

RESEARCH ARTICLE

A Cross Sectional Study on Knowledge, Attitude and Practice related to Human Papillomavirus Vaccination for Cervical Cancer Prevention between Medical and Non-Medical Students in Hong Kong

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Abstract

Background: One of the most important aetiologies of cervical cancer is Human Papillomavirus (HPV) infection. While vaccination is an effective way in preventing high risk HPV infection, HPV vaccine uptake rate in Hong Kong has been low. Considering the proven effectiveness of HPV vaccination and the low vaccination uptake rate in Hong Kong, this study was conducted to compare the knowledge, attitude and practice towards HPV vaccination for cervical cancer prevention between medical and non-medical students in the University of Hong Kong. **Methods:** A total of 420 full time undergraduates from the University of Hong Kong were recruited and evaluated. Questionnaires covering demographics, sexual risk profile, knowledge, attitude and practice towards HPV vaccination were applied, with the Chi-square test analysis. **Results:** Medical students had more comprehensive knowledge than their non-medical counterparts on HPV vaccination, including the carcinogenicity of HPV ($P<0.001$), available vaccines on the market ($P<0.001$) and the outcome of vaccination ($P<0.001$). In particular, senior medical students (Year 3 or above) were shown to be more knowledgeable than their juniors (below Year 3) with statistical significance ($P<0.001$). Positive attitudes toward HPV vaccination were observed more frequently among medical students when compared to non-medical students, especially regarding the usefulness of HPV vaccination in males ($P<0.001$). However, there was no significant difference in the vaccination rate between medical and non-medical students ($P=0.671$), suggesting an importance for factors other than knowledge, such as cost of vaccination and anxiety of side effects. **Conclusions:** Medical students in Hong Kong, especially those in senior years, had more comprehensive knowledge and positive attitudes towards HPV vaccination than non-medical students. Yet, there was no significant difference in the practice of HPV vaccination between medical and non-medical students. In addition to medical education, other factors such as health beliefs, risk perception and financial considerations, may have a role in determining HPV vaccination for cervical cancer prevention.

Keywords: Cervical cancer- health education- HPV vaccine- Hong Kong

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Introduction

Cervical cancer was the 8th commonest cancer in 2012 among the Hong Kong female population (Centre for Health Protection, 2015). Unlike other cancers with broad-spectrum aetiologies, cervical cancer is primarily caused by sexually transmitted human papillomavirus (HPV) infection, in particular HPV-16 and -18 (Chen and Leung, 2016). It has been proven that HPV vaccination, preferably before initiation of sexual life, is highly effective in HPV and cervical cancer prevention (Chatterjee, 2014). In Hong Kong, two registered HPV vaccines, namely Gardasil and Cervarix, are currently available. Clinical

trials have shown not only do the two vaccines provide nearly 100% protection against dysplastic changes and cervical cancer, they are also safe for use with limited side effects (Ferris et al., 2014; Naud et al., 2014).

In light of the high efficacy and safety, HPV vaccination has been advocated by the government and non-governmental organizations as part of the dual preventive measure against cervical cancer, which also included regular Pap smear screening (Hong Kong Cancer Fund, 2012; Globeathon, 2015). Despite extensive promotion campaigns on HPV vaccination in Hong Kong over the past decade, vaccination rate was less than 20% among the population (Li et al., 2013). Studies revealed

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that the vaccination rates were as low as 9.7% among university students (Chen and Leung, 2016) and 7.2% among secondary school students (Li et al., 2013).

A number of studies have demonstrated the relationship between medical education and the KAP towards various health issues. In Hong Kong, Chen (2016) explored how personal health beliefs and knowledge contributed to the practice of HPV vaccination among female university students. Their study showed that students who were more informed about cervical cancer were more likely to receive HPV vaccination. Moreover, participants with low perceived susceptibility and high perceived barriers, such as the cost of HPV vaccine, were less likely to receive vaccination. There was a positive association between medical education, health beliefs and HPV vaccination.

Considering the low vaccination uptake rate in this locality and its proven effectiveness, this research compared the difference in knowledge, attitude and practice towards HPV vaccination for cervical cancer prevention between medical and non-medical students in the University of Hong Kong. Our study will provide information for further policies related to medical education on cervical cancer, especially for non-medical students, and to enhance the overall practice of HPV vaccination in Hong Kong.

Material and Methods

Study Design

This was a cross-sectional observational study conducted from November 2015 to February 2016, and full-time undergraduates from the University of Hong Kong were recruited. Students under 18 were withdrawn.

Approval from the Institutional Review Board of the University of Hong Kong / Hospital Authority Hong Kong West Cluster were obtained before the commencement of the study (UW 15-583). Written and informed consents were obtained from all participants. Data were collected through self reported questionnaires.

Questionnaire

The questionnaire covered demographic information, sexual risk profile, knowledge, attitude and practice (KAP) towards HPV vaccination for cervical cancer prevention. Participants were also asked whether they have been tested HPV positive.

Demographics

Personal particulars including age, gender, study programme and year of study were collected.

Sexual Risk Profile

Participants were asked to indicate whether they had any sexual activity, including vaginal, oral and anal sex. Among participants who had sexual activity, safe sex practice and number of sexual partners were asked. Safe sex was defined as sexual intercourse with the use of male condom.

Knowledge of HPV Vaccination

Participants' knowledge was assessed by 6 questions

including (1) whether HPV can cause penile cancer, (2) whether HPV-16 can cause cancer in human, (3) number of HPV vaccines available in Hong Kong, (4) number of injections in a full course of HPV vaccination in Hong Kong, (5) whether women receiving HPV vaccines can develop cancer, and (6) whether women who have received HPV vaccination need to take Pap smear test to screen for cervical cancer.

Attitude towards HPV Vaccination

Participants were asked to indicate their views towards HPV vaccination about its usefulness for men, potential in promoting sexual risk behaviour (i.e. unsafe sex), and whether they would recommend HPV vaccine to their families.

For participants who received or planned to receive HPV vaccine, they were asked about their views on the safety of HPV vaccination, its effectiveness in cancer prevention, and sexual partner protection.

For those who did not receive HPV vaccination, their rationales were explored, including lack of prior knowledge about HPV vaccination, the price, effectiveness, perceived inefficiency due to previous sexual exposure, side effects, and perceived risk of HPV infection.

Practice of HPV Vaccination

Participants were asked to indicate their HPV vaccination status; whether they had (1) completed the full course, (2) not completed the full course, (3) scheduled for vaccination in the coming 6 months, or (4) never vaccinated and not scheduled for vaccination in the coming 6 months.

Statistical Analysis

All analyses were performed using SPSS 23 statistical software. The incomplete questionnaires were excluded. Descriptive statistics were used for the demographic items and attitudes towards HPV vaccination. The chi-square test was applied to examine the differences in knowledge and practice between 4 groups: (1) medical and non-medical students, (2) female and male, (3) people with and without sexual experience, and (4) junior and senior medical students. P-value of less than 0.05 was considered as statistically significant.

Results

Demographics

The total of 512 questionnaires was collected. After exclusion of incomplete responses, data analysis was performed on the remaining 420 responses. Among the respondents shown in Table 1, 43.1% were male and 56.9% were female, and the mean age was 19.8 years. In terms of study programme, 58.1% were medical; and among them, 58.2% were at year 3 or above. None of the respondents were found to be HPV positive previously. (Table 1)

Risk Profile

A minority of respondents n=? (N=35, 8.3%) were sexually active. Among them, 62.9% had practiced unsafe

Table 1. Demographics, Risk Profile and HPV Vaccination Practice

1.1 Characteristics of Respondents, N=420		1.2 Risk Profile of Respondents, N=420		
Demographics	No. (%)	Sexual Behaviour	No. (%)	
Male	181 (43.1)	Sexually active	35 (8.3)	
Female	239 (56.9)	Unsafe sexual practice, N=35	22 (62.9)	
		≥2 sexual partners, N=35	6 (17.1)	
Mean Age (Median)	19.8			
		1.3 HPV Vaccination Status, N=420		
Medical Student	244 (58.1)	Vaccination Status	No. (%)	
< Year 3	102 (41.8)		Male	Female
≥ Year 3	142 (58.2)	Completed the Whole Course	12 (2.9)	86 (20.5)
		Currently Participating	3 (0.7)	13 (3.1)
Non-Medical Student	176 (41.9)			
< Year 3	119 (67.6)	Scheduled in 6 Months	1 (0.2)	9 (2.1)
≥ Year 3	57 (32.4)			
		Not Scheduled in 6 Months	165 (39.3)	131 (31.2)
HPV positive	0 (0.0)			
1.4 HPV Vaccination Status between Different Groups				
Respondents' Characteristics		Completed the Course / Currently Participating / Scheduled in the Coming 6 Months (%)	Not Scheduled in the Coming 6 Months (%)	P-value (α=0.05)
Major of Study				0.671
Medicine, N=244		74 (30.3)	170 (67.7)	
Non-Medicine, N=176		50 (28.4)	126 (71.6)	
Gender				<0.001
Male, N=181		16 (8.8)	165 (91.2)	
Female, N=239		108 (45.2)	131 (54.8)	
Year of Study (Medicine)				0.267
<Year 3, N=102		27 (26.5)		
≥ Year 3, N=142		47 (33.1)		
Risk Profile				0.302
Sexually Active, N=35		13 (37.1)		
Sexually Non-Active, N=385		111 (28.8)		

HPV, Human Papillomavirus; bolded values significant at P<0.05

sex.

Knowledge

Comparison between Medical and Non-Medical Students

Comparing medical and non-medical students, the former had significantly more comprehensive knowledge on HPV. For example, 92.6% (N=226) of medical students correctly stated that HPV-16 is a cause of cancer in human, while only 78.4% (N=138) of non-medical students could correctly identify HPV-16 as a carcinogen (Table 2).

Medical students also performed better in knowledge about HPV vaccination with statistical significance (P<0.001). More than three quarters of medical students (82.0%) understood that 3 injections were necessary for a complete vaccination regimen, while less than two-thirds of non-medical students (62.5%) answered correctly (P<0.001). Also, 69.3% of medical students were aware of the 2 different types of vaccines available in Hong Kong, while less than half (45.5%) of non-medical students had

this knowledge (P<0.001) (Table 2).

In addition, medical students were more knowledgeable in cervical cancer prevention. A majority of medical students (93.9%) realized the importance of Pap smear test after HPV vaccination to prevent cervical cancer, but only 59.4% of non-medical students were aware of this preventive measure (P<0.001) (Table 2).

Among the respondents, 142 (58.2%) were senior medical students (i.e. Year 3 or above). Senior medical students performed better with statistical significance than junior medical students (P<0.001), except to the question whether women would develop cervical cancer after HPV vaccination (P=0.719) (Table 3).

Among the respondents, 43.1% were male and 56.9% were female. The male and female study population had similar knowledge towards HPV vaccination, except for the question about the number of injections included in a full course of vaccination in Hong Kong, where the female respondents performed significantly better (P<0.001)

Table 2. Knowledge of HPV Vaccination in Medical and Non-Medical Students

	Medical, N=244 (% of correct responses)	Non-Medical, N=176 (% of correct responses)	P-value ($\alpha=0.05$)
1. Question on HPV and penile cancer	178 (73.0)	94 (53.4)	<0.001
2. Question on HPV-16 and malignancy	226 (92.6)	138 (78.4)	<0.001
3. Question on HPV vaccinations available in Hong Kong	169 (69.3)	80 (45.5)	<0.001
4. Question on full course of HPV vaccination	200 (82.0)	110 (62.5)	<0.001
5. Question on efficacy of HPV vaccination on cervical cancer prevention	223 (91.4)	144 (59.0)	<0.001
6. Question on screening test for cervical cancer after HPV vaccination	229 (93.9)	145 (59.4)	<0.001

Ans, correct answer; HPV, Human Papillomavirus; bolded values significant at $P<0.05$

Table 3. Knowledge of HPV Vaccination in Junior and Senior Medical Students

	\geq Year 3, N=142 (% of correct responses)	< Year 3, N=102 (% of correct responses)	P-value ($\alpha=0.05$)
1. Question on HPV and penile cancer	117 (82.4)	61 (59.8)	<0.001
2. Question on HPV-16 and malignancy	136 (95.8)	90 (88.2)	0.026
3. Question on HPV vaccinations available in Hong Kong	123 (86.6)	46 (45.1)	<0.001
4. Question on full course of HPV vaccination	123 (82.6)	77 (75.5)	0.026
5. Question on efficacy of HPV vaccination on cervical cancer prevention	129 (90.8)	94 (92.2)	0.719
6. Question on screening test for cervical cancer after HPV vaccination	141 (99.3)	88 (86.3)	<0.001

Ans, correct answer; HPV, Human Papillomavirus; bolded values significant at $P<0.05$

(Table 4).

Comparison between respondents with and without sexual experience showed that only 8.3% of respondents had sexual experience. Respondents with or without sexual experience had no statistical difference in knowledge about HPV vaccination ($P>0.05$) (Table 5).

Practice

Among the 420 students shown in Table 1, a quarter (23.4%) had completed the whole course of the vaccine; 3.8% were currently participating; 2.3% had scheduled in the coming 6 months. The majority (70.5%) was never vaccinated and had not scheduled it in the coming 6 months.

The characteristics of respondents were grouped according to their study programme, gender, year of study and risk profile. Vaccination status was compared within the groups. Only female students had statistically significant difference when compared to male students ($P<0.001$). About half of the female respondents (54.8%)

were not vaccinated and did not scheduled it in the coming 6 months, while an overwhelming majority (91.2%) of the male respondents indicated this practice (Table 1).

Attitude

More than three quarters (84.0%) of medical students agreed HPV vaccination was useful for men, while only 66.5% of non-medical students agreed. Also, 91.0% of medical students and 90.9% of non-medical students disagreed that HPV vaccination would promote high-risk sexual behaviour. Moreover, 86.1% of medical students would recommend HPV vaccine to their family members and friends, while only 78.4% of non-medical students would recommend (Table 6 and 7).

From Table 3, among 124 students who had participated or scheduled for HPV vaccination, nearly all (99.2%) agreed HPV vaccine was safe and effective in cancer prevention.

Among 296 students who was never vaccinated and had not scheduled for HPV vaccination, 58.8% had never

Table 4. Knowledge of HPV Vaccination in Junior and Senior Medical Students

	Male, N=181 (% of correct responses)	Female, N=239 (% of correct responses)	P-Value ($\alpha=0.05$)
1. Question on HPV and penile cancer	119 (65.7)	153 (64.0)	0.713
2. Question on HPV-16 and malignancy	156 (86.2)	208 (87.0)	0.802
3. Question on HPV vaccinations available in Hong Kong	112 (61.9)	137 (57.3)	0.347
4. Question on full course of HPV vaccination	116 (64.1)	194 (81.2)	<0.001
5. Question on efficacy of HPV vaccination on cervical cancer prevention	155 (85.6)	209 (87.4)	0.588
6. Question on screening test for cervical cancer after HPV vaccination	162 (89.6)	212 (88.7)	0.795

Ans, correct answer; HPV, Human Papillomavirus; bolded values significant at $P<0.05$

Table 5. Knowledge of HPV Vaccination in Respondents with and without Sexual Experiences

	Experience, N=35 (% correct responses)	No Experience, N=385 (% of correct responses)	P-Value ($\alpha=0.05$)
1. Question on HPV and penile cancer	21 (60.0)	251 (65.2)	0.538
2. Question on HPV-16 and malignancy	30 (85.7)	334 (86.8)	0.863
3. Question on HPV vaccinations available in Hong Kong	19 (54.3)	230 (29.7)	0.529
4. Question on full course of HPV vaccination	23 (65.7)	287 (74.5)	0.255
5. Question on efficacy of HPV vaccination on cervical cancer prevention	24 (68.6)	340 (88.3)	0.001
6. Question on screening test for cervical cancer after HPV vaccination	29 (82.6)	345 (89.6)	0.221

Ans, correct answer; HPV, Human Papillomavirus; bolded values significant at $P<0.05$

Table 6. Positive Attitudes Towards HPV Vaccination in Medical Students

Medical Students, N=74	Agree	Disagree
HPV vaccine is effective in cancer prevention	74 (100.0)	0 (0.0)
HPV vaccine is safe for injection	74 (100.0)	0 (0.0)
Receiving HPV vaccination can effectively protect themselves and their sexual partners	73 (98.6)	1 (1.4)

HPV, Human Papillomavirus

thought about taking HPV vaccination. There was a higher proportion of non-medical students (66.7%) who had never considered receiving HPV vaccine than medical students (52.9%). Around half (48.3%) considered the HPV vaccine to be too expensive, and the proportion of medical students (47.1%) with this belief was similar

Table 7. Positive Attitudes Towards HPV Vaccination in Non-Medical Students

Non-Medical Students, N=50	Agree (%)	Disagree (%)
HPV vaccine is effective in cancer prevention	49 (98.0)	1 (2.0)
HPV vaccine is safe for injection	49 (98.0)	1 (2.0)
Receiving HPV vaccination can effectively protect themselves and their sexual partners	48 (96.0)	2 (4.0)

HPV, Human Papillomavirus

Table 8. Negative Attitudes Towards HPV Vaccination in Medical Students

Medical Students, N=170	Agree (%)	Disagree (%)
Never considered of receiving HPV vaccine	90 (52.9)	80 (47.1)
HPV vaccine is too expensive	80 (47.1)	90 (52.9)
HPV vaccine is not effective	17 (10.0)	153 (90.0)
HPV vaccine would be inefficient because of previous sexual activities	6 (3.5)	164 (96.5)
Concerned of side effects of receiving HPV vaccination	50 (29.4)	120 (70.6)
Self perceived low risk of HPV infection	116 (68.2)	54 (31.8)

HPV, Human Papillomavirus

Table 9. Negative Attitudes Towards HPV Vaccination in Non-Medical Students

Non-Medical Students, N=126	Agree (%)	Disagree (%)
Never considered of receiving HPV vaccine	84 (66.7)	42 (33.3)
HPV vaccine is too expensive	63 (50.0)	63 (50.0)
HPV vaccine is not effective	16 (12.7)	110 (87.3)
HPV vaccine would be inefficient because of previous sexual activities	7 (5.6)	119 (94.4)
Concerned of side effects of receiving HPV vaccination	48 (38.1)	78 (61.9)
Self perceived low risk of HPV infection	81 (64.3)	45 (35.7)

HPV, Human Papillomavirus

to that of non-medical students (50.0%). Some students (11.1%) thought that the HPV vaccine was ineffective, and 4.4% thought that HPV vaccination would be ineffective because of previous sexual activities. One-third (33.1%) were concerned of the side effects of receiving HPV vaccination. There was a higher proportion of non-medical students (38.1%) with concerns about the side effects this concern compared to medical students (29.4%). A majority of students (66.6%) thought they had low risk of HPV infection. The proportion of medical students (68.2%) with this risk perception was similar to that of non-medical students (64.3%) (Table 8 and 9).

Discussion

In this study, we found that medical students had more broad knowledge on the nature of HPV, cervical cancer and HPV vaccination. Medical students received

Table 10. General Attitudes towards HPV Vaccination in Medical Students

Medical Student, N=244	Agree (%)	Disagree (%)
HPV vaccination is useful for males	205 (84.0)	39 (16.0)
HPV vaccination promotes high-risk sexual behaviour	22 (9.0)	222 (91.0)
Would recommend HPV vaccine to family and friends	210 (86.1)	34 (13.9)

HPV, Human Papillomavirus

Table 11. General Attitudes Towards HPV Vaccination in Non-Medical Students

Non-Medical Student, N=176	Agree (%)	Disagree (%)
HPV vaccination is useful for males	117 (66.5)	59 (33.5)
HPV vaccination promotes high-risk sexual behaviour	16 (9.1)	160 (90.9)
Would recommend HPV vaccine to family and friends	138 (78.4)	38 (21.6)

HPV, Human Papillomavirus

systematic education on health-related issues (Han, 2012). With increased exposure to the pathophysiological knowledge of malignancies, it was not surprising to see medical students having more comprehensive knowledge on cervical cancer, which was one of the most prevalent cancer in this locality. In contrast, non-medical students had less opportunity to come in contact with general medical knowledge. It was reasonable to see that non-medical students were less familiar with cervical cancer or HPV vaccination.

In addition to the different level of knowledge, medical and non-medical students also had different attitudes towards HPV vaccination. For instance, 84.0% of medical students believed HPV vaccination was useful for men, while only around 66.5% of non-medical students held this belief. In general, the more positive attitude in medical students could be attributed to more comprehensive knowledge about HPV vaccination. By having a greater understanding about the aetiology and impact of cervical cancer, medical students would tend to have a more positive perception of HPV vaccination, and would be more willing to recommend vaccination. This finding was compatible with previous study which showed that students with higher level of medical knowledge were more enthusiastic to be vaccinated (Chen and Leung, 2016).

However, for participants who had not been vaccinated, the attitudes of medical and non-medical students were similar. Around half of those not vaccinated believed that HPV vaccines were too expensive. Two-thirds of them were concerned about the side effects of the vaccine and had low risk perception of HPV infection. From the study, the reasons for no vaccination were mainly related to personal health beliefs and cost-effectiveness evaluation. While knowledge about cervical cancer and HPV played a role in determining the attitude towards HPV vaccination; other factors, such as financial concern, health perception and cost-effectiveness evaluation also came into play (Li et al., 2013).

In the study, about a quarter of respondents were in the process or had taken the full course of HPV vaccination. While medical students had a higher level of knowledge, and a more positive attitude towards HPV vaccination, there was no significant difference in vaccination status between the medical and non-medical students. This was compatible with previous studies in Belgium by Deriemaeker (2014) and in Turkey by Borlu (2016). The underlying reasons could be attributed to the high cost of HPV vaccines, the concern about the side effects and the

self-perception of HPV risks. No matter the knowledge and attitude, financial considerations may hinder HPV vaccination. In addition, despite the minimal side effects of HPV vaccination, both medical and non-medical students may worry about potential harm. Besides, risk perception of HPV infection could explain why difference in knowledge and attitude did not correlate with vaccination practice. Both groups of university students may perceive themselves as having low risk of HPV infection because of abstinence or trust in their partners. With the above health beliefs, students may choose not to be vaccinated even if they had the knowledge and positive attitudes towards HPV vaccination.

Senior medical students had more comprehensive knowledge of HPV vaccination than junior medical student in this study, suggesting students accumulated knowledge about HPV and its vaccination through medical education. A study by Chen (2016) also provided compatible findings. Through repeated exposure from classes and study materials, students would consolidate their knowledge in HPV vaccination. However, the difference in knowledge level between junior and senior medical students did not affect HPV vaccination status. This suggested that knowledge level was not the only factor affecting practice of HPV vaccination. Self-perceived susceptibility, barriers and the cost of vaccination all played a role in health behaviours.

In the study, male and female respondents had similar knowledge of HPV vaccination. This may be attributed to the fact that they received health-related information through comparable channels. At the moment, HPV vaccination was advertised through leaflets, TV advertisements and public transport posters by the government and drug companies. However, there was a lack of gender specific information provided. For example, in question 1, we aimed to test if respondents knew HPV may cause penile cancer in men. Only two-thirds of male (65.7%) and female (64.0%) respondents knew the correct answer, showing that even some men did not realise HPV vaccination would be useful for them. In contrast, there was statistical difference in the vaccination status between men and women. Nearly half of all female respondents (45.2%) received or was in the process of receiving HPV vaccination, while less than one-tenth of male respondents (8.8%) had the same practice. This could be attributed to the skewed promotion campaign in Hong Kong, which mostly focused on the prevention of cervical cancer by HPV vaccination. Information such as prevention of genital warts or penile cancer by HPV vaccination seldom became a focus in the promotion campaigns. Therefore, men would be less aware of how HPV vaccination directly benefited them, and thus had less motivation to receive vaccination.

There was no statistically significant difference in knowledge and vaccination status between people with and without sexual experience. Further research may be required to explore about the correlations, as only 35 out of 420 respondents had sexual experience.

In light of the study results, there were several recommendations to promote HPV vaccination for cervical

cancer prevention in the community. Medical students had significantly more comprehensive knowledge related to HPV vaccination compared to non-medical students. This highlighted the need to include relevant general medical knowledge, especially on HPV vaccination, in the curricula of non-medical students. On the other hand, in view of the comparably low vaccination rates among all respondents despite their differences in knowledge and attitude, further campaigns could focus on preparing students for the contemplation stage of HPV vaccination. Obstacles towards HPV vaccination, such as low perceived susceptibility, concern of side effects and the high cost of vaccine should be tackled.

In conclusion, medical students in Hong Kong, especially those in senior years, had more comprehensive knowledge and positive attitudes towards HPV vaccination than non-medical students. However, the practice of HPV vaccination was comparable between medical and non-medical students. This suggested the role of other factors, including health beliefs, risk perception and financial considerations, in HPV vaccination for cervical cancer prevention.

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