

Adults' Knowledge and Behaviors Related to Human Papillomavirus Infection

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Background: Our objective was to assess adults' knowledge, risk behaviors, and preference for information about human papillomavirus (HPV).

Methods: A cross-sectional study using a self-administered questionnaire given in 3 locations (a university health service and 2 community family practice offices); 289 people completed the questionnaire. The primary outcome measure was a knowledge score calculated from the responses on specific items in the questionnaire. This knowledge score was developed by other investigators and has acceptable psychometric properties.

Results: Knowledge about HPV was low, with an average knowledge score of 5.50 (possible scores ranged from 0 to 14) and a mode of 0. Knowledge scores were significantly higher in women ($P = .001$) and married adults ($P = .001$). Knowledge scores were inversely related to age ($P = .004$) and positively correlated with years of education ($P = .001$) and self-assessment of knowledge ($P < .001$). Knowledge scores were positively correlated with condom use ($P = .05$) but not significantly associated with other risk behaviors. The most frequently desired time to receive information about HPV was before becoming sexually active.

Conclusions: Adults seen in a typical family physician's office have limited knowledge of HPV. One tool family physicians can use to identify those with the least amount of knowledge is to ask patients how informed they are about HPV. The preferred time to receive information about HPV was before a patient became sexually active. However, it remains unclear whether educational intervention or knowledge changes risky behaviors. (*J Am Board Fam Pract* 2004;17:26–31.)

Many studies have indicated that the human papillomavirus (HPV) is one of the most widespread sexually transmitted infections (STIs), with the number of cases continuing to grow.¹ The prevalence of HPV infection in young women has been estimated to range from 20% to 46% in various countries, but recent results from studies in the US suggest that 60% of college-aged women are infected with HPV at some time.² Genital warts, one of the clinical manifestations of HPV, are observable in 1% of sexually active adults in the United States.¹ Another measure of the epidemic proportions of the spread of HPV is apparent by the fact that cervical cancer, also attributable to HPV, is the second most common type of cancer worldwide.³

Despite the overwhelming prevalence of HPV and potentially catastrophic consequences of an HPV infection, several studies have demonstrated an enormous lack of awareness of the disease.^{4–8} In

a study of 263 college-aged women, 87% replied that they had either never heard of HPV or were not sure if they had heard of HPV.⁶ Another study of university students confirmed these findings; only 38% responded that they had heard of HPV.⁵ The same study also found that 59% of participants responded that they were unaware of how HPV could be transmitted.⁵ Ramirez et al⁸ quantified HPV knowledge among young women at a local university, finding a mean knowledge score at only the 68th percentile. Those that had heard of HPV had received information from the following sources: health professionals (30%), class (29%), clinics (23%), friends (22%), teachers (18%), and parents and boyfriends (<8%).⁸ In contrast, adolescents' knowledge of HPV and cervical dysplasia after the diagnosis of HPV was quite high.⁷

With the trend toward introducing testing for HPV^{9,10} as part of a cervical cancer screening program, family physicians will have more interactions with patients regarding HPV. The published studies have focused only on young women, primarily representing well-educated, affluent, and white populations. Does the typical family practice

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population of sexually active adults have the same level of understanding about HPV? Other questions relevant to family physicians are what information should be presented, when should it be presented, and whether patients accurately self-identify their own level of knowledge. These are the questions that guided this study.

Methods

The target subjects for the study were men and women aged 18 and older. Subjects were recruited from a local university health service and 2 family practice clinics in 2001. A goal of 100 to 150 surveys was set for each location. At the university health service, the questionnaires were given out by health care providers or with other paperwork, with the instructions to drop it in a collection box when finished. At the other 2 locations, the questionnaires were distributed in the waiting room by researchers. In all 3 settings, the study sample was a convenience sample of consecutive patients agreeing to participate. No data were collected from potential subjects refusing to participate. The subjects were consecutive adults meeting the eligibility criteria agreeing to participate. The University of Michigan Institutional Review Board approved the study.

The questionnaire consisted of 52 items in a variety of formats: 20 true/false/don't know questions; 6 fill-in-the-blank questions; 24 multiple-choice questions requiring one or more answers, and 2 questions using a rating scale. The items on the questionnaire inquire about demographics, HPV knowledge, sexual history, information participants would like to know about HPV, how and when they would wish to receive the information, attitudes toward STIs and STI prevention, and what participants would do if they or their partner were diagnosed with HPV. Another question requested participants to rate how much they knew about 7 different STIs (chlamydia, gonorrhea, herpes, hepatitis B, syphilis, HPV, and HIV) with a 3-point Likert scale (1, know nothing; 2, know a little; 3, know a lot). Another question asked them to rate how worried they are about getting the same 7 STIs with a 4-point Likert scale of 1, not worried, to 4, very worried.

A knowledge score was calculated using the 14 items taken with permission from a study by Yacobi et al⁵ The number of correct responses to these 14

items was combined to form a knowledge scale score of 0 to 14. The content areas addressed by these 14 questions are highlighted in Table 2. As previously reported, the knowledge score has good internal consistency (Cronbach's $\alpha = 0.93$) along with face and construct validity.⁵

To determine whether any demographic variables were significantly different between the office setting from which participants were recruited, *t* test and χ^2 analyses were performed. The knowledge scores were used to determine associations between knowledge and demographic variables. *t* Tests, one-way, and multivariate analysis of variance, and correlation analysis were used as indicated by the variable type. Multiple regression was used with the knowledge score as the dependent variable, and the independent variables were participant demographics and the responses on each in the 14-item Yacobi knowledge instrument to determine whether any one of these variables was more influential in the overall score.

Results

At the 3 locations, a total of 289 people completed and returned the questionnaire. Table 1 provides the demographic data on study respondents by clinic site of recruitment. No data were collected on nonrespondents. The estimated response rate was 80% of all subjects approached with no variation between offices. As noted in Table 1, significant demographic differences were found between the study subjects recruited from the student health office and from the 2 family practice offices.

Knowledge

Knowledge about HPV from the participants was low, with 12% having never heard of genital warts before and 33% having never heard of HPV before. Among the subjects that had heard of HPV, 72% knew it could be spread by vaginal intercourse, 61% indicated it could be prevented by use of a condom, and 55% indicated they would not know if they had HPV. The specific responses to the items used to calculate the knowledge score⁵ are displayed in Table 2. The average score on this scale was 5.50 with a mode of 0. Certain characteristics were examined for association with knowledge scores. These findings are summarized in Table 3. Knowledge scores were significantly different between groups classified by gender ($P = .001$) and

Table 1. Demographics

Variable	Family Practice Offices (n = 148)	Student Health Clinic (n = 140)
Age (years)		
Mean	36.7*	24.6
Age range between 25th and 75th percentiles	27 to 46	20 to 27
Gender		
Men	32%*	15%
Women	68%	85%
Race		
White	77%*	64%
Black	14%	9%
Hispanic	2%	7%
Asian	3%	13%
Other	1%	1%
Marital Status		
Single	35%*	84%
Married	56%	12%
Divorced/separated/widow	9%	4%
Hours of work for pay outside the home (mean)	34.5*	18.8
Have Medical Insurance		
Yes	91%	82%
No	8%	14%
Not Sure	1%	4%
Smoking Status		
Smoker	19%	9%
Never Smoker	81%	91%
Number of sexual partners in past 2 months (mean)	1.2	0.8
Number of lifetime sexual partners (mean)*	9.9*	5.2
Sexual Preference		
Heterosexual	94%	95%
Homosexual	3%	2%
Bisexual	3%	3%
Age of first intercourse (years, mean)	17.7	16.7
Currently in a monogamous relationship		
No	23%	31%

* Significant difference between the clinic populations ($P \leq .001$).

marital status ($P = .001$). No significant differences were found by race, medical insurance status, sexual preference, or current relationship monogamous.

The participants' age correlated inversely with their knowledge scores (-0.171 , $P = .004$). Amount of education was positively correlated with knowledge score (correlation coefficient = 0.21 , $P = .001$). Subjects reporting a previous diagnosis of HPV or genital warts had a significantly higher ($P = .001$) mean knowledge score of 9.1 compared with 5.1 for subjects without such a diagnosis. The student health clinic subjects had a significantly ($P = .001$) higher mean knowledge score of 6.8

compared with subjects from the family practice clinic mean score of 4.2 , after adjusting for age and years of education. The amount of knowledge about HPV that the participants reported positively correlated with their knowledge scores (correlation coefficient = 0.67 , $P < .001$) which is highlighted in Figure 1. Adjusting for age, years of education, gender, and clinic site do not affect this relationship. Knowledge scores were not significantly different between ethnic groups, sexual preference, age at first intercourse, smoking status, currently in a monogamous relationship, hours of work outside the home, and number of sexual partners in last 2 months or lifetime.

Correlation of Knowledge and Behavior

Subjects reporting regular condom use to prevent sexually transmitted infections had a knowledge score of 6.1 , compared with 5.0 for nonusers of condoms ($P = .05$). The same was true for subjects reporting use of a condom at last sexual intercourse. Subjects reporting they would use a condom if they or their partner were diagnosed with HPV had a knowledge score of 7.1 compared with a score of 4.1 ($P = .001$). Other risk behaviors, such as age of initiating intercourse and number of lifetime sexual partners, were not associated with knowledge scores.

Education on HPV

The participants who had heard of HPV were asked where they had heard about HPV. Of this group, 22.8% learned of HPV from their doctors, 18.3% from their friends, 27.6% from a health education class, 20.3% from magazines and newspapers, 11% from television and radio, and 22.8% had never heard of HPV. No difference was found between participants from different clinic sites in terms of sources of information about HPV. Participants who were able to identify a source of information about HPV had significantly higher knowledge scores ($P = .001$), and participants indicating a doctor as a source had the highest mean score of 9.8 compared with means of 5.8 to 7.2 for other sources.

The participants were asked which 3 of 5 content areas were the most important items to know about HPV. Following are the 5 content areas and the percentage of subjects rating each area as important: "What is HPV?" (57.6%), "How do you get HPV?" (66.9%), "What diseases does HPV

Table 2. Knowledge about HPV

	True	False	Don't Know
HPV is the virus that causes herpes	20%	27%	51%
Genital warts are caused by HPV	38%	7%	53%
HPV is the virus that can cause cervical cancer	39%	8%	51%
The best way to prevent complications caused by HPV is to have regular Pap smears*	48%	9%	41%
If a woman's Pap smear is normal, she doesn't have HPV	13%	39%	46%
Changes in a Pap smear may indicate that a woman has HPV	42%	5%	51%
Genital warts are caused by the herpes virus	32%	28%	38%
HPV can cause cancer	44%	8%	47%
Pap smears will almost always detect HPV	18%	21%	59%
Symptoms of HPV: warty growths	28%	20%	52%
If untreated, HPV can cause pre-cancer or cervical dysplasia	30%	20%	50%
What increases risk of getting HPV:			
Sex before the age of 16	22%	75%	3%
Multiple sexual partners	69%	28%	3%
Your partner has many sexual partners	65%	33%	2%

* Pap smear, Papanicolaou smear.

cause?" (45.9%), "How can HPV be prevented?" (66.6%), and "How can HPV be treated?" (45.2%). The most popular ways to receive this information

are, in descending order, pamphlets and brochures (61.4%), health care providers (46.2%), health education class (22.8%), Internet (22.4%), friends (7.9%), and family (5.2%). An overwhelming 86.2% believed that the most useful time to receive this information would be before becoming sexually active.

Table 3. Knowledge Scores by Various Groupings

Variable	Knowledge Score
Gender	
Men	4.0*
Women	5.9
Race	
White	5.5
Black	4.7
Hispanic	5.3
Asian	6.9
Other	4.0
Marital Status	
Single	6.1*
Married	4.9
Divorced/separated/widow	3.8
Have Medical Insurance	
Yes	5.7
No	4.6
Not Sure	1.85
Smoking Status	
Smoker	4.2
Never Smoker	5.7
Sexual Preference	
Heterosexual	5.6
Homosexual	3.2
Bisexual	5.3
Currently Monogamous	
Yes	5.7
No	4.9

* Significant difference in the knowledge scores between the groups ($P \leq .001$).

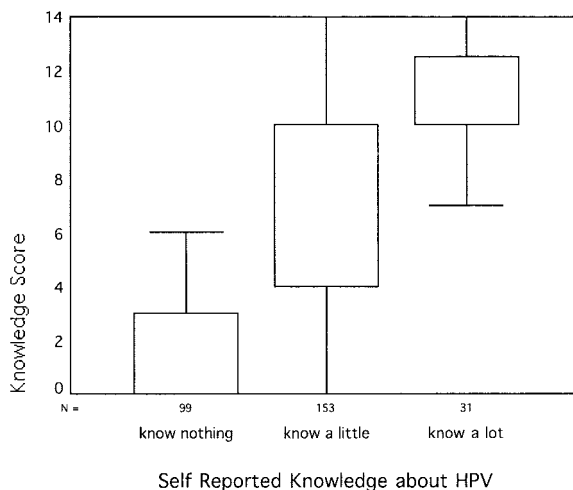


Figure 1. Knowledge scores (possible scores are 0 to 14) by self-reported level of knowledge about HPV. The central dark line is the median, the box is the scores between the 25th and 75th percentiles, and the line represents the range of scores.

Knowledge and Worry about HPV and Other STIs

Participants were asked to rate 7 STIs with regard to their own knowledge (1, know nothing; 2, know a little; 3, know a lot). They were also asked to rate how worried they were about getting each of these STIs (1, not worried; 2, a little worried; 3, moderately worried; 4, very worried). The mean perceived knowledge ratings for each STI ranged from 1.5 to 2.4. The mean worry ratings ranged from 1.5 to 2.1. Regardless of STI, the mode for perceived knowledge was 2 and for worry was 1. No significant correlation existed between number of lifetime sexual partners and number of sexual partners in last 2 months and perceived knowledge and perceived worry.

Discussion

HPV testing along with a Papanicolaou smear every 2 years seems to save additional years of life at a reasonable cost compared with Papanicolaou testing alone.¹¹ The 2001 Consensus Guidelines for the Management of Women with Cervical Cytological Abnormalities includes testing for HPV in women with atypical squamous cells of uncertain significance.¹⁰ Thus, family physicians are very likely to have more encounters with patients that involve discussions about HPV. Poor knowledge is not limited to college-age, as this study population included adults recruited from 2 community-based family practice centers. Fortunately, more than 50% of all study participants realized that HPV could be transmitted sexually. Unfortunately, the data also demonstrated that the average person knew less than half of the knowledge questions. Only 33.8% of the respondents were aware that HPV caused genital warts. Only 39% of the participants knew that HPV could cause cervical cancer, the most devastating consequence of infection.

For most family physicians, one question is how to identify the patients at greatest risk for poor knowledge about HPV. The study indicated that adults' perception about their HPV knowledge is fairly accurate. Those who think they know more about HPV do, in fact, know more. This is also reflected in their increased use of condoms to prevent STIs. Therefore, a general guide to determining if a patient needs information about HPV is to ask if they feel like they know enough about HPV. Other groups with limited knowledge about HPV are men and older adults. However, the older

adults also have less risk. The preferred time to learn about HPV was before becoming sexually active. In this study, the average age of initiating sexual intercourse was 18 and younger. Thus, the target age group for education would be age 18 and younger.

Another issue of concern to family physicians is whether the educational intervention is effective in changing behavior. Some studies conclude that education can be effective,^{12,13} whereas others do not.^{14,15} Even among the studies demonstrating an effect of educational intervention, the sole outcome has been condom use, not reduction in risky sexual behaviors.^{12,13}

This study shows that increased knowledge was associated with some less risky behaviors, but not others. Those reporting that they use condoms to prevent STIs and those who actually used condoms the last time they had intercourse had higher knowledge scores than those who answered "no" to these questions. Knowledge of HPV was not correlated with number of lifetime sexual partners or age of intercourse. Those identifying a doctor as their primary source of information about HPV had the highest mean knowledge score. However, their sexual behaviors were not different from others. From this study, it is unknown whether increasing awareness and knowledge of HPV, including physicians attention to HPV, would change adults' participation in risky sexual behaviors.

Conclusions

Participants in this study demonstrated a general lack of awareness about HPV, as studies before have concluded.^{5,6,8} However, this study highlights similar deficits among a more diverse sample of subjects with regards to age, gender, and source of health care. Adults with more knowledge about HPV are more likely to report regular use of condoms during sexual intercourse. Self-assessment of one's knowledge about HPV is reasonably accurate and potentially a useful clinical tool for family physicians. The preferred time for information about HPV was before becoming sexually active. It remains unknown whether educational intervention will change the risky sexual behaviors, but it may at least increase use of condoms.

Key Points

- Adults typical of family practice patients have low knowledge of HPV.

- Adults' self-knowledge report is an accurate reflection of actual knowledge.
- Adults' preferred time for information about HPV would be before they became sexually active.

References

1. Koutsky L. Epidemiology of genital human papillomavirus infection. *Am J Med* 1997;102:3–8.
2. Ho GY, Bierman R, Beardsley L, Chang CJ, Burk RD. Natural history of cervicovaginal papillomavirus infection in young women. *N Engl J Med* 1998;338:423–8.
3. Parkin DM, Pisani P, Ferlay J. Estimates of the worldwide incidence of 25 major cancers in 1990. *Int J Cancer* 1999;80:827–41.
4. Dell DL, Chen H, Ahmad F, Stewart DE. Knowledge about human papillomavirus among adolescents. *Obstet Gynecol* 2000;96:653–6.
5. Yacobi E, Tennant C, Ferrante J, Pal N, Roetzheim R. University students' knowledge and awareness of HPV. *Prev Med* 1999;28:535–41.
6. Vail-Smith K, White DM. Risk level, knowledge, and preventive behavior for human papillomaviruses among sexually active college women. *J Am Coll Health* 1992;40:227–30.
7. Gerhardt CA, Pong K, Kollar LM, Hillard PJ, Rosenthal SL. Adolescents' knowledge of human papillomavirus and cervical dysplasia. *J Pediatr Adolesc Gynecol* 2000;13:15–20.
8. Ramirez JE, Ramos DM, Clayton L, Kanowitz S, Moscicki AB. Genital human papillomavirus infections: knowledge, perception of risk, and actual risk in a nonclinic population of young women. *J Womens Health* 1997;6:113–21.
9. Solomon D, Davey D, Kurman R, et al. The 2001 Bethesda System: terminology for reporting results of cervical cytology. *JAMA* 2002;287:2114–9.
10. Wright TC Jr, Cox JT, Massad LS, et al. 2001 Consensus Guidelines for the management of women with cervical cytological abnormalities. *JAMA* 2002;287:2120–9.
11. Mandelblatt J, Lawrence W, Womack S, et al. Benefits and costs of using HPV testing to screen for cervical cancer. *JAMA* 2002;287:2372–81.
12. Kamb ML, Fishbein M, Douglas JM Jr, et al. Efficacy of risk-reduction counseling to prevent human immunodeficiency virus and sexually transmitted diseases: a randomized controlled trial. Project RESPECT Study Group. *JAMA* 1998;280:1161–7.
13. O'Donnell LN, Doval AS, Duran R, O'Donnell C. Video-based sexually transmitted disease patient education: its impact on condom acquisition. *Am J Public Health* 1995;85:817–22.
14. Clark LR, Brasseux C, Richmond D, Getson P, D'Angelo LJ. Effect of HIV counseling and testing on sexually transmitted diseases and condom use in an urban adolescent population. *Arch Pediatr Adolesc Med* 1998;152:269–73.
15. Gollub EL, French P, Loundou A, Latka M, Rogers C, Stein Z. A randomized trial of hierarchical counseling in a short, clinic-based intervention to reduce the risk of sexually transmitted diseases in women. *Aids* 2000;14:1249–55.