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ORIGINAL PAPER

Perceived Barriers and Trends in HPV Vaccination via Patient Survey Responses at Kalamazoo, Michigan's Federally-Qualified Health Center

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Abstract

Human Papillomavirus (HPV) is the most common sexually transmitted infection (STI) in the United States. Despite numerous studies proving the safety and efficacy of the HPV vaccine, immunization rates remain low, especially among underserved populations. To identify factors contributing to low HPV vaccination rates, patients at a federally qualified health center in Kalamazoo MI were surveyed. Surveys were administered during routine patient visits to determine self-reported vaccination status and vaccination barriers. A total of 98 vaccine-eligible (males/females, ages 9–26 years old) patients/guardians completed the survey. In all, 46% of respondents completed the multi-dose vaccination course, and 56% of those identified as female. White patients reported higher vaccination rates (50%) than patients of color (45%). Of those vaccinated, the most common reason was "physician recommendation" (39%). Those not fully vaccinated most commonly reported being "too young" (39%). Importantly, individuals who had begun, but not completed, the vaccination course reported that their provider had not spoken to them about future vaccines in the series (74%). This study revealed disparities in vaccination rates between the sexes and racial groups, and emphasized the influential role of physician's recommendation on vaccination. Interestingly, other frequently cited barriers to vaccination—an association with sex, personal/religious beliefs, efficacy—proved to be insignificant barriers for this population. Instead, age-related misunderstandings and lack of consistent physician communication about vaccination provided significant barriers. Based on our results, education and reminders about the HPV vaccine by providers is a significant tool to maximize vaccination coverage.

Keywords HPV · Vaccination · Barriers · FQHC · Kalamazoo

Introduction

Human Papillomavirus (HPV) is the most prevalent sexually transmitted infection (STI) in the United States. HPV is a significant cause of morbidity and mortality; it is known to be a causative agent in the development of oral, genital, and anal warts, as well as numerous forms of cancer (cervical, vulvar, vaginal, anal, and oropharyngeal) [1–3]. Approximately 79 million Americans are currently infected with HPV, with an additional 14 million people infected each year [4].

The HPV vaccine is a multi-dose vaccine that is currently recommended for males and females between the ages of 9 and 45 (9–26 at the time this research was conducted). HPV vaccines protect against the most commonly implicated isotypes in the development of cancer and warts [1–3]. The dosing schedule for the HPV vaccine is either: (1) two doses, administered at least 6 months apart, for children ages 11

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and 12, or (2) three doses, administered over the course of 18 months, for children ages 9–10 and 13–45 [1].

Even though the vaccine has been shown to be safe and effective, and is the only vaccine with the ability to prevent the development of several types of cancers, vaccination rates have lagged behind the vaccination rates of other vaccines [5]. Studies have shown that HPV vaccination rates are even lower in medically underserved communities around the US, but the reasons behind this have yet to be fully elucidated [1, 7–9]. This population presents with a unique set of obstacles, including lack of access to consistent and quality healthcare, which makes vaccination adherence a challenge and places these patients at an increased risk for the sequelae of infection with HPV.

Our study aimed to elucidate the factors contributing to the low rates of HPV vaccination as well as concerns and rationale for patients or parents/guardians who refused the HPV vaccination at a local Federally Qualified Health Center (FQHC) in Southwest Michigan.

By identifying factors that have the greatest impact on the underserved population's willingness and/or ability to be vaccinated, an FQHC can directly address the barriers that impede vaccination, create programs to raise awareness, and educate patients about the HPV vaccine.

Methods

Surveys were administered to patients or gardians between September 2017 and January 2018 at an FQHC, the Family Health Center (FHC) in Kalamazoo MI. Any parents/guardians of vaccine-eligible patients ages 9–17 or vaccine-eligible patients themselves ages 18–26 were eligible for the study. To evaluate the perceived barriers to HPV vaccination for this patient population, the survey was modeled after a combination of the 2010 Carolina HPV Immunization Attitudes and Beliefs Scale (CHIAS) and 2014 CHIAS survey used in young adult women. This allowed for comparison of our results to a previously validated measure to describe the attitudes surrounding HPV and vaccination in both guardians and adult patients [14, 15].

The exclusion criteria for participation in this study included: (1) patients who were under 18 years of age and unaccompanied by a parent/guardian, (2) patients who were non-English speakers and/or readers, and (3) patients for whom the HPV vaccine would be contraindicated due to an immunocompromised state or an allergy to any component of the vaccination. Respondents provided written consent prior to participating in the survey, and those who chose to participate were allowed to skip any question(s) they did not wish to answer. Respondents were also given the option to select multiple answers for most given prompts. Surveys (Supplemental 1) were administered electronically using the Western Michigan University Homer Stryker MD School of Medicine (WMed) REDCap platform. iPads with survey questionnaires were distributed after each patient visit to willing participants by Medical Assistants (MA's) at the FHC. During this survey collection process, the MA's did not provide any additional explanation of the survey prompts or content. The entire survey questionnaire process took less than 5 min to complete. Descriptive analysis was utilized to summarize prospective patient survey data. Qualitative data was reported as frequency (percent), and quantitative data as mean (standard deviation). Descriptive statistics of patient demographics and each survey item were provided. The aggregate of patient responses and the aggregate of parent/guardian responses were reported separately as well as combined. For each survey item, patient age, race, and gender were summarized by response. Subgroup analyses were performed to reveal characteristics of respondents' who reported being fully vaccinated versus that for those who reported otherwise. All data cleaning and analyses were performed in SAS v9.4.

This study was approved by the Western Michigan University Homer Stryker M.D. School of Medicine Instititional Review Board.

Results

Ninety-six patients aged 9–26 and/or their guardians were surveyed. The demographic composition of the patients surveyed in this study is representative of the population seen by the FQHC (Table 1).

Table 1 Respondent composition (n = total number of respondents)

		Total % (n = 88)
Person completing survey[a]	Patients (18–26 yo)	16 (14)
	Parents/guardians of patients (9–17 yo)	84 (74)
Patient sex	Male	44.3 (39)
	Female	55.7 (49)
Patient race	White/Caucasian	35.6 (31)
	Black/African American	33.3 (29)
	Hispanic/Latino	5.8 (5)
	Asian	2.3 (2)
	Native American	1.2 (1)
	Other, including biracial	21.84 (19)
	Overall non-white[b]	64.4 (56)

[a]Responses to person completing the survey divides patient sample into those patients that are 18 years of age or older and completed the survey themselves versus those patients that are less than 18 years of age and had a parent or guardian complete the survey on their behalf

[b]All Non-White/Caucasian categories, incl Black/African American, Hispanic/Latino, Asian, Native American, and Other

Of patients/guardians surveyed, 36.4% had completed their full course of the HPV vaccine, 20.5% had received a vaccination that day, 5.6% had received part of the HPV vaccine series, 20.5% had never recieved an HPV vaccination, and the remaining 17% were unsure of the patient's vaccination status (Table 2). Of patients who received the vaccination the day of the survey, the most important factors contributing to their decision to vaccinate were: "the physician recommended it," "I've heard it's important," and "health" (Table 3). For patients who did not receive the vaccination the day of the survey, the most common factors cited that impacted their decision included "patient too young," "I don't know enough about this particular vaccine, including possible side effects," and "I think the vaccine is unsafe" (Table 3).

Approximately 44% of survey respondents were male, while 56% were female (Table 1). Male patients were less likely than their female counterparts to be have completed the vaccination series (30.8% vs. 40.8%) and more likely to have not begun the series at all (25.6% vs. 16.3%) (Table 2). More males reported that they "don't know enough about the vaccine and its side effects" (30% of males, 9% of females), while more females reported concerns over vaccine safety (18% of females, 10% of males) and the vaccine's association with sex (9% of females, 0% of males). Nearly two-thirds of male respondents indicated that the physician recommendation was a primary reason for vaccination, while slightly less than one-third of females selected it as a factor (Table 3).

The most common racial groups represented were white/Caucasian, black/African American, and biracial. To understand the differences between racial minorities and Caucasians, we grouped all self-identified non-white response into one category, yielding a response rate of approximately 36% white and 64% non-white (Table 1). A slightly higher vaccination rate was reported amongst the white cohort (50% vs. 45.4%) (Table 2). Meanwhile, almost twice as many non-white participants (29.5%) reported being unvaccinated compared to white participants (16.6%). The proportion of respondents who claimed to have been vaccinated against HPV on the day of the survey were similar between the two racial groups. For non-white individuals, the most commonly stated reasons for vaccinating were because they "heard it was important," "the physician recommended it," and "health." White individuals indicated "physician recommendation," and "I researched it" were the strongest factors influencing their decision to vaccinate (Table 3). Nearly half of non-white respondents selected the recommendation of the health care provider as a major contributor to their decision, compared to only about 30% of white respondents.

The reported rates of follow-up and recommendation of the HPV vaccination by primary care providers for their patients appears to be lacking. Those patients who received at least one HPV vaccine reported that their provider failed to discuss future HPV vaccines with them, especially if they identified as female (87.5% of females, 70% of males) or non-white (80% of non-white, 75% of white) (Table 3). Of the 18 patients who received the HPV vaccine on the same day that the survery was administered, only 4 respondants reported that the physician discussed future vaccines to complete the series (Table 3). Finally, unvaccinated respondents indicated that their provider spoke to them about the HPV vaccine about 50%

Table 2 Patients' vaccination status at time of survey completion, separated out by sex, race, and respondent type

		Total % (n = 88)	Males % (n = 39)	Females % (n = 49)	White % (n = 24)	Non-white % (n = 44)	Parent/Guardian % (n = 74)	Patient % (n = 14)
Vaccination on day of survey[a]	Received vaccination	20.5 (18)	17.9 (7)	22.4 (11)	22.6 (7)	19.6 (11)	21.6 (16)	14.3 (2)
	Did not receive vaccination	79.5 (70)	82.1 (32)	77.6 (38)	77.4 (24)	80.4 (45)	78.4 (58)	85.7 (12)
Vaccination status of those who did not receive a vaccine on day of survey[b]	Completed the full HPV course	46.4 (32)	37.5 (12)	54.1 (20)	50 (12)	45.5 (20)	45.6 (26)	50 (6)
	Completed part of the HPV course	7.2 (5)	9.4 (3)	5.4 (2)	8.3 (2)	6.8 (3)	7 (4)	8.3 (1)
	Never received an HPV vaccine	26.1 (18)	31.3 (10)	21.6 (8)	16.7 (4)	29.5 (13)	24.6 (14)	33.3 (4)
	Unsure	20.3 (14)	21.9 (7)	18.9 (7)	25 (6)	18.2 (8)	22.8 (13)	8.3 (1)

[a]31 white respondents and 56 non-white respondents (Percentages may not align with n values as respondents were permitted to select multiple factors or omit certain questions)

[b]69 total respondents, 32 males, 37 females, 24 white, 44 non-white, 58 parents/guardian, 12 patient respondents

Table 3 Factors cited by respondents that influenced sample population to either obtain or not obtain vaccination

		Total (n = 18)	Males (n = 7)	Females (n = 11)	White (n = 7)	Non-white (n = 11)	Parent/ Guardian (n = 16)	Patient (n = 2)
Factors cited for getting vaccine that day	Physician recommended it	38.9 (7)	57.1 (4)	27.3 (3)	28.6 (2)	45.5 (5)	43.8 (7)	0
	I've heard it's important	38.9 (7)	57.1 (4)	27.3 (3)	14.3 (1)	54.6 (6)	37.5 (6)	50 (1)
	Health	33.3 (6)	42.9 (3)	27.3 (3)	28.6 (2)	36.4 (4)	25 (4)	100 (2)
	I researched it	11.1 (2)	0	18.2 (2)	28.6 (2)	0	12.5 (2)	0
	I don't know	5.6 (1)	0	9.1 (1)	14.3 (1)	0	6.3 (1)	0
	Other	0	0	0	0	0	0	0
Factors cited for not getting vaccine that day[a]	Other: Too young[b]	38.9 (7)	42.9 (3)	36.4 (4)	25 (1)	46.4 (6)	50 (7)	0
	I don't know enough about the vaccine & its side effects	22.2 (4)	30 (3)	12.5 (1)	0	30.8 (4)	14.3 (2)	50 (2)
	I think the vaccine is unsafe	16.7 (3)	10 (1)	25 (2)	50 (2)	7.7 (1)	21.4 (3)	0
	Vaccine is new & I want to wait a while before deciding	11.1 (2)	10 (1)	12.5 (1)	25 (1)	7.7 (1)	14.3 (2)	0
	Vaccines association with sex	5.6 (1)	0	12.5 (1)	25 (1)	0	7.1 (1)	0
	Provider did not talk about the vaccine	11.1 (2)	0	12.5 (1)	25 (1)	7.7 (1)	7.1 (1)	25 (1)
	Personal and/ or religious beliefs	0	0	0	0	0	0	0
	Cost	0	0	0	0	0	0	0
	I do not think the HPV vaccine is effective	0	0	0	0	0	0	0
	I think the vaccine is unnecessary	5.6 (1)	10 (1)	0	0	7.7 (1)	0	25 (1)
	Other	11.1 (2)	20 (2)	0	0	7.7 (1)	7.1 (1)	25 (1)

[a]Percentages may not align with n values as respondents were permitted to select multiple factors

[b]7 parents/guardians checked the Other option and wrote in statements specifically citing that the patient was too young to receive the HPV vaccine

of the time, a rate that is consistent between sex and race (Table 4).

Discussion

Despite the established safety and effectiveness of the HPV vaccine, vaccination rates have lagged behind the vaccination rates of other vaccines [5]. This may be due to limiting factors- including its association with youth sexuality, the lack of urgency with which it is recommended by physicians, and lack of information provided to patients—in addition to the difficulties associated with adhering to a multi-part dosing schedule [1, 2, 6, 12]. Studies have shown that HPV vaccination rates are even lower in medically underserved communities around the US [1, 7–9]. In particular, African American and Hispanic individuals from low-income households have an increase likelihood of contracting an STI, and

Table 4 Self-reported identification of having discussed HPV vaccination with their healthcare provider during same medical visit in which sample population was surveyed, divided by whether patient had or had not received vaccination that day

	Total	Males	Females	White	Non-white	Parent/guardian	Patient
Received vaccine that day and provider talked to them about future vaccines	22.2 (4/18)	30 (3/10)	12.5 (1/8)	20 (2/8)	20 (2/10)	12.5 (2/16)	100 (2/2)
Never received vaccine & provider talked with them about the HPV vaccine	50 (9/18)	50 (5)	50 (4/8)	50 (2/4)	46.2 (6/13)	50 (7/14)	50 (2/4)

thus this population would benefit greatly from adequate protection against preventable infections that eliminate the long-term complications of the disease [10]. Given the low HPV vaccination rates nationally and the even lower rates seen in medically underserved communities, our study elucidated factors that contribute to low HPV vaccination rates. This is the first step towards improving the vaccination rates, and decreasing the potential morbidity and mortality associated with the effects of long-standing HPV infections.

Self-reported vaccination rates provide important information that indicates the perceived vaccination coverage of an individual and informs providers about the level of health literacy and knowledge of personal health information for a given population. This information would not be captured by a retrospective analysis of population-wide vaccination status. Furthermore, eliciting a clear understanding of the perceived rationales and barriers to vaccination is essential to develop a specific plan for intervention that addresses the concerns and relevant needs of the population of interest.

A 2016 study in Puerto Rico working with a similar FQHC patient population found that physician recommendation was the key factor for increasing vaccination rates among parents of unvaccinated sons [13]. Participants who received a provider recommendation were 34 times more likely to initiate the vaccine series [13]. Similar results were found in our study with physician recommendation being one of the key facilitators in vaccine acceptance. Respondents who reported receiving the HPV vaccine on the day of the survey stated that "physician recommendation," "having heard that the vaccine was important," and "health" were the most important factors in their decision-making process. While "hearing something is important" and "health" might appear seemingly inexplicit, capitalizing on these factors and embracing the resources that these patients used to inform their decision will likely enhance vaccination rates in this community. Further investigations will be needed to explore those sources of health information utilized by patients. Taken together, these studies highlight the integral role that healthcare providers play in influencing their patients' health maintenance plan

Of the respondents who had never received the HPV vaccine, the reported reasons included the patient being "too young," "not knowing enough about the vaccine and/or its side effects," and believing that the vaccine is "unsafe." It is important to note, however, that the respondents who reported "too young" as a reason (n = 7) had to first select "other" and then contribute written commentary along the lines of being "too young" as a reason that they decided not to vaccinate. This was surprising as all patients surveyed were of a vaccine-eligible age. It is important to appreciate that common responses such as "not old enough" and "too young" could be attributed to: (1) the inaccurate perception that the young patient does not meet the age-related criteria for the HPV vaccine, (2) that the parent/legal guardian does not deem the young patient ready for the vaccine because he or she is too young to be sexually active, or (3) another reason altogether. Based on our results, we were able to identify a few misconceptions of the HPV vaccine that are easily amendable with educational intervention. When discussing the HPV vaccine, it is important for physicians to emphasize the CDC's recommended age (9–45 years old) to receive the vaccine so that parents and patients both understand that the HPV vaccine can be initiated in patients as young as 9 years old. Furthermore it should be stress that the HPV vaccine is safe and has been available to the public for almost 10 years, and that its side effects are similar to the required vaccines [16].

There was an overall discrepancy in vaccination rates between the sexes with male patients reporting lower vaccination rates than females (Table 2). However, the overall reasons that both sexes rejected the vaccine were similar: not knowing enough about the vaccine and its side effects, the vaccine being new, and vaccine safety (Table 3). The lower vaccination rates seen in males compared to females may be a result of the HPV vaccine being historically only offered and administered to females. It is important that in the future that physicians continue to recommend the HPV vaccine to both males and females.

In our study, half of the unvaccinated respondents indicated that their provider spoke to them about the HPV vaccine. This supports the findings from a previous study conducted by Pierrer-Victor and et al. that showed that the lack of physician recommendations was the most commonly cited reason for not initiating the HPV vaccine [16]. This

highlights a need for providers to be more consistent in recommending HPV vaccination during every patient encounter. However, an unexpected finding in our study was that 50% of unvaccinated patients had received a physician recommendation, but still declined the HPV vaccine. This may be due to the quality of the physician's recommendation for the HPV vaccine and not being able to properly address the patient's concerns about the vaccine. In a previous study by Gilkey and et al., it was shown that physicians who provided high-quality recommendations compared to those who provided low-quality recommendations were able to better encourage vaccination among vaccine-hesitant parents [17]. Overall a high-quality recommendation, which includes the physician informing the patient that the HPV vaccine prevents cancer, strongly recommending the vaccine, and strongly recommending the patient to get the vaccine at that visit, resulted in higher initiation rates of the HPV vaccine, as shown [17].

Another interesting and even more prevalent barrier that was highlighted in this study is the perceived lack of reminders for patients to follow-up and complete the vaccination series by healthcare providers. The Michigan Department of Health and Human Services (MDHHS) reported that many Michigan adolescents are starting the HPV series (54% of females, 38.8% of males), but are not acquiring all the recommended doses, and therefore not obtaining maximal protection against the virus [11]. Based on these results, it is important for physicians to: (1) inform and/or remind the patients that the HPV vaccine is a multi-part vaccine and (2) schedule a follow-up office visit to ensure subsequent vaccination.

Several previous HPV vaccination studies have found that patients were hesitant to take the HPV vaccination due to its association with sex [14]. Only a single respondent indicated that the "vaccine is associated with sex" in our study. This was encouraging, as it implies that several potentially immovable barriers or fundamental beliefs that have been reported by other studies were not major factors for this patient population [1, 2]. This may be a reflection of the general population's change in perception regarding the HPV vaccine over the years. It is important to continue to educate the public that the HPV vaccine is intended for the prevention of HPV-realted cancers. Therefore, the vaccine is eligible and highly encouraged for all patients, not just individuals who are at high risk. It is also important to inform patients that the vaccine is best administered before HPV exposure and that the vaccine confers less protection in already sexually active individuals [16].

The main limitation of this study was the low number of surveys and lack of proper representation from all groups, in particular individuals between the ages of 18 to 26 years old. Many MA's also reported hostile responses from anti-vaccine supporters, which limited the survey responses to those who were at least open to a discussion about the HPV vaccine, thus likely eliminating the perspective of some unvaccinated individuals. The low survey response rate also led to grouping white versus non-white patients for analysis. It has traditionally been shown that ethnic minorities experience significant health care disparities compared to white patients. According to the 2010 U.S. census data, black patients received worse care than white patients. We also understand that each ethnic minority has unique experiences in the healthcare system and that health concerns and barriers should ideally be addressed from each unique background.

In future studies, it would be beneficial to gauge the perspective of the provider to determine techniques, limitations, and comfort with discussing the HPV vaccine with different patients in the clinic. This would provide further directions for tailoring an approach for diverse groups of patients to achieve the best coverage possible against HPV. Finally, evaluating the association between physician demographics and vaccination rates would further clarify the role of provider-patient interaction dynamics on vaccine acquisition.

Conclusion

Through this study, we were able to highlight factors that both encourage and prevent HPV vaccine acquisition. A major factor that parents/guardians of unvaccinated children cited for not obtaining vaccination was that their child was "too young." This, along with the perception held by some that the vaccine is unsafe, indicates that patient education on the current Center for Disease Control and Prevention vaccine recommendations, as well as reassurance of the safety of the HPV vaccine series, may improve the FHC's vaccination rates. In addition, an easy change that physicians can implement is to discuss the HPV vaccine when patients are coming in for their universally recommended or required vaccines for school. By grouping the HPV vaccine with the other vaccines, physicians are able to normalize the HPV vaccine and help patients and parents understand that the HPV vaccine is no different from other vaccines [18].

Physician recommendation of vaccination is a major enabling factor for obtaining vaccination. However, we found that patients report low rates of physician recommendation or reminders to vaccinate, especially among females and non-whites. Based on our results, providers' commitment to educate, reassure, and remind patients about the HPV vaccine is a significant tool to initiate and complete vaccination series and minimize missed vaccination opportunities. This could empower clinicians to use their influence to promote a therapeutic strategy with patients that enhances the long-term health of the community as a whole.

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Compliance with Ethical Standards

Conflict of interest The authors deny any conflict of interest.

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