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Knowledge and Beliefs About Cervical Cancer and Human Papillomavirus Among Taiwanese Undergraduate Women

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Cervical cancer is the second most common cancer in women worldwide, accounting for 15% of all female cancers (World Health Organization [WHO], 2010). About 493,000 new cases of cervical cancer are diagnosed each year worldwide, and more than 27,400 women die annually of the disease (WHO, 2010). In Taiwan, cervical cancer is the sixth leading cause of cancer mortality among women (Bureau of Health Promotion, Department of Health, ROC Taiwan, 2010). In 2008, 1,725 new cases of cervical cancer were diagnosed in Taiwan, resulting in an incidence of 12 cases per 100,000 women, with 813 women dying from the disease (Bureau of Health Promotion, Department of Health, ROC Taiwan, 2010). The development of cervical cancer is strongly associated with infection by oncogenic types of human papillomavirus (HPV); in fact, HPV DNA can be detected in 90%–100% of women with cervical cancer (Bosch, Lorincz, Muñoz, Meijer, & Shah, 2002; Brown et al., 2005). In addition to cervical cancer, oncogenic types of HPV contribute to vulvar, penile, and anal cancers, as well as head and neck or oral cancers (Schiffman & Kjaer, 2003; Shew & Fortenberry, 2005).

Ten percent of women worldwide have HPV infections, making HPV one of the most common sexually transmitted infections (WHO, 2010). HPV infection often appears shortly after women become sexually active (Brown et al., 2005). The prevalence rate of HPV infection in Taiwanese women is estimated to be 16% (Chen et al., 2011). Epidemiologic literature shows that HPV infection is highly prevalent in women younger than 25 years worldwide, particularly those who are sexually active (Bosch & de Sanjosé, 2007). Similarly, the peak prevalence of HPV in Taiwanese women is from 21–30 years of age (Jeng et al., 2005). Thus, college-aged women in Taiwan and Western societies alike compose a high-risk population for HPV infection.

Purpose/Objectives: To assess knowledge and attitudes regarding cervical cancer and human papillomavirus (HPV) among undergraduate women in Taiwan.

Design: A descriptive cross-sectional design.

Setting: Five universities in southern Taiwan.

Sample: 953 undergraduate women aged 17–36 years.

Methods: The self-administered HPV Belief questionnaire was used to collect data on knowledge and beliefs regarding cervical cancer, Pap testing, and HPV.

Main Research Variables: Knowledge, beliefs, cervical cancer, Pap testing, HPV, likelihood of cervical cancer, and HPV infection.

Findings: Seventy percent of participants agreed that cervical cancer could be prevented and was a severe disease, and 80% knew the purpose of Pap testing. Forty-nine percent were aware of HPV. Undergraduate women with an awareness of HPV were more likely to be older, studying a health-related major, have a higher class standing, have a personal history of gynecologic visits, and have had a Pap test. Neither family history of gynecologic cancer nor sexual experience predicted HPV awareness, although sexual experience had a significant association with the knowledge and beliefs of cervical cancer. Most of the undergraduate women believed themselves unlikely to acquire cervical cancer or HPV infection.

Conclusions: Undergraduate women in Taiwan have limited knowledge of cervical cancer and HPV. Awareness of the likelihood of HPV infection is low among undergraduate women, even those who are sexually active.

Implications for Nursing: Educational campaigns focusing on cervical cancer screening and HPV infection are needed, particularly for sexually active undergraduate women.

The HPV vaccine has been introduced to many countries since it was approved for use in the United States in 2006. Two strains of HPV vaccine are available in many countries, including Taiwan. The quadrivalent (types 6, 11, 16, and 18) vaccine, recombinant (Gardasil®)

provides protection against two high-risk types of HPV infection related to cervical cancer (types 16 and 18) and two low-risk types of HPV infection related to genital warts (types 6 and 11). The bivalent (types 16 and 18) vaccine, recombinant (Cervarix®) provides protection against two high-risk types of HPV infection related to cervical cancer (types 16 and 18) (U.S. Centers for Disease Control and Prevention [CDC], 2011b). In Taiwan, Gardasil and Cervarix were approved in 2006 and 2008, respectively (Food and Drug Administration, ROC Taiwan [Taiwan FDA], 2011). Both vaccines are administered as three-dose injections. The efficacy of HPV vaccines on cervical cancer is estimated to be 70% because 30% of cervical cancers related to HPV infection are not covered by the vaccines (La Torre, de Waure, Chiaradia, Mannocci, & Ricciardi, 2007). The most common adverse effects of vaccination are injection-site reactions (e.g., pain, redness, swelling) (McIntosh, Sturpe, & Khanna, 2008). The recommended age for HPV vaccination varies by country. In Taiwan, the recommended age for female vaccination is 9–26 years for Gardasil and 10–25 years for Cervarix (Taiwan FDA, 2011). The HPV vaccine can be accessed from clinics and hospitals in Taiwan, but it is not covered by national health insurance. A complete HPV vaccination, with all three doses, costs \$350 in Taiwan (U.S. currency). In the United States, the recommended age for female vaccination is 9–26 years. The U.S. Advisory Committee on Immunization Practice recommends that a routine vaccination be given to girls aged 11–12 years, with a catch-up vaccination given to young women aged 13–26 years (CDC, 2011b). In 2009, the U.S. Food and Drug Administration licensed Gardasil for use in boys and men aged 9–26 years for prevention of genital warts (CDC, 2011a). In Australia, Cervarix is approved for women and girls aged 10–45 years, and Gardasil is approved for women and girls aged 9–45 years (Harper & Paavonen, 2008).

A systematic review of 39 studies concerned with HPV knowledge that were published before the HPV vaccine was licensed indicated that 13%–93% of young women aged 14–30 years had heard of HPV (Klug, Hukelmann, & Blettner, 2008). Many studies have assessed the knowledge of cervical cancer and HPV infection in undergraduate women (Gerend & Magloire, 2008; Lopez & McMahan, 2007; Sandfort & Pleasant, 2009). Findings from those studies indicated that awareness of HPV is increasing, particularly after the licensing of HPV vaccines. However, a poor understanding of HPV, modes of transmission, and the links to cervical cancer and genital warts still persists among young women. In addition, little is known about Taiwanese college women's knowledge and beliefs regarding cervical cancer and HPV infection. The purpose of the current study was to assess the knowledge and beliefs regarding cervical cancer and HPV among undergraduate women in Taiwan.

Methods

Sample

The current study used a descriptive cross-sectional design with a convenience sample of undergraduate women who were recruited from five universities in southern Taiwan. Three of the universities offered health-related majors (e.g., nursing) and liberal arts departments (e.g., Chinese, history, business). Two of the universities offered either health-related or liberal arts majors.

Data Collection

Data analyzed in the current study were part of a previously reported larger study on HPV intention (Hsu et al., 2009). After approval from the institutional review board at the National Cheng Kung University Hospital and the five universities, a survey was conducted from October 2007 to April 2008. Information on the study was introduced by research assistants in classes or distributed on campus by handing out flyers. A packet of materials, including a cover letter describing the study, an informed consent, and a questionnaire, was distributed to students in their classrooms by research assistants. Students completed the questionnaire after class and returned it in an anonymous envelope.

Measures

The researcher-developed **HPV Belief** questionnaire contained 46 items in Mandarin derived from the Health Belief Model (Rosenstock, Strecher, & Becker, 1988, 1994). The questionnaire assesses (a) knowledge of cervical cancer and HPV, (b) health beliefs about HPV vaccination, (c) intention of HPV vaccination, (d) demographic information, and (e) gynecologic history. Face validity and clarity of the scale were conducted and have been previously described in detail (Hsu et al., 2009). Three dimensions assessing the knowledge of cervical cancer and HPV were retrieved from the survey for analysis.

Knowledge and beliefs of cervical cancer: Four items assessed students' knowledge and beliefs of cervical cancer. Two single-choice items assessed knowledge about cervical cancer, and two items assessed beliefs about cervical cancer. The belief items were rated on a five-point Likert-type scale from 1 (strongly disagree) to 5 (strongly agree).

Awareness of human papillomavirus: One item evaluated the awareness of HPV: "Have you heard of human papillomavirus?" A yes-no format was used. If participants answered yes, six specific questions were posed related to HPV; if participants answered no, those questions were bypassed.

Knowledge and beliefs of human papillomavirus: Six items assessed knowledge and beliefs about HPV. Four single-choice items assessed the knowledge of

HPV, including transmission route, genital tract infection, cervical cancer, and detection methods for HPV. One multiple-choice item assessed knowledge regarding prevention strategies for HPV infection. One item assessed beliefs regarding the likelihood of HPV infection. The belief item was rated on a five-point Likert-type scale from 1 (improbability) to 5 (very high probability).

Data Analysis

Data were analyzed using SPSS®, version 15.0. Descriptive analyses for knowledge and beliefs were performed. Simple logistic regressions were used to examine predictors of HPV awareness. Chi-square tests were conducted to examine the associations between sexual experience and knowledge, as well as between sexual experience and beliefs.

Results

A total of 974 questionnaires were collected. Twenty-one undergraduate women did not complete the questionnaire and were excluded in the final analysis, with 953 undergraduate women remaining in the sample.

Of the 953 students, 19% were freshmen, 26% were sophomores, 33% were juniors, and 22% were seniors. The mean age of the female students was 20.6 years (SD = 1.6), ranging from 17–36 years old. Ninety-nine percent of the students were single and never married (see Table 1). Only 22% of students (n = 207) admitted any sexual experience, with a mean age at first sexual intercourse of 18.3 years old (SD = 1.7, range = 14–25). Only 3% of students (n = 28), all sexually active, reported having a Pap test. Of the undergraduate women who admitted sexual activity, the Pap testing rate was only 14%.

Knowledge and Beliefs Regarding Cervical Cancer

Undergraduate female students had limited knowledge of cervical cancer. About 70% of participants agreed or strongly agreed that cervical cancer could be prevented and was a severe disease; however, 84% (n = 791) believed the likelihood of acquiring cervical cancer themselves was a definite improbability or low probability (see Table 2).

Fifty-four percent of the students responded that the purpose of a Pap test was to identify abnormal cells in the cervix, and 32% responded that the Pap test identified cervical cancer or sexually transmitted infections. Sixty-three percent (n = 601) knew the meaning of abnormal Pap test results. Twenty-four percent (n = 226) responded that an abnormal smear could indicate cancer or sexually transmitted diseases.

Knowledge and beliefs about cervical cancer differed significantly by sexual experience. Undergraduate women who had sexual experience were more likely

Table 1. Sample Characteristics

Characteristic	\bar{X}	SD
Age (years)	20.6	1.6
Characteristic	n	%
Class standing		
Freshman	183	19
Sophomore	243	26
Junior	315	33
Senior	212	22
Major area of study		
Health-related	458	48
Nonhealth-related	495	52
Marital status		
Unmarried	947	99
Married or have a partner	5	< 1
Omitted	1	< 1
Family history of gynecologic cancer		
Yes	70	7
No	882	93
Omitted	1	< 1
History of gynecologic visits		
Yes	269	28
No	683	72
Omitted	1	< 1
Sexual experience		
Yes	207	22
No	585	61
Omitted	161	17
Number of lifetime sexual partners		
None	585	61
One	107	11
Two	47	5
Three or more	43	5
Not disclosed	171	18
Pap testing		
Yes	28	3
No	925	97
Human papillomavirus awareness		
Yes	466	49
No	487	51

N = 953

Note. Because of rounding, not all percentages total 100.

to believe that cervical cancer was a severe disease than undergraduate women who were not sexually experienced ($\chi^2 = 8.18$, $p < 0.05$). Women with sexual experience were more likely to believe they had an average probability of acquiring cervical cancer than those with no sexual experience ($\chi^2 = 13.03$, $p < 0.001$).

Awareness of Human Papillomavirus and Predictors

Demographic and health variables were independently regressed on HPV awareness (see Table 3). Forty-nine percent of students (n = 466) were aware of HPV. Those with an awareness of HPV were more likely to be older, studying a health-related major, have a higher class standing, have a personal history of gynecologic visits, or have had a Pap smear. Neither family history

Table 2. Knowledge About Pap Smear Screening and Attitude About Cervical Cancer

Question	All Participants (N = 953)		Sexual Experience ^a				χ^2
			No (N = 585)		Yes (N = 207)		
	n	%	n	%	n	%	
Can cervical cancer be prevented?							
Strongly disagree or disagree	40	4	23	3	14	7	4.36
Moderately agree	227	24	145	20	41	20	
Agree or strongly agree	683	72	415	56	152	73	
No response	3	<1	163	22	–	–	
Is cervical cancer a severe disease?							
Strongly disagree or disagree	65	7	47	6	8	4	8.18*
Moderately agree	212	23	135	18	36	17	
Agree or strongly agree	669	70	398	53	161	78	
No response	7	<1	166	22	2	<1	
What is the Pap smear screening test used for?							
To identify abnormal cells in cervix ^b	514	54	319	43	109	53	5.75
To identify cervical cancer or STDs ^b	301	32	189	25	57	28	
Do not know	138	15	77	10	41	20	
No response	–	–	161	22	–	–	
What do you think an abnormal smear result might mean?							
Abnormal cells ^b	601	63	367	49	129	62	0.86
Cancer or STDs	226	24	144	19	47	23	
Do not know	125	13	74	10	31	15	
No response	1	<1	161	22	–	–	
What is your likelihood of acquiring cervical cancer?							
Improbability or low probability	791	84	494	66	154	74	13.03**
Average probability	126	13	68	9	44	21	
High or very high probability	22	2	14	2	8	4	
No response	14	2	170	23	1	<1	

* $p < 0.05$; ** $p < 0.001$ ^a 161 participants did not disclose sexual experience.^b Correct answer

STDs—sexually transmitted diseases

Note. Because of rounding, not all percentages total 100.

of gynecologic cancer nor sexual experience predicted HPV awareness.

Knowledge and Beliefs Regarding Human Papillomavirus

Eighty-two percent of the 466 women who were aware of HPV correctly identified that sexual contact was the primary transmission route of HPV infection (see Table 4). Only 46% of the students correctly identified that condyloma (genital warts) might occur if a woman contracted an HPV infection. Eighty-seven percent of those who had an awareness of HPV were quite knowledgeable about the relationship between HPV infection and cervical cancer. However, only 8% of those students correctly identified that HPV infection can be detected by using the HPV DNA test in cervical smears. In addition, the most common strategies reported for preventing HPV infection were avoidance of multiple sexual partners (88%), condom

use (87%), and HPV vaccination (61%). When asked about the likelihood of acquiring an HPV infection, 82% responded that they considered the likelihood to be improbable or of low probability.

Knowledge and beliefs about HPV did not differ by sexual experience. Of the women who were aware of HPV, 77% who were sexually active believed they had an improbable or low probability of acquiring HPV infection, compared with 82% of women who were sexually inexperienced.

Discussion

The current study provides a comprehensive understanding of undergraduate female students' awareness, knowledge, and beliefs regarding cervical cancer and HPV after the HPV vaccination licensure in Taiwan. Although female undergraduate students have strong and appropriate beliefs that cervical cancer is a severe

disease that can be prevented, the current study revealed a limited knowledge about HPV infection, as well as misconceptions regarding the likelihood of acquiring those diseases.

A quarter of the undergraduate women in the study were sexually experienced. The rate of sexual experience in undergraduate women in the current study is lower than that in undergraduate women in the United States, which ranges from 62%–80% (Burak & Meyer, 1997; Gerend & Magloire, 2008; Lopez & McMahan, 2007). One possible explanation for that difference is that sexual values in Taiwanese society are more conservative than in Western societies. Early sexual intercourse generally is not accepted or encouraged in Taiwanese society. The students may have been reluctant to respond truthfully to some questions, and, as a result, sexual experience may have been underreported. The rate of Pap testing among Taiwanese undergraduate women also is low. Pap smear tests are recommended within three years of a woman's first vaginal intercourse experience, but no later than age 21 (American Cancer Society, 2010; Taiwan Cooperative Oncology Group, 2007). A study conducted in the United States found that 70% of young women between ages 21–24 years who had their first vaginal intercourse experience within three years or less had obtained a Pap test in the previous year (Saraiya, Martinez, Glaser, & Kulas-ingam, 2009). Unlike in the United States, student health centers on Taiwanese university campuses usually do not provide any gynecologic services, including Pap testing, which makes accessibility to undergraduate women insufficient. Cultural norms are other factors underlying the low rate of Pap testing in undergraduate women (Lee-Lin et al., 2007; Warman, 2010). As early sexual intercourse generally is not acceptable in Taiwanese society, undergraduate women are not likely to get a Pap test to avoid the disclosure of sexual behaviors. Furthermore, because the national cervical cancer screening program in Taiwan is recommended for women age 30 years and older, undergraduate women may believe that Pap testing is not necessary for them. Because cervical cancer generally is regarded as a health threat to middle-aged women, many younger women may disregard the threat (Cotthran & White, 2002; Saules et al., 2007). Thus, under-

graduate women may be ignoring the importance of Pap testing. Future educational campaigns should emphasize the importance of Pap testing in detecting dysplasia and cervical cancer in undergraduate women, particularly focusing on those who are sexually active.

The study findings suggest that a majority of undergraduate female students believe that cervical cancer is a severe and preventable disease. In addition, 80% of participants knew the purpose of Pap testing. The national cervical cancer screening campaign, initiated in 1995, has contributed to lay knowledge of early detection, and effectively focused on the severity of the disease. The educational efficacy of the campaign has been remarkably successful. Information on Pap testing and cervical cancer is disseminated frequently through television, radio, newspapers, and magazines.

Compared with findings from western undergraduate women, Taiwanese women's awareness of HPV in the current study was low, as more than half of the participants had never heard of HPV. General awareness of HPV in western societies has increased gradually since 2000 (Gerend & Magloire, 2008; Lopez & McMahan, 2007; Sandfort & Pleasant, 2009). The awareness of HPV has ranged from 79%–94% after the HPV vaccine was approved in western societies (Jain et al., 2009; Klug et al., 2008). Although the HPV vaccine has been available in Taiwan as long as it has in western countries, the difference in HPV awareness is dramatic. Taiwanese women aged 21–30 years have the highest prevalence rate of HPV infection (30%), so increasing HPV awareness re-

Table 3. Independent Predictors of Human Papillomavirus Awareness

Variable	Coefficient	SE	Wald	OR	95% CI
Age	0.21	0.05	21.03	1.23**	1.12–1.34
Major area of study				1	
Nonhealth-related					
Health-related	2.68	0.16	280.6	14.54**	10.63–19.9
Class standing				1	
Freshman			58.51		
Sophomore	0.66	0.21	9.99	1.93*	1.28–2.9
Junior	0.97	0.2	23.81	2.63**	1.78–3.88
Senior	1.63	0.22	55.03	5.08**	3.31–7.81
Family history of gynecologic cancer				1	
No					
Yes	0.42	0.25	2.77	1.52	0.93–2.49
History of gynecologic visit				1	
No					
Yes	0.42	0.15	8.52	1.53*	1.15–2.03
Sexual experience				1	
No					
Yes	0.21	0.16	1.64	1.23	0.90–1.69
Pap testing				1	
No					
Yes	1.17	0.44	7.08	3.24*	1.36–7.69

N = 953

* p < 0.01; ** p < 0.001

CI—confidence interval; OR—odds ratio; SE—standard error; Wald—Wald statistic

Table 4. Knowledge of Human Papillomavirus (HPV) Among Women Who Were Aware of It

Item	All Participants (N = 466)		Sexual Experience				χ^2
	n	%	No (N = 289)	%	Yes (N = 113)	%	
What is the main transmitted route of HPV infection in women?							0.25
Sexual contact ^a	384	82	241	83	92	81	
Toilet seats, public springs, or saunas	8	2	4	1	2	2	
Do not know	74	16	44	15	19	17	
What genital tract infection might occur if women have an HPV infection?							0.85
Condyloma (genital warts) ^a	212	46	137	47	48	43	
Pelvic inflammatory diseases or vaginitis	159	34	96	33	40	35	
Do not know	95	20	56	19	25	22	
What cancer might occur if a woman has an HPV infection?							1.21
Cervical cancer ^a	403	87	249	86	98	87	
Breast cancer or ovarian cancer	14	3	11	4	2	2	
Do not know	49	11	29	10	13	12	
What is the main method of detecting HPV infection in women?							0.41
Pap smear testing	313	67	195	68	76	67	
HPV DNA detection at cervix ^a	38	8	23	8	11	10	
Blood sample	10	2	6	2	2	2	
Do not know	105	23	65	23	24	21	
What strategies can be used to prevent HPV infection? (Choose all that apply.)							
Use condoms.	405	87	248	86	100	89	0.5
Avoid multiple sexual partners.	410	88	255	88	96	85	0.79
HPV vaccine	283	61	175	61	65	58	0.31
Do not know	19	4	14	5	3	3	0.96
What is your likelihood of acquiring an HPV infection?							1.35
Improbability or low probability	382	82	237	82	87	77	
Average probability	65	14	41	14	20	18	
High or very high probability	19	4	11	4	6	5	

^a Correct answer

Note. 64 participants omitted the item of sexual experience.

Note. Because of rounding, percentages may not total 100.

quires ongoing attention. The results of HPV awareness predictors suggest a real need for targeted informational campaigns. Younger women and nonhealth-related majors were identified by the current study as having a low awareness of HPV. Conversely, undergraduate women having a history of gynecologic visits or Pap tests are more aware of HPV.

Similar to other studies (Burak & Meyer, 1997; Ingledue, Cottrell, & Bernard, 2004; Lopez & McMahon, 2007), the current study's findings show that undergraduate women believe themselves unlikely to acquire cervical cancer or HPV infection. Sexually active undergraduate women are more likely to acknowledge a risk of acquiring cervical cancer, but not HPV infection. Epidemiologic reviews indicate that risk factors for HPV infection and cervical cancer include early age at first intercourse, smoking, and multiple sexual partners (Bosch & de Sanjosé, 2007; Tay, Ngan, Chu, Cheung, & Tay, 2008). Developing health promotion campaigns for sexually

active undergraduate women is important to improve their self-defense and self-efficacy in preventing HPV infection, such as through condom use, avoiding multiple sexual partners, smoking cessation, and HPV vaccination.

Limitations

The current cross-sectional study includes sampling limitations. First, because participants were not randomly selected from universities, the findings might not be representative of all college women in Taiwan. Second, the findings cannot be generalized to male undergraduates. Male undergraduate students may have different knowledge and attitudes regarding HPV infection than female undergraduates. Future research should examine male undergraduate students and compare gender differences in knowledge and attitudes regarding HPV infection. Third, Taiwanese cultural norms may affect undergraduate women's willingness to answer

questions regarding sexual practices accurately. The results of the current study may underestimate sexual activity among undergraduate women. Fourth, family history of gynecologic cancer may be misreported because families may rarely communicate gynecologic cancer incidence because of personal privacy. In addition, family history may be misreported because of a person or a family member misidentifying an incidence of cervical cancer as uterine or ovarian cancer, or vice versa. Fifth, the age at first intercourse may be misreported because of a recall bias. Finally, sexual behaviors and the rate of Pap testing may be under-reported by the undergraduate women because of cultural norms.

Conclusion

The present study is the first assessment of Taiwanese undergraduate women's knowledge and beliefs regarding cervical cancer and HPV infection. The results indicate that Taiwanese undergraduate women's knowledge of cervical cancer and HPV differ from their counterparts in western countries. The HPV knowledge of Taiwanese undergraduate women who are sexually active is lacking, particularly considering their misconceptions regarding the likelihood of acquiring HPV.

Implications for Nursing

The rate of Pap testing among undergraduate women in the current study is low. The Health Belief Model indicates that knowledge influences an individual's health-related actions (Rosenstock et al., 1988, 1994). Previous research also indicates that knowledge and attitudes toward Pap tests and cervical cancer are related to having a Pap test (Lee-Lin et al., 2007; Tsui & Tanjasiri, 2008). An urgent need exists to educate young women who are sexually active to obtain a Pap test regularly within three years of their first intercourse experience and have routine gynecologic examinations (Lindley et al., 2009; Warman, 2010). Oncology nurses should provide educa-

tional campaigns for primary prevention on college campuses, focusing on the progression of cervical cancer, the importance of Pap testing, the relationship between HPV infection and cervical cancer, and safe sexual behaviors. The current study shows that HPV knowledge among Taiwanese undergraduate women is lacking. Teaching young women about the risks of HPV infection and preventive strategies is crucial. The HPV vaccine provides an efficacious method to protect against cervical cancer. A previous study showed that Taiwanese undergraduate women have a high intention toward HPV vaccination (Hsu et al., 2009). Nurses should provide information on HPV vaccinations to undergraduate women. More education about HPV is needed for younger undergraduate women outside of health-related majors. In addition, the comprehensive national cervical cancer screening, which provides free Pap testing to women older than 30, should be extended to include women aged 18–30 years. If young women with dysplasia or cervical intraepithelial neoplasia can be identified through Pap testing, they can receive appropriate treatments to prevent the advanced progression of the diseases.

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References

- American Cancer Society. (2010). Cervical cancer. Retrieved from <http://documents.cancer.org/115.00>
- Bosch, F.X., & de Sanjosé, S. (2007). The epidemiology of human papillomavirus infection and cervical cancer. *Disease Markers*, 23, 213–227.
- Bosch, F.X., Lorincz, A., Muñoz, N., Meijer, C.J., & Shah, K.V. (2002). The causal relation between human papillomavirus and cervical cancer. *Journal of Clinical Pathology*, 55, 244–265. doi:10.1136/jcp.55.4.244
- Brown, D.R., Shew, M.L., Qadadri, B., Neptune, N., Vargas, M., Tu, W., . . . Fortenberry, J.D. (2005). A longitudinal study of genital human papillomavirus infection in a cohort of closely followed adolescent women. *Journal of Infectious Diseases*, 191, 182–192. doi:10.1086/426867
- Burak, L.J., & Meyer, M. (1997). Using the Health Belief Model to examine and predict college women's cervical cancer screening beliefs and behavior. *Health Care for Women International*, 18, 251–262. doi:10.1080/07399339709516279
- Bureau of Health Promotion, Department of Health, ROC Taiwan. (2010). Taiwan cancer registry. Retrieved from <http://www.bhp.doh.gov.tw/BHPnet/Portal/StatisticsShow.aspx?No=200911300001>
- Chen, H.C., You, S.L., Hsieth, C.Y., Schiffman, M., Lin, C.Y., Pan, M.H., . . . Chen, C.J. (2011). Prevalence of genotype-specific human papillomavirus infection and cervical neoplasia in Taiwan: A community-based survey of 10,602 women. *International Journal of Cancer*, 128, 1192–1203.
- Cothran, M.M., & White, J.P. (2002). Adolescent behavior and sexually transmitted diseases: The dilemma of human papillomavirus. *Health Care for Women International*, 23, 306–319.
- Food and Drug Administration, ROC Taiwan. (2011). Drug information. Retrieved from <http://licquery.fda.gov.tw/DO8180.asp>

- Gerend, M.A., & Magloire, Z.F. (2008). Awareness, knowledge, and beliefs about human papillomavirus in a racially diverse sample of young adults. *Journal of Adolescent Health*, 42, 237–242. doi:10.1016/j.jadohealth.2007.08.022
- Harper, D.M., & Paavonen, J. (2008). Age for HPV vaccination. *Vaccine*, 26(Suppl. 1), A7–A11. doi:10.1016/j.vaccine.2008.01.013
- Hsu, Y.Y., Fetzter, S.J., Hsu, K.F., Chang, Y.Y., Huang, C.P., & Chou, C.Y. (2009). Intention to obtain human papillomavirus vaccination among Taiwanese undergraduate women. *Sexually Transmitted Diseases*, 36, 686–692. doi:10.1097/OLQ.0b013e3181ad28d3
- Ingledue, K., Cottrell, R., & Bernard, A. (2004). College women's knowledge, perceptions, and preventive behaviors regarding human papillomavirus infection and cervical cancer. *American Journal of Health Studies*, 19, 28–34.
- Jain, N., Euler, G.L., Shefer, A., Lu, P., Yankey, D., & Markowitz, L. (2009). Human papillomavirus (HPV) awareness and vaccination initiation among women in the United States, National Immunization Survey–Adult 2007. *Preventive Medicine*, 48, 426–431.
- Jeng, C.J., Ko, M.L., Ling, Q.D., Shen, J., Lin, H.W., Tzeng, C.R., . . . Chen, S.C. (2005). Prevalence of cervical human papillomavirus in Taiwanese women. *Clinical and Investigative Medicine*, 28, 261–266.
- Klug, S.J., Hukelmann, M., & Blettner, M. (2008). Knowledge about infection with human papillomavirus: A systematic review. *Preventive Medicine*, 46, 87–98. doi:10.1016/j.ypmed.2007.09.003
- La Torre, G., de Waure, C., Chiaradia, G., Mannocci, A., & Ricciardi, W. (2007). HPV vaccine efficacy in preventing persistent cervical HPV infection: A systematic review and meta-analysis. *Vaccine*, 25, 8352–8358. doi:10.1016/j.vaccine.2007.09.027
- Lee-Lin, F., Pett, M., Menon, U., Lee, S., Nail, L., Mooney, K., . . . Itano, J. (2007). Cervical cancer beliefs and Pap test screening practices among Chinese American immigrants. *Oncology Nursing Forum*, 34, 1203–1209. doi:10.1188/07.ONF.1203-1209
- Lindley, L.L., Brandt, H.M., Annang, L., Barnett, C.L., Hardin, J.W., & Burcin, M. (2009). Receipt of routine gynecological examinations among sexually active female college students in the United States. *Journal of Women's Health*, 18, 1195–1200. doi:10.1089/jwh.2008.1205
- Lopez, R., & McMahan, S. (2007). College women's perception and knowledge of human papillomavirus (HPV) and cervical cancer. *Californian Journal of Health Promotion*, 5, 12–25.
- McIntosh, J., Sturpe, D.A., & Khanna, N. (2008). Human papillomavirus vaccine and cervical cancer prevention: practice and policy implications for pharmacists. *Journal of the American Pharmacists Association*, 48(1), E1–E13. doi:10.1331/JAPhA/2008.07032
- Rosenstock, I.M., Strecher, V.J., & Becker, M.H. (1988). Social learning theory and the Health Belief Model. *Health Education Quarterly*, 15, 175–183.
- Rosenstock, I.M., Strecher, V.J., & Becker, M.H. (1994). The Health Belief Model and HIV risk behavior change. In R.J. DiClemente, & J.L. Peterson (Eds.), *Preventing AIDS: Theories and methods of behavioral interventions* (pp. 5–24). New York, NY: Plenum Press.
- Sandfort, J.R., & Pleasant, A. (2009). Knowledge, attitudes, and informational behaviors of college students in regard to the human papillomavirus. *Journal of American College Health*, 58, 141–149. doi:10.1080/07448480903221368
- Saraiya, M., Martinez, G., Glaser, K., & Kulasingam, S. (2009). Pap testing and sexual activity among young women in the United States. *Obstetrics and Gynecology*, 114, 1213–1219. doi:10.1097/AOG.0b013e3181be3db4
- Saules, K.K., Vannest, N.O., Mehringer, A.M., Pomerleau, C.S., Lee, K., Opipari, A.W., Jr., . . . Snedecor, S.M. (2007). Actual versus perceived risk of cervical cancer among college women smokers. *Journal of American College Health*, 55, 207–213. doi:10.3200/JACH.55.4.207-213
- Schiffman, M., & Kjaer, S.K. (2003). Chapter 2: Natural history of anogenital human papillomavirus infection and neoplasia. *Monographs*, 2003(31), 14–19.
- Shew, M.L., & Fortenberry, J.D. (2005). HPV infection in adolescents: Natural history, complications, and indicators for viral typing. *Seminars in Pediatric Infectious Diseases*, 16, 168–174. doi:10.1053/j.spid.2005.04.005
- Taiwan Cooperative Oncology Group. (2007). *Clinical guideline for gynecologic cancer*. Taipei, Taiwan: National Health Research Institute.
- Tay, S.K., Ngan, H.Y., Chu, T.Y., Cheung, A.N., & Tay, E.H. (2008). Epidemiology of human papillomavirus infection and cervical cancer and future perspectives in Hong Kong, Singapore and Taiwan. *Vaccine*, 26(Suppl. 12), M60–M70. doi:10.1016/j.vaccine.2008.05.042
- Tsui, J., & Tanjasiri, S.P. (2008). Cervical cancer screening among Thai women in Northern California. *Journal of Women's Health*, 17, 393–401. doi:10.1089/jwh.2007.0427
- U.S. Centers for Disease Control and Prevention. (2011a). HPV and men: Fact sheet. Retrieved from <http://www.cdc.gov/std/hpv/STDFact-HPV-and-men.htm>
- U.S. Centers for Disease Control and Prevention. (2011b). HPV vaccine monitoring. Retrieved from <http://www.cdc.gov/std/hpv/monitoring-rpt.htm>
- Warman, J. (2010). Cervical cancer screening in young women: Saving lives with prevention and detection. *Oncology Nursing Forum*, 37, 33–38. doi:10.1188/10.ONF.33-38
- World Health Organization. (2010). WHO/ICO Information Centre on human papillomavirus (HPV) and cervical cancer. Retrieved from <http://www.who.int/hpvcntr/en>