

Original Investigation

Efficacy of a Human Papillomavirus Vaccination Educational Platform in a Diverse Urban Population

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IMPORTANCE Human papillomavirus (HPV) is a preventable disease that plays a causative role in a significant proportion of malignant neoplasms of the head and neck. Inner-city populations are at risk for HPV-related oropharyngeal cancer, are least likely to receive HPV vaccination, and report a lack of information regarding HPV.

OBJECTIVE To determine whether an educational platform affects knowledge, attitudes, and practices regarding HPV vaccination in an inner-city community.

DESIGN, SETTING, AND PARTICIPANTS This prospective cohort study, conducted from March 1 to December 31, 2014, surveyed 128 participants at multiple inner-city community centers regarding their knowledge of, attitudes toward, and practices regarding HPV vaccination before and after a brief educational presentation. No eligible individuals refused to participate in the educational session. Surveys were excluded from analysis if they were incomplete.

INTERVENTIONS Participants completed two 20-question surveys separated by a 15-minute educational session on HPV-related disease, including a short PowerPoint presentation.

MAIN OUTCOMES AND MEASURES Presence of statistically significant differences in survey scores before and after the educational session.

RESULTS Eighty-six participants met eligibility criteria (61 male [70.9%]; 68 with a high school education [79.1%]). Baseline knowledge of HPV, its causal association with cancer, and the existence of a vaccine against HPV were poor: of a total composite score of 20, the mean knowledge score before the educational session was 9.69. Participants' self-rated knowledge regarding HPV disease and vaccination improved significantly as a result of the educational session; the absolute increase in mean knowledge composite score from before the educational session to after the session was 3.52 (17.6%) (95% CI, -2.87 to 9.92; $P < .01$). Attitudes regarding government involvement in vaccination did not change as a result of the educational session (composite attitudes score before the educational session, 16.57 of 28; score after the session, 15.22; $P = .98$). Participants' intent to vaccinate their children increased significantly following the educational presentation: before the presentation, 34 respondents (40%) intended to have their children vaccinated; after the presentation, 60 (70%) intended to do so ($P = .002$).

CONCLUSIONS AND RELEVANCE Lack of knowledge regarding HPV vaccination and unwillingness to undergo vaccination contribute to low rates of HPV vaccination within urban populations. Community-based educational sessions successfully teach the link between HPV and various cancers, provide information regarding the risks and benefits of vaccination, and increase participants' willingness to vaccinate their children against HPV. Attitudes regarding government involvement in health programs are resistant to change.

JAMA Otolaryngol Head Neck Surg. 2016;142(6):590-595. doi:10.1001/jamaoto.2016.0433
Published online April 21, 2016.

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Human papillomavirus (HPV) is the most common sexually transmitted disease in the United States and plays a causative role in a significant proportion of head and neck cancers.¹ As in cervical cancer, a portion of HPV-related oropharyngeal squamous cell carcinoma (OPSCC) is likely preventable. While prospective data examining reduction in OPSCC incidence are scarce at present, recent data demonstrate a 56% decrease in HPV infection rates among women in the United States since the introduction of the HPV vaccination in 2006.² Despite its efficacy, current rates of vaccination in the United States among adolescents (aged 13-17 years) are 39% in girls and 21% in boys.³

Conceivably, a thoughtful strategy regarding vaccination may reduce HPV-related head and neck cancer. Current Centers for Disease Control and Prevention Advisory Committee on Immunization Practices guidelines call for routine vaccination against HPV in boys and girls aged 11 and 12 years.⁴ To date, 42 states have proposed legislation to fund either HPV-related education or vaccination. Despite this legislation, only 1 state requires vaccination for adolescent girls (not boys) at this time.⁵

In the past 2 decades, there have been significant concerns about vaccination safety. In particular, concern about purported neurologic sequelae of vaccination, including autism, led a portion of parents to opt out of routine vaccinations for their children against measles, mumps, rubella, and, now, HPV. There has been extensive international study of the safety profile of the quadrivalent HPV vaccine since its licensure 10 years ago. These studies, which included 7 phase 3 clinical trials, included 29 000 males and females aged 9 to 45 years and demonstrated no serious adverse consequences resulting from vaccination.⁶ The authors' analysis concluded that rates of major adverse outcomes, such as pregnancy loss, autoimmune disease (eg, Guillain-Barré syndrome and multiple sclerosis), anaphylaxis, venous thromboembolism, and stroke, demonstrated no increase in incidence above background rates.

Several related studies examining obstacles to vaccination have identified lack of information as a principal barrier in more than 50% of these parents and patients.^{7,8} In particular, there is little knowledge of the link between HPV and head and neck cancers. In a recent cross-sectional survey by Luryi et al,⁹ only 0.8% of respondents identified HPV infection as a risk factor for mouth and throat cancer. In addition, observed racial and ethnic disparities in rates of HPV vaccination do not appear to be the result of differences in access to care.¹⁰ Finally, HPV disease and HPV vaccination engender additional controversy given popular misconceptions about transmission, prevalence, and preventability of HPV. Such misconceptions may increase feelings of isolation and shame that prevent individuals from making informed decisions about their health.

Currently, there is a paucity of data regarding the knowledge, attitudes, and practices of patients surrounding HPV-related disease and vaccination. To address this lack of data, we proposed a prospective study to assess our inner-city community's knowledge, attitudes, and practices surrounding HPV disease and vaccination. We hypothesized that in our inner-city community, as in the US population at large, there exists a significant educational and knowledge gap regarding HPV-related disease and vaccination and that the implementation of a brief educational platform

Key Points

Question Is community education effective in increasing knowledge and changing attitudes and practices toward human papillomavirus (HPV) vaccination in an inner-city community?

Findings In this prospective cohort study, participants' baseline knowledge of HPV disease and vaccination was poor but improved significantly following a short educational session, which resulted in a significant increase in the proportion of participants who intended to vaccinate their children against HPV.

Meaning Education regarding HPV disease and vaccination may be an effective method to increase vaccination rates and, theoretically, to prevent HPV-related head and neck cancer in this high-risk community.

will increase knowledge, improve attitudes, and affect projected practices regarding HPV vaccination.

Methods

Multiple brief, community-based educational sessions on HPV-related disease addressed both characteristics of HPV disease (transmission, symptoms, and risk for progression to cancer) and indications for, risks of, benefits of, and guidelines for HPV vaccination. The effect of these educational sessions on participants' knowledge, attitudes, and practices was determined by measuring changes to responses on identical surveys administered before and after the presentation. Sessions were offered from March 1 to December 31, 2014, at a variety of churches, ministry conferences, and faith-based recovery centers in New Orleans, Louisiana, including Light City Church, Philadelphia Ministries Church, and Bridge House. Participation was offered to all in attendance at a particular church service or session who were capable of completing the survey, with demographic features and exclusion criteria as outlined below. Tulane University Institutional Review Board approved this study. All participants provided verbal consent before participating in the surveys and educational session.

Development of an Educational Platform and Survey Validation

A partnership (Healing Hands Across the Divide) between faith and community leaders and health care professionals was used to develop the educational platform and validate the surveys through a series of meetings. The health care professionals presented the proposed surveys on knowledge, attitude, and practices regarding HPV as well as educational session materials to the community leaders. The collaboration between the faith and community leaders and health care professionals allowed for refining and alteration of the surveys to ensure clarity to the target audience. A similar platform was used to develop a culturally competent educational module to be presented in the inner-city churches and community centers.

Table. Participant Demographics

Characteristic	Value ^a
Completed surveys (N = 128)	86 (67.2)
Age, mean (SD), y	46.3 (13.4)
Male sex	61 (70.9)
Race/ethnicity	
White	41 (47.7)
African American	35 (40.7)
Other or not reported	10 (11.6)
Tobacco users	41 (47.7)
Insured	41 (47.7)
Completed 12th grade	68 (79.1)

^a Data are presented as number (percentage) of patients unless otherwise indicated.

Surveys

A simple 20-question survey was distributed to each participant before the educational session and then again immediately after the session (eFigure 1 and eFigure 2 in the Supplement). The surveys consisted of questions divided into 3 categories: knowledge, attitudes, and practices. A demographic questionnaire was included with the pre-session survey to assess participants' age, sex, race/ethnicity, smoking history, medical insurance history, and highest educational level attained. The sections on knowledge and attitudes contained 5 and 7 items, respectively, and participants responded using a 4-item Likert scale. The section on practices consisted of 5 yes or no questions regarding personal and family history of HPV vaccination, along with 2 multiple-choice questions about the location of previous vaccination and perceived barriers in the community to vaccination.

Educational Session

After completion of the initial survey, participants took part in a 15-minute educational session. A member of the health care team delivered a PowerPoint (Microsoft Corporation) presentation providing background information on HPV and its role in causing genital warts as well as cervical, vaginal, anal, and head and neck cancers. In a culturally sensitive and nonjudgmental manner, the health care professional explained how HPV is transmitted and detailed the benefits, risks, and current guidelines for HPV vaccination. The presentation component of each educational session lasted approximately 8 minutes and was followed by a brief, community-based discussion that allowed for participants' questions and a dialogue regarding misconceptions surrounding HPV-related disease.

Exclusion Criteria

Survey results were checked for completeness and aggregated. Surveys were excluded if either the preeducation or posteducation component was not completed or if the survey was completed during the wrong part of the session (eg, completing the posteducation survey before presentation and discussion or vice versa).

Statistical Analysis

Survey responses to Likert-scale questions from both the knowledge and attitudes sections were aggregated to create a composite knowledge score and composite attitudes score for each participant for the preeducation and posteducation surveys. A higher composite score in the knowledge section reflected increased knowledge of HPV and vaccination, while a higher composite score in the attitudes section reflected greater distrust of publicly sponsored and federally mandated vaccination programs. Yes or no questions from the practices section were analyzed using the mean percentage of a yes or no response to each question as dichotomous variables. Comparison of independent samples of continuous data was performed using paired-sample 2-tailed *t* test. Fischer exact tests were used to compare dichotomous variables. *P* < .05 was considered significant.

Results

Respondent Characteristics

Eighty-six of 128 participants met eligibility criteria. Demographic data of participants are presented in the Table. Respondents were diverse with regard to age and self-identified ethnicity, mirroring the greater New Orleans population from which these individuals were sampled. There was a preponderance of male participants, likely owing to one of our study locations serving as a faith-based substance abuse recovery home with exclusively male residents. Most respondents (68 [79.1%]) had attained a high school education or better. Participants were divided nearly evenly with regard to health insurance coverage.

Knowledge

Baseline self-ratings for HPV knowledge, including the causal association of HPV with cancer and the knowledge that there was a vaccine against HPV, were poor. Of a total composite score of 20, the mean knowledge score before the educational session was 9.69. After the session, the same survey was deployed. In the posteducation survey, there was a significant increase in the respondents' appreciation of their knowledge regarding HPV and vaccination, with a mean composite score of 13.21 (*P* < .01). The absolute increase in mean knowledge composite score from the preeducation survey to the posteducation survey was 3.52 (17.6%) (95% CI, -2.87 to 9.92). The Cohen *d* value for effect magnitude of the education program was 1.07.

Attitudes

Respondents expressed a moderate level of worry regarding government involvement in vaccination programs for infectious diseases and cancer, reflected by a mean composite attitudes score before the education session of 16.57 of a possible total of 28. The mean composite attitudes score after the session was 15.22. No significant changes in participants' attitudes were identified as a result of the educational presentation (*P* = .98).

Practices

The final question in the practices section (“Would you give your child the HPV vaccine?”) was selected as a key indicator of the effect of the educational program. A significant increase in intention to vaccinate was found as a result of the educational session. Before the educational session, only 34 respondents (40%) indicated that they would have their child vaccinated against HPV. After the educational session, 60 (70%) stated they would want to have their child vaccinated ($P = .002$).

Discussion

Despite the decreasing incidence of head and neck cancer during the past 2 decades in the United States, the incidence of OPSCC continues to rise.¹¹ Head and neck squamous cell cancer has been attributed to multiple etiologic factors, including smoking, HPV infection, and decreased vegetable consumption. Current data from Gillison et al¹² would suggest that up to 72% of OPSCC occurs in HPV-positive patients. With the increasing incidence of HPV infection among men and women and the concurrent increase in HPV-related OPSCC, the world is currently facing an epidemic increase in the incidence of OPSCC. Unfortunately, the vaccination that may serve as a potential preventive method is grossly underused.

The role of vaccination against specific HPV serotypes in preventing cervical cancer is clear. However, HPV vaccination has not been adopted on a comparable scale for the prevention of head and neck malignant neoplasms. High-risk HPV serotypes 16 and 18 have been found in more than 60% to 90% of HPV-positive OPSCC, and vaccination with the bivalent vaccine could afford a strong protection against both HPV 16 and 18.¹³⁻¹⁶ This finding suggests that HPV vaccination can be effective at reducing the incidence of OPSCC. However, no longitudinal studies on the effect of HPV vaccination on head and neck malignant neoplasms exist at this time.¹⁷

Several studies have examined the complexities of screening for HPV and vaccination in inner-city and lower socioeconomic status populations. It is clear that providing affordable access to vaccination is insufficient to propagate vaccination adoption in the communities studied.¹⁸ Factors contributing to low vaccination rates also include distrust or suspicion of health care professionals and systems, lack of flexibility of work hours, shortage of socially competent caregivers, and transportation challenges. Publicly insured individuals, including those with Medicaid and Medicare, represent a significant proportion of the population at high risk for HPV and have challenges with both the initiation and completion of a vaccine series. The lack of linkage from initiation to completion is especially prevalent in lower socioeconomic groups, resulting in incomplete immunity in patients at highest risk of infection.¹⁹

Multiple studies have examined the political and social underpinnings of inadequate HPV vaccination in the United States. Osazuwa-Peters¹⁷ suggested the need for a broadened vaccine policy to incorporate the prevention of oral HPV-related pathologic conditions. He further advocated for a fed-

eral mandate of HPV vaccination for all school-aged children, noting the success of federally mandated vaccinations dating back to World War I. With public concern about purported adverse effects of even commonly required vaccinations, this approach appears to be faulty. Examination of failed state-level legislative efforts suggests that politicization of HPV vaccination has hindered wide adoption of vaccination programs.²⁰ To minimize such politicization, we chose to use our previously established faith and/or community-based platform (Healing Hands Across the Divide) to gain a better understanding of the community's knowledge base, attitudes, and health care practices concerning vaccination and, in particular, HPV vaccination.²¹

In this study, we demonstrated that, prior to an educational session, members of our inner-city community believed that they had a significant education and knowledge deficit regarding HPV infection, its association with cancer, and the existence of an HPV vaccine, which was associated with an inherent mistrust of the health care system. Participants also noted a reluctance to discuss HPV vaccination with their physicians. After participation in an educational session, individuals believed that they had an increased knowledge base and a better understanding of HPV infection, HPV-related cancer, and the indications for HPV vaccination. This improved knowledge base empowered the participants and increased their desire to further discuss vaccinations with their physicians.

Despite these findings, our study was limited in its ability to determine the durability of this educational effect, that is, whether an individual's willingness to receive vaccination held up over time. Future study should seek to evaluate whether individuals sought out and received vaccination and, where appropriate, provide referral and/or actual administration at the time of the educational session. In addition, data regarding perceived barriers to vaccination might inform further educational sessions and study. We envision adoption of this platform in schools, places of worship, and community centers. Our hope is that our data will generate community funds and/or grant support for implementation of sessions at these centers as well as education of community leaders so that they may lead the sessions independently and provide referral to (barrier-free) clinics offering HPV vaccination.

Despite an increase in willingness to undergo vaccination, feelings of mistrust of a government mandate persisted. Mistrust of the health care system is common among the African American community, who was strongly represented in our study population.²²⁻²⁴ In innumerable community discourses, the Tuskegee Syphilis Study is offered as powerful evidence for justified suspicion. This finding of a pervasive lack of trust is reinforced by our own studies, which confirm continued health disparities incurred by African Americans that range from poor access to care to denial of advanced interventional procedures and even life-saving organ transplants.²⁵ All of these factors serve to justify any amount of continued suspicion that African Americans may have regarding the medical community and government-driven public health efforts.²⁶ The effect of distrust is especially disturbing in the arena of OPSCC. The African American community has been shown to

have a higher incidence of oral HPV and HPV-positive OPSCC and is at higher risk for poor outcomes for head and neck cancer.²²⁻²⁴

To address this basic problem of trust, we have advanced community-based education to offer hope for a partnership and improved outcomes even in an environment of skepticism. Our study demonstrated that a community-based educational platform can increase an individual's knowledge of HPV and change their intended vaccination practices. We found that the open forum portion of these sessions was particularly useful in increasing knowledge among the community members. Open dialogue allowed for misconceptions regarding HPV vaccination to be aired in a socially acceptable and safe manner. In particular, commonly held misconceptions that HPV is rare and vaccination is intended only for females were addressed in depth. Our data support the previously published premise that education in an appropriate, supportive, nonthreatening environment allows individuals to make the best decisions regarding their own health.²⁷

Our study is limited by the lack of demonstration of a true increase in vaccination as a result of our educational program. While significant increases in participant knowledge regarding HPV and intention to vaccinate children were observed, the true effect on vaccination rates within our population was not measured. The link between education, intention to vaccinate, and

vaccination rates is a clear area for future research. Next, the key target for HPV vaccination is adolescent males and females; however, our study population had only 1 adolescent participant and a majority of male participants. A key audience for future education would be adolescent participants and their parents. Indeed, educational materials are being developed and planning is under way for future outreach products and study through schools in our community.

Conclusions

In the United States, there exists a significant knowledge and educational gap regarding HPV, with pervasive mistrust of health care professionals and the health care system. This attitude inhibits an individual's ability to hear a message, let alone accept and complete a vaccination series endorsed by that message that is intended to protect them from cancer. Participation in a community-based educational platform significantly improved the level of knowledge and increased the rate of intended vaccination among participants. However, these efforts did not decrease the level of mistrust in health care professionals or the health care system. Despite this finding, we believe that community-based education offers the best hope for vaccination, screening, and improved outcomes.

ARTICLE INFORMATION

Accepted for Publication: February 23, 2016.

Published Online: April 21, 2016.
doi:10.1001/jamaoto.2016.0433.

Author Contributions: Dr Weinstein had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study concept and design: Weinstein, Ananth, Brunner, Nelson, Carter, Buell, Friedlander.

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Statistical analysis: Weinstein, Ananth, Carter, Buell.
Administrative, technical, or material support: Weinstein, Ananth, Brunner, Nelson, Bateman, Buell, Friedlander.

Study supervision: Ananth, Nelson, Buell, Friedlander.

Conflict of Interest Disclosures: None reported.

Funding/Support: This work was funded by a 2014 Prevention and Early Detection grant from the American Head and Neck Society.

Role of the Funder/Sponsor: The funding source had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

Previous Presentation: This study was presented as a poster at the 2014 Triological Society

Combined Sections Meeting; January 24, 2014; Coronado, California.

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