.

After completion of primary data analysis as described, the 2014 cohort was compared with the 2009 cohort to determine effect of statewide vaccine mandate on rates of vaccination. Proportion vaccinated was calculated according to race and insurance status for both 2009 and 2014 cohorts. Proportions for each then were compared, and the probability values were calculated; a probability of $<.05$ was considered significant.

Results

During the study period of January 2014 to December 2014, 908 total patients were identified who met criteria. Comparing demographic data, the postmandate patients in the current study were similar to the premandate patients from 2009. All patients were female and 11-12 years old. Six hundred seventy-seven patients (74.6%) identified as non-Hispanic white; 146 patients (16.1%) identified as African American, and 84 patients (9.3%) identified as any other race or ethnicity. Distribution of race and insurance coverage did not show significant variance (Table 1).

Four hundred forty-two patients (48.7%) received at least 1 HPV vaccination in the series. The potential for a patient to receive at least 1 HPV vaccine in the series was dependent on race and insurance status (Table 2). When compared by race/ethnicity, white girls were approximately 25% less likely to initiate vaccination (relative risk, 0.74; 95% confidence interval, 0.64–0.85); African American girls were 35% more likely to initiate vaccination (relative risk, 1.35; 95% confidence interval, 1.17–1.55). When compared by insurance status, those with private insurance were almost 30% less likely to initiate vaccination (relative risk, 0.71; 95% confidence interval, 0.62–0.81); those with public insurance were almost 40% more likely to initiate vaccination (relative risk, 1.39; 95% confidence interval, 1.22–1.58).

When we compared the 2009 premandate vaccination rates to those of the 2014 postmandate year, there is no significant change in the rates of any

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