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Ethnic and Racial Differences in HPV Knowledge and Vaccine Intentions among Men Receiving HPV Test Results

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Abstract

We examined factors associated with HPV vaccine intentions by racial/ethnic group among men participating in a HPV natural history study. HPV knowledge, vaccine intentions and perceived barriers were assessed among non-Hispanic White, non-Hispanic Black and Hispanic men. Men were tested for HPV every 6 months. After receiving test results from their previous visit, participants (N=477) reported their intentions for HPV vaccination in a computer-assisted survey instrument (CASI). Vaccine intentions were high among all respondents, although differences were found between racial and ethnic groups in awareness and knowledge of HPV and, vaccine intentions and perceived access and barriers to receiving the HPV vaccine. In order to effectively disseminate the vaccine among men, factors that may promote or inhibit vaccine acceptability need to be identified. Identifying these factors related to vaccine intentions among minority and majority men offers an opportunity for addressing barriers to health equity and, in turn, reductions in HPV-related disparities.

Keywords

Human papillomavirus; vaccine; health disparities; men; barriers; psychosocial

1. Introduction

Human Papillomavirus (HPV), the most common sexually transmitted virus in the United States (U. S.), remains a considerable public health problem [1]. Although most attention has been directed to cervical cancer, the most common HPV-related cancer, HPV has been indicated in 40% of vulvar and vaginal cancers, 40% of penile cancers, 90% of anal cancers

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[2–4] and 25–63% of head and neck cancers in the U. S. [2–7]. Racial/ethnic minorities account for a disproportionate number of HPV-related cancers [8]. Greater proportions of Black and Hispanic men and women are diagnosed with HPV-related cancers and are diagnosed at later stages of the disease than men and women of other races or ethnicities [9–14]. Thus, race and ethnicity, or associated factors, play a fundamental role in the epidemiology of HPV-related cancer in the U.S.

In 2006, the Food and Drug Administration (FDA) approved a prophylactic quadrivalent HPV vaccine for women (9–26 years) [15] and recently in 2009, the FDA approved the quadrivalent HPV vaccine for use in preventing HPV 6 and 11 related to genital warts in males ages 9–26 years [16]. Numerous studies evaluating the acceptability of and the attitudes towards the HPV vaccine have been conducted, but few have examined acceptability among racial and ethnic minority men [17]. Across racial/ethnic groups, factors associated with vaccine acceptance among men include knowledge of HPV, perceived threat, and perceived barriers to HPV vaccine [17–20]. Previous research conducted with men found low levels of awareness and knowledge about HPV [21–23]. Acceptability of the HPV vaccine was on average higher in studies conducted with gay and bi-sexual men (47%–74%) than studies conducted with heterosexual men (37%–78%) [17, 21–24]. These rates also varied based on how the vaccine was framed, and there was a general preference for a vaccine that protected against more types of HPV and that provided some direct protection for males [24, 25]. Vaccine acceptance is generally higher among men who perceive themselves to be at risk for HPV infection, those with higher lifetime partners and those with greater anticipated regret if they did not get vaccinated and later had an HPV infection [21, 22, 25, 26]. Perceived barriers to vaccination often include concerns about vaccine safety, side effects, costs, and fear of shots [18, 19, 23, 26]. Additionally, it is well documented that a physician's recommendation plays a significant role in the decision to be vaccinated [21, 27–31], and physicians who currently vaccinate women support vaccinating men [31]. Understanding factors related to vaccine intentions among racial and ethnic minority populations is critical, because disparities in other types of immunization and vaccinations remain an important public health concern, and addressing potential disparities now may be key to preventing major disparities [32].

The purpose of this current investigation is to examine whether there are racial and ethnic differences among men in: a) factors associated with vaccine uptake, including knowledge of HPV and other demographic factors; b) barriers to HPV vaccination; c) importance of provider recommendation; and d) vaccine intentions. Results from this study will inform future HPV vaccine interventions among racial and ethnic minority men at high risk for HPV-related cancers.

2. Methods

2.1. Study design and population

The Cognitive and Emotional Responses to HPV in Men (CER) Study is the behavioral arm of a Natural History Study of HPV Infection in Men (the HIM study) [34]. The CER survey was developed as a computer-assisted survey instrument (CASI) that measures theoretically-based constructs related to cognitive and emotional responses to an HPV test result. The constructs in the survey were derived from the Parallel Processing Model and Common Sense Model (Leventhal), the Extended Parallel Processing Model (Witte), and from a previous study funded by the Centers for Disease Control and Prevention, “Assessing the Impact of an HPV-related Diagnosis [35].” Details of the CER [36] and HIM [34] studies and a description of the theoretical model have been previously reported.

CER participants (ages 18–70) were recruited from the HIM study where they are tested for genital HPV every 6 months. At each 6-month visit men are given the result of their previous HPV test. Men complete the CER questionnaire 2 to 4 weeks after receiving an HPV test result. A surprising number of participants inaccurately reported their test results on the survey: among the 225 men whose HPV DNA lab result was positive, only 178 (79%) self-reported correctly, while 17 (7%) reported being HPV negative and 26 (12%) were unsure of their test results. Conversely, among the 311 men whose HPV DNA lab result was negative, 281 (90%) self-reported their result correctly, while 12 (4%) reported being HPV positive, and 17 (6%) were unsure of their test results. Based upon these findings, we report all results in this study based upon men's *self-reported* HPV test results, as the constructs of the model measure their cognitive and emotional responses to an HPV test result as they report it on the CASI.

When participants are informed of their HPV test result from the previous visit, it is explained that the test which was used for such results is not FDA-approved for men and is used for research purposes only. The nurse practitioner who sees each participant provides general information about HPV upon entry into the study and at each 6-month visit. HPV information shared with participants includes oral and written materials explaining that HPV is a sexually transmitted virus, associated with certain cancers and genital warts. At the time CER participants complete the first survey, they have been exposed to educational messages about HPV through the Informed Consent process, and at 3 separate clinic visits with the nurse practitioner. The study and questionnaire were approved by the Institutional Review Board of the lead author's institution prior to study initiation.

2.2. Exposure measures

Race was assessed by one question asking *"How would you describe yourself? Check all that apply"*, with response options of "White", "Black or African American", "Asian", "Native Hawaiian or Other Pacific Islander", "American Indian, Alaska Native", "Other", and "Don't know/Not sure". Ethnicity was assessed by asking *"Are you Hispanic or Latino?"*. If participants reported they were Hispanic they were included in the Hispanic group regardless of what race they reported. Among men who reported they were one race and not Hispanic, participants who selected "White" were classified as non-Hispanic White and participants who selected "Black or African American" were classified as non-Hispanic Black.

2.3. Outcome measures

Vaccine Intentions—Vaccine intentions were originally measured with a 4-point likert-scale item asking *"If there was a safe vaccine that could prevent HPV in men, how likely is it that you would be vaccinated?"* Response options included "very likely", "likely", "unlikely", or "very unlikely". In June 2009, additional questions concerning the vaccine were added. A 6-month time frame was added to the vaccine intentions item; *"If the vaccine was available for males, how likely is it that you would go to your health care provider within 6 months to get the HPV vaccine?"* Data from this question including the 6-month time frame were used in the analysis (n=215). Because nearly 80% of participants indicated they were "likely" or "very likely" to receive the vaccine within 6 months (if it became available for men), vaccine intentions were dichotomized to reflect those who were "likely" vs. "unlikely" to receive the HPV vaccine within 6 months.

Barriers to vaccination—Perceived barriers to HPV vaccination were measured by the question, *"If there was a safe and effective vaccine available for men, what do you think would prevent or stop you from being vaccinated against HPV?"* Participants were provided with a list of 9 possible response options including *cost, side effects, transportation, what*

people would think of me if I got the vaccine, getting 3 shots over 6 months, fear of needles, ability to get an appointment at a clinic, getting time off work or school, and fear of vaccines (plus other and nothing) and asked to check all that apply.

Healthcare provider recommendation—Importance of healthcare provider recommendation in getting the vaccine was assessed by the question “How important would it be to you that your health care provider (nurse, doctor, counselor, etc.) tell you to be vaccinated against HPV?” with response options of “very important”, “somewhat important” or “not important”. Due to response distribution this variable was dichotomized as very important versus somewhat/not important.

HPV Knowledge—HPV knowledge was measured by 18 true/false items. A knowledge score was created by summing the number of correct answers (theoretical range = 0–18, with a higher score indicating greater knowledge). *HPV Self-Report Test Result.* Men were asked the result of their most recent HPV test, “Positive”, “Negative”, or “Not sure”. Age was calculated using birth date and date of survey completion. For adjustment in the analysis, marital status was categorized as unmarried (single or living with a partner) or married, separated/divorced, or widowed.

2.4. Statistical Analysis

Data were derived from the first completed CER questionnaire (i.e. the first time men are provided with an HPV test result). Of the total sample of 536 participants, only 477 (89%) identified as non-Hispanic White, non-Hispanic Black, or Hispanic. As this report specifically addresses ethnic and racial differences related to HPV knowledge and vaccine intentions, the 59 participants who did not provide an answer to that item were excluded; this analysis includes only the data from the subset of 477 participants who self-identified as non-Hispanic White, non-Hispanic Black, or Hispanic. Descriptive statistics were employed to summarize differences by race and ethnicity in background variables, including socio-demographics, HPV knowledge and self-reported HPV status. Chi-square and Wilcoxon two-sided t-tests were used to compare non-Hispanic White men to non-Hispanic Black and Hispanic men on background variables. P-values less than 0.05 were considered statistically significant. Logistic regression was employed to compare non-Hispanic Black and Hispanic men with non-Hispanic White men (referent group) on HPV vaccine intentions, importance of healthcare provider recommendation, and perceived barriers to HPV vaccination outcomes. Odds ratios (OR) and 95% Confidence Intervals (CI) were calculated and reported. Background factors that were associated with the exposure were assessed as possible confounders. Background factors which changed any of estimated risks by more than 10% were controlled for in a multivariable analysis. SAS version 9.2 (Cary, NC) was used to conduct all analyses.

3. Results

3.1. Sample characteristics

Of 477 respondents, 307 (64%) identified as non-Hispanic White, 78 (16%) as non-Hispanic Black, and 90 (19%) as Hispanic. Self-reported HPV status did not differ among these 3 groups. The mean age of participants was 31 years (range, 18–69). Overall, men in this sample had high scores on the HPV knowledge scale (mean=15, SD=3) and reported having at least some college education (87%). Compared to non-Hispanic White men, a greater proportion of non-Hispanic Black men reported ever having had symptoms of HPV, 10% and 22% respectively, $p=0.004$ (Table 1). Non-Hispanic Black men were also less likely to report being college educated ($p<0.001$) and single ($p=0.009$); they were older ($p<0.001$) and less knowledgeable about HPV than non-Hispanic White men ($p<0.001$). Hispanic men

were less likely to report having health insurance than non-Hispanic White men ($p=0.003$), but did not differ on other demographic variables or HPV knowledge.

3.2. Vaccine intentions

Intentions to get vaccinated within 6 months were strong among all respondents (Table 2), however Hispanic men reported greater HPV vaccine intentions than men in the other groups (94% said they were likely to get the vaccine compared to 74% of non-Hispanic White men and 81% of non-Hispanic Black men). Hispanics had greater intentions to get the vaccine within 6 months if it became available for men compared to non-Hispanic Whites, after adjusting for background factors, adjusted OR=7.33 (95% CI, 1.60–33.58) (Table 2).

3.3. Importance of provider recommendation of the HPV vaccination

A greater proportion of non-Hispanic Black men (74%) reported that having a healthcare provider recommend the vaccine would be “very important” to them compared to non-Hispanic White (49%) or Hispanic (61%) men (Table 2). Compared to non-Hispanic White men, non-Hispanic Black men had greater odds that a healthcare provider would be “very important” after adjusting for background factors, adjusted OR=2.60 (95% CI, 1.4–4.81) (Table 2). When asked about how much they would be willing to pay for an HPV vaccine, more than half of all participants said they would be willing to pay \$100 or less (Table 2). There were no differences in the amount of money men were willing to pay by race and ethnicity.

3.4. Barriers to HPV Vaccination

Greater than two-thirds of non-Hispanic White men reported *cost* (70%) and *side effects* (67%) as barriers that might prevent them from getting the vaccine (Table 2). Fewer non-Hispanic Black men perceived *cost* (48%) and potential *side effects* (50%) as barriers to vaccination, compared to non-Hispanic White men. Adjusting for background factors, this difference remained statistically significant for cost, but not for side effects (Table 2). Compared to non-Hispanic White men fewer Hispanic men reported cost (64%) and side effects (59%) as barriers than non-Hispanic White men, but these differences were not statistically significant. A small proportion of all respondents reported that *going back for 3 shots*, *getting time off work or school*, or *transportation* issues might prevent them from getting vaccinated (Table 2).

Only half of participants reported that they had a place where they could go to get the vaccine (Table 2). Compared to non-Hispanic White men, Hispanic men were less likely to report having a place where they could get vaccinated (56% versus 35%, respectively). This difference did not remain statistically significant after adjusting for all the other factors (Table 2). Fewer non-Hispanic Black men had a place to get the vaccine (47%) compared with non-Hispanic White men (Table 2).

4. Discussion

One of the four goals outlined in Healthy People 2020 is “achieve health equity, eliminate disparities, and improve the health of all groups [37].” Strategies of this initiative to avert vaccine-preventable diseases include: improved quality and quantity of vaccination services; minimization of financial burden for disadvantaged persons; increased community participation, education, and leadership; improved disease monitoring and vaccine coverage; and development of new or improved vaccines. Blacks and Hispanics have high rates of sexually transmitted infections (STIs) compared to Whites, have lower vaccination rates and may have lower health literacy. Opportunities to improve health communication and decrease the burden of STIs are also important in improving health disparities [37].

This study is the first of which we are aware to explore racial and ethnic differences in factors associated with HPV vaccine intentions among males. Our data are consistent with other studies that identified racial differences regarding HPV knowledge [38, 39]. Health literacy is a notable concept that emerged as a deficiency and may have contributed to lower levels of knowledge. For instance, men who participated in the CER study were repeatedly educated about HPV but non-Hispanic Black respondents in this study were still less knowledgeable about HPV infection than were men in other groups. A study conducted among ethnically and racially diverse patients, found that 43% reported difficulty understanding HPV information in the clinical encounter [40]. These data suggest that there may be less comprehension of the complex nature of HPV, transient environment of HPV infection and its association to cancer, among non-Hispanic Black men.

Although men play an important role in the transmission and acquisition of HPV, limited information has been directed toward men regarding HPV and the HPV vaccines, as compared to the significant health education programs for women. Improved efforts towards educating men about HPV will be important, especially in light of the recent FDA approval of the HPV vaccine for males aged 9–26 years for prevention of genital warts. The findings of this study substantiate the need for developing educational messages designed to reach minority men who are less knowledgeable about HPV. Employing outreach workers or community-based patient navigators [41, 42] may also be useful at providing men with culturally competent information regarding the HPV vaccine. Human Immunodeficiency Virus (HIV) education campaigns and messages could be models of how to script culturally relevant information and demonstrate effective dissemination of HPV information [43]. While knowledge is just one of many predictors of protective sexual behavior and, in some cases vaccine intentions, given the relatively low levels of HPV knowledge among non-Hispanic Black men in this study, increasing HPV education and improving health literacy may better facilitate informed decision making, particularly related to the HPV vaccine [44, 45].

Reducing perceived barriers to vaccination may also be important for ensuring that men who desire vaccination actually receive the vaccine. Previous studies have found that several barriers, such as cost, receiving a 3-shot series, safety, and side effects were associated with vaccine acceptability in men [18, 19, 23, 26]. Non-Hispanic White men in our study reported cost and side effects as barriers, which are consistent with previous studies [18, 19, 23, 26]. Hispanic men in this study also reported having strong intentions of being vaccinated; yet structural barriers, namely not having access to vaccine administration facilities was a perceived obstacle (although report of having a place to get the vaccine was low among all groups). Non-Hispanic Black men were least likely to identify barriers to vaccination (i.e. cost and side effects), and are the group that seems least likely to actually get vaccinated.

HPV vaccination can be an effective measure to controlling and preventing HPV infection. Previous studies conducted with women show that HPV vaccine uptake among minority women is low. The 2007 National Immunization Survey showed that only 1% of Hispanic women 18–26 years had one or more doses of the HPV vaccine [46]. This is likely a lack of insurance issue as Vaccines for Children (VFC) no longer applies to those women over 18 years of age and nearly 40% of Hispanic women are uninsured [47]. Low vaccine uptake rates may also be attributed to the various barriers that minorities face when accessing care. Since the vaccine is now available for men, research on men is sorely needed to determine the most important barriers to being vaccinated. An understanding of perceived barriers by minority populations can guide health promotion and HPV prevention. Identifying barriers against vaccination among racial and ethnic men is critical in alleviating disparities.

There is lack of policy for men's health care. A structured continuum of care for men throughout the lifespan needs to be established. Health care providers can take a number of steps to increase their cultural competence, including increasing bilingual/bicultural and diversity capacity of their existing staff, intensifying recruitment efforts of diverse staff, and establishing partnerships with community organizations to facilitate outreach to racial and ethnic minorities.

4.1. Limitations

Study limitations should be considered when interpreting the present findings. HPV testing for men is not FDA-approved and may never be a part of standard care for men. The CER study is a unique opportunity to understand the vaccine intentions of at-risk groups and facilitate the institution of gender-neutral vaccine dissemination strategies. Data for the study were collected as part of a natural history study of HPV in men, and those enrolled in the study may differ in some ways from the overall population of the community from which they were drawn. Awareness and knowledge of HPV are likely to be higher in this population since they are exposed to repeated educational messages about HPV. *Vaccine intention*, measured initially in this study through a single item, reflects the time at which the instrument was developed (approximately five years before the vaccine was approved for males). This limited measure, coupled with the elevated levels of awareness of HPV and the vaccine among this cohort of males in an HPV natural history study, may account for high levels of vaccine intention. Additionally, although items used to assess perceived barriers mirror the broad measures used across the literature (e.g. cost, side effects) [18, 19, 23, 26], they may lack detail that would prove useful. Future research may benefit from questions that include a more specific description of these barriers, such as more detailed monetary amounts, or a more specific list of possible side effects, now that more is known about vaccine acceptance and uptake.

Larger studies with racial and ethnic minorities could evaluate whether HPV knowledge and awareness of HPV vaccines is lower among certain racial and ethnic groups. Results were based on self-report, making recall bias and reporting errors a potential concern. Men in this sample were generally older than the upper age limit for which the HPV vaccine is approved (age 26), and might likely differ in their attitudes towards a vaccine for HPV than younger men; hence, their attitudes regarding vaccine intention may not reflect those of the younger cohort for which the vaccine is approved.

Finally, future studies should assess racial and ethnic differences related to HPV vaccine acceptability among gay/bisexual men, as these priority populations represent high risk groups (although gay and bisexual men participated in low numbers in this study).

4.2. Conclusions

HPV-related cancer is not simply a woman's issue, although until recently the marketing messages for the HPV vaccine have presented it as a "women's shot" which may leave men feeling uncertain about its transmissibility and effect on both men and women. The initial approval of the vaccine for females has potentially led to the "feminization" of HPV, which may result in its falling below the radar of men – an issue even more crucial among racial and ethnic minority males. Irrespective of race and ethnicity, recent studies have shown that men do not perceive HPV to be relevant to them [22, 23]. Participants in one study referred to HPV as a "woman's disease" [23]. To date, there is a paucity of data on knowledge, attitudes, and practices among these groups with regards to HPV and the acceptability of the HPV vaccine. Racial and ethnic disparities in incidence, morbidity and mortality will continue to exist without aggressive strategies to close this gap. As this study illustrates,

barriers to HPV vaccination need to be identified and addressed to reduce disparity gaps and promote strategies to reach all populations.

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Table 1

Socio-demographic characteristics and HPV status by race/ethnicity (N = 477)

	Total			Non-Hispanic White (n = 307)			Non-Hispanic Black (n = 80)			Hispanic (n = 90)		
	Mean	(SD, Range)		Mean	(SD, Range)		Mean	(SD, Range)		Mean	(SD, Range)	<i>P^a</i>
Age	31	(14, 18–69)		31	(14, 18–69)		37	(14, 18–69)		29	(13, 18–55)	0.18
HPV Knowledge	15	(3, 0–18)		15	(3, 1–18)		12	(4, 0–18)		15	(3, 4–18)	0.61
	No.	(%)		No.	(%)		No.	(%)		No.	(%)	
Education												0.60
High school or less	62	13%		23	7%		30	38%		9	10%	
Some college/Two-year degree	279	60%		196	64%		33	41%		59	66%	
Four year degree or post grad	125	27%		88	29%		17	21%		22	24%	
Marital Status												0.60
Unmarried, Single	296	64%		205	67%		43	54%		58	65%	
Unmarried, Living with partner	41	9%		27	9%		5	6%		9	10%	
Married	74	16%		49	16%		14	18%		11	12%	
Divorced, separated, or widowed	53	11%		26	8%		17	22%		11	12%	
Health Insurance												
Yes	336	74%		237	78%		52	69%		55	63%	0.00
Self-report HPV Status												0.68
Negative	251	54%		166	54%		39	50%		53	60%	
Positive	174	38%		113	37%		34	44%		29	33%	
Not Sure	38	8%		27	9%		5	6%		7	8%	
Ever had symptoms of HPV	55	12%		30	10%		17	22%		8	9%	0.80

^aThe referent group is non-Hispanic white men

Table 2
Associations Between Race and Ethnicity and HPV Vaccine Intentions and Barriers Among Men (N = 477)

	Non-Hispanic White			Non-Hispanic Black			Hispanic		
	n (%)	OR (95% CI)	AOR ^a (95% CI)	n (%)	OR (95% CI)	AOR ^a (95% CI)	n (%)	OR (95% CI)	AOR ^a (95% CI)
Likely to get vaccinated ^b	107 (74)	30 (81)	1.52 (0.62, 3.75)	2.03 (0.66, 6.23)	35 (95)	6.22 (1.43, 27.10)	7.33 (1.60, 33.58)		
Provider recommendation very important	149 (49)	58 (74)	3.02 (1.73, 5.26)	2.60 (1.41, 4.81)	54 (61)	1.61 (0.99, 2.60)	1.64 (0.99, 2.70)		
Willing to pay more than \$100.00	57 (40)	12 (38)	0.90 (0.41, 1.97)		17 (46)	1.27 (0.61, 2.63)			
Perceived Barriers to Vaccination									
Cost	214 (70)	38 (48)	0.39 (0.24, 0.65)	0.45 (0.26, 0.80)	58 (64)	0.79 (0.48, 1.29)	0.67 (0.38, 1.07)		
Side effects	205 (67)	40 (50)	0.50 (0.30, 0.82)	0.72 (0.41, 1.26)	53 (59)	0.71 (0.44, 1.16)	0.75 (0.45, 1.23)		
Three shots	22 (7)	5 (6)	0.86 (0.32, 2.36)		7 (8)	1.09 (0.45, 2.65)			
Time off work/school	21 (7)	4 (5)	0.72 (0.24, 2.15)		12 (13)	2.10 (0.99, 4.46)			
Transportation	4 (1)	2 (3)	1.94 (0.35, 11.0)		2 (2)	1.72 (0.31, 9.56)			
Place to get vaccine ^b	83 (56)	18 (47)	0.69 (0.34, 1.42)	1.44 (0.59, 3.51)	14 (35)	0.42 (0.20, 0.86)	0.46 (0.21, 1.01)		

Note. OR = Crude odds ratio; AOR = Adjusted odds ratio

^a Adjusted for age, HPV knowledge, education, and insurance status

^b Items received by a subset of respondents