College Students' Knowledge of Human Papillomavirus and Effectiveness of a Brief Educational Intervention

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Background: **Human papillomavirus (HPV) is the most prevalent sexually transmitted disease in the United States and is associated with considerable morbidity and cost. Several surveys of college students have found, however, a paucity of knowledge of HPV. Sexually transmitted disease education focused on human immunodeficiency virus infection has been found to be effective at improving knowledge and safe-sex behaviors, at least in the short term. The purpose of this study was to evaluate the effectiveness of a brief HPV-focused, educational intervention on college students' knowledge of HPV.**

Methods: **Sixty physician's assistant and psychology students were administered a questionnaire that elicited their knowledge of HPV, including prevalence, symptomatology, and complications. The participants then underwent a brief HPV-focused educational intervention. Three months later, the cohorts were reevaluated with the same questionnaires.**

Results: **Before the intervention, only 45% of the HPV questions were answered correctly, compared with 87% of the non-HPV items. After the intervention, 79% of the HPV questions were answered appropriately. Physician's assistant students performed significantly better than the psychology students on the HPV questions, but not statistically significantly better on the non-HPV related items. Women performed better than men on the non-HPV questions, but scored similarly for the HPV-related items.**

Conclusion: **Despite the high prevalence and serious complications associated with HPV infection, most college students know very little about HPV. Brief HPV-focused educational interventions, which could be readily implemented in the family physician's office at a routine visit, were found to be effective at improving HPV knowledge, at least in the short term. More HPV education is needed, particularly for young adults. Further studies should be undertaken to evaluate the effectiveness of HPV education on improving safe-sex behaviors. (J Am Board Fam Pract 2001;14:178–83.)**

Human papillomavirus (HPV) is the most common sexually transmitted disease in America. Studies have shown that 10% to 46% of all sexually active women are infected at any given point in time, depending on the population evaluated.[1–3] In addition, some studies have shown a potential lifetime risk of infection of 70% or greater.[1,3] The risk for sexually active men is less well defined, but prevalence has been estimated to be 10% to 20%.[1] Men and women in their 20s, particularly the 20- to 24-year age-group, have been found to be at especially high risk,[1,3] with many of these high rates of infection found among college students.

HPV infection leads to clinically apparent genital warts in less than 10% of all infections.[1] Although this number is relatively small, genital warts can cause considerable morbidity for patients. HPV has also been well established as the most important causative factor of cervical cancer,[4–6] as well as penile and anal cancer.[7] In 1998, 12,800 women in the United States had cervical cancer diagnosed, and 4,800 died of the disease.[8] In addition, more than 700,000 cases of high-grade cervical dysplasia are detected every year in the United States.[9] Although the incidence of low-grade dysplasia in the United States is not known, it is greater than the incidence of high-grade dysplasia. Treatment of these precancerous lesions caused by HPV in and of itself leads to serious morbidity and expense.[10]

Primary prevention of HPV infection, and thus prevention of its sequelae, would be important for public health. The concept of primary prevention of HPV infection, however, has been understated and even ignored.[11] Several studies have shown that men and women in the 20- to 24-year age-group are largely unaware of HPV.[12–14] Yet, no study has

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been undertaken to examine the feasibility and effectiveness of HPV-specific education as a primary prevention of HPV infection. The *Cochrane Review* was searched for studies to test the theory that HPV-focused educational interventions prevent HPV and cervical cancer.[11] Although no HPV-focused studies were found, other studies with the human immunodeficiency virus (HIV) and other sexually transmitted diseases as the educational focus do exist. HIV-focused interventions were found to have a statistically significant positive effect on safe-sex behaviors, at least in the short-term.

Education about sexually transmitted diseases might be an effective primary prevention strategy for HPV infection and cervical cancer. It has been suggested that HPV-focused education could be more effective than other education focused on sexually transmitted diseases, because more people have experience with the complications of HPV (ie, cervical dysplasia) than with other sexually transmitted diseases.[11] Thus, this population would be more likely to retain information from an HPV-focused intervention and have a stronger motivation to improve their safe-sex practices.

This study evaluated the knowledge of HPV among two groups of college students. These students then underwent a brief, information-only educational intervention focused solely on HPV. The cohorts' knowledge about HPV was then reevaluated 3 months after the intervention. Thus, this study evaluated cohorts of college students for their knowledge about HPV, then performed a brief, simple educational intervention and a follow-up evaluation to determine how well this high-risk population would retain HPV knowledge, which is a primary step in improving safe-sex behaviors. In turn, this knowledge might lead to primary prevention of HPV infection and, thus, prevention of cervical dysplasia and cancer.

Methods

Students attending a private college in upstate New York were selected as the target population. Access was granted to all students in a first-year physician's assistant class and all students in a mid-level psychology class. There was no overlap of students between the two classes. The physician's assistant students did not receive formal HPV teaching before or during the study. The survey instrument was a 12-item self-administered questionnaire with forced-response demographic questions and true-false knowledge questions. The questionnaire was reviewed by clinicians and health educators for content, readability, and comprehensiveness. The reliability of the questionnaire was evaluated by test-retest method using a lay sample from outside the study population.

Questionnaires were distributed to students in their classrooms. All questionnaires had an attached cover letter explaining the purpose and noncompulsory nature of the study. The questionnaires were filled out anonymously, and students had to be 18 years old or older to participate. All students at the preintervention classes participated. Questionnaires were filled out in the classroom and immediately returned. The educational intervention ensued immediately upon return of all questionnaires. Three months after the intervention, the same questionnaire was administered to the same classes. Eight of the initial 60 students were not available to participate in the follow-up questionnaire. Results of the pre- and post-intervention questionnaires were then compared to evaluate the effectiveness of the educational intervention.

Variables

The questionnaire contained nine true-false questions on knowledge about sexually transmitted diseases. Five of the questions were specific to HPV, including the high prevalence of HPV infection and its links to genital warts and genital cancers, including cervical cancer. Some basic demographic information was also obtained regarding the participant's sex, year of high school graduation, and state in which the high school was located. These variables were chosen to test for potential relations between knowledge about HPV and sex, age, and educational background of the participants.

Analysis

Data were obtained in the form of independent binomial variables. Exact two-sided *P* values were calculated for the hypothesis test using a mid-*P* approach to the Fisher exact test. All analyses were performed using Arcus QuickStat (Addison Wesley Longman Limited, Cambridge). All values for α were set at 0.05. Before undertaking data collection, this study was approved by the Institutional Review Board of the author's institution and by the Institutional Review Board of the participants' college.

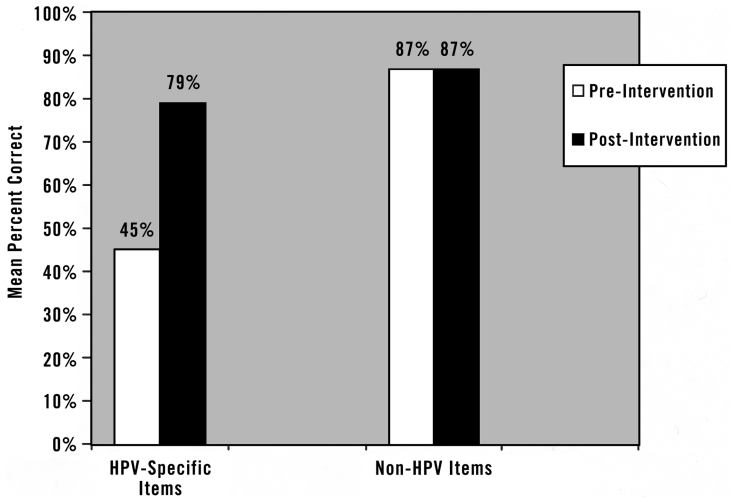

Figure 1. Knowledge scores of all participants. HPV - human papillomavirus.

Results

Preintervention Questionnaire Results

Sixty students were surveyed initially, 33 psychology students and 27 physician's assistant students. Seventy-six percent were female. The average year of graduation from high school was 1994, and 78% graduated from a high school in New York State.

For the combined groups, significantly more non-HPV questions than HPV questions were answered correctly (Figure 1). The highest scores were obtained on questions pertaining to HIV; the lowest scores were from HPV items. The breakdown of scores for the HPV questions can be seen in Figure 2.

The physician's assistant students had significantly better knowledge scores than the psychology students for the HPV items. The physician's assistant students also performed better on the non-HPV questions, although this difference was not statistically significant (Figure 3). There was no significant difference in scores for HPV items between the men and the women. The women, however, performed significantly better than the men on the non-HPV items (Figure 4).

Postintervention Questionnaire Results

Three months after the educational intervention, the students overall showed a statistically signifi-

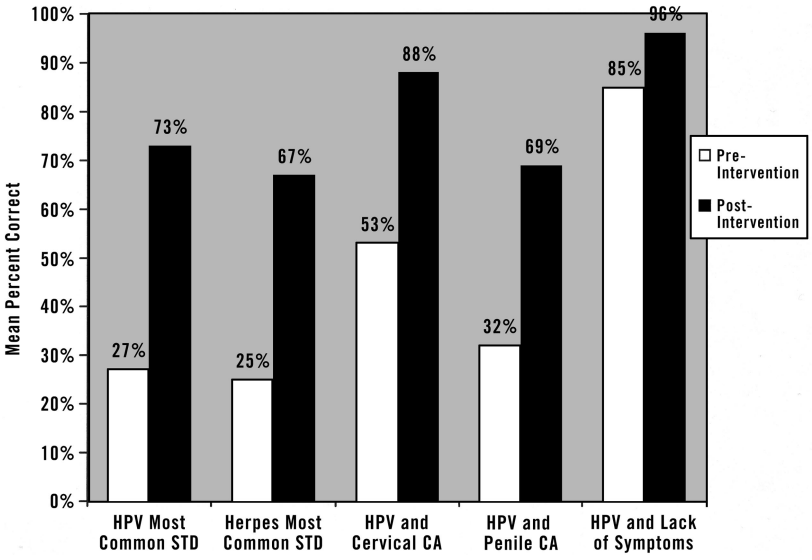

Figure 2. Human papillomavirus (HPV) question scores. STD - sexually transmitted disease, CA - cancer.

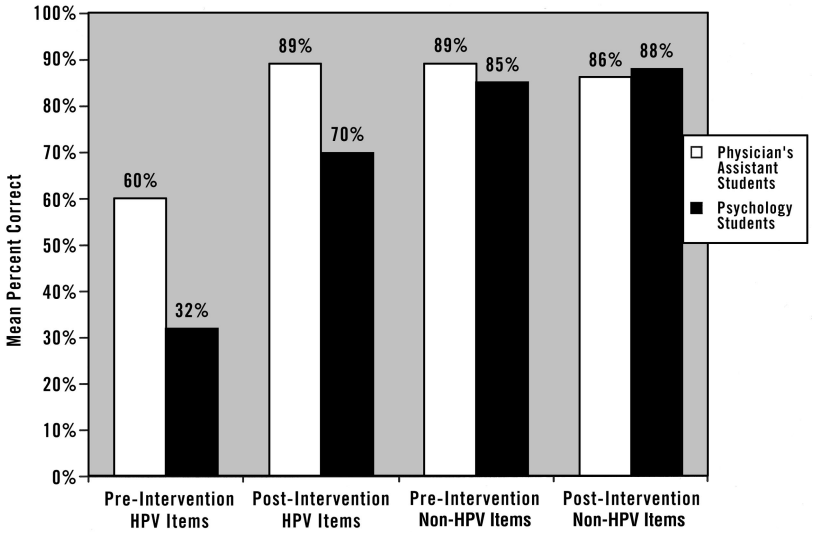

Figure 3. Knowledge scores of physician's assistant and psychology students. HPV - human papillomavirus.

cant improvement in knowledge scores for HPV-specific questions, with no difference in scores for non-HPV questions (Figure 1). There was a statistically significant improvement in scores for all HPV-related questions except for the item pertaining to the lack of symptoms associated with HPV. Of all the HPV-related questions, this item had the highest knowledge score before the intervention as well as afterward (Figure 2). None of the individual non-HPV items had statistically significant differences in pre- and post-intervention scores.

Evaluating the physician's assistant students and the psychology students separately, both groups showed the same trends. In both cohorts, overall scores for HPV-specific questions were significantly improved at the postintervention evaluation, with no significant difference for non-HPV items. The physician's assistant students still performed better on the HPV questions, although the psychology students' scores did show more overall improvement (Figure 3).

Looking at male and female responses in the combined classes, there continued to be no statistically significant difference between male and female students' performance on HPV-specific questions after the intervention, although the women again scored significantly higher for non-HPV related questions after the intervention (Figure 4).

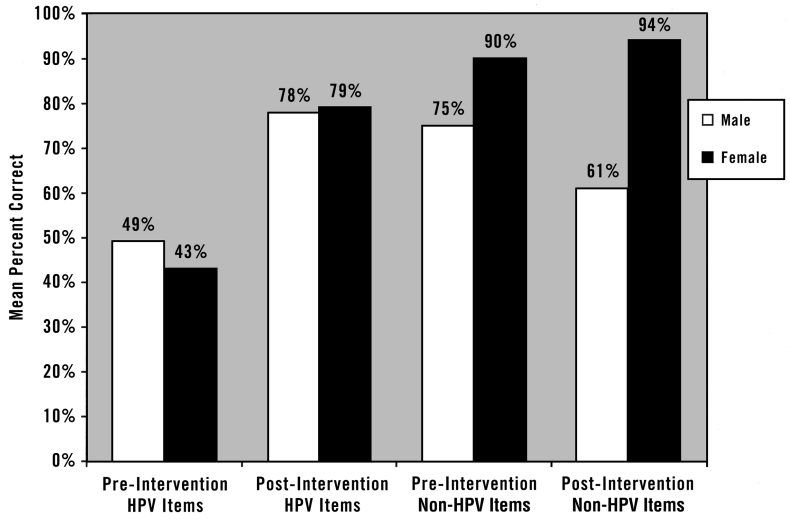

Figure 4. Knowledge scores of male and female students. HPV - human papillomavirus.

There were no relations between participants' knowledge and year of high school graduation or location of high school. Younger students performed as well as older students. No single high school location showed a positive nor negative trend in knowledge about HPV.

Discussion

This study found results consistent with those of previous studies on college students and their knowledge of HPV:[10–13] Only a minority of college students are familiar with HPV and its sequelae. As seen with other studies,[12,14,15] college students' knowledge about HIV was quite good and significantly better than that of HPV. It has been suggested that education about HIV has overshadowed other sexually transmitted disease teaching, including HPV,[11,12] and that as HPV is so common and carries risks of such far-reaching complications, improved educational efforts regarding HPV are warranted.

Interestingly, the men and women performed equally well on HPV-related questions, whereas women tended to do better on non-HPV questions. The reasons for this finding are unclear. These findings differ from those of previous studies, which have shown better knowledge among women.[10]

There were no trends between knowledge and year of high school graduation or high school location. This study therefore failed to support theories that older persons, who potentially have more life experience, know more or that younger persons obtained better sexually transmitted disease education in high school. Nor did any one location show improved scores, despite differences between public high school sexually transmitted disease curricula within the state.

The physician's assistant students performed better than the psychology students on HPV-related questions. For non-HPV questions, however, there was no significant difference between the two groups. This finding might reflect a trend of education of the general public on sexually transmitted diseases other than HPV.

The question arises of how best to inform students, as well as the general public, about HPV. Previous studies evaluating HIV education found that all forms of educational interventions (including group discussion and counseling, one-on-one discussion and counseling, and media campaigns) occurring in formal educational settings, community settings, and clinical settings did improve knowledge and safe-sex behaviors, at least in the short term.[11] This study also found significant improvement in knowledge after a brief information-only intervention that was sustained 3 months after the intervention. The intervention used was similar to a brief discussion of HPV transmission, prevention, and complications that could easily occur between a physician and patient during a routine office visit.

Whether an HPV-specific intervention could improve safe-sex behaviors remains to be seen. It follows that, as HIV-specific interventions are effective at improving behaviors, HPV-specific interventions might also result in better safe-sex behaviors. HPV interventions might be even more effective, as a much larger proportion of the general public have had personal experience with HPV and related complications than with HIV.[11] Studying trends between a group's personal experience with cervical pathology (ie, history of abnormal Papanicolaou smears, experience with colposcopy, etc) and changes in their safe-sex behavior after an HPV-focused educational intervention would be important.

Considerably more HPV education is needed in the United States, particularly among young adults. This study showed that brief HPV-focused educational interventions are effective at improving knowledge about HPV. Such interventions could be readily implemented in a physician's office. Although it has not yet been shown that improving knowledge about HPV leads to safe-sex behaviors, it can be inferred from studies focused on HIV instruction that this outcome is likely. Brief, HPV-focused educational interventions could therefore be effective for the primary prevention of all sexually transmitted diseases, as well as cervical dysplasia and cancer.

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