KNOWLEDGE, ATTITUDES, AND ACCEPTABILITY OF A HUMAN PAPILLOMAVIRUS VACCINE AMONG HEALTHCARE PROVIDERS

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Abstract. A cross-sectional survey was conducted to evaluate acceptability, knowledge, and attitude regarding HPV, cervical cancer, and HPV vaccine among healthcare providers working in hospitals located in Bangkok, Thailand. Two hundred nurses and 100 doctors from three government hospitals and one private hospital were recruited. Data collection was done using a self-administered questionnaire. Nurses and doctors knowledge on HPV, cervical cancer, and HPV vaccine was at a medium level. Both nurses and doctors had positive attitude toward HPV, cervical cancer, and HPV vaccine. Approximately 80% of nurses and 63% of doctors agreed on the use of a HPV vaccination. Almost all the nurses and doctors suggested that adolescent aged ≤18-years-old should be the target group for HPV vaccination. Furthermore, 73% of nurses and 76% of doctors would recommend clients to receive HPV vaccine.

INTRODUCTION

Human papillomavirus (HPV) infection of the genital mucosa is a common sexually transmitted infection (STI), and there is conclusive evidence for its role in the etiology of cervical cancer (Bosch and Munos, 2002). Among asymptomatic women in the general population, the prevalence of HPV infection ranges from 2-40% (Trottier and Franco, 2006). The prevalence of HPV varies with age, and HPV is highly prevalent in younger populations, with the highest rate in the age range of 20-30 years (Sellors *et al*, 2000; Stone *et al*, 2002). Approximately 50% of HPV infection occurs in sexually active adolescent girls and young women (Kahn *et al*, 2002). An international meta-analysis reported that about 90% of women in Asia were infected with HPV 16, and 18. The next common incidence types were HPV 58, 52, 51, 31, 33, 45, and 56 (Clifford *et al*, 2006). In Asia, the incidence of cervical cancer occurred in Vietnam, China, Singapore, and India were 32.3, 2.7, 17.4, and 24.9 per 100,000, respectively (Parkin and Bray, 2006). In Thailand, approximately 6,000 new cases occur yearly, and the rate is about 20-29 per 100,000 (Attasara, 2008).

Currently, there are highly efficacious vaccines available in the market. The first is Quadrivalent HPV vaccine, or Gardasil®, the first vaccine for the prevention of cervical cancer, abnormal and precancerous cervical lesions, abnormal and precancerous vaginal and vulva lesions, and genital warts. The

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other is Cervarix™, or bivalent HPV, the second vaccine for the prevention of cervical cancer and precancerous lesions associated with the most common cancer-causing HPV types. Both have been approved for females aged 9-26 years (Gerend and Barley, 2009). In Thailand, bivalent vaccine has been available at a private hospital with a cost of THB 6,800 (Nakornthon Hospital, Bangkok).

The acceptance for the vaccine might be related to other factors for decision making in vaccination of the population other than the price alone, such as the acceptance by healthcare providers (Zimet, 2005). Healthcare providers play the key role in influencing parents' decision making to allow their children to receive HPV vaccination (Dinh *et al*, 2007). The acceptance for HPV vaccine of healthcare providers, therefore, might result in HPV vaccine implementation in the future.

Although the HPV vaccine has been used in Thailand for two years, there is little information about HPV vaccine acceptability among healthcare providers working in Thailand. Healthcare providers were expected to have good acceptance and positive attitude toward HPV vaccine. They were also expected to have good knowledge on HPV vaccine as well as HPV infection and its relation to cervical cancer. Moreover, they are considered the primary and most trusted source of health and vaccine information for the public.

HPV vaccine acceptability has been studied worldwide. Previous studies demonstrated that HPV vaccine acceptability was generally positive among healthcare providers. However, most studies have been conducted in the developed world. Therefore, the objective of this study was to assess HPV vaccine acceptability, knowledge, and attitude regarding HPV, cervical cancer, and HPV vaccine of health care providers. Our research question was what were the levels of the acceptance, knowledge, and attitude among health care providers? It was expected that the results of the study could contribute to health policy in terms of health manpower development for vaccine introduction to the public in the future.

MATERIALS AND METHODS

This study was a hospital-based cross-sectional survey among healthcare providers. The hospitals included three government hospitals and one private hospital located in Bangkok, Thailand. Four hospitals with OPD or family planning/health promotion unit or pediatric clinic or obstetric/gynecologic clinic were selected. Healthcare providers included general nurses/technical nurse, general practitioner/medical doctors, pediatricians, and obstetricians/gynecologist. The initial sample size was determined to be 250 cases, including 150 nurses and 100 doctors. Sample size was calculated based on the acceptance rate from the previous reports and studies (acceptance rate = 80%) with absolute precision = +/-5%, 95% CI, and power = 80% (Raley *et al*, 2004; Kahn *et al*, 2005; Riedesel *et al*, 2005). However, to compensate for expected non-response, the sample size was increased to 350 (200 nurses and 150 doctors). Data collection was done between June and August 2008 using a self-administered questionnaire. Questions included those concerning basic socio-demographic characteristics; knowledge and attitudes regarding HPV, cervical cancer, and HPV vaccine; and the acceptability of HPV vaccine. The questionnaire on knowledge was constructed using basic knowledge about HPV infection and its consequences. Knowledge of cervical cancer included cause, risk, and screening. Knowledge of HPV vaccine focused mainly on the efficacy and its benefit. The Health Belief Model (Glanz *et al*, 2002) was applied to develop

the questions about attitude that focused on the perceived severity of cervical cancer, perceived benefit of the vaccination, and perceived barriers to vaccination, because these three factors could be expected to influence decisions about HPV vaccine acceptance among health care providers. Questions about acceptability were based on characteristics of the vaccine (*ie*, vaccination procedure, cost, benefit, and target group of vaccination).

Content validity and reliability of questionnaire were verified by the experts. The reliability of the questionnaire was tested among 30 cases of healthcare providers. The Cronbach's alpha coefficients were 0.91 (knowledge), 0.72 (attitude), and 0.81 (acceptability).

Data analyses

Data were analyzed using a statistical software program (SPSS®, version 16.1). Descriptive statistics were used to explain the socio-demographic characteristics of participants such as age, sex, educational level, and income. Knowledge was presented by frequency and percentage in each item, and the overall of knowledge presented by mean and standard deviation. Attitude assessment was categorized on a 5-level Likert scale that ranged from 1, for "strongly disagree," to 5 for "strongly agree." Each item of attitude was presented in percentage, mean, and standard deviation. Level of attitude was calculated from mean scores and grouped into three classes: 1-2.33 = "negative," 2.34-3.67 = "neutral," 3.68-5 = "positive." Overall attitude was presented by mean scores. The acceptance of a HPV vaccine was presented by frequency and percentage. The chi-square test was used to compare the differences in the proportions of knowledge and acceptance, and independent *t*-test was used to compare the mean differences of knowledge and attitudes between nurses and doctors. All values of alpha were set at 0.05.

Ethical considerations

Information collected was kept confidential by using numbers and codes, especially the data on knowledge, attitude, and acceptability of HPV vaccine. Furthermore, informed consent was obtained from all individuals. Ethical approval was obtained from the Ethics Committee of the Faculty of Tropical Medicine, Mahidol University, conducting the research (Ref No. MUTM 2008-011-01; approved dated 2009/May/18).

RESULTS

Two hundred nurses were studied; all were females. One-third (35.5%) were less than 30 years old, with a mean age of 36.4 years (SD = 10.0). Fifty-six percent were single, and 96.5% were Buddhist. Approximately one-half of them (49%) had a monthly income of between THB 20,001-40,000, and their mean monthly income was THB 44,678.44 (SD = 36,580.56). Most of them (44.0%) had work experience of less than 10 years. Almost one-half of them (45%) worked at an outpatient department.

Among 100 doctors participated, 55% were females and 45% males. Forty percent were aged between 30-39 years, with a mean age of 39.7 years (SD = 10.7). More than half of them (54.0%) were married, and almost all of them (96.0%) were Buddhist. More than two-thirds of them (72.0%) graduated with higher than a bachelor's degree. Approximately 80% of doctors had a monthly income greater than THB 40,000, with a mean income of THB 87,308.51 per month (SD = 62,724.70). The proportions of the respondents who worked at out patients departments, pediatric clinics, and obstetric/gynecological clinics were 33.3, 31.3, and 32.4%, respectively.

Table 1
Knowledge about HPV, nurses and doctors, *n* (%).

Questions	Nurses	Doctors
1. How many types of HPV are there?	65 (35.5)	54 (55.5)[a]
2. What is the incorrect statement about HPV?	96 (49.5)	72 (73.5)[a]
3. Which statement is not a risk of getting HPV infection?	110 (56.4)	66 (68.0)
4. What diseases can HPV cause?	87 (44.4)	70 (70.7)[a]
5. What is the most important cause of cervical cancer?	152 (77.8)	90 (90.9)[a]
6. What type of HPV that causes cervical cancer most?	111 (59.7)	61 (64.9)
7. What are the risk factors of cervical cancer?	96 (49.7)	57 (58.8)
8. Who should see the doctor for the cervical cancer screening?	39 (19.9)	24 (24.0)
9. Miss Kiew is 20 years old and has had sexual activity, should she have HPV vaccine?	106 (54.4)	78 (78.0)[a]
10. What is the efficacy of HPV vaccine in preventing infection from HPV vaccine subtypes?	21 (10.9)	17 (17.3)
11. Mrs Daeng is 30 years old, married, She has 2 children and got full course of HPV vaccination before getting married, does she need to get cervical cancer screening?	185 (94.4)	98 (98.0)
Total scores/mean (SD)	5.45 (1.82)	6.87 (1.99)[a]

[a]$p<0.05$

Knowledge

Nurses and doctors had knowledge regarding HPV infection, cervical cancer, and HPV vaccine at moderate levels, with the mean scores of 5.45 and 6.87 out of 11, respectively (Table 1). There were five questions that doctors answered correctly more than nurses; this was significantly different ($p<0.05$). The vast majority (94.4%) of nurses and doctors (98%) were aware that women who received a full course of HPV vaccination needed to have cervical cancer screening; however, only 10.9% of nurses and 17% of doctors knew about the efficacy of the HPV vaccine. Approximately 36% of nurses and 55.5% of doctors were aware the HPV subtypes. More than 90% of doctors knew the most important cause of cervical cancer, whereas 77.8% of nurses did. Conversely, only 19.9% of nurses and 24% of doctors were aware of who should see the doctor for cervical cancer screening. Nurses and doctors aged less than 40 years were more likely to have better knowledge on HPV, cervical cancer, and HPV vaccine than those aged 40 years and older were (data not shown).

Attitude

Nurses and doctors had positive attitude regarding HPV, cervical cancer, and HPV vaccine with mean scores of 3.68 and 3.87 out of 5, respectively (Table 2). There were 9 out of 20 items that the mean scores of doctors were significantly different from the nurses ($p<0.05$). More than 90% of nurses and doctors agreed that cervical cancer is a major problem for women, and sex education is needed for Thai adolescents. More than 80% of them agreed that people need reassurance about vaccine efficacy, cervical cancer causes death in women, and children must have knowledge on cervical cancer. However, 91% of doctors and 85% of nurses suggested that getting Pap test examination is an embarrassment. Greater proportion of doctors (79.6%) than nurses (63.1%) agreed that both boys and girls should get HPV

Table 2
Attitudes about HPV, nurses and doctors, Likert scale (%).

Statements	Nurses						Doctor					
	5(%)	4(%)	3(%)	2(%)	1(%)	$\overline{\chi}$(SD)	5(%)	4(%)	3(%)	2(%)	1(%)	$\overline{\chi}$(SD)
1. HPV infection is not important only for women.	21.9	16.8	17.3	28.6	15.4	3.02(1.40)	40.4	27.3	12.1	17.2	3.0	3.85(1.22)[a]
2. Person who has only one sex partner can protect from HPV infection.	11.7	29.7	20.9	21.4	16.3	2.99(1.28)	11.1	19.2	20.2	25.3	24.2	2.68(1.33)
3. Condom use cannot protect HPV infection completely.	5.6	13.8	17.8	43.4	19.4	2.43(1.12)	15.3	24.5	14.3	33.7	12.2	2.97(1.30)[a]
4. HPV infection in men is as important as in women.	4.6	19.9	33.2	31.1	11.2	2.76(1.04)	12.2	25.5	25.5	31.6	5.1	3.08(1.13)[a]
5. Education on HPV should be implemented at school.	52.6	36.2	10.2	0.5	0.5	4.40(0.73)	68.7	22.2	5.1	2.0	2.0	4.54(0.85)
6. Cervical cancer is a big problem for women.	82.0	8.2	4.1	2.6	3.1	4.63(0.92)	88.9	5.1	1.0	4.0	1.0	4.77(0.75)
7. Cervical cancer causes death in women.	73.5	15.3	3.1	1.5	6.6	4.47(1.10)	74.8	8.1	1.0	3.0	13.1	4.28(1.42)
8. Men can get involved to prevent cervical cancer.	61.2	30.1	7.7	0.5	0.5	4.51(0.71)	71.4	18.4	6.1	1.0	3.1	4.54(0.90)
9. Getting Pap test examination is not an embarrassment.	69.1	16.0	11.3	2.1	1.5	4.49(0.89)	83.8	7.2	4.0	3.0	2.0	4.68(0.86)
10. Both boys and girls should get HPV vaccine before he/she become sexually active.	28.2	34.9	24.6	4.6	7.7	3.71(1.15)	45.9	33.7	13.3	5.1	2.0	4.16(0.98)[a]
11. It is preferable to vaccinate HPV to every boy and girl.	14.3	24.5	38.3	9.2	13.7	3.16(1.20)	23.5	35.7	25.5	9.2	6.1	3.85(1.22)[a]
12. A well-informed child should be able to request vaccination without parental consent.	7.7	9.2	20.6	29.2	33.3	2.29(1.24)	6.1	10.1	12.1	30.3	41.4	2.68(1.33)
13. Children must have knowledge about HPV.	38.8	39.3	17.3	2.6	1.0	4.14(0.87)	31.6	44.9	20.5	2.0	1.0	4.04(0.84)
14. Children must have knowledge about cervical cancer.	40.8	38.3	17.9	1.0	2.0	4.15(0.89)	36.8	44.9	15.3	2.0	1.0	4.14(0.83)
15. Sex education is needed for Thai adolescent.	59.0	33.8	6.7	-	0.5	4.51(0.67)	59.2	34.7	4.1	2.0	-	4.54(0.85)
16. Communication between children and parents to get HPV vaccination might be a problem in Thai culture.	22.1	27.6	32.3	14.4	3.6	3.50(1.10)	42.4	26.3	18.2	10.1	3.0	4.77(0.75)[a]
17. People are worried about vaccine safety.	13.8	40.5	31.3	10.8	3.6	3.50(0.98)	4.0	20.3	44.4	21.2	10.1	4.28(1.42)[a]
18. People need reassurance about vaccine efficacy.	49.8	39.0	8.7	1.5	1.0	4.35(0.79)	41.8	49.1	7.1	2.0	-	4.54(0.90)
19. I am sure that vaccine is safe.	7.1	39.3	44.4	7.7	1.5	3.43(0.80)	19.2	54.5	22.3	4.0	-	4.68(0.86)[a]
20. HPV vaccine cannot lead to an increase in risky sexual behavior.	14.8	22.4	25.6	27.0	10.2	3.05(1.23)	28.3	42.4	16.2	12.1	1.0	4.16(0.98)[a]
Total scores ($\overline{\chi}$(SD))				3.68(0.32)						3.84(0.38)[a]		

5, strongly agree; 4, agree; 3, neutral; 2, disagree; 1, strongly disagree. $\overline{\chi}$, 1-2.33 = negative, 2.34-3.67 = neutral, 3.68-5 = positive
[a] p <0.05.

vaccine before she/he become sexually active (p <0.05). Most of nurses (91.3%) and doctors (88.8%) suggested that men could get involved to prevent cervical cancer. Interestingly, the proportion of doctors (70.7%) who agreed that HPV vaccine cannot lead to increase in risky sexual behavior was greater than nurses (37.2%); this was significantly different (p <0.05). However, 62.5% of nurses and 71.7% of doctors disagreed about "a child is free to request vaccination without the parents' consent." In addition, most of nurses and doctors disagreed that "condom use cannot protect HPV infection 100%."

Acceptability of HPV vaccine

There was a significant difference (p >0.05) between nurses and doctors who were willing to receive vaccination, 53.8% of nurses and 43% of doctors, respectively (Table 3). A majority of nurses (62.1%) and doctors (69.9%) agreed that the procedure of vaccination was appropriate. Doctors (61%) showed significant interest in the HPV vaccine as compare to nurses (49%). There was a small difference between those nurses who suggested that only females needed vaccination and those who suggested both sexes required vaccination (50.3% *vs* 49.7%). However, 63% of doctors suggested that both sexes should be vaccinated. Fifty-nine percent of nurses and 61% of doctors were willing to pay for vaccination themselves if the vaccine cost THB 500-2,000 per dose. All nurses and doctors suggested that an adolescent aged 18 years old and younger should receive vaccination. There was no significant difference in the proportion of nurses and doctors who would advise eligible groups to receive vaccination, 73% and 76%, respectively (p >0.05).

Perceived severity, benefits and barriers

Most nurses and doctors had a good understanding of the severity of cervical cancer, and the benefits of and barriers to vaccination (data not shown). Eighty-nine percent of nurses and 83% of doctors understood that cervical cancer causes death in women. Sixty-three percent of nurses and 73% of doctors believed that HPV vaccine should be introduced for both boys and girls, and they should be educated before becoming sexually active. Finally, > 80% of nurses and doctors believed that the efficacy of the vaccines might be a problem for vaccination.

DISCUSSION

This study showed that nurses had significantly lower knowledge mean score (p <0.05) compared to that of doctors (5.45 *vs* 6.87). However, both doctors and nurses had moderate knowledge on HPV, cervical cancer, and HPV vaccine. It was similar to the studies in the US assessing knowledge and attitude among 512 pediatricians and 115 family doctors. The studies illustrated that the knowledge mean score of pediatrician and family physician were at medium level, 1.86 and 2.9 out of 5, respectively (Kahn *et al*, 2005; Riedesel *et al*, 2005). However, it is different from a study that measured knowledge and attitude regarding HPV and its prevention among 160 hospital pediatricians reported that Italian pediatricians had poor level of knowledge (Esposito *et al*, 2007). In this study, nurses who worked at private hospital were more likely to have knowledge than those who worked in public hospital. It might be because the selected private hospital had provided HPV vaccination for nearly two years. Therefore, the nurses in the hospital were probably more ready to provide the information to clients than those in the public sectors.

Research on knowledge, attitudes, and beliefs among Canadian physicians reported that 75% obstetricians-gynecologists (n = 395), 60% family physicians (n = 408), and 48%

Table 3
Acceptance of HPV vaccine, nurses and doctors (*n*, %).

Variables	Nurses	Doctors
Need of vaccination		
No,	38 (19.3)	31 (31.0)
Yes,	106 (53.8)	43 (43.0)
Not sure	48 (24.4)	23 (23.0)
Need information	5 (2.5)	3 (3.0)
Total	197 (100)	100 (100)
Procedure of vaccination		
Appropriate	137 (69.9)	60 (61.2)
Not appropriate	48 (24.5)	28 (28.6)
Need information	11 (5.6)	10 (10.2)
Total	196 (100)	98 (100)
Levels of HPV vaccine interest		
Very much	13 (6.6)	15 (15.0)[a]
Much	83 (42.1)	46 (46.0)
Neutral	52 (26.4)	28 (28.0)
Little	35 (17.8)	7 (7.0)
Very little	14 (7.1)	4 (4.0)
Total	197 (100)	100 (100)
Who needs HPV vaccine		
Female	99 (50.3)	37 (37.0)[a]
Both equally	98 (49.7)	62 (63.0)
Total	197 (100)	100 (100)
Willingness to pay (THB)		
<500	66 (33.5)	25 (25.0)[a]
500-2,000	117 (59.4)	61 (61.0)
2,001-4,000	14 (7.1)	14 (14.0)
Total	197 (100)	100 (100.0)
Initiating age for vaccination		
≤18 years old	197 (100.0)	100 (100)
>18 years old	0	0
Total	197 (100)	100 (100)
Recommend vaccination to patients		
Yes	144 (73.1)	76 (76.0)
No	17 (8.6)	6 (6.0)
Gave information	36 (18.3)	18 (18.0)
Total	197 (100)	100 (100)

[a] $p < 0.05$

pediatricians (n = 461) were aware that persistent HPV is a necessary cause of cervical cancer (Duval *et al*, 2007). In contrast, 90.9% of doctors in this study, and 80% of general practitioners and obstetricians-gynecologists from a national survey assessing knowledge and attitude among 1,206 physicians in Mexico (Aldrich *et al*, 2005) had that knowledge. Compared to other studies, the doctors in the present study was relatively higher

than those in term of cause of cervical cancer. Sixty-five percent of the doctors in this study knew the common subtypes of HPV causing cervical cancer whereas 84.1% of family physicians (Riedesel *et al*, 2005) and 45% of pediatricians in the US (Kahn *et al*, 2005) did. The findings revealed that the awareness on HPV subtypes of doctors in this study were at a moderate level.

As most of the nurses and doctors in this study agreed that Thai adolescent should have knowledge on sex education, HPV, and cervical cancer, education on these aspects are needed for them. Seventy-one percent of doctors in this study agreed that HPV vaccine might not lead to an increase in risky sexual behavior, which was different from a study where only 48.5% of pediatricians agreed (Kahn *et al*, 2005). However, attitude of nurses and doctors in this study were positive toward HPV, cervical cancer, and HPV vaccine. This may lead to successful vaccine introduction if a national policy would be implemented.

A study conducted in Thailand to assess knowledge, attitude, and practice about cervical cancer among 149 nurses reported that 62.2% of nurses needed vaccination (Nganwai *et al*, 2008) which was similar to this study 53.8% of nurses were observed. All of nurses and doctors agreed that an adolescent age 18 years or younger should receive vaccination. This was consistent with the study of Esposito *et al* evaluating knowledge and attitude among 400 pediatricians reported that almost all pediatricians suggested that the first target group for HPV vaccination was children age less than 18 years. However, Duval *et al* (2007) stated that 80% of physicians agreed that best age for vaccination is less than 14 years. In the US, clinicians were more likely to advice older adolescent (>15 years) to get vaccination than younger age (Raley *et al*, 2004; Kahn *et al*, 2005). In this study, 73% of nurses and 76% of doctors would like to suggest eligible group to receive HPV vaccine, which implied that the majority of them accepted HPV vaccine. This was similar to the study conducted in the US (79% of clinicians accepted HPV vaccine (Raley *et al*, 2004). In contrast to two studies in Canada and Italy, there was greater proportion of doctors in Canada (84%; Duval *et al*, 2007) and in Italy (85%; Esposito *et al*, 2007) would like to suggest the target group to receive vaccination. The previous studies showed that the willingness of doctors to suggest their clients to receive vaccination might depend on their belief about the best benefit that the receiver can get from the vaccination.

The findings of this study suggested that the knowledge of health care providers was sufficient; however, they should improve awareness in terms of basic knowledge of HPV, cervical screening, and the efficacy of the vaccine. Overall, their attitude was positive to HPV vaccine and the acceptance of HPV vaccine was high. Most of them had good attitude about the severity of cervical cancer and the benefit of HPV vaccination. The barrier that might influence vaccination achievement was the efficacy of the vaccine. As a result, health policymakers should consider appropriate training programs for healthcare providers to gain more knowledge and improve their attitude. The program could potentially increase the acceptance for HPV vaccine among healthcare providers in the future.

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