Published in final edited form as:

J Community Health. 2013 December ; 38(6): 1106–1114. doi:10.1007/s10900-013-9720-y.

Knowledge and Beliefs Regarding Human Papillomavirus Among College Students at a Minority-Serving Institution

Geri Schmotzer and

Assistant Professor, School of Nursing P. O. Box 30001, MSC 3185 Las Cruces, NM 88003-8001

Kerryn Reding, PhD, MPH, RN

Assistant Professor, Biobehavioral Nursing and Health Systems, School of Nursing, University of Washington, Assistant Member, Cancer Prevention Division of Public Health Sciences, Fred Hutchinson Cancer Research Center, (206) 221-1571

Abstract

Background—Cervical cancer is a leading cause of death in U.S. women, with Hispanic women at higher risk of mortality than non-Hispanic white women. While the human papillomavirus (HPV) vaccine represents substantial progress towards cervical cancer prevention, little is currently known about Hispanic student's beliefs regarding the HPV vaccine.

Objective—To assess the knowledge, attitudes, behaviors, and beliefs of college students in the U.S.-Mexico border region following the release of the HPV vaccine for both males and females.

Methods—This survey was conducted using a convenience sample where participants were recruited from pre-nursing and nursing courses. The self-administered questionnaire ascertained HPV vaccination status, and knowledge and beliefs regarding the HPV vaccine.

Results—202 male and female students responded. 28.9% of respondents reported having received the HPV vaccine. Of the non-vaccinated students under age 27, 27.3% Hispanic students reported an intention to receive the vaccine. Misinformation about HPV was common and among non-Hispanic white students was associated with intention to get vaccinated.

Conclusions—We found a relatively small proportion of unvaccinated Hispanic and non-Hispanic nursing students intending to be vaccinated for HPV. Findings indicate an intervention to increase vaccination rates among college-aged students may not be as straightforward as increasing knowledge of HPV.

Implications for Practice—Nurses are in a unique position to educate and recommend HPV to underserved patients. Thus, educating nursing students regarding HPV and the associated cancers is paramount if we are to encourage ethnic minorities to receive the HPV vaccine.

Introduction

Background

Cervical cancer is one of the leading causes of mortality in young women. In 2010, there were 12,200 new cases of cervical cancer and 4,210 deaths in the U.S. Worldwide cervical cancer is the second most common cancer among women with approximately 500,000 new cases and 250,000 deaths (WHO, 2009). In the United States-Mexico border region, 1,023

new cases of cervical cancer were diagnosed in 2004 (U.S. Mexico Border Health Commission, 2010). Central to the epidemiology of cervical cancer is race, ethnicity, and socioeconomic status. Higher incidence rates are observed for Hispanic women (12.7/100,000 women) compared to non-Hispanic white women (7.9/100,000 women), as well as higher mortality rates (3.1 vs. 2.2 deaths/100,000) (Jemal, Siegel, Xu, & Ward, 2010). The increased mortality may in part be due to the significantly lower rates of a Papanicolaou (Pap) tests in Hispanic women compared to non-Hispanic white women (Bazargan, Bazargan, Farooq, & Baker, 2004; Centers for Disease Control and Prevention, 2006). Additionally, cervical cancer is increasingly a disease of poor women. In the U.S., lower socioeconomic status is associated with lower rates of cervical cancer screening, diagnosis, treatment, and survival (Newmann & Garner, 2005). Furthermore, mortality rates are higher among rural populations than urban populations for cervical cancer, as factors that place women at high risk for developing or dying from cancer are concentrated disproportionately in rural areas of the United States (Newmann & Garner, 2005).

The vast majority of cervical cancers are strongly associated with infection by the oncogenic types 16 and 18 of human papillomavirus (HPV) while nononcogenic types 6 and 11 are associated with genital warts. The original vaccine, Gardasil[®], HPV vaccine was licensed for use in females ages 9 through 26 in 2006. This vaccine is directed against two oncogenic HPV types (16 and 18) and two nononcogenic HPV types (6 and 11). Subsequently, in 2009 Cervarix[®] was licensed for use in females ages 10 through 25 to protect against oncogenic HPV types 16 and 18 (Center for Disease Control and Prevention, 2010a). Additionally, in 2009 Gardasil[®] was approved for males ages 9 through 26 for protection against nononcogenic HPV types 6 and 11 (Center for Disease Control and Prevention, 2010b). Both Gardasil[®] and Cervarix[®] are administered in a three-dose intramuscular injection.

HPV is a highly prevalent sexually transmitted infection (STI) among college students. In a study conducted by Ingledue, Cottrell, & Bernard (2004), the researchers found as many as 60% of the college women they sampled had HPV. Potential reasons for this include risky sexual behaviors, lack of STI knowledge, and lack of preventive care—including Pap test. Additional studies have shown that a lack of HPV knowledge and transmission among college women influences their behaviors regarding cervical cancer prevention (Denny-Smith, Bairan, & Page, 2006; Ingledue et al., 2004; Vail-Smith & White, 1992). To date, few studies have examined college men's perceptions of HPV. McPartland, Weaver, Shu-Kuang, & Koutsky (2005) found college-aged men do not consider themselves vulnerable to HPV. Of six STIs including HIV, syphilis, gonorrhea, chlamydia, genital herpes, and genital HPV, the authors found genital HPV was perceived to be less severe for men. These findings suggest that intervening to provide knowledge and education about HPV could be a reasonable approach to reducing HPV prevalence. Therefore following the release of the HPV vaccine for both males and females, the purpose of this study was to answer the following research question: to what extent does the ethnicity of a college nursing student influence the knowledge of HPV, the receipt of the HPV vaccine, or the intent to receive the HPV vaccine? Additionally, we sought to examine what sources college nursing student used to obtain their HPV health information.

Methods

Design and Sample

For this cross-sectional, descriptive study, we recruited participants at New Mexico State University, which represents a minority serving university along the U.S.-Mexico border region. In March 2011, six senior-level nursing students recruited participants from nursing and pre-nursing pathophysiology courses using a convenience sampling method. These students approached the participants during their nursing classes after gaining permission from the faculty of record, and administered the survey. All nursing and pre-nursing students were eligible. The Institutional Review Board for the Protection of Human Subjects at New Mexico State University (NMSU) approved this study.

Survey Instrument

We developed a self-administered survey on HPV after a thorough review of the literature (Dillard & Spear, 2010; J. Drewry, I. C. Garces-Palacio, & I. Scarinci, 2010; Gerend & Shepherd, 2011; Jones & Cook, 2008; Licht et al., 2010; Jessica R. Sandfort & Andrew Pleasant, 2009). The questionnaire included sections on demographics, sexual behavior, vaccination status, intent to vaccinate, HPV knowledge and beliefs, primary sources of information about HPV and the HPV vaccine, as well as their preferences for obtaining information about sexual health. We pre-tested the survey for clarity and comprehension with 38 students and revised it based on student feedback. The survey had 95 items using Likert scales and true/false response formats. It took approximately 30 minutes to complete. Of the 241 students eligible, 202 students completed the survey for a response rate of 84%. In appreciation for completing the survey, we gave a \$5 gift card to each student. Here, we present a report on the knowledge and beliefs section of the survey.

Measures

The main dependent variable was self-reported prior HPV vaccination; response options were “yes” or “no” to the statement “I have been vaccinated for HPV.” Additionally, we examined intent to vaccinate; response options were “yes” or “no” to the statement “I plan to get the HPV vaccine.” Independent variables included HPV knowledge and beliefs, gender, ethnicity, sexual experience, age at first sexual encounter, and parental status.

Analytic Strategy

For descriptive analysis, we calculated mean, standard deviations, and percentages. For bivariate analyses, we used the chi-square test to test associations. The exception to this was the use of Fischer’s exact test when we encountered small numbers (5 or less people per cell). The analysis was conducted using STATA v.11.

Results

The study sample included 202 nursing and pre-nursing students aged 18 to 54 years old; 83.2% were female ($n=168$, $M_{age} = 25.2$ years, $SD = 7.1$; Table 1) and 16.8% were male ($n=34$, $M_{age} = 28.4$ years, $SD = 9.9$). The mean age of all students was 25.8 ($SD = 7.61$). 69% were between the ages of 18 and 26 years. Most students were first-degree students

(73.3%), had never married (70.3%), and had an annual income of \$20,000 or less (77.7%). There were equal numbers of Hispanic and non-Hispanic students (100 and 102, respectively); the majority self-identified as white (85.6%) and most were born in the United States (90.2%). About a quarter of the students (23.3%) received their health care at the Student Health Center. The majority of students (84.6%) had a least one sexual encounter. The mean age of the first encounter was 17 years ($SD = 2.2$) and average number of sexual partners was 6.9 ($SD = 8.8$). When asked if they used protections during their sexual encounters, 25% of students reported never using condoms during intercourse. About half reported they had been sexually active in the last 30 days.

Table 2 reports nursing students' knowledge regarding HPV. This table presents statements with the highest percent of respondents answering incorrectly at the top of the table with a descending percent of incorrect answers. The main area of misinformation was not realizing that changes in a Pap smear might indicate a woman has HPV. In addition, more than half the respondents had misinformation regarding men and HPV, including not knowing that there is a vaccine to protect men from HPV, and that HPV can cause cancer of the penis. On the other hand, areas of HPV knowledge held by the vast majority of respondents (more than 95%) centered upon knowing that an asymptomatic person can spread HPV, and knowing that HPV is sexually transmitted and can cause cervical cancer.

In our dataset, 28.9% of our college-aged survey respondents reported having received the HPV vaccine (Table 3). We observed a difference in the percent of men and women who had received the HPV vaccine ($p < 0.001$), with men being less likely to have been vaccinated (3.0%) compared to women (33.9%). We investigated the percent who intended to receive the vaccine in those under 27 years. We observed 27.3% of Hispanic students reported intention to get vaccinated; 36.4% of the female Hispanic students reported this intention while no Hispanic males intended to get the HPV vaccine. 17% of non-Hispanic students intended to vaccinate; 16.7% were female and 20% were male. However, due to the small number of non-Hispanic males in our sample this percentage lacks statistical precision. Never having had a pap test was associated with the intention to receive the HPV vaccination in the future ($p < 0.001$). Ethnicity, history of sexual activity, and number of sexual partners were not associated with receiving or planning to receive the HPV vaccine.

Table 4 presents the associations of HPV knowledge with having received the HPV vaccine or the intention to receive the HPV vaccine (in students under the age of 27), stratified by ethnicity. We report two significant associations with having received a vaccination for each ethnic group. Among non-Hispanics, the belief HPV can cause herpes was associated with vaccination, and the belief that HPV does not cause cancer of the anus was associated with having been vaccinated. In Hispanic students, the belief that a normal Pap test means a woman does not have HPV was associated with not being vaccinated, and the belief genital warts are caused by HPV was associated with having been vaccinated.

We found several significant associations between HPV knowledge and intention to get HPV vaccine. Non-Hispanic students who planned to be vaccinated were more likely than those not planning to be vaccinated to believe the following: HPV does not cause cervical cancer, HPV causes HIV/AIDS, HPV cannot be passed to the baby during birth, and there is a

vaccine for men. Interestingly, answering questions **incorrectly** about HPV was associated with having been vaccinated or planned to get the HPV vaccine for non-Hispanic students in more situations than answering these questions correctly. Specifically, in non-Hispanic students, all but one of the significant associations between beliefs and vaccine status occurred when a larger proportion of people who had received or planned to get the HPV vaccine held misinformation. The exception to this was reporting there is a vaccine to protect men from HPV, in which a higher percentage of people who planned to get the vaccine believed this to be true. This pattern was not the case for Hispanic students. In Hispanic students, knowledge that most women with HPV will not develop cervical cancer was associated with the intention to get the vaccine. Supplemental Table 1 lists the survey items that were examined but not found to be associated with receipt of the vaccine or plans to receive the vaccine.

The most common sources of HPV information were a doctor, TV commercial, high school/college course or health brochure (as presented in Table 1). Among these sources of information, we investigated whether a particular source of information was more likely to result in accurate knowledge of HPV. We observed the source of information did not differ substantially in the accuracy of information, with for example, between 97% and 100% of students reporting knowledge HPV causes cervical cancer when information was received from the sources listed above. However, we observed misinformation to be associated with the intention to receive the vaccine, regardless of source.

Conclusions

Thirty-two percent of adolescents have reported completing the HPV series in the U.S. (Center for Disease Control and Prevention). In our study, 28.9% of surveyed nursing students reported having received the HPV vaccine, of which 33.9% were female and 3% were male. In addition, we observed that only 22.8% of the nonvaccinated students under age 27 intended to receive an HPV vaccine. The HPV vaccine was developed to combat HPV infection. Both Gardasil® and Cervarix® are vaccines to prevent HPV infections in females and Gardasil is approved for use in males (American Social Health Association).

A systematic review of 39 studies concerned with HPV knowledge, published before the HPV vaccine was introduced indicated that the percentage of young women who had heard of HPV ranged from 13% to 93% (Klug, Hukelmann, & Blettner, 2008). While many studies have assessed the knowledge of cervical cancer and HPV infection in college women, (Caron, Kispert, & McGrath, 2009; Denny-Smith et al., 2006; Licht et al., 2010; J. R. Sandfort & A. Pleasant, 2009) few have assessed this knowledge in men (Cirilo, Barbosa, & Zambrano, 2010; McPartland et al., 2005). Furthermore, little is known about the Hispanic student's knowledge and beliefs about cervical cancer and HPV infection. In our study, we observed misinformation regarding some aspects of HPV is common among college students. In particular, more than half of respondents (of both genders) were not aware a vaccine is available to protect men from HPV or that HPV can cause cancer of the penis. Consistent with this finding, we report few men (3%) had been vaccinated for HPV. We also observed that intention to receive the HPV vaccine was not necessarily associated with holding correct information about HPV, particularly for non-Hispanic students.

A lack of knowledge regarding HPV in males for both men and women could have substantial consequences. Prior research has reported an increased risk of cervical cancer in female partners of men with HPV (Bosch et al., 1996; Hippelainen et al., 1993). Men with HPV report significantly more sex partners than those without HPV. In a study conducted by Ho, Bierman, Beardsley, Chang, & Burk, the authors reported that women whose recent partners were sexually promiscuous were at increased risk for HPV (Ho, Bierman, Beardsley, Chang, & Burk, 1998). Of equal importance, men may unknowingly increase their female sex partner's risk for acquiring HPV. Men in this study reported almost 3 times the number of lifetime sexual partners as women. Since most HPV infections are asymptomatic and it is typically unknown if one is infected, a man's sexual behavior plays a substantial role in the transmission and acquisition of HPV infection (Hippelainen et al., 1993). The number of lifetime partners a woman's male partners have increase not only the detection of HPV in the woman, but also the risk of developing cervical cancer (Burk et al., 1996). Hence, educating men about HPV is crucial because screening in this population is not a standard clinical practice (Palefsky & Barrasso, 1996).

In addition, there are implications of our findings on HPV misinformation in designing an intervention aimed at increasing HPV vaccine rates among college students. Clearly, improving HPV vaccination rates is not as straightforward as increasing students' knowledge about HPV. Moreover, in our data we observed that holding misinformation was associated with an intention to be vaccinated, regardless of the source of information. However, our finding that 60% of students received their HPV information through a college course indicates a vehicle for transmitting HPV information. Furthermore, we would expect nursing students to have greater levels of knowledge about health issues than other students; thus, the extent of misinformation could be greater in students not majoring in health-related disciplines. Nevertheless, given the high proportions who are misinformed about HPV indicates the need for a more innovative teaching method within this setting. Considering that a catch-up vaccine for college students 26 and younger may be the last chance to obtain protection from cervical cancer and genital warts, developing a successful intervention at this time point is warranted.

Implications for Nursing

We surveyed nursing students at a minority serving institution well situated within the U.S.-Mexico border region and found misinformation regarding HPV knowledge and Pap testing. Similar findings have been reported among low-income, ethnic minority, and immigrant populations in the U.S. (Bastani et al., 2011; J. Drewry, I. C. Garces-Palacio, & I. C. Scarinci, 2010; Fernandez et al., 2009). However, with nursing students the implications of these findings reach beyond the students themselves. Nurses are in a unique position to educate and recommend HPV to underserved patients. Thus, educating nursing students regarding HPV and the associated cancers is paramount if want to encourage ethnic minorities to obtain the HPV vaccine. Additionally, public health nurses are positions to provide interventions in communities. Therefore, having an understanding of what knowledge deficits ethnic minorities have is a first step to developing culturally sensitive interventions.

Our study had several limitations. First, as a cross-sectional study it is difficult to establish causal relationships. We addressed in part this by spending some of our focus on intention to be vaccinated so that we could get an estimate of the pathway between HPV knowledge and intention to be vaccinated. Second, because it is a self-reported survey it may over- or underestimate responses since students may answer in a manner they think more socially acceptable. We attempted to circumvent this issue by providing students with anonymous, self-administered questionnaires. Additionally, there is the potential of nonresponses for questions that the participant feels are too embarrassing or misunderstood. To the extent that this is the case limits our generalizability. However, for the vaccination status questions and HPV belief questions, relatively few respondents left the questions blank (ranging from 0.5% to 3.9%, with a mean for these questions of 1.1% missing data). Lastly, because our study was conducted among nursing students it may not be generalizable to other populations of students. A primary strength of our study is the inclusion of both male and female students in a largely Hispanic community. This information may offer better insights on pertinent health issues that public health nurses may consider as they develop integrated public health education and immunization initiatives aimed at reducing the burden of HPV infection among college students.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

References

- American Social Health Association. HPV and Cervical Cancer Prevention. Retrieved January 7, 2011, from http://www.ashastd.org/hpv/hpv_vaccines.cfm
- Bastani R, Glenn BA, Tsui J, Chang LC, Marchand EJ, Taylor VM, Singhal R. Understanding Suboptimal Human Papillomavirus Vaccine Uptake Among Ethnic Minority Girls. *Cancer Epidemiology Biomarkers & Prevention*. 2011; 20(7):1463–1472. DOI: 10.1158/1055-9965.epi-11-0267
- Bazargan M, Bazargan SH, Farooq M, Baker RS. Correlates of cervical cancer screening among underserved Hispanic and African-American women. *Prev Med*. 2004; 39(3):465–473. doi: 10.1016/j.ypmed.2004.05.003 [doi] S0091743504002713 [pii]. [PubMed: 15313085]
- Bosch FX, Castellsagué X, Muñoz N, de Sanjosé S, Ghaffari AM, González LC, Shah KV. Male Sexual Behavior and Human Papillomavirus DNA: Key Risk Factors for Cervical Cancer in Spain. *Journal of the National Cancer Institute*. 1996; 88(15):1060–1067. DOI: 10.1093/jnci/88.15.1060 [PubMed: 8683637]
- Burk RD, Ho GYF, Beardsley L, Lempa M, Peters M, Bierman R. Sexual Behavior and Partner Characteristics Are the Predominant Risk Factors for Genital Human Papillomavirus Infection in Young Women. *Journal of Infectious Diseases*. 1996; 174(4):679–689. DOI: 10.1093/infdis/174.4.679 [PubMed: 8843203]
- Caron RM, Kispert E, McGrath RJ. Human Papillomavirus (HPV) Vaccine: Attitudes, Behaviors, and Beliefs of At-Risk Women. *The Internet Journal of Health*. 2009; 9
- Center for Disease Control and Prevention. National and state vaccination coverage among adolescents aged 13 through 17 years—United States, 2010. *MMWR Morbidity and Mortality Weekly Report*. 60(33):1117–1123.
- Center for Disease Control and Prevention. FDA Licensure of Bivalent Human Papillomavirus Vaccine (HPV2, Cervarix) for Use in Females and Updated HPV Vaccination Recommendation for the Advisory Committee on Immunization Practices (ACIP). *MMWR Morbidity and Mortality Weekly Report*. 2010a; 59(20):626–629. [PubMed: 20508593]

- Center for Disease Control and Prevention. FDA Licensure of Quadrivalent Human Papillomavirus Vaccine (HPV4, Gardasil) for Use in Males and Updated HPV Vaccination Recommendation for the Advisory Committee on Immunization Practices (ACIP). MMWR Morbidity and Mortality Weekly Report. 2010b; 59(20):630–632. [PubMed: 20508594]
- Centers for Disease Control and Prevention. Cervical Cancer Statistics. Jan 7. 2009 2006Retrieved July 25, 2009, from <http://www.cdc.gov/cancer/cervical/statistics/>
- Cirilo CA, Barbosa AS, Zambrano E. Level of behavior and knowledge concerning human papillomavirus among university students of a nursing college. Rev Soc Bras Med Trop. 2010; 43(4):362–366. doi: S0037-86822010000400005 [pii]. [PubMed: 20802931]
- Denny-Smith T, Bairan A, Page MC. A survey of female nursing students' knowledge, health beliefs, perceptions of risk, and risk behaviors regarding human papillomavirus and cervical cancer. Journal of the American Academy of Nurse Practitioners. 2006; 18(2):62–69. DOI: 10.1111/j.1745-7599.2006.00100.x [PubMed: 16460412]
- Dillard JP, Spear ME. Knowledge of Human Papillomavirus and Perceived Barriers to Vaccination in a Sample of US Female College Students. Journal of American College Health. 2010; 59(3):186–190. DOI: 10.1080/07448481.2010.493189 [PubMed: 21186448]
- Drewry J, Garces-Palacio IC, Scarinci I. Awareness and knowledge about human papillomavirus among Latina immigrants. Ethnicity & Disease. 2010; 20(4):327–333. [PubMed: 21305817]
- Drewry J, Garces-Palacio IC, Scarinci IC. Awareness and Knowledge about Human Papillomavirus Among Latina Immigrants. Ethnicity & Disease. 2010 Autumn;20:327–333. [PubMed: 21305817]
- Fernandez ME, McCurdy SA, Arvey SR, Tyson SK, Morales-Campos D, Flores B, Sanderson M. HPV knowledge, attitudes, and cultural beliefs among Hispanic men and women living on the Texas–Mexico border. Ethnicity & Health. 2009; 14(6):607–624. DOI: 10.1080/13557850903248621 [PubMed: 19953392]
- Gerend MA, Shepherd JE. Correlates of HPV Knowledge in the Era of HPV Vaccination: A Study of Unvaccinated Young Adult Women. Women and Health. 2011; 51(1):25–40. DOI: 10.1080/03630242.2011.540744 [PubMed: 21391159]
- Hippelainen M, Syrjanen S, Koskela H, Pulkkinen J, Saarikoski S, Syrjanen K. Prevalence and risk factors of genital human papillomavirus (HPV) infections in healthy males: a study on Finnish conscripts. Sex Transm Dis. 1993; 20(6):321–328. [PubMed: 8108754]
- Ho GYF, Bierman R, Beardsley L, Chang CJ, Burk RD. Natural History of Cervicovaginal Papillomavirus Infection in Young Women. New England Journal of Medicine. 1998; 338(7):423–428. DOI: 10.1056/NEJM199802123380703 [PubMed: 9459645]
- Ingledeue K, Cottrell R, A B. College Women's Knowledge, Perceptiona, and Preventive Behavior. American Journal of Health Studies. 2004; 19(1):28–34.
- Jemal A, Siegel R, Xu J, Ward E. Cancer Statistics, 2010. CA: A Cancer Journal for Clinicians. 2010; 60(5):277–300. DOI: 10.3322/caac.20073 [PubMed: 20610543]
- Jones M, Cook R. Intent to Receive an HPV Vaccine Among University Men and Women and Implications for Vaccine Administration. Journal of American College Health. 2008; 57(1):23–32. DOI: 10.3200/jach.57.1.23-32 [PubMed: 18682342]
- Klug SJ, Hukelmann M, Blettner M. Knowledge about infection with human papillomavirus: A systematic review. Preventive Medicine. 2008; 46(2):87–98. DOI: 10.1016/j.ypmed.2007.09.003 [PubMed: 17942147]
- Licht AS, Murphy JM, Hyland AJ, Fix BV, Hawk LW, Mahoney MC. Is use of the human papillomavirus vaccine among female college students related to human papillomavirus knowledge and risk perception? Sexually Transmitted Infections. 2010; 86(1):74–78. DOI: 10.1136/sti.2009.037705 [PubMed: 19841004]
- McPartland TS, Weaver BA, Shu-Kuang L, Koutsky LA. Men's Perceptions and Knowledge of Human Papillomavirus (HPV) Infection and Cervical Cancer [Article]. Journal of American College Health. 2005; 53(5):225. [PubMed: 15813233]
- Newmann S, Garner E. Social inequities along the cervical cancer continuum: a structured review. Cancer Causes and Control. 2005; 16(1):63–70. DOI: 10.1007/s10552-004-1290-y [PubMed: 15750859]

- Palefsky JM, Barrasso R. HPV infection and disease in men. *Obstet Gynecol Clin North Am*. 1996; 23(4):895–916. [PubMed: 8989780]
- Sandfort JR, Pleasant A. Knowledge, Attitudes, and Informational Behaviors of College Students in Regard to the Human Papillomavirus. *Journal of American College Health*. 2009; 58(2):141–149. DOI: 10.1080/07448480903221368 [PubMed: 19892651]
- Sandfort JR, Pleasant A. Knowledge, attitudes, and informational behaviors of college students in regard to the human papillomavirus. *J Am Coll Health*. 2009; 58(2):141–149. doi: 4527T37250115724 [pii] 10.1080/07448480903221368 [doi]. [PubMed: 19892651]
- U.S. Mexico Border Health Commission. *Border lives: health status in the United States-Mexico Border region*. 2010
- Vail-Smith K, White DM. Risk level, knowledge, and preventive behavior for human papillomaviruses among sexually active college women. *J Am Coll Health*. 1992; 40(5):227–230. [PubMed: 1315349]
- WHO. Human papillomavirus vaccines: WHO position paper. *Biologicals*. 2009; 37(5):338–344. DOI: 10.1016/j.biologicals.2009.04.005 [PubMed: 19525124]

Table 1

Characteristics of The Study Population

Demographic Characteristics	N	%
<i>Total</i>	202	100.0%
<i>Age (Mean/SD)</i>	25.8	(7.61)
Range	202	18–54
<i>Gender</i>		
Male	34	16.8%
Female	168	83.2%
<i>Ethnicity</i>		
Hispanic or Latino	100	49.5%
Male	23	23.0%
Female	77	77.0%
Not Hispanic or Latino	102	50.5%
Male	11	10.8%
Female	91	89.2%
<i>Relationship Status</i>		
Married	60	29.7%
Not married	142	70.3%
<i>Education</i>		
First degree student	148	73.3%
Second degree student	54	26.7%
<i>Annual income</i>		
Demographic Characteristics		
\$0 – \$20,000	157	77.7%
Greater than \$20,001	43	21.2%
Omitted	2	1.0%
<i>Race</i>		
American Indian or Alaska Native	7	3.5%
Asian	9	4.5%
Black or African American	9	4.5%
Native Hawaiian or Other Pacific Islander	1	0.5%
White	173	85.6%
Omitted	3	1.4%
<i>Birthplace</i>		
United States	174	90.2%
Mexico	6	3.1%
Other	13	6.7%

Demographic Characteristics	N	%
<i>Where health information is received</i>		
Family doctor	102	50.5%
Health brochure	105	52.0
College course	122	60.4
TV commercial	144	71.3
Sexual Experiences		
<i>Ever had sexual intercourse</i>		
Yes	171	84.6%
No	29	14.3%
Omitted	2	1.0%
<i>Age at first sex encounter (Mean/SD)</i>	17	(2.28)
<i>Number of sexual partners in lifetime (Mean/SD)</i>	6.9	(8.75)
Male	15.3	(17.1)
Female	5.4	(5.4)
<i>Ever had oral sex</i>		
Yes	163	80.6%
No	37	18.3%
Omitted	2	1.0%
<i>Age at first oral sex encounter (Mean/SD)</i>	18	(2.79)
<i>Number of oral sexual partners in lifetime (Mean/SD)</i>	4.5	(5.02)
<i>Condom use during sexual intercourse</i>		
Never	52	25.7%
Occasional	75	37.1%
Always	48	23.8%
Omitted	27	13.4%
<i>Protection during oral sex</i>		
Never	132	65.4%
Occasional	33	16.3%
Always	5	2.5%
Omitted	32	15.8%
<i>Currently sexually active</i>		
Yes	89	44.1%
No	100	49.5%
Omitted	13	6.4%

Table 2

Knowledge and Beliefs Regarding HPV Ordered From Highest to Lowest Percentage Misinformed

HPV knowledge	Correct Answer	Students Answering Incorrectly	
		N	%
Changes in a Pap smear may indicate a woman has HPV	True	182	91.5
There is a vaccine to protect men from HPV	True	142	71.7
HPV infection can be cured	False	136	68.0
HPV can cause cancer of the anus	True	122	62.6
HPV can cause cancer of the penis	True	116	59.8
Pap smears will almost always detect HPV	False	119	59.5
Most women with HPV will not develop cervical cancer	True	108	54.0
A negative test for HPV means you do not have HPV	True	107	53.3
HPV can cause herpes	False	76	37.8
If a women's Pap smear is normal, this means she does not have HPV	False	70	34.8
HPV can be treated	True	64	31.8
Genital warts are caused by HPV	True	51	25.5
Most people with genital HPV have no visible signs and/or symptoms	True	40	19.9
HPV can cause HIV/AIDS	False	26	12.9
Having one type of HPV means you cannot acquire other new types	False	15	7.5
There is a vaccine to protect women from HPV	True	12	6.0
I can transmit HPV to my partner(s) even if I have no HPV symptoms	True	9	4.5
HPV can be sexually transmitted	True	7	3.5
HPV can cause cervical cancer	True	4	2.0

Table 3
Descriptive Characteristics of Having Received or Intending To Receive HPV Vaccination

	No		Yes		p-value
	N	%	N	%	
Has received HPV vaccination					
All study participants	143	71.1	58	28.9	
Gender					
Women	111	66.1	57	33.9	<0.001
Men	32	97.0	1	3.0	
Ethnicity					
Hispanic	76	76.8	23	23.2	0.08
Male	21	95.5	1	4.5	
Female	55	71.4	22	28.6	
Non-Hispanic	67	65.7	35	34.3	
Male	11	100.0	0	0.0	
Female	56	61.5	35	38.5	
Last Pap test ^a					
Never	23	65.7	12	34.3	0.35
Within 3 years or less	84	65.1	45	34.9	
Greater than 3 years ago	4	100.0	0	0.0	
Sexual activity					
Ever	120	70.6	50	29.4	0.84
Never	21	72.4	8	27.6	
Number of lifetime sexual partners					
0	29	82.9	6	17.1	0.34
1–2	30	65.2	16	34.8	
3–6	47	68.1	22	31.9	
7+	37	72.6	14	27.4	

	No		Yes		p-value
	N	%	N	%	
Intends to receive HPV vaccination^b					
<i>All study participants</i>	79	77.2	18	22.8	
<i>Gender</i>					0.08
Women	46	73.0	17	27.0	
Men	15	93.8	1	6.2	
<i>Ethnicity</i>					0.29
Hispanic	32	72.7	12	27.3	
Male	11	100.0	0	0.0	
Female	21	63.6	12	36.4	
Non-Hispanic	29	82.9	6	17.1	
Male	4	80.0	1	20.0	
Female	25	83.3	5	16.7	
<i>Last Pap test^c</i>					<0.001
Never	10	47.6	11	52.4	
Within 3 years or less	34	85.0	6	15.0	
Greater than 3 years ago	2	100.0	0	0.0	
<i>Sexual activity</i>					0.71
Ever	44	75.9	14	24.1	
Never	16	80.0	4	20.0	
<i>Number of lifetime sexual partners</i>					0.38
0	16	80.0	4	20.0	
1-2	14	73.7	5	26.3	
3-6	18	69.2	8	30.8	
7+	13	92.9	1	7.1	

^a Among females

^b Among those eligible to receive vaccine (≥ 26 years) and not already vaccinated

Table 4
Associations of HPV Knowledge With HPV Vaccination Status Stratified by Ethnicity

<i>Survey statement</i>	<i>Vaccinated/Non-vaccinated</i>					
	<i>All Non-Hispanics</i>			<i>All Hispanics</i>		
	<i>Vaccinated</i>	<i>Not Vaccinated</i>	<i>p- value</i>	<i>Vaccinated</i>	<i>Not Vaccinated</i>	<i>p- value</i>
	<i>True %</i>	<i>True %</i>		<i>True %</i>	<i>True %</i>	
HPV can cause herpes. (F)	51.4	31.3	0.04	34.8	38.2	0.76
Genital warts are caused by HPV. (T)	77.1	77.6	0.95	91.3	65.3	0.01
If a women's Pap smear is normal, this means she does not have HPV. (F)	28.6	23.9	0.60	21.7	51.3	0.01
HPV can cause cancer of the anus. (T)	26.5	46.3	0.05	36.4	34.7	0.88
<i>Planning Vaccination/Not Planning Vaccination^a</i>						
	<i>Plan Vaccine</i>		<i>Do Not Plan Vaccine</i>		<i>Plan Vaccine</i>	
	<i>True %</i>	<i>True %</i>	<i>True %</i>	<i>p- value</i>	<i>True %</i>	<i>p- value</i>
HPV can cause HIV/AIDS. (F)	50.0	6.9	0.006	0.006	25.0	12.5
There is a vaccine to protect men from HPV. (T)	66.7	21.4	0.02	0.02	25.0	15.6
Most women with HPV will not develop cervical cancer. (T)	50.0	34.5	0.47	0.47	58.3	25.0
HPV can be passed to the baby during birth. (T)	50.0	93.1	0.006	0.006	75.0	62.5

^a .18–26 year olds among those not already vaccinated.

(F) indicates false statement; (T) indicates a true statement.