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Racial/ethnic disparities in HPV vaccine uptake among a sample of college women

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Abstract

Objective—To determine the association between racial/ethnic status and uptake and completion of the HPV vaccine series in college women.

Methods—Participants were recruited from a large University in North Central Florida. Young women between 18 and 26 years of age who were currently enrolled in a college course comprised the study sample. Participants completed an anonymous online survey that assessed sociodemographic characteristics, sexual behaviors, gynecological healthcare utilization and perception of risk to HPV-associated diseases. Multivariable analysis was conducted to determine the relationship between racial/ethnic status and HPV vaccination status.

Results—Of the 835 with complete data (51.0% white, 16.5% black, 13.8% Hispanic, 8.3% Asian and 9.9% other), 53% had initiated (receipt of at least one dose) the three dose HPV vaccine series. Of those who initiated, 70% indicated that they had completed all three doses. In adjusted analysis, blacks were significantly less likely to report initiation [adjusted prevalence ratio (aPR) = 0.78; 95% confidence interval (CI), 0.63, 0.97] and completion (aPR= 0.64; 95% CI: 0.48, 0.84) of the three dose HPV vaccine as compared to whites. Although completion rates were lower in all other racial/ethnic groups as compared to whites, these rates did not reach statistical significance.

Conclusions—These findings are consistent with research from other types of settings and demonstrate lower initiation and completion rates of HPV vaccine among black women attending college as compared to their white counterparts. Additional research is needed to understand why black college women have low initiation and completion rates.

Keywords

Human papillomavirus; HPV vaccine; Vaccination; College women; Racial/ethnic disparities

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Conflict of Interest

Chukwuemeka Okafor, Xingdi Hu, and Robert L Cook declare that they have no conflict of interest.

Informed Consent

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5). Informed consent was obtained from all participants for being included in the study.

Animal Studies

No animal studies were carried out by the authors for this article.

Introduction

Human Papillomavirus (HPV) is the most prevalent sexually transmitted infection in the United States [1]. Persistent infection with high-risk HPV sub-types 16 and 18 is associated with 99.7% of all cervical cancers [2]. Two HPV vaccines – the quadravalent HPV-4 (Gardasil, Merck, Whitehouse Station, NJ) [3], and the bivalent HPV-2 (Cervarix, GlaxoSmithKline, Philadelphia, PA) vaccine [4] are currently recommended by the Advisory Committee on Immunization Practices (ACIP)[5]. Current guidelines by the ACIP recommend routine vaccination of females aged 11 to 12 years and catch-up vaccination for females aged 13 – 26 years old [5]. Both HPV vaccines administered as a 3 dose series have demonstrated between 70 to 95% efficacy in reducing the rate of HPV-associated diseases [3,4]. Despite the vaccine's benefits, rates of vaccine uptake among eligible women in the United States have been low to moderate. Rates of receipt of 1, 2, and 3, doses of the vaccine among adolescent girls aged 13 to 17 years were approximately 54%, 43% and 33% respectively in 2012 [6]. Whereas, among females aged 18 – 26 years initiation rates (receipt of 1 dose) range from 43% to 45% [8–10], while completion rates (receipt of 3 doses) among those who start the series range from 13% to 58% [11–13].

Racial/ethnic minorities are disproportionately affected by the burden of HPV-associated cervical cancer incidence and mortality [14], yet racial/ethnic disparities in uptake of the HPV vaccine continue to be reported. In studies of non-college women, some studies show black and Hispanic adolescent women have similar or even higher rates of initiating HPV vaccination than their white counterparts; however, nearly all studies show that black women are less likely to complete the series as compared to white women [12,15–19]. Several factors have been associated with HPV vaccine uptake and could help explain any racial/ethnic disparities. These include individual factors such as sociodemographic characteristics, cost or lack of health insurance, provider recommendation, negative attitudes toward vaccination (e.g. concerns about side effects), lack of knowledge about HPV infection, and a woman's perceived risk for HPV infection (e.g. a family or friends experience with a HPV-associated disease) [7,12,20–24]. Also, women who seek sexual health services such as Pap tests or prescription contraception (e.g. hormonal contraception) may be more proactive to their sexual health, engage in regular contact with healthcare services and therefore, more likely to be made aware of and receive HPV vaccination. Additionally, parental concerns that HPV vaccination may give young women a false sense of security and license for increased sexual activity may also influence HPV vaccination rates[7].

Female college students have increased knowledge of HPV infection and vaccination as compared to a community sample of similar age [25] along with access to a college's health care center that provides HPV vaccination. Whether racial/ethnic disparity in HPV vaccination persists in a sample of female college students has not been thoroughly described. As college women are exposed to known risk factors for HPV infection including early initiation of sexual activity and multiple sexual partners [20,26], it is therefore important to continuously monitor the progress of HPV vaccine coverage and to delineate factors influencing vaccination. Therefore, the purpose of this analysis was to: 1) determine

the rates of initiation and completion of the three-dose HPV vaccine series among a sample of college women, and 2) determine the association of racial/ethnic status with vaccine initiation and completion.

Methods

Participant Recruitment

As part of a larger study related to oral HPV infection, participants for this study include a convenience sample of young women recruited from the campus of the University of Florida, a large United States southeastern university. From April 2011 to September 2011, women were recruited within and around the university Student Health Care Center (SHCC). The sample included women seeking care at the center, as well as those just passing by, referred by friends, or responding to brochures or online advertisements about the study. Women were eligible to participate if they were at least 18 years of age and currently enrolled in a college course. Among women who inquired about the study and declined to participate, the primary reason for non-participation was lack of time. The study was approved by the Institutional Review Boards at the University of Florida and the Moffitt Cancer Research Center. All participants provided written informed consent and received a \$20 incentive.

Data Collection Procedure

Participants completed an anonymous 10 – 15 minute web-based survey in a private room. Survey responses were entered directly by participants using a netbook computer.

Measures

The primary outcome measure ‘HPV vaccination status’ was assessed with the following question: ‘How many HPV vaccine shots have you received in your lifetime (Cervarix or Gardasil)? (0, 1, 2, or 3). In this analysis we defined HPV vaccine initiation as receipt of any (n = 1) HPV vaccine dose and vaccine completion as receipt of all three doses. Participants who reported ‘0’ number of shots to the vaccine question were defined as unvaccinated. Participants with missing data or who answered ‘don’t know’ to the HPV vaccination question (n = 68) were excluded from the analysis yielding a final study sample of 835 college women aged 18 – 26 years. There were no significant differences in the distribution of the sociodemographic variables, and all other covariates between those included in the final analytic sample and those that were excluded (data not shown).

Participant’s sociodemographic characteristics, sexual behavior, gynecological health care utilization and perceptions of risk for HPV-associated diseases were assessed for their association with HPV vaccination and for possible inclusion in multivariable analysis. A single question was used to ask participants to describe their racial/ethnic status. We categorized racial/ethnic status as white, black, Hispanic, Asian, and other. Age was dichotomized to 18 – 20 versus 21 – 26 years. Participants’ relationship status was categorized as single; in a relationship; and other.

Sexual behavior was measured as number of vaginal sex partners in the past year, which was an ordinal variable categorized as none; 1 – 2; or 3+ partners. We included to variables to assess gynecological health care utilization. Participants were asked whether they had ever received a Pap test, dichotomized as yes versus no and to indicate through a check list which contraceptive methods they had used in the past year. Hormonal contraception which must be prescribed by a healthcare provider was dichotomized as yes versus no. The survey included items related to perceptions of risk of HPV-associated diseases in which participants were asked whether they ever had a physician or health care provider diagnosis of an abnormal Pap smear/colposcopy/biopsy, genital warts or genital HPV and whether they had a family history of head and/ or neck cancer.

Data Analysis

We compared sociodemographic characteristics, sexual behaviors, gynecological health care utilization and perceived risk of HPV infection by racial/ethnic status using Chi-square or Fishers exact test. Similar methods were used to determine bivariate associations of factors associated with HPV vaccination. Covariates with p-values at or below 0.2 were included in a multivariable analysis. We used log-binomial regression models to calculate crude and adjusted prevalence ratios with 95% confidence intervals[27]. All data analyses were conducted using SAS version 9.3 (Cary, NC).

Results

Sample characteristics

The final study sample included 835 college women aged 18–26 years. Approximately half of the female college students in this sample self-identified as white (51%), followed by black (16.5%), Hispanic (13.8%), Asian (8.3%) and other (9.9%). Table 1 displays the sociodemographic, sexual behavior, gynecological health care utilization and perceptions of risk of HPV-associated disease by racial/ethnic status. The results show that there were several significant differences across racial/ethnic groups for several variables related to sociodemographic characteristics, sexual behavior, and gynecological health care utilization (Table 1).

HPV vaccine coverage

Table 2 displays the HPV vaccination status of the study sample by racial/ethnic groups. Overall, fifty-three percent of the study participants had initiated the vaccine (receipt of at least 1 dose), of these, 70% had received all three doses. The rates of initiating the HPV vaccine were similar between whites and Hispanics (57% and 57% respectively) and higher than all other racial groups (blacks: 42%, Asians: 51% other: 47%). Whites had the highest completion rate, whereas blacks had the lowest (whites: 78%, blacks: 45%, Hispanics: 66%, Asians: 65% other: 69%).

HPV vaccine initiation

Table 2 shows results from the unadjusted and adjusted prevalence ratios of HPV vaccine initiation. After adjusting for age and hormonal contraception use in the past year, the prevalence of HPV vaccine initiation was significantly lower among blacks (aPR = 0.80,

95% CI = 0.65, 0.99; Table 2) than whites. Asides from Hispanics, who had similar prevalence rates as compared to whites (aPR = 1.00, 95% CI = 0.85, 1.18), the prevalence for vaccine initiation among all other racial/ethnic groups were lower than their white counterparts, although these associations were not statistically significant.

HPV vaccine completion

In unadjusted analysis, blacks had significantly lower rates of HPV vaccine completion (aPR = 0.58, 95% CI = 0.43, 0.77) than whites. All other racial/ethnic groups also had lower rates of completion than white women but not statistically significant. In adjusted analyses that controlled for hormonal contraception use in the past year the prevalence of HPV vaccine completion remained significantly lower for blacks (aPR = 0.64, 95% CI = 0.48, 0.84) than whites. All other racial/ethnic groups had lower but non-significant HPV vaccine completion rates as compared to white women.

Discussion

The findings from this analysis indicate that female college students in this sample had modest rates of HPV vaccine initiation (53%), whereas, among those who initiated, completion rate was relatively high (70%). The rates reported in this study are slightly higher than those reported in previous studies of women aged 18 – 26 years old which have ranged from 25% to 50% for initiation [8,22,28–31] and 2% to 53% for completion [8,15,25,31,32], with one study reporting a completion rate of 70% [25].

In our multivariable models, we found younger aged college women to report significantly higher prevalence of initiating HPV vaccination. This likely reflects increased healthcare provider recommendation for HPV vaccine as well as the eligibility of this age group for the Vaccine for Children program (VFC), which provides free vaccines for children and adolescents through 18 years of age who are uninsured. Our finding that past year hormonal contraception use to be predictive of HPV vaccine initiation. This finding is not surprising, as women who seek sexual health promotion services may be more concerned about their sexual health and more likely to seek other sexual health preventive services including HPV vaccination. In this analysis, black women had significantly lower prevalence rates of initiating and completing the HPV vaccine, while no other racial/ethnic group had initiation or completion rates that were significantly different from whites. We are aware of only one study that has investigated racial/ethnic differences in HPV vaccine uptake in college women. Bednarczyk et al found that black women were 33% less likely to have initiated the HPV vaccination as compared to white women, however data for completion rate among racial/ethnic group was not reported[33]. Of note in the present analysis is the relatively higher number of single relationship status and lower number of past year vaginal sex partners among black women than other racial/ethnic groups. Therefore, it is possible that black women in this study may have perceived themselves to be at lower risk for an HPV infection and not likely to benefit from receiving the HPV vaccine. Additionally, black women in this analysis reported lower rates of past year hormonal contraception use and Pap tests as compared to most racial/ethnic groups. It is also possible that the black women in this sample may have been less proactive to sexual health, less inclined to seek sexual health

preventive services and thus have missed opportunities to be made aware of and receive HPV vaccine.

The findings from this analysis should be interpreted cautiously. Firstly, this was a cross-sectional analysis and therefore we are unable to make any inferences about causality. Secondly, for our primary outcome measure, we relied on self-reported HPV vaccination status, and there is a potential for some reporting bias in our estimates for HPV vaccination uptake. In one study, adolescent girls aged 14 – 17 years were more likely to underestimate than to overestimate their HPV vaccine uptake [34] and therefore there is a possibility that the actual HPV vaccination rate may be higher. Also, we did not account for other important factors including socioeconomic status and cultural health beliefs about HPV vaccination which could have influenced the propensity to get vaccinated. Thirdly, since our study was from a single university, our results may not be generalizable to all college students.

Despite these limitations, our analyses provide a five- year update on rates of initiation and completion of the HPV vaccine in a sample of college women. Our findings suggest that racial/ethnic disparity in HPV vaccination persists even among female college students, specifically in black women. Although the completion rates are encouraging, our analysis suggest that more targeted intervention for HPV vaccination may be needed among minority women.

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Sociodemographic characteristics, sexual behaviors, sexual health care utilization and perceptions of risk, by racial/ethnic status

Table 1

Variable	White (n=425) (%)	Black (n=138) (%)	Hispanic (n=119) (%)	Asian (n=69) (%)	Other ^a (n=83) (%)	p Value
Total	51.0	16.5	13.8	8.3	9.9	
Age						
18 – 20	47.5	61.6	52.1	56.5	59.0	.032
21 – 26	52.5	38.4	47.9	43.5	41.0	
Relationship Status						
Single	43.3	72.5	47.9	60.9	43.4	<.001
In a relationship	10.1	24.6	39.5	37.7	54.2	
Other ^b	46.6	2.9	12.6	1.5	2.4	
Vaginal Sex Partners – Past Year						
None in the past year	23.9	45.6	19.5	45.5	27.2	<.001
1 – 2	59.8	40.4	61.0	43.9	61.7	
3+	16.3	14.0	19.5	10.6	11.1	
Ever had a Pap Test						
Yes	62.4	38.4	49.6	28.4	53.0	<.001
No	37.7	61.6	50.4	71.6	47.0	
Hormonal Contraception – Past Year						
Yes	64.5	21.0	57.1	30.4	56.6	<.001
No	35.5	79.0	42.9	69.6	43.4	
F/H of Head/Neck Cancer ^c						
Yes	6.4	3.3	3.9	13.5	4.5	.089
No	93.6	96.7	96.1	86.5	95.5	
History of HPV-associated Disease ^d						
Yes	6.4	6.7	5.9	4.6	3.7	.873
No	93.6	93.3	94.1	95.4	96.3	

^aIncludes American Indian/Alaskan Native, and Hawaiian/Pacific Islander

^bIncludes cohabiting or living together and married

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Family History of Head and Neck Cancer

Includes abnormal Pap test, colposcopy, or genital warts

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Table 2
Unadjusted and adjusted prevalence ratios of HPV vaccine initiation and completion

Variables	Initiated (1 to 3 Doses) ^a			Completed (3 Doses) ^b		
	Vaccine Initiation (%)	PR (95% CI)	aPR (95% CI)	Vaccine Completion (%)	PR (95% CI)	aPR (95% CI)
Total	53.3			70.1		
Age						
18 – 20	59.8	1.30 (1.14, 1.48)***	1.34 (1.18, 1.52)***	68.7	0.95 (0.84, 1.08)	-
21 – 26	46.1	Ref	Ref	72.1	Ref	
Racial/Ethnic						
White	57.7	Ref	Ref	77.8	Ref	Ref
Black	42.0	0.73 (0.59, 0.90)**	0.78 (0.63, 0.97)*	44.8	0.58 (0.43, 0.77)***	0.64 (0.48, 0.84)***
Hispanic	57.1	0.99 (0.83, 1.18)	1.00 (0.85, 1.18)	66.2	0.85 (0.71, 1.02)	0.86 (0.71, 1.03)
Asian	50.7	0.88 (0.69, 1.13)	0.96 (0.76, 1.20)	65.7	0.84 (0.66, 1.08)	0.87 (0.67, 1.13)
Other	47.0	0.82 (0.64, 1.04)	0.79 (0.63, 1.00)	69.2	0.88 (0.71, 1.11)	0.93 (0.75, 1.15)
Hormonal Contraception – Past Year						
No	44.6	Ref	Ref	63.6	Ref	Ref
Yes	61.1	1.37 (1.20, 1.57)***	1.33 (1.14, 1.54)***	74.4	1.17 (1.02, 1.33)*	1.24 (0.91, 1.70)

* p<.05,

** p< .01,

*** p< .001

^a Initiation rate defined as the percentage of college women with 1 dose of the HPV vaccine, among the study sample

^b Completion rate defined as the percentage of college women with 3-dose of the HPV vaccine, among those who had 1 HPV vaccine dose