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Factors associated with Human Papilloma Virus (HPV) vaccine recommendation by physicians in Lebanon, a cross-sectional study

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ABSTRACT

Persistent Human Papilloma Virus (HPV) infection is associated with the development of cervical cancer, a leading cause of female death worldwide. In Lebanon, cervical cancer is the 6th most common cancer amongst girls and women aged 14–44 years. Cervical cancer is preventable through HPV vaccination; however, Lebanon does not include HPV vaccination in its national routine vaccination schedule. Hence, physician recommendation is key for patient vaccine uptake. We conducted a cross-sectional study in Beirut, Lebanon to assess factors affecting physician recommendation regarding HPV vaccination. Physicians practicing in Obstetrics and Gynecology (OBGYN), Pediatrics, Family Medicine and Infectious Diseases were included in the study. In total, 228 physicians completed the survey (28.79% response rate). The survey consisted of a set of demographic and HPV knowledge questions along with clinical vignettes. The vignettes presented theoretical patients who differed in gender, age, sexual activity, social background and whether the patient presented with his mother or not. The results show that physicians tend to recommend the vaccine more commonly for vignettes presenting female patients, with an Adjusted Odds Ratio (AOR) of 6.8. Also, physicians were more likely to recommend the vaccine for vignettes with patients coming from a non-conservative background (AOR = 2.1), vignettes where patients claim to be sexually active (AOR = 2.7) and vignettes where patients presented with their mother (AOR = 1.4). Physicians tend to recommend the vaccine less in vignettes with married patients (AOR = 0.5). Physicians with higher knowledge scores recommended the vaccine more often (AOR = 3.4). Overall, OBGYN physicians recommended the vaccine less than pediatricians (AOR = 0.5). These results show that Lebanese physicians' recommendations rely on factors external to international guidelines. The results also highlight the importance of knowledge in adequate patient consultation. Thus, improved physician awareness towards international guidelines and physician education regarding HPV vaccination is essential in order to improve patient care in Lebanon.

1. Introduction

Persistent HPV[2] infection is associated with the development of cervical cancer [1,2], one of the leading causes of death for women globally. In Lebanon, cervical cancer is the 6th most common cancer amongst girls and women aged 14–44 years [3]. Cervical cancer is mostly preventable and treatable through HPV vaccination, screening and treatment programs [4]. By 2018, around eighty countries worldwide introduced the HPV immunization programs in the national routine vaccination schedule [5]. However, Lebanon still does not include HPV vaccination in its national routine vaccination schedule. Furthermore, the vaccine is not readily available in all Lebanese physicians' offices, but it is available on demand and in pharmacies throughout Lebanon. Vaccination is therefore dependent on multiple factors including physician recommendation, parental or patient request or access to the vaccine. Patients and parents tend to be strongly influenced by physician's recommendations in making

Abbreviations: HPV, Human Papilloma Virus; WHO, World Health Organization; OBGYN, Obstetrics and Gynecology; ODK, Open Data Kit; IRB, Institutional Review Board; AOR, Adjusted Odds Ratio; OR, Odds Ratio; USA, United States of America.

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[2] Human Papilloma Virus.

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decisions about vaccine uptake [6,7]. Hence, physician recommendation is an important and consistent predictor of vaccine uptake [8].

In this context, there are no known data on HPV vaccination practices, while studies from other countries in the region have found the rate of vaccination and knowledge related to HPV infections and vaccines to be particularly low [9]. Studies conducted in Lebanon and the United Arab Emirates show that only one third of participants are aware of HPV infection and vaccine [10]. Factors that influence recommendations by physicians to vaccinate their patients include personal knowledge about HPV, attitudes and values toward HPV [11], physician age and gender, as well as age and gender of the patient [12]. Moreover, different specialties tend to adopt different practices when it comes to vaccine recommendation [11]. This qualitative study showed that none of the obstetrics and gynecologists physicians opposed recommending HPV vaccination to males. However, the majority of physicians who did oppose male vaccination were from family medicine and private practice [11]. Another factor is culture and the norms of a society, where cultural factors can influence recommendation of the vaccine leading to several missed clinical opportunities for vaccination, particularly in early adolescence [12].

In 2017, the WHO[3] Executive Board highlighted vaccination of 9–13 year-old girls against HPV as one of the 5 main recommended interventions against non-communicable diseases [13]. In that same year, the WHO recommended the inclusion of HPV vaccination in national immunization programs [14]. In light of these current updates, and combined with the fact that the HPV vaccine is currently not part of Lebanon's national vaccine schedule, understanding factors that influence recommendations becomes important. This paper presents the knowledge and perception of physicians regarding HPV vaccine recommendations, and investigates the factors that influence these recommendations.

2. Methods

2.1. Study design

A cross-sectional study was designed to assess physician recommendations regarding HPV vaccination in Lebanon. A survey was thus administered to physicians by telephone, e-mail or in person during the months of February and March 2017. The survey integrated clinical vignettes. The vignettes presented theoretical scenarios of patients who differed in several variables to assess their influence on HPV vaccination recommendation. Such methodology has been used in other contexts to assess physicians' clinical practices [15,16]. Clinical vignettes were deemed to be a good proxy of physician's practices regarding HPV vaccination recommendation in a context where HPV vaccination is not routine, and electronic medical records are not yet available.

2.2. Study population

The study included physicians with specialties most likely to recommend HPV vaccination in their practice; OBGYN[4], Pediatrics, Family Medicine and Infectious Diseases. The sampling frame consisted of all physicians registered in the Lebanese Order of Physicians in January 2017 and practicing in the Greater Beirut area. The list obtained from the Lebanese Order of Physicians included 1168 physicians that met the above inclusion criteria. We attempted to contact all listed physicians. Potential participants were contacted by phone to obtain informed consent for participation in the survey. When a physician did not answer, 2 additional calls were placed. 376 of the 1168 listed physicians were not reachable due to missing contact details, wrong telephone number(s), having left the country or not answering after three phone calls. When contacted, physicians were given the choice for the survey to be administered face to face, on the phone or sent via email. When the survey was sent by email, a total of 3 email reminders followed. In total, 228 physicians gave consent and provided data for the study. All data were entered directly on tablets or through an online survey sent by email using ODK (Open Data Kit). Participating physicians were offered the choice to complete the survey either in English or in Arabic. All study protocols were approved by the IRB (Institutional Review Board) of the American University of Beirut.

2.3. Study questionnaire

The survey included a sociodemographic module including variables such as age, gender, location and years of practice adapted from Tolunay et al. [17] (Table 1). A set of knowledge questions and questions relating to barriers to vaccination were adapted from Vadaparampil et al. [8]. A knowledge score based on 11 questions was generated for each physician as percent correctly answered.

Constructed vignettes describing clinical scenarios followed by a question were administered to assess physician practices regarding HPV vaccination, and factors that influence vaccination decision. A total of 64 vignettes were created using a combination of variables. Each physician responded to 8 randomly selected vignette cases. The vignettes aimed to test the influence of patients'

Table 1
Socio-demographic characteristics, specialties and knowledge scores of physicians.

	Percentage (%)
Age (N = 202)	
25–35	11.4
36–45	19.8
46–55	40.1
56–65	19.8
>65	8.9
Gender (N = 224)	
Male	51.3
Female	48.7
Marital status (N = 221)	
Currently Married	84.4
Single	10.0
Other	5.7
Children (N = 210)	
Yes	86.2
No	13.8
Specialty (N = 220)	
Pediatrics	53.2
OBGYN	35.0
Family Medicine	9.1
Infectious Diseases	2.7
Geographic location of clinical practice (N = 213)	
Aley	1.4
Baabda	15.0
Beirut	68.5
Metn	15.0
Residency program (N = 213)	
Lebanon	45.5
USA	11.3
Europe	35.7
Other	7.5
Years practicing (N = 171)	
2–19	52
20–56	48
Knowledge score (N = 214)	
Lower than 73	58.4
Higher than 73	41.6

[3] World Health Organization.
[4] Obstetrics and Gynecology.

Table 2
Patient/vignette characteristics that influence HPV vaccine recommendation.

	UOR[a] (95% CI)	Model 1[b], Patient/vignette AOR (95% CI) (N = 1768)
Patient/vignette:		
Sex		
Male	–	–
Female	5.5* (4.1;7.3)	7.0* (5.1;9.7)
Age		
11–12	–	–
13–17	0.7* (0.5;0.9)	1.0 (0.6;1.4)
18 and more	0.6* (0.4;0.8)	0.7 (0.5;1.1)
Social status		
Conservative	–	–
Non-Conservative	2.0* (1.5;2.6)	2.1* (1.5;2.8)
Sexual activity		
None	–	–
Sexually Active	2.5* (1.8;3.4)	2.8* (2.0;4.0)
Married	0.7** (0.5;1.0)	0.6* (0.4;0.8)
Accompanied by mother		
No	–	–
Yes	1.4* (1.1;1.8)	1.3* (1.0;1.8)

[a] Unadjusted Odds Ratio; adjusted only for physician as fixed effect.
[b] Model 1: Patient/vignette characteristics influencing physician recommendation of HPV vaccination.
* $p < 0.05$.
** $p < 0.1$.

characteristics on whether the physician would recommend the vaccine or not. The variable characteristics consisted of patient gender, age, sexual activity, social background (explicitly stated as either conservative or non-conservative) and whether the patient presented alone or accompanied by the mother.

The questionnaire was piloted and tested for understanding and timing (10 min) prior to administration.

2.4. Data analysis

In all analyses, mixed effects logistic regression models were used to take into account the multiple responses made by each physician (up to eight vignettes per physician). Associations were examined between: each of the patient/vignette characteristics and recommendation of HPV vaccination (Table 2), and each of the physicians' characteristics and recommendation of HPV vaccination (Table 3). The variables included in the first and second model were based on studies that examined the relationship between those variables and HPV vaccine [8,11]. We used stepwise backward multiple logistic regressions to determine the association between patient/vignette variables (model 1, Table 2), physician characteristics (model 2, Table 3) and both patient/vignette and physician characteristics combined (model 3, Table 4) on odds of physician recommendation of HPV vaccination. In models 1 and 2 (Tables 2 and 3), any variable with a two-sided significance level less than 0.1 was retained and included in the stepwise regression for model 3. In model 3 construction we took into consideration not to exclude a variable was considered a key predictor of HPV vaccination. In model 3 (Table 4), a two-sided p-value less than 0.05 was considered statistically significant. All analyses were conducted using Stata version 13.

3. Results

3.1. Sample characteristics

Of the 792 physicians contacted, 228 completed the survey (28.79% response rate), generating for a total of 1768 vignette entries.

Table 3
Physician characteristics that influence HPV vaccine recommendation.

	UOR[a] (95% CI)	Model 2[b], doctor AOR (95% CI) (N = 1624)
Physician:		
Geographic location of clinical practice		
Aley		
Baabda	0.3 (0.0;3.4)	–
Beirut	0.5 (0.0;4.9)	–
Metn	0.4 (0.0;4.1)	–
Gender		
Male		
Female	1.1 (0.7;1.9)	–
Age		
25–35		
36–45	0.7 (0.3;17)	0.7 (0.3;1.6)
46–55	0.8 (0.4;1.8)	1.0 (0.5;2.1)
56–65	0.6 (0.3;1.5)	0.8 (0.3;1.8)
>65	0.4** (0.1;1.0)	0.4 (0.2;1.1)
Marital status		
Currently married		
Single	1.0 (0.5;2.3)	–
Other	0.3* (0.1;0.8)	–
Children		
Yes		
No	0.9 (0.4;1.6)	–
Specialty		
Pediatrics		
OBGYN	0.8 (0.3;2.0)	0.6* (0.4;0.9)
Family Medicine	0.8 (0.4;1.3)	0.9 (0.4;2.0)
Infectious Diseases	2.1 (0.4;12.2)	4.6 (0.7;32)
Knowledge score		
Lower than 73		
higher than 73	2.8* (1.8;4.4)	2.7* (1.7;4.2)
Years Practicing		
2–19		
20–56	0.7** (0.4;1.1)	–

[a] Unadjusted Odds Ratio; adjusted only for physician as fixed effect.
[b] Model 2: Physician characteristics influencing physician recommendation of HPV vaccination.
* $p < 0.05$.
** $p < 0.1$.

Table 1 presents the socio-demographic characteristics, specialties and knowledge scores of physicians who completed the survey. There were similar number of males and females. The majority of the participants was married (84.4%) and had children (86.2%). Most participants were aged between 46 and 55 (40.1%). Most participants were pediatricians (53.2%) and OBGYN specialists (35%), whereas the sample included less Family Medicine (9.1%) and Infectious Disease specialists (2.7%). Median HPV knowledge score was 73%, with 58.4% scoring below the median.

3.2. Factors associated with HPV vaccine recommendation

Table 2 presents the results of mixed effects logistic regression analyses for patient/vignette characteristics with recommendation of HPV vaccination (Model 1). Table 3 presents the results of mixed effects logistic regression analyses for physician characteristics with recommendation of HPV vaccination (Model 2). All variables from models 1 and 2 with p-values less than 0.1 were retained in model 3 (Table 4).

After adjusting for both patient/vignette and physicians' characteristics, we find that vignettes of female patients are approximately seven times more likely to receive a vaccine recommendation than vignettes of male patients (AOR[5] = 6.8, p-

[5] Adjusted Odds Ratio.

Table 4
Patient/vignette and physician characteristics that influence HPV vaccine recommendation.

	Model 3[a], Patient/vignette and doctor AOR (95%CI) (N = 1656)
Patient/vignette:	
Sex	
Male	
Female	6.8* (5.0;9.5)
Social status	
Conservative	
Non-Conservative	2.1* (1.5;2.8)
Sexual activity	
None	
Sexually Active	2.7* (1.9;3.9)
Married	0.5* (0.3;0.7)
Accompanied by mother	
No	
Yes	1.4* (1.1;1.8)
Physician:	
Specialty	
Pediatrics	
OBGYN	0.5* (0.3;0.9)
Family Medicine	0.8 (0.3;2.2)
Infectious Diseases	7.9 (0.8;75.5)
Knowledge score	
Lower than 73	
higher than 73	3.4* (2.0;5.9)

[a] Model 3: Patient/vignette and physician characteristics influencing physician recommendation of HPV vaccination.
* $p < 0.05$.

value < 0.001). Cultural perceptions also appear to play a role in vaccine recommendations, with physicians recommending HPV vaccination twice as often for vignettes of patients coming from a non-conservative background as compared to vignettes of patients coming from a conservative background (AOR = 2.1, p-value < 0.001).

Vignettes showing patients with sexual activity are also more frequently offered a vaccine recommendation as compared to those of patients reporting no sexual activity (AOR = 2.7, p-value < 0.001). However, vignettes of married patients tend to receive less vaccine recommendations than vignettes of patients who report no sexual activity (AOR = 0.5, p-value < 0.001).

In addition, vignettes of patients presenting to physicians while accompanied by their mother are more likely to receive a vaccine recommendation than vignettes of patients presenting alone (AOR = 1.4, p-value = 0.034).

When comparing recommendation rates between different specialties, our results showed lower recommendation rates among OBGYN specialists when compared to pediatricians (AOR = 0.5, p = 0.034). The difference in recommendation rates between other specialties was not statistically significant.

Finally, physicians who scored higher on the knowledge section were three times more likely to recommend HPV vaccination than those who scored lower (AOR = 3.4, p < 0.001). When we examined where knowledge deficits were (Table 5), we found that the majority of physicians who participated in the study did not know that condoms are not enough to prevent HPV transmission, with only 48.8% scoring correctly on this question. Moreover, sufficient knowledge also lacked when it came to the question of HPV causing head and neck cancers (only 57.1% answered correctly).

Other factors, such as the patient's age in the vignettes, physician's age and gender were not statistically significant variables in determining vaccine recommendation rate.

4. Discussion

Studies have shown that physician recommendation is an important and consistent predictor of vaccine uptake [8]. Moreover, the WHO recommends HPV vaccination for girls aged 9–14 years prior to becoming sexually active as primary target population [14]. The WHO also recommends vaccination of males and females above the age of 15 years as a secondary target population, when vaccination is feasible, affordable and cost-effective [14]. Three HPV vaccines have been approved by the U.S. Food and Drug Administration since 2006 which are the Bivalent, Quadrivalent and the 9-valent. However, after the end of 2016 only the 9-valent HPV vaccine is available in the U.S. [18]. Our study finds that vignettes of female patients are 6.8 times more likely to be recommended for vaccination by a physician compared to vignettes of males. It has been shown that Quadrivalent HPV vaccination for males is critical to prevent infection with HPV types 6, 11, 16 and 18 and thus preventing the development of external genital lesions and condylomata acuminata [19]. In our model, the difference in male and female HPV recommendation could be due to physicians following WHO guidelines since males are not part of the primary target population. Thus, physicians might consider male vaccination lacking cost-effectiveness. However, not enough data on HPV feasibility and cost-effectiveness is present in Lebanon to make such decisions. Another possible explanation for the lower vaccination recommendation in male vignettes might be that physicians perceive the vaccine as a main route to protect female patients against cervical cancer only, neglecting its effect in protecting against head and neck cancers. Indeed, only 57.1% of the physicians knew that HPV causes head and neck cancer, despite it being a prevalent cancer. In 2017 the Center for Disease Control and Prevention estimated that the average number of cases per

Table 5
Percent of physicians answering knowledge questions on HPV correctly (N = 212).

Knowledge question (correct answer)	Percentage correct (%)
Most HPV infections resolve without medical intervention (T)[a]	71.4
Treatment of cervical dysplasia/cancer permanently eliminates the causative infection (F)[b]	78.8
Genital warts are caused by the same HPV types that cause cervical cancer (F)	68.5
Almost all cervical cancers are caused by HPV infection (T)	71.8
The FDA approved the quadrivalent HPV vaccine for use in females ages 9–26 (T)	81.5
Females who have been diagnosed with HPV infection should not be given the HPV vaccine (F)	75.2
HPV causes vulvar, vaginal, and anal cancers in women (T)	82.9
HPV causes anal cancers in men (T)	82.1
HPV causes some head and neck cancers (T)	57.1
HPV infection is the most common sexually transmitted disease (T)	64.6
Condom use prevents HPV transmission (F)	48.8

[a] T: True.
[b] F: False.

year of male oropharyngeal cancer in the U.S. is around 13,200, of which 72% were probably caused by any HPV type [20].

Furthermore, our study shows that knowledge of HPV infection, vaccination, and HPV complications correlates with the likelihood of recommendations. Specifically, the majority of physicians falsely assume that condoms are sufficient to protect against HPV transmission (Table 5). Therefore, increasing awareness and continuing education among physicians regarding HPV is essential in order to assure better patient care.

Our results show that vignettes of patients coming from a conservative background and those who claimed to be sexually inactive received lower rates of vaccine recommendations. It is possible that physicians perceive patients who claim to be sexually inactive, and/or married and/or from a conservative social background to be at a decreased risk of HPV exposure. However, such assumptions may be unfounded, and guidelines such as those of the WHO do not make such a distinction [14]. Also, physicians tend to recommend the vaccine more if the mother of the patient is present in the vignette. This might be due to the fact that physicians are more comfortable discussing sexual topics and sharing vaccine options in the presence of the patient's mother. Another possible explanation for this finding might be that physicians consider the mother to be the responsible party when it comes to HPV vaccination, among other sexual concerns for the child. In fact, there are no laws in Lebanon regarding minors and health information, however, laws do exist when it comes to consent. Therefore, since the vaccine is not part of the national immunization schedule, it is up to the parents, and not the minor, to give consent for vaccination. This might drive physicians to feel obliged to discuss such issues in the presence of a parent.

Finally, our data show that OBGYNs were less likely to recommend the vaccine when compared to pediatricians, which may suggest that OBGYNS perceive the HPV vaccine, or vaccination in general as external to their field of practice, despite the fact that they may be a first point of contact for adolescent patients seeking sexual health care. It has been shown that quality improvement programs that include in-service training for OBGYN staff members encompassing patient counseling increased the rate of HPV immunization among young women and adolescent girls in an OBGYN service [21].

The main limitation of this study is the low response rate (28.79%), despite the fact that different means for completing the survey were offered (phone, email or tablet), and reminders were sent to those opting for an email survey. Other studies have found similarly low response rates by Lebanese primary care physicians [22]; this could be due in part to the inaccuracy of some of the information provided in the listing by the Lebanese Order of Physicians. This might also be explained by a potential lack of interest by Lebanese physicians when it comes to participating in research, or they might lack time for research participation due to heavy clinical duties, and some may have found the survey to be too lengthy to complete. Studies in other contexts have shown that monetary incentives improve physician response rates, and this could be considered in future research with physicians [23]. Thus, our results might be skewed towards a population with a higher interest in and knowledge about research or HPV specifically. Furthermore, the study was restricted to four specialties practicing in the Greater Beirut area, so the results cannot be generalized to the entire population of Lebanese physicians. Finally, clinical vignettes were used because of the difficulty of obtaining archive vaccination records. However, our analysis may not have accounted for unmeasured confounders in the vignettes' storyline.

In conclusion, this study was conducted in a context where HPV vaccination is not routine, despite strong recommendations by the WHO that highlight the role of HPV vaccination in protection from non-communicable diseases [13]. This study shows a lack of knowledge of current recommendations by Lebanese physicians. This leads physicians to recommend HPV according to patient criteria that are not substantiated. If the WHO guidelines on HPV vaccination are to be translated to policy in the Lebanese context, these factors will need to be taken into consideration to ensure physician compliance with recommendations. Indeed, the introduction of the HPV vaccination in the national routine immunization schedule is essential in Lebanon to ensure proper adherence to international guidelines. Indeed, the importance of introducing the HPV vaccine in the national immunization schedule in a middle-income country such as Lebanon is underlined by the fact that in the low/middle income countries who have already introduced national programs, coverage has been high. Indeed, administrative coverage estimates (number of doses delivered over the estimated target population) available in mid-2016 from 4 national programs in such countries indicate that 80–90% of the girls targeted received at least one dose [24]. These results may also be significant since research in countries in the region and in those with similar complex interactions of socio-economic and cultural factors is scarce. As such, this study may provide insight on immunization practices in such countries, with hope of encouraging further research on the matter.

Conflict of interest

The authors have declared no conflicts of interest.

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Author contributions

Joseph Abi Jaoude: Study conception and design. Data collection. Data management and analysis. Data interpretation. Article Drafting. Manuscript finalization.

Diana Khair: Study conception and design. Data collection. Data interpretation. Article Drafting. Manuscript finalization.

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Mohamad Ali Kaafarani: Study conception and design. Data collection. Data interpretation. Article Drafting.

Zeina Jamaluddine: Data management and analysis. Data interpretation. Article Drafting.

Hala Ghattas: Study conception and design. Data management and analysis. Data interpretation. Article Drafting.

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All authors attest they meet the ICMJE criteria for authorship.

Appendix A. Supplementary material

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