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Original article

Human Papillomavirus Vaccine Initiation in an Area with Elevated Rates of Cervical Cancer

Sami L. Gottlieb, M.D., M.S.P.H.[a,*], Noel T. Brewer, Ph.D.[b], Maya R. Sternberg, Ph.D.[a], Jennifer S. Smith, Ph.D.[b], Karen Ziarnowski, M.P.H.[b], Nicole Liddon, Ph.D.[a], and Lauri E. Markowitz, M.D.[a]

[a]*Division of STD Prevention, Centers for Disease Control and Prevention, Atlanta, Georgia*
[b]*UNC Gillings School of Global Public Health, University of North Carolina, Chapel Hill, North Carolina*

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Abstract

Purpose: We assessed human papillomavirus (HPV) vaccination of adolescent girls living in communities with elevated cervical cancer rates.

Methods: During July to October 2007, we conducted interviews with a probability sample of parents (or guardians) of 10- to 18-year-old girls in five North Carolina counties with cervical cancer rates substantially higher than the national average. Estimates are weighted.

Results: We interviewed 889 (73%) of 1220 eligible parents; 38% were black. Overall, 10.3% (95% confidence interval [CI] 7.7%–13.5%) of daughters had received at least 1 dose of HPV vaccine. Only 6.4% of 10- to 12-year-olds had initiated vaccination, versus 17.5% of 16- to 18-year-olds (odds ratio [OR] 3.1, 95% CI 1.4–6.9). Older age of daughters and doctor's recommendation were the only factors independently associated with vaccine initiation. Main reasons reported for not initiating HPV vaccine were: needing more information (22%) or never having heard of the vaccine (14%), believing daughter is too young (16%) or not yet sexually active (13%), and not having gone to the doctor yet (13%). Only 0.5% of parents cited concern about HPV vaccine making a teenage girl more likely to have sex as a main reason for not vaccinating. Of 780 parents with unvaccinated daughters, 62% reported their daughters ''probably'' or ''definitely'' will, and 10% reported their daughters ''definitely won't'' get HPV vaccine in the next year.

Conclusions: Approximately 1 year after its introduction, HPV vaccine had been initiated by only 10% of adolescent girls in an area with elevated cervical cancer rates; however, most parents intended for their daughters to be vaccinated. Additional efforts are needed to ensure that parents' intentions to vaccinate are realized. Published by Elsevier Inc. on behalf of Society for Adolescent Medicine.

Keywords: Human papillomavirus; HPV vaccines; Immunization; Adolescent

The quadrivalent human papillomavirus (HPV) vaccine was licensed by the U.S. Food and Drug Administration in June 2006. Soon thereafter, the Advisory Committee on Immunization Practices (ACIP) recommended routine HPV vaccination for 11- and 12-year-old girls and ''catch-up'' vaccination for 13- through 26-year-olds who have not previously received it [1,2]. HPV vaccine holds great promise for reducing the burden of cervical cancer and other HPV-related disease where its uptake is high. This will be especially important in communities with the highest cervical cancer rates, which often include large racial and ethnic minority populations [3,4].

Little is known about HPV vaccine uptake in communities with elevated cervical cancer rates. Because these communities are often medically underserved, there is concern that adolescents with the greatest need for HPV vaccine may be least likely to receive it. The objective of this study was to assess HPV vaccine uptake by adolescent girls, their parents' intentions for them to be vaccinated, and potential barriers to their vaccination in an area with elevated cervical cancer rates.

*Address correspondence to: Sami L. Gottlieb, M.D., M.S.P.H., Division of STD Prevention, Centers for Disease Control and Prevention, 1600 Clifton Road NE, MS E-02, Atlanta, GA 30333.

E-mail address: sgottlieb@cdc.gov

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Methods

We conducted a telephone survey of caregivers (parents or guardians) of 10- to 18- year-old girls in five North Carolina counties. To select these counties, we identified 11 North Carolina counties that met predefined inclusion criteria of: (a) annual cervical cancer incidence rates greater than 10 cases/100,000 women, 1993 to 2003, and mortality rates greater than 4 deaths/100,000 women, 1994 to 2004; (b) at least 20% African American residents; and (c) at least 1500 girls in the targeted age range. We further narrowed the list to nine eligible counties geographically clustered in southeastern North Carolina. We included the only urban county in the region: Cumberland (population 302,963), and randomly selected four rural counties: Duplin, Harnett, Sampson, and Wayne (combined population 336,481). Annual cervical cancer incidence rates in these counties ranged from 10.2 to 13.9 cases/100,000 women and mortality rates ranged from 4.2 to 6.5 deaths/100,000 women (personal communication, North Carolina State Center for Health Statistics, 2006), substantially higher than annual U.S. rates in a similar time frame (incidence, 8.6 cases/100,000; mortality, 2.9 deaths/100,000) [5].

The survey was conducted July to October 2007, approximately 1 year after HPV vaccine was licensed and first recommended [1], 5 months after final ACIP recommendations were published [2], and 6 months after HPV vaccine became available through the Universal Children's Vaccine Distribution Program (UCVDP). UCVDP is North Carolina's program to distribute vaccines through the federally funded Vaccines for Children (VFC) program, which provides vaccines at no cost primarily to uninsured and Medicaid-eligible children and adolescents [6]. Although North Carolina also uses state funds to supplement the VFC entitlement to provide vaccines for all underinsured, non-VFC-eligible children, state funds were not available for HPV vaccine in 2007.

Trained interviewers contacted a stratified probability sample of county households with telephone access, using a dual-frame approach. Five percent of the sample was selected using a list-assisted random digit dialing frame, and 95% was chosen from a nonoverlapping targeted-list frame consisting of directory-listed residential telephone numbers with available recent demographic information. Samples were stratified at the telephone exchange level by concentration of African American residents and rural versus urban status (based on U.S. Census 2000 block-level classification) [7]. We oversampled households likely to include a 10- to 18-year-old girl and those in predominantly African American and rural areas. To be eligible for the study, telephone numbers needed to reach study county residential households that included a female child aged 10 to 18 years. If a household had more than one female child aged 10 to 18, we randomly selected one index child for questions. We attempted to interview the child's female caregiver but interviewed the male caregiver if she was not available. For the sake of simplicity, hereafter we refer to caregivers as ''parents'' and index children as ''daughters.'' All respondents gave verbal consent for the study. The institutional review board at the University of North Carolina approved the study protocol.

Interviews contained questions on HPV vaccine uptake, main reasons for not vaccinating, and intentions to vaccinate daughters (survey instrument available on request). Vaccine initiation was determined by the question: ''Has [daughter] had any shots of the HPV vaccine?'' If a daughter had not been vaccinated, the interviewer asked the open-ended question, ''What is the *main* reason she has not gotten any HPV shots?'' Respondents were encouraged to give just one reason, but all reasons were recorded. Parents were also asked: ''How likely are you to get [daughter] the HPV vaccine in the next year?'' Response options were ''definitely won't,'' ''probably won't,'' ''probably will,'' and ''definitely will.'' We collected additional information including demographics, healthcare provider recommendations, where HPV vaccine was received and costs of vaccination. Race/ethnicity was defined as white (non-Hispanic), black or African American (non-Hispanic), Hispanic, or ''other.'' Hispanics and ''other'' race/ethnicities were evaluated separately for HPV vaccine initiation, but were combined to evaluate the multilevel variable for intentions to vaccinate, because of small numbers.

All prevalence estimates were weighted to incorporate the sampling design of the survey. Confidence intervals (CIs) for prevalence estimates were calculated using a logit transformation, and variance estimates were calculated using a Taylor series linearization. Summary p-values for bivariate associations were calculated using a Wald F test for independence. Odds ratios (ORs) with 95% CIs were calculated by logistic regression.

A multivariate logistic regression model was developed to examine independent associations with HPV vaccine initiation, using a backward elimination process. Variables associated with vaccine initiation with a p-value less than or equal to 0.20 in bivariate analysis were considered for the initial model. At each step, the variable with the largest Wald F p-value was removed from the model. Possible confounding was assessed by confirming that no beta coefficients of statistically significant variables in the previous step changed by more than 25%. This process was repeated until all remaining variables had a Wald F p-value less than or equal to 0.05. Last, all pairwise interactions were explored among remaining variables. Statistical analyses were performed using SAS-callable SUDAAN (Research Triangle Institute, Research Triangle Park, NC).

Results

Among 3259 households contacted, 89% were screened for eligibility [8]. We identified 1220 eligible parents, and 73% (889) agreed to participate and completed the interview. This sample represented parents with a mean age of 41 years (interquartile range [IQR] 36–45 years); 38% reported their