HPV in West Virginia: Exploring Human Papilloma Virus
Education, Prevention, and Beliefs

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Abstract

West Virginia has the highest incidence rate of cancers associated with Human Papilloma Virus (HPV) in the United States. This study explored issues that may provide clues to the high rate of HPV-associated cancers in West Virginia. Specific topics that were explored include knowledge of HPV and associated cancers, accessibility to preventative healthcare relating to HPV vaccination and Pap smear, as well as any beliefs that may affect HPV-associated cancer prevention. 1,038 State Fair attendees from 45 counties in West Virginia voluntarily consented to take a gender and knowledge specific survey. The results were analyzed and presented in graphical formats. Gender is shown to be a significantly independent variable in the knowledge of HPV across all age groups over 20 (p=0.0001) but not in the youngest age groups (p=0.92). The increased acceptance rate for HPV vaccination seen in the younger generations is likely to continue (R²=0.08673). The findings of this study suggest a vigorous, all-inclusive educational campaign against HPV that details HPV-associated cancers, risk factors and mode of transmission, availability and safety of HPV vaccines, as well as preventative strategies, conducted by schools, clinics, and media may reduce the future incidence rate of cancers caused by HPV in West Virginia.

Introduction

Human Papilloma Virus (HPV) is the most commonly spread sexually transmitted infection in the United States. About 79 million Americans are currently infected with HPV. There are more than 150 strains of HPV, many of which are spread orally, anally, and vaginally. It can be transmitted even when the infected person does not have symptoms. Symptoms develop years after infection. High-risk strains of HPV can cause cancer of the vulva, vagina, penis, cervix, and oropharynx. Cancer takes years to develop in a person infected with high-risk HPV strains.

West Virginia has the highest rate of HPV-associated cancers of all fifty states. The CDC’s 2016 Morbidity and Mortality Weekly Report found 17.0 HPV-associated cancers in women and 10.7 HPV-associated cancers in men for every 100,000 people in West Virginia in 2000. The CDC’s 2012 Morbidity and Mortality Weekly Report found the national average was 13.2 cases for females 8.1 for males for every 100,000 people in 2004 to 2008. West Virginia’s HPV vaccination coverage is above the national average. 40.0% females and 23.5% males between the ages of 13 to 17 have completed three doses of the HPV vaccine while the US national average is 39.7% for females and 21.6% for males in 2014.

There are a couple of ways to decrease the risk of developing HPV-associated cancers. Currently, there are two FDA approved vaccines (Gardasil and Cervarix) available to prevent HPV infection, which are recommended to be administered from age 11-12 to both males and females. Routine Pap smear for women ages 21 to 65 years old can prevent cervical cancer caused by HPV.

There is no treatment for the virus itself. However, both genital warts and pre-cervical cancer lesions can be treated. Women who get routine Pap smears can identify problems before cancer develops. The increased rate of HPV-associated cancers in West Virginia raises an alarm that warrants further scrutiny and investigation. This study explored issues that may provide clues to this dilemma.

Specific topics that were explored included knowledge of HPV and associated cancers, accessibility or economic issues relating to HPV vaccination and Pap smear as well as any beliefs that may affect HPV-associated cancer prevention. In addition, this study aimed to discuss what led to the current vaccination acceptance rate and how this may affect future incidence rate of HPV-associated cancers in WV.

Methods

An IRB exemption was granted for this project. A 22-item questionnaire and a flow chart were designed to make the questionnaire gender and knowledge specific. (see figure 1; question #1 is only applicable to females). The electronic survey was administered via Google Forms on electronic devices to a random sampling of attendees at the 2016 West Virginia State Fair that was held in Lewisburg, WV, in Greenbrier county from August 12-21. Two students and one faculty
or staff supervisor administered the survey for two to three hours on a daily basis for eight days. 1,038 West Virginia residents between the ages of 18-60+ were surveyed. All participants voluntarily consented and had to answer basic demographic information like gender, age, and their county of residence. Responses were analyzed with the chi-squared tests and regression analysis.

Results

A total of 1,038 State Fair attendees voluntarily consented to participate in the survey. Residents from 45 out of 55 counties in West Virginia participated. Of the residents who participated in the survey, 288 were from Greenbrier county. The gender distribution for all counties was 41% (n=422/1,038) male and 59% (n=615/1,038) female. The age distribution for participants in all counties: ages 18-20 was 8% (n=89/1,038), ages 21-30 was 19% (n=200/1,038), ages 31-40 was 14% (n=144/1,038), ages 51-60 was 18% (n=183/1,038), and ages 60+ was 20% (n=207/1,038). To exclude any potential skewing of the data, the gender and age distribution of participants were compared including and excluding Greenbrier County participants and results were similar.

The females in this study (n=615) were asked if they knew what a Pap smear was. The majority of females 99% (n=609/615) responded “yes” and were additionally asked if they have ever had a Pap smear. From this group, 7% (n=45/609) answered “no” and reasons stated were: 33% (n=15/45) did not feel the need to, 11% (n=5/45) had the HPV vaccine, 2% (n=1/45) did not know much about it, 2% (n=1/45) no health insurance, 0% (n=0/45) difficult to set up an appointment, and 51% (n=23/45) chose other reasons not listed. In the study, 74% (n=770/1,038) of participants claimed to have heard about HPV. When those who claimed to have heard about HPV were asked two additional questions about it, 85% (n=655/770) knew HPV could cause cancer and 86% (n=663/770) knew that it was sexually transmitted. Those who knew it could cause cancer were also asked what types of cancer it could cause (multiple answers could be selected): 91% (n=598/655) answered cervical cancer, 43% (n=283/655) vaginal cancer, 22% (n=146/655) penile cancer, and 13% (n=86/655) oropharyngeal cancer.

Gender appears to be a significantly independent variable regarding knowledge of HPV across all age groups (p< 0.0001 for each age group above 20) except for the youngest age group of 18-20 (p=0.92). (Figure 2) The primary source of HPV information in the latter group was their school. (Figure 3) The participants’ responses regarding awareness of a vaccine that could prevent cancer were split into 60% “yes” (n=624/1,038) and 40% “no” (n=414/1,038). Only 73% (n=456/624) of those who answered yes have heard about Gardasil or Cervarix. The top three sources of information about the HPV vaccines are from clinic staff, television and school.

Based on our findings, (n=377/456) females were knowledgeable of Gardasil/ Cervarix versus males (n=79/456). The group that responded “yes” to having heard of Gardasil or Cervarix was asked the additional question “Would you be open to you or your child receiving the HPV vaccine?”. Eighty-three percent responded “yes” [female: (n=309/377); male: (n=69/79)] and seventeen percent responded “no” (n=78/456). In general, women who
are knowledgeable of HPV are less accepting of HPV vaccination than men who are knowledgeable about the HPV vaccine \((p=0.05)\). (Figure 4)

The top three reasons of those who answered “no” to the question “Would you be open to you or your child receiving the HPV vaccination?” in decreasing order by number of responses obtained for females and males are as follows, (Females: “I do not think it is safe”, “I don’t think my child or I need it”, “I do not think my child or I need it”. For males: “I do not know much about it”, “I don’t think my child or I need it”, “I do not think it is safe”). No participants in the 18-20 age group answered that they did not know much about the HPV vaccine.

Participants were asked if they have ever received the HPV vaccine and the results from the 18-40 age range \((n=168, \text{age group that is eligible to have received the vaccine when it was introduced})\) were extrapolated: 46\% \((n=78/168)\) answered “yes” and 54\% \((n=90/168)\) answered “no.” The responses were broken down by age groups to see a trend (Figure 5). Analysis suggests that this trend is likely to continue \(R^2=0.8673\).

**Discussion**

West Virginia female residents are knowledgeable of Pap smears. The data shows no accessibility issues to this preventative strategy. Majority of the females who did not have a Pap smear were in the 18-20 age group. USPTF recommends screening cervical cancer with Pap smears every 3 years starting at the age of 21.6 Therefore, individuals in this age range are not yet eligible for Pap smear screening. Of those participants surveyed who did not have a Pap smear \((n=45)\), 11\% answered, “Because I received the HPV vaccine”. This suggests a need to emphasize that receiving an HPV vaccination does not eliminate the necessity of using the Pap smear as a preventative screening tool.
Gender is an independent variable across all age groups except for the 18-20 age group surveyed (p=0.92). Significantly more women over the age of 20 claimed to have knowledge of HPV than men (p<0.0001 for each age group over 20). This supports the importance of including current health issues in the high school curriculum since the survey reports that the primary source of HPV information of this age group is their school.

Men are less knowledgeable compared to women about HPV. The primary source of HPV information for men above the age of 20 is the television, while most women acquire their HPV knowledge from a clinic staff. This suggests that there is inequality in HPV health education between men and women. This may be because women in the eligible age group for Pap smears are getting their HPV education during their routine visits. This knowledge gap between genders in the older age groups can be bridged by emphasizing that HPV is a sexually transmitted disease that does not discriminate between sexes. This sexual mode of HPV viral transmission should be included in the educational campaign to promote awareness and prevent the spread of the virus.

A significant percentage of West Virginia residents do not know much about HPV, despite what some claim. There is a minority group of about 11% each in the 2 additional questions posed to those who claimed knowing about HPV—these participants did not know about its clinical significance of a causal relationship to a variety of cancers, or that it is a sexually transmitted disease. These percentages, added to those who initially denied knowing about HPV, consist of a larger group of WV residents (approximately 40%) who lack knowledge about the Human Papilloma virus. Many participants in this study, including most women, who were aware that HPV could cause cancer, knew primarily that HPV could cause cervical cancer, but not the other cancers caused by HPV. It is linked to 60% of penile cancers, 70% of oropharyngeal cancers, 70% of vaginal cancers, and 90% of anal and cervical cancers. Additional educational component on other cancers caused by high-risk strains of HPV is warranted.

The younger age groups (18-20, 21-30, 31-40) are considered an important parameter in this study in assessing the vaccination trend in WV. The eligible HPV vaccine recipients (up to age 36 for female participants) fall within these age groups.
groups since Gardasil’s FDA approval in 2006 for women and in 2011 for men. Over half of vaccine-eligible participants did not receive HPV immunization at the time it was introduced; however, there seems to be an inverse relationship between age groups and the acceptance rate for HPV vaccination. The findings in this study are significant because the younger generations show an increased uptake of the HPV vaccine. There is a higher acceptance rate among the younger age groups, a trend that is likely to continue, per the regression analysis. With more of the younger generation being vaccinated, the HPV-associated cancers in the future may decrease in WV, making it vital to educate future generations in schools and clinics.

Current HPV vaccination campaigns display the benefits of HPV vaccination for women and are many times labeled and known as the “cervical cancer vaccine”. High-risk HPV strains are linked to cervical cancers, however, other HPV-linked cancers as previously mentioned have high statistical significance of cause and effect and could also be prevented with vaccination. There is no educational campaign currently available regarding the effects of HPV in men comparable to a campaign against cervical cancer for women.

The positive influences of receiving the HPV vaccine included family, friends, neighbors, staff at clinic, and school. For the youngest age group (18-20), school and clinical staff have had the greatest influence in the acceptance of the HPV vaccination. School plays a vital role in education and access to information about HPV. West Virginia currently does not have legislation in place that requires children to receive the HPV vaccine. In 2007, a bill proposal required vaccinations of all girls entering the sixth grade against the human papillomavirus, but was dismissed.

Family members play the role of a secondary source of support and reinforcement of acceptance. Other studies on HPV have similar findings. The Department of Public Health in Italy conducted a study on HPV, which consisted of a questionnaire about vaccination status, sources of information about vaccination, knowledge and prevention of the disease, modes of transmission, HPV-related diseases, and acceptance of immunization. Their study population consisted of 576 female high schools and secondary students. The study showed that parents, school, and health care workers have a central role in girls’ education and choices about HPV vaccination. In a different study conducted at the University of Cincinnati, participant’s intentions of receiving the HPV vaccine were examined. The women who had high intention of receiving the HPV vaccine also reported high intention of having their daughter (if applicable) receive the HPV vaccine. Majority of participants who knew about the HPV vaccine were open to having themselves or their child be vaccinated for HPV.

In general, men who are knowledgeable about the HPV vaccine are more open to receiving HPV vaccination for themselves and their children compared to women who are knowledgeable of HPV vaccination, except for the 41-50 age group. This is an unexpected finding in this survey that is worth exploring in future studies. Many of the participants who have heard about the vaccine but were not open to receiving it or were opposed to encouraging others to receive it did not think it was safe or did not know much about it. The study conducted by the Department of Public Health in Italy mentioned above, cited several reasons for non-adherence to vaccination and these were the disagreement of the parents among the 11-12 year group (45.3%) and the lack of evidence on efficacy among the 18 years-old group (26.8%). The level of HPV knowledge of the girls that were vaccinated reported higher scores than the unvaccinated group in several questions (p ≤ 0.05). They concluded that there was a lack of information about HPV infection, and the findings in this WV survey re-affirm that knowledge of HPV is a critical variable in the acceptance of the HPV immunization program.

The limitations of this study are the exclusion of children under the age of 18 in the study parameter as well as exclusion of risk factors and sexual behaviors in the questionnaire that may provide more insight regarding the high rate of HPV-associated cancers in WV. These were intentionally excluded during the design of the study to maintain the family friendly environment of the study site, which was the West Virginia State Fair, and to avoid the necessity of parental consent for surveying minors. There were aspects of the study that were subject to recall bias. We do not know how the attendees who refused to participate in the study could have affected the results. In addition, some may have heard about the vaccine from TV, but did not really know what it was about. Also, the question “Why are you not open to you or your child receiving the HPV vaccine?” could have been separated into two questions to identify the parent population from the child population. Future studies should include a wider age range and scope of questions to better gauge participant responses such as a choice on the questionnaire pertaining to beliefs that allowing a teenager to be vaccinated for HPV is akin to encouraging them to engage in sexual activities. It may include other associated risk factors, such as smoking, to account for other reasons that may have driven the HPV associated cancer rate up in West Virginia.
Conclusions and Recommendations

The findings of this study show that almost half of West Virginia residents are not knowledgeable about HPV and its associated cancers. Gender is shown to be a significantly independent variable in the knowledge of HPV across all age groups over 20 but not in the youngest age groups. This supports the importance of including current health issues in the high school curriculum since this survey reports that the primary source of HPV information of this age group is their school.

Majority of residents eligible for the HPV vaccine did not receive it during the early years after its FDA approval. There is, however, an increased trend of HPV vaccination acceptance in the younger generation. This may decrease future incidence rates of HPV-associated cancers in WV.

The results of this survey underscore the need for a more vigorous campaign to raise awareness of HPV that should include facts about its cancer causing effects, the various types of cancers it can cause and its sexual mode of transmittance. It should also be emphasized that HPV vaccination is not a replacement for cervical cancer screening. Special emphasis should be placed on the safety and effectiveness of the HPV vaccine and educating the young population in schools and in clinics about HPV. A concerted effort by the schools, clinical staff, and media are key to a successful campaign in raising awareness of HPV among WV residents.

This and other studies on HPV reaffirm that knowledge increases acceptance and public support of the HPV immunization program.

References


