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HPV vaccine awareness and knowledge among women living with HIV

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Introduction

Women living with HIV (WLH) bear a disproportionate burden of oncogenic human papillomavirus (HPV) infection (1, 2). Given the causal role of oncogenic HPV infection in cancer development, WLH also bear an unequal burden of cervical cancer (3–5). The advent of HPV vaccines and subsequent recommendation for use among WLH present an opportunity to lessen the burden of cervical disease among a population disproportionately affected. In 2014, the Advisory Committee on Immunization Practices (ACIP) recommended routine HPV vaccination for WLH through age 26 (6). Ideally, the HPV vaccine should be given prior to sexual initiation (6). However, emerging evidence suggests that WLH have a low prevalence (5–12%) of the two HPV types (i.e., HPV16, HPV18) associated with 70% of cervical cancers (7). Consequently, similar to the general population, HPV vaccination has the potential to substantially reduce cervical cancer incidence and mortality among WLH. Identifying opportunities to promote HPV vaccination is central to realizing and maximizing the public health potential of HPV vaccination. A first step in realizing this potential involves increasing awareness and knowledge of HPV vaccines among at-risk populations such as, WLH.

Research assessing HPV vaccine awareness and knowledge among WLH is limited. Extrapolating from other populations, deficits in HPV vaccine awareness and knowledge among at-risk women exist (8). Unfortunately HPV vaccine uptake has been lowest among

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Dr. Heather M. Brandt is a member of the United States HPV Advisory Board of Merck.

the populations at greatest risk (e.g., lower socioeconomic status). These deficits undoubtedly play a role in the suboptimal HPV vaccination rate among adult women. In 2013, 36.9% of adult women received at least one dose of the HPV vaccine (9). Population-based surveys such as the Health Information National Trends Survey (HINTS) have assessed HPV vaccine awareness in the general population as well as patient-provider communication about the HPV vaccine among adults with vaccine-age eligible immediate family members (10). These data illustrate an immediate need to address barriers to vaccine uptake especially among populations who bear the burden of cervical cancer. Thus, the purpose of this study was to examine HPV vaccine awareness and HPV knowledge among WLH. Such an assessment will provide critical information in directing a way forward to increase awareness and knowledge of HPV vaccines and begin to bridge the gap in HPV-associated outcomes.

Methods

Participants

WLH (n=145) were recruited from clinical and community-based recruitment sites located in the southeastern United States between March 2011 and April 2012. Study recruitment sites included two Ryan White-funded clinics, where we recruited 70.3% (102/145) of our sample, and two community-based AIDS-service organizations (ASO) where we recruited an additional 43 WLH. Community-based ASO recruitment sites were included to increase representation of WLH who may be less engaged with the health care system. Eligibility criteria included being female, diagnosed HIV-positive, and at least 18 years old. No other inclusion or exclusion criteria were used. The study was briefly described to 168 WLH. WLH who were interested in learning more about the study were referred to research staff who explained the study in more detail. Written consent was obtained from 145 WLH who agreed to participate in the study. Our response rate was 86.3% (145/168). This cross-sectional study was approved by the University of South Carolina's institutional review board and has been previously described (11–12).

Key Measures

HPV and HPV vaccine awareness was assessed by asking the following two questions: (1) *Have you ever heard of HPV?*, and (2) *Have you ever heard of the HPV shot or cervical cancer vaccine?* The response options for both of these questions were yes or no. We also assessed HPV knowledge by asking, *HPV can cause cervical cancer*. True responses were coded as correct and false/don't know responses were coded as incorrect. We assessed health literacy with the question, "How often do you need to have someone to help you understand information you get from your doctor, nurse, or other health care provider?" A 5-point Likert scale was used. Responses were recoded and participants were categorized as either having high (never/rarely needing help) or low (sometimes/often/always needing help) health literacy. Covariates included: age (<50 or ≥50 years); race/ethnicity (non-Hispanic black or other); education (high school or some college+); income (<\$10K or ≥\$10K+); children in household (none or 1+).

Statistical Analysis

Our focal relationship was the association between HPV vaccine awareness (dependent variable) and HPV knowledge (main independent variable). Chi-square tests and simple logistic regression analyses were performed to examine the bivariate association between HPV vaccine awareness and HPV knowledge. We modeled HPV vaccine awareness=yes. For our multivariate logistic regression analyses, covariates were added to the model in a forward stepwise fashion. Variables were considered a potential confounder if the odds ratio of our main independent variable (i.e., HPV knowledge) was increased or decreased by more than 10% when they were added to the model. A Hosmer-Lemeshow test was performed to assess the goodness-of-fit of the full model. All statistical analyses were performed using Stata/IC 13.

Results

Sample Description

Only 66% of the WLH (n=127) in this study had heard of HPV, and even fewer (38%) had heard of the HPV vaccine. Half (50%) knew that HPV caused cervical cancer. Our sample was predominantly non-Hispanic Black (90%). More than half of the WLH in our study were less than 50 years old (61%), reported an annual household income of less than \$10,000 per year (64%), and had high health literacy (64%). About half of the WLH in our study had a high school education or less (52%), and only 38% had minor children living in their homes.

Chi-square tests

Our focal relationship between HPV vaccine awareness and HPV knowledge were statistically significant ($p<0.001$). The relationship between HPV vaccine awareness and income ($p=0.033$) and health literacy ($p<0.001$) were also statistically significant. Age ($p=0.067$) and education ($p=0.070$) were approaching statistical significance. Race/ethnicity ($p=0.512$) and number of children in the household ($p=0.746$) were not statistically significant. These data are reported in Table 1.

Logistic regression analyses

We performed simple logistic regression analyses modeling HPV vaccine awareness=yes with our main independent variable (i.e., HPV knowledge) as well as each of our covariates. Again, the relationship between HPV vaccine awareness and HPV knowledge (focal relationship) was statistically significant. In fact, our findings report that HPV vaccine awareness among WLH who knew that HPV caused cervical cancer was 14 times higher (crude OR=14.2; 95%CI: 5.9–34.1) than those who did not know about the causal relationship between HPV and cervical cancer. Even after controlling for age, race/ethnicity, education, income, number of minor children in the home, and health literacy, HPV vaccine awareness was 10 times higher (adjusted OR=10.2; 95%CI: 3.8–27.1) among WLH who knew that HPV caused cervical cancer compared to those who did not this fact. The Hosmer-Lemeshow goodness-of-fit test that we performed suggest a good fit of our full model ($p=0.417$). These data are reported in Table 1.

Although WLH with higher income were twice as likely to have heard of the HPV vaccine (crude OR=2.2; 95% CI: 1.1–4.6), these differences were not statistically significant in our multivariate model (adjusted OR=2.2; 95% CI: 0.8–5.8) after controlling for other factors. Health literacy was statistically significant in both our simple (crude OR=5.6; 95% CI: 2.4–13.2) and multivariate logistic regression models. Hence we observed a 3-fold increase (adjusted OR=3.2; 95% CI: 1.0–9.9) in HPV awareness among WLH who were more health literate after controlling for other factors. It is important to note however that the strength of this relationship was reduced by more than 10% which suggests that one or more of our covariates is a potential confounder of the relationship between HPV vaccine awareness and health literacy. Both income and health literacy were potential confounders of the relationship between HPV vaccine awareness and HPV knowledge. Age, race/ethnicity, education, and number of children in the household were not statistically significant in our simple or multivariate logistic regression models. These data are reported in Table 1.

Discussion

The quadrivalent HPV vaccine was approved for use in females 9–26 years old in 2006. In order to realize the public health benefits of HPV vaccination, ensuring initiation and completion is critical. Among the population for whom HPV vaccination is recommended, uptake has been abysmal almost 10 years later at below 50% in the United States and less among adult women. In our study, HPV vaccine awareness was low among WLH despite their dramatically increased risk of developing pre-cancerous cervical lesions and cervical cancer as well as other types of HPV-associated cancers.

Limited research has been conducted on WLH and HPV vaccination. The 2014 recommendation for HPV vaccination among WLH occurred after our study was conducted, but it is important to note that HPV vaccination was in routine use during the study. While the sample for this study was small in size and included an older age group of women, our results may be indicative of the overall lack of awareness and knowledge about HPV vaccination among WLH. Other limitations of our study include self-reported data, as well as the use of HINTS questions that were used for a general population-based sample of higher SES and predominantly White adults in contrast to our smaller sample of lower SES and predominantly Black WLH.

These findings underscore the importance of increased cancer prevention efforts aimed at raising HPV vaccine awareness and increasing HPV knowledge to reduce cervical cancer disparities among special populations, particularly WLH. Our findings also have implications for increasing health literacy among WLH and raising HPV vaccine awareness among WLH who have minor children in their households. Further, health care provider education, although not a focus of our study, may be important to ensure HPV vaccination is recommended to WLH.

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Table 1

Chi-square tests and logistic regression analyses examining HPV vaccine awareness among WLH, N=127

Sample Characteristics	Total N=127	Aware n=48 (%)	Unaware n=79 (%)	p-Value	COR (95%CI)	AOR (95%CI)
<i>HPV Knowledge</i>						
HPV causes cervical cancer				<0.001		
True (Correct)	64	83.3	30.4		14.2 (5.9–34.1) ***	10.2 (3.8–27.1) ***
False/DK (REF)	63	16.7	69.6		---	---
<i>Sociodemographics</i>						
Age				0.067		
<50 years old	77	70.8	54.4		2.0 (0.9–4.2)	2.1 (0.8–6.0)
50 years old (REF)	50	29.2	45.6		---	---
Race/Ethnicity				0.512		
NH Black	114	87.5	91.1		0.8 (0.3–2.5)	0.5 (0.1–2.3)
Other (REF) ^	13	12.5	8.9		---	---
<i>SES</i>						
Education				0.070		
High school(REF)	66	41.7	58.2		---	---
Some college+	61	58.3	41.8		1.7 (0.8–3.4)	1.0 (0.4–2.6)
Income				0.033		
<\$10K (REF)	81	52.1	70.9		---	---
\$10K+	46	47.9	29.1		2.2 (1.1–4.6) *	2.2 (0.8–5.8)
<i>#Children in household</i>						
None (REF)	79	60.4	63.3		---	---
1 or more	48	39.6	36.7		1.1 (0.5–2.2)	0.6 (0.2–1.6)
<i>Health Literacy</i>						
High	81	85.4	50.6	<0.001	5.6 (2.4–13.2) ***	3.2 (1.0–9.9) *
Low (REF)	46	14.6	49.4		---	---
HL goodness-of-fit test	---	---	---	---	---	p=0.417 (p-value)

Notes:

^ Other race/ethnicity includes 6 NH white, 3 NH other, and 4 Latinas.

Abbreviations: Don't know (DK); Hosmer-Lemeshow (HL); non-Hispanic (NH); socioeconomic status (SES); women living with HIV (WLH)

p<0.001

p<0.01

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p<0.05

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