



## National survey study on the approaches of pediatricians, family physicians, medical oncologists and gynecologists to the HPV vaccine

Ahmet Unlu<sup>a,\*</sup>, M. Dogukan Kalenderoglu<sup>b</sup>, Hale Ay<sup>b</sup>, Ceren Kabaoglu<sup>b</sup>, Z. Lutfullah Koc<sup>b</sup>, D. Ozel Erkan<sup>c</sup>, Seyda Gunduz<sup>d</sup>, Onder Kirca<sup>d</sup>, Saadettin Kilickap<sup>e</sup>, Mustafa Ozdogan<sup>d</sup>

<sup>a</sup> Cay State Hospital, Ministry of Health, Afyonkarahisar, Turkey

<sup>b</sup> Akdeniz University, Faculty of Medicine, Antalya, Turkey

<sup>c</sup> Akdeniz University, Department of Biostatistics and Medical Informatics, Antalya, Turkey

<sup>d</sup> Memorial Antalya Hospital, Oncology Department, Antalya, Turkey

<sup>e</sup> Hacettepe University, Oncology Department, Ankara, Turkey

### ARTICLE INFO

#### Article history:

Received 7 December 2017

Received in revised form

21 April 2018

Accepted 24 April 2018

Available online 3 May 2018

#### Keywords:

Human papilloma virus

HPV vaccine

Cancer

Preventive medicine

### ABSTRACT

**Objective:** In this study, we aimed to emphasize the critical role of physician recommendations in increasing the HPV vaccination rates, and to create awareness in this regard, by revealing the approach of oncologists, gynecologists, pediatricians, and family physicians, who are the primary interlocutors in the matter of HPV vaccination.

**Procedures:** The study was prepared by conducting a questionnaire in a face-to-face manner, with the participation—on the basis of volunteerism—of 425 physicians including oncologists, gynecologists, pediatricians and family physicians. The interviews were conducted at 4 separate national oncology, pediatrics, gynecology and family medicine congresses. With the questions, the participants' attitudes towards HPV vaccination as well as the power, timing, consistency and scope of their recommendations were questioned.

**Findings:** In the study; 33% of the respondents stated that the vaccination was not important, and the ones who considered it to be unnecessary (31%) pointed out its non-cost effectiveness to justify their opinion. Only 51% of the respondents stated that the vaccine should be administered to both girls and boys. The rate of the respondents who stated that it should be administered to those with a risk factor was only 19%. 21% of the respondents stated that they promoted the vaccination in their routine practice. In addition, it was observed that the respondents, who answered correctly the question intended for questioning their knowledge about HPV's share in all types of cancer, considered the vaccine to be more important and recommended it more in their routine practices.

**Results:** The results of the analyses reveal that the low HPV vaccination rates are caused substantially by the attitudes of physicians regarding the vaccination; that they do not adequately play a role in its promotion; and that it should be the basic strategy to increase the physicians' level of knowledge about the vaccine, for increasing the rate of vaccination.

**Efficacy:** This is the first study in the literature, which involves the evaluation of the attitudes of physicians—who are the primary interlocutors in the matter of HPV vaccination—from 4 branches towards HPV vaccination. The study is also one of the first studies involving a sophisticated evaluation of the attitudes of physicians towards HPV vaccination. In terms of its results, the study has a nature that gives information and inspiration to people, institutions, and organizations both in Turkey and other countries, who/which have an aim to increase the rates of HPV vaccination.

© 2018 Turkish Society of Medical Oncology. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

### 1. Introduction

Despite the high efficacy<sup>1,2</sup> and safety profile<sup>3,4</sup> of HPV vaccination, the number of vaccinated individuals is well below the target value in many countries. According to the 2015 data, 41.9% of

\* Corresponding author.

E-mail address: [md.ahmetunlu@gmail.com](mailto:md.ahmetunlu@gmail.com) (A. Unlu).

Peer review under responsibility of Turkish Society of Medical Oncology.

adolescent girls and 28.1% of adolescent boys between the ages of 13 and 17 completed the three-dose series of HPV vaccine.<sup>5</sup> These rates are far behind the targeted 80% vaccinated individuals foreseen for 2020.<sup>6</sup>

The obstacles to HPV vaccination are multifactorial. In studies conducted among parents and health care professionals, certain causes of the low HPV vaccination rates have been revealed as follows:

- Health care professionals do not recommend the vaccine adequately and clearly;
- Inadequate awareness of HPV and HPV-related diseases;
- Concerns about the safety of the vaccine;
- Inadequate repayments and concerns about the cost;
- Parents think that their children are not sexually active and are also too small for vaccination;
- Physicians do not have enough time to talk about the vaccine;
- Feeling discomfort when talking about sexual behaviors;
- Individuals forget to take extra doses or they do not know the need for doing so;
- The lack of systems reminding physicians to recommend this vaccine in addition to other routine vaccines.<sup>3</sup>

Observations from the United States reveal that the main underlying cause of the low HPV vaccination rates is the fact that physicians do not adequately play a role in the promotion of the vaccine.<sup>7,8</sup> A study published in 2015, conducted in the United States with the participation of family physicians and pediatricians, showed that 27% of physicians do not strongly support the vaccine, 39% of physicians do not recommend it timely for males, 26% of physicians do not recommend it timely for females, and 59% of physicians recommend it for only those who have a risk factor.<sup>8</sup> According to a report released by the American Centers for Disease Control and Prevention (CDC), 36% of parents reported that physicians did not recommend vaccination for their adolescent girls, and 58% of parents reported the same regarding their adolescent boys.<sup>7</sup> CDC launched the “You are the key” campaign for emphasizing the critical role of physician’s communication in increasing the rates of HPV vaccination.<sup>9</sup> Another questionnaire study showed that physicians’ sense of self-efficacy is another obstacle to the promotion of the vaccine. In the study, many of the physicians stated that patients had hesitation about the vaccine, and that they did not recommend it routinely because they did not believe they could change the minds of patients.<sup>10</sup>

Another underlying cause of the low HPV vaccination rates is the level of knowledge about vaccination among allied health personnel, who are the other interlocutors in the matter of the promotion of HPV vaccination. In a study conducted in Turkey, intended for the evaluation of the level of knowledge about HPV and HPV vaccination among allied health personnel, 15% of the respondents stated that they were unaware of the HPV vaccine; and 12% and 44% of the respondents could not correctly reply the questions about the HPV-cervical relationship and HPV’s mode of transmission, respectively.<sup>11</sup> These findings indicate the importance of increasing the level of knowledge about HPV vaccination among allied health personnel. Likewise, studies conducted in America showed that health care professionals support the vaccine more when they are given information about it.<sup>3</sup>

The level of knowledge about HPV and HPV vaccine among parents is one of the other important underlying causes of the low HPV vaccination rates. In a study conducted among the mothers of children aged 10–15 in Turkey, 55% of the respondents reported that they have never heard about HPV. In the study, a strong correlation was found between parents’ previously gained knowledge about HPV and their acceptance of HPV vaccination for their

children.<sup>12</sup> Observations from studies conducted in the United States indicate that increasing parental knowledge about HPV vaccination would be an important strategy.<sup>3</sup>

In the literature, studies intended for the evaluation of the characteristics of physicians’ recommendations about HPV vaccination included pediatricians and family physicians, as respondents.<sup>8,10</sup> However, oncologists and gynecologists have an important role in increasing HPV vaccination rates, as well. Within the scope of the mission of reducing the burden of cancer, oncologists and gynecologists should make recommendations for cancer prevention to not only patients but also their families. HPV vaccination is also recommended until the age of 26. Accordingly, the American Society of Clinical Oncology (ASCO) states that oncologists are of vital importance in increasing HPV vaccination rates.<sup>3</sup>

Base on this, we aimed to emphasize the critical role of physician recommendations in struggling with HPV-related cancers, and to create awareness in this regard, by revealing the approach of oncologists, gynecologists, pediatricians, and family physicians, who are the primary interlocutors in the matter of HPV vaccination.

## 2. Procedures

### 2.1. Respondents and procedures

The “national questionnaire study on the approach of pediatricians, family physicians, medical oncology specialists, and gynecologists to HPV vaccine” was prepared by conducting a questionnaire in a face-to-face manner, with the participation—on the basis of volunteerism—of 425 physicians including oncologists, gynecologists, pediatricians and family physicians. The interviews were conducted at 4 separate national oncology, pediatrics, gynecology and family medicine congresses in Turkey, between March 10 and March 19, 2016. With intent to ensure respondent heterogeneity, the interviews were conducted at national congresses because they are meeting places of physicians from every part of Turkey and from different study areas. As a type of questionnaire, face-to-face-questionnaire was chosen with intent to enable the respondents to understand the questions more accurately, answer more questions, and give more serious responses. In the study, oncology, pediatrics, gynecology and family medicine specialists and assistants, who are the primary interlocutors in the matter of HPV vaccination, were selected as examples. Physician assistants were excluded from the study because physician assistants at clinics in Turkey are in more communication with patients, and they take on the primary task in patient examination and follow-up processes. Approximately 10% of all respondents were physician assistants in the relevant field. Questionnaire interviews were conducted by medical faculty students knowledgeable about the subject and proficient in statistical analysis and interpretation. The statistical analyzes were performed by an academician with Ph.D degree in statistics.

### 2.2. Demographic features and questions

The selected questions and sample features were determined in accordance with national HPV vaccination guidelines and the research literature.<sup>3,8,13,14</sup> For ensuring objectivity, the questions were prepared as closed-ended questions in advance, and just the questions were asked to the respondents during the interviews, without giving information about the vaccine. With the questions, the participants’ attitudes towards HPV vaccination as well as the power, timing, consistency and scope of their recommendations were questioned.

The question “What is your attitude about HPV vaccination?” was the primary hypothesis question intended for the evaluation of the

respondent's approach to the vaccine. The patients who answered the question, saying "it is unnecessary", were given the options of possible reasons, in accordance with the literature.<sup>3,14</sup> With the question "Do you consider having your child vaccinated against HPV, or would you have your child vaccinated if you had any?" the power of recommendation by physicians regarding the vaccine was questioned in the way of empathy. With the question "Which sex group should be vaccinated in your opinion?", whether or not vaccination of males is neglected was questioned. With the question "In what situations should the vaccine be administered in your opinion?", whether the vaccination is routinely recommended to all people of appropriate age or only those with risk factors was questioned. Rather than how the physicians recommended the vaccination to patients in their routine practices, their general opinions about the vaccine were questioned with the questions about to which age group, at what times and under which conditions the vaccine should be administered. Whether or not the physicians told their patients about the vaccine and whether they recommend them to get vaccinated were questioned with the question "Do you recommend the vaccine to your patients in your daily practice?". The questions "What should the timing of vaccination be?" and "What is the percentage of HPV-related cancers in all cancers?" were intended for questioning the physicians' level of knowledge about HPV and HPV vaccines. The question "What is the percentage of HPV-related cancers in all cancers?" was also measured the physicians' awareness about the importance of HPV-related cancers.

In the study, the demographic characteristics of the respondents including gender, branch, service period (from the date of graduation from the medical school), existence of boy(s) and girl(s), average number of patients seen per week, and stock status of HPV vaccine at workplace were questioned.

### 2.3. Statistical analysis

All the analyses were performed by using PASW Statistics 22. P values less than 0.05 were considered to be statistically significant. Descriptive statistics were presented with frequency and percentage values. Pearson Chi square test was used for the analysis of the relations between the categorical variables. The measurement values of the two groups were determined using the Mann-Whitney U Test when the data were not in accordance with the normal distribution; and using the Independent Samples *t*-Test when they were in accordance with the normal distribution. The Kruskal Wallis Test was used for the nonparametric comparison of the three groups; and the Bonferroni-Dunn Test was used as the post-hoc test for the measurements that gave significant results. Spearman Correlation Test was performed for the relations between the ordinal or continuous variables, which were not in accordance with normal distribution.

### 3. Findings

28% of the respondents were pediatricians, 26% were gynecologists, 23% were medical oncologists and 23% were family physicians. About two-thirds of them were male (67%) and three quarters were public officials (74%). 74% of them served for 10 years in their profession, and 65% saw more than 150 patients per week. 74% of the respondents had at least one child, and 47% had at least one girl (Table 1).

In the study; 33% of the respondents stated that the vaccination was not important, and the ones who considered it to be unnecessary (31%) pointed out its non-cost effectiveness to justify their opinion (Fig. 1).

29% of the physicians replied the question "Do you consider having your child vaccinated against HPV, or would you have your

**Table 1**  
Sample features.

(n = 425)	n (%)
<b>Branch</b>	
Medical oncology	96 (22,6)
Family medicine	99 (23,3)
Gynecology	109 (25,6)
Pediatrics	121 (28,5)
<b>Gender</b>	
Female	141 (33,2)
Male	284 (66,8)
<b>Type of Service</b>	
Public	314 (73,9)
Private	111 (26,1)
<b>Stock status of HPV vaccine at workplace</b>	
Available	81 (19,1)
Unavailable	344 (80,9)
<b>His/her service period</b>	
≤10	111 (26,3)
10-20	127 (30,1)
≥20	184 (43,6)
<b>Average Number of Patients per Week</b>	
≤150	143 (33,6)
150-300	128 (30,1)
≥300	150 (35,3)
<b>Having Child(ren)</b>	
Available	
Unavailable	
<b>Having daughter(s)</b>	
Available	198 (46,6)
Unavailable	227 (53,4)

child vaccinated if you had any?" saying "No". Only 51% of the respondents stated that the vaccine should be administered to both girls and boys. The rate of the respondents who stated that it should be administered to those with a risk factor was only 19%. 43% of the respondents stated that they did not recommend the vaccine in their routine practices, while 21% stated that they promoted it in their routine practices. Only 44% of the respondents stated that the ideal timing of the vaccine was between 9 and 12 years of age. The question intended for questioning the respondents' knowledge about the share of HPV in all cancers was answered correctly by 40% of the respondents (Table 2).

When the HPV status was evaluated based on branch, the proportion of those who considered the vaccination important was found to be significantly lower in gynecologists ( $p < 0,001$ ). Among the respondents who correctly answered the question intended for questioning the respondents' knowledge about the share of HPV in all cancers, the proportion of those who considered the vaccination important was found to be significantly higher (74,7) ( $p = 0,014$ ). Among the respondents who serve in public hospitals, the proportion of those who did not recommend the vaccine in their routine practices was found to be significantly higher ( $p = 0,012$ ). In addition, those who had HPV vaccine in the stocks of their workplaces were found to promote the vaccine significantly more often ( $p = 0,005$ ). Among those who did not recommend the vaccination in their daily practices, the rate of correct answer to the question intended for questioning the respondents' knowledge was found to be significantly lower ( $p = 0,011$ ). Those with a low number of weekly patients were observed to promote the use of the vaccine in their routine practices significantly more often ( $p = 0,01$ ). In addition, weak but significant negative correlation was found between the number of patients and the level of recommendation (I do not recommend, only informative, promotive) ( $r = -0,126$ ). No significant difference was observed between the groups, during the analyses performed based on the variables including gender, existence of boy(s), existence of girl(s), service period, and stock status of the vaccine (Table 3).

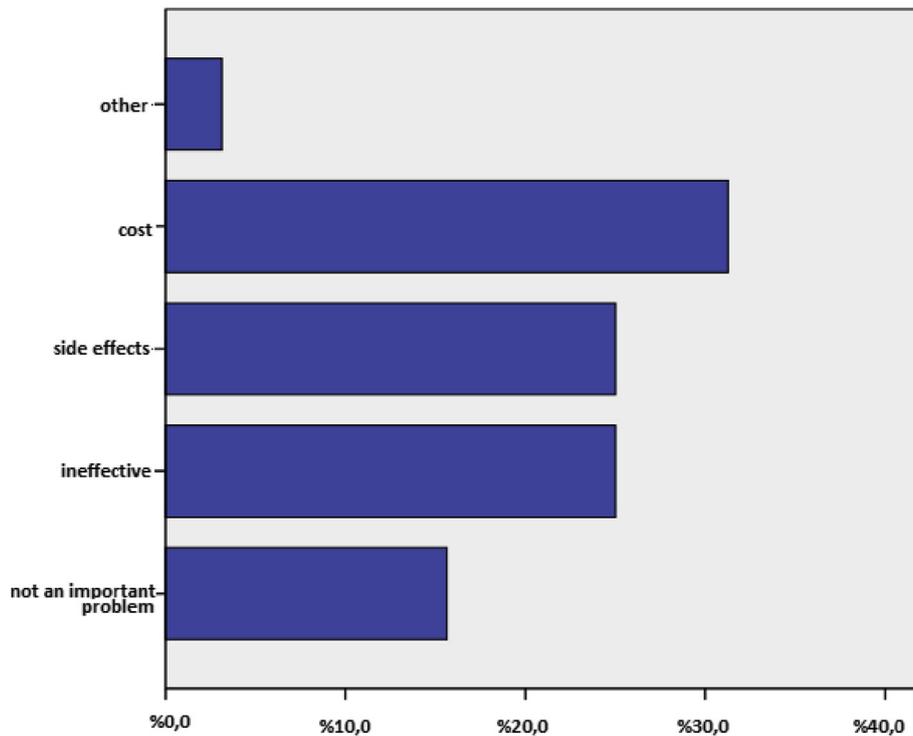


Fig. 1. Reasons shown by those who considered HPV vaccination as unnecessary.

**Table 2**  
Features of HPV vaccine recommendations.

(n = 425)	n (%)
<b>General Attitude</b>	
Unnecessary	32 (7,5)
Reasonable	110 (25,9)
Important	191 (44,9)
Very important	92 (21,6)
<b>Reason for Considering it Unnecessary</b>	
Non-existence of significant problems	5 (1,6)
Side effects	8 (2,0)
Weak efficacy	8 (2,0)
High cost	10 (3,1)
Other	1 (3,1)
<b>Gender to which it is Recommended</b>	
Only girls	175 (41,6)
Only boys	213 (50,6)
Not recommended	33 (7,8)
<b>Group to which it is Recommended</b>	
Only those with risk factors	81 (19,2)
Routinely to all people of an appropriate age	308 (73)
Not recommended	33 (7,8)
<b>Recommendation Status in Routine Practice</b>	
Promotive	87 (20,5)
Informative	157 (36,9)
Not recommended	181 (42,6)
<b>Vaccination Timing</b>	
9-12	184 (43,6)
≥12	205 (48,6)
Never	33 (7,8)

#### 4. Discussion

Our study is the first study in the literature, which involves a sophisticated evaluation of the attitudes of physicians, from four branches, towards HPV vaccination.

According to the data obtained from our national questionnaire, just a small proportion (20%) of the physicians from four branches,

who are the primary interlocutors in the matter of HPV vaccination, recommend the vaccine in their routine practices in a promotive way. However, the attitude of the physician exhibited when recommending the vaccination has a great effect on the acceptance of the vaccination by the person. It is because if physicians do not strongly recommend the vaccination, parents may become hesitant about vaccination and give up.<sup>15</sup>

One of the important findings obtained from our study was that only half of the respondents thought that the vaccine should be administered to both girls and boys. However, the current guidelines state that the vaccine should be administered to boys, as well.<sup>14</sup> It is because administering the vaccine to boys is important in terms of both reducing the incidence of penile, anal, and oropharyngeal cancers in men and also reducing the incidence of HPV-associated cancers indirectly in women, by preventing men from carrying such diseases.<sup>14</sup>

In our study, approximately one fifth of the respondents stated that vaccine should be administered to only those who had risk factors. However, the current guidelines state that the vaccine should be routinely administered to everyone of appropriate age. It is because 80–90% of sexually active women and men get infected by a type of HPV at least once in their lives.<sup>17</sup> According to a study, 46% of women experienced an HPV infection within the 3 years after the first sexual intercourse.<sup>18</sup> In other words, the risk of getting HPV infection is already high from adolescence periods. At this point, the risk-based approach to HPV vaccination is an unreasonable approach that causes overlooking many adolescents, who are likely to get HPV-associated cancers.<sup>19</sup>

Observations from epidemiological studies reveal that the ages between 11 and 12 are ideal for vaccination in terms of sexual activity. These ages have also been shown to be the ideal ages for immunoreactivity and HPV antibody titers.<sup>20</sup> However, according to the findings obtained from our study, most of the physicians stated that the vaccination should not be performed between the ages of 9 and 12. A significant proportion of physicians consider

**Table 3**  
Table of p values of the groups, in whom significant differences were found.

General attitude toward HPV vaccination							
	Unnecessary		Reasonable		Important		P Value
	N	%	N	%	N	%	
<i>Branch</i>							
Family Medicine	5	5.1	27	27.3	67	67.7	<0.001
Gynecology	18	16.5	38	34.9	53	48.6	
Pediatrics	5	4.1	20	16.5	96	79.3	
Medical Oncology	5	5.2	24	25	67	69.8	
<i>Branch2</i>							
Surgical branches (gynecology)	18	16.5	38	34.9	53	48.6	<0.001
Internal branches (others)	15	4.7	71	22.5	230	72.8	
<i>Recommendation of the vaccine</i>							
Promotive	0	0	15	17.2	72	82.8	<0.001
Informative	0	0	56	35.7	101	64.3	
I do not recommend	33	18.2	38	21	110	60.8	
<i>The answer to the question about the share of HPV in all cancers</i>							
Correct	9	5.3	34	20	127	74.7	0.014
Wrong	23	9.1	75	29.8	154	61.1	
<i>Recommending the vaccine to patients</i>							
	I promote		I give information		I do not recommend		P Value
	N	%	N	%	N	%	
<i>Branch</i>							
Family Medicine	16	16.2	29	29.3	54	54.5	<0.001
Gynecology	27	24.8	58	53.2	24	22	
Pediatrics	20	16.5	36	29.8	65	53.7	
Medical Oncology	24	25	34	35.4	38	39.6	
<i>Branch2</i>							
Surgical branches (gynecology)	27	24.8	58	53.2	24	22	<0.001
Internal branches (others)	60	19	99	31.3	157	49.7	
<i>Institute where the physician serve</i>							
Public	55	17.5	114	36.3	145	46.2	0.012
Private	32	28.8	43	38.7	36	32.4	
<i>Stock status of HPV</i>							
Available	27	33.3	27	33.3	27	33.3	<0.001
Unavailable	60	17.4	130	37.8	154	44.8	
<i>In which cases the vaccine should be administered</i>							
To those with risk factors	6	7.4	27	33.3	48	59.3	<0.001
Routinely to a certain age group	80	26	129	41.9	99	32.1	
I do not recommend	0	0	0	0	33	100	
<i>For whom the vaccine should be administered</i>							
For only girls	38	21.7	61	34.9	76	43.4	<0.001
For both girls and boys	49	23	93	43.7	71	33.3	
I do not recommend	0	0	0	0	33	100	
<i>The answer to the question about the share of HPV in all cancers</i>							
Correct	43	25.3	69	40.6	58	34.1	0.011
Wrong	44	17.5	86	34.1	122	48.4	

these ages to be early for vaccination and sexually inactive ages.<sup>21</sup> Some physicians in Turkey justify their thoughts by indicating the fact that sexual activities begin at much advanced ages in Turkey than Europe and the United States. However, studies have shown that the age of onset of sexual activity in Turkey is actually not much different from that in Europe and the United States.<sup>22,23</sup>

In our study, most of those who thought that vaccination is unnecessary justified their opinion by mostly indicating its non-cost-effectiveness. Similarly, a study previously conducted with the participation of family physicians in Turkey showed that the greatest cause of why HPV vaccine is not prescribed is its high cost (50%).<sup>24</sup> This reveals that the biggest obstacles to the recommendation of the vaccine in Turkey is its cost. The cost of the vaccine is the most important obstacle to the widespread adoption of the vaccine not only in Turkey, but also in other countries. Indeed, also in a study conducted in the United States, the cost of the vaccine and inadequate reimbursements were shown to be the greatest obstacle to HPV vaccination.<sup>25</sup>

In our study, the respondents, who answered correctly the

question intended for questioning the their knowledge about HPV's share in all types of cancer, considered the vaccine to be more important and recommended it more in their routine practices. In other words, physicians recommend the vaccine more often when they are more aware of the importance of HPV. This indicates that training intended for physicians will be a key strategy in increasing HPV vaccination rates.

It was seen that among the physicians who participated in our study, those who had a lower number of patients per week and those who did not serve in public institutions encouraged the use of vaccine more in their routine practices. Therefore, work intensity is another important obstacle to the promotion of the vaccine. In addition, the fact that those who have HPV vaccine in the stocks of their workplaces promote the vaccine more often shows that the ability to easily obtain the vaccine is also one of the factors affecting the recommendation of the vaccine by physicians.

The strengths of our study include the facts that it is a comprehensive study with a high number of participants involving physicians from 4 branches (Oncology, pediatrics, gynecology and

family medicine), who are the primary interlocutors in the matter of promoting the HPV vaccination; that the physicians participated in the study on the basis of volunteerism; that the interviews were conducted on a face-to-face manner to ensure more careful and attentive responses; and that the participants' attitudes towards HPV vaccination as well as the power, timing, consistency and scope of their recommendations were questioned.

## 5. Conclusion

In conclusion, this study indicates that clear and strong communication of physicians about the importance of the vaccine is extremely important for protecting today's young people from HPV-related cancers that they may encounter in the future. The fact that those who consider the vaccine unimportant have lower levels of knowledge about HPV and HPV vaccination reveals that increasing the physicians' level of knowledge about the vaccine should be the basic strategy. In terms of its results, the study has a nature that gives information and inspiration to people, institutions, and organizations both in Turkey and other countries, who/which have an aim to increase the rates of HPV vaccination. However, there is a need for comprehensive and well-designed studies intended for evaluating the attitudes of nurses, pharmacists and parents of children in the target age group—who are the other interlocutors in the matter of vaccination—towards the HPV vaccine, for determining the strategies that will ensure the vaccination rates to reach the desired levels.

## References

- Gillison ML, Chaturvedi AK, Lowy DR. HPV prophylactic vaccines and the potential prevention of noncervical cancers in both men and women. *Cancer*. 2008;113:3036–3046.
- Koutsky LA, Ault KA, Wheeler CM, et al. A controlled trial of a human papillomavirus type 16 vaccine. *New England Journal of Medicine*. 2002;347:1645–1651.
- Bailey HH, Chuang LT, duPont NC, et al. American society of clinical oncology statement: human papillomavirus vaccination for cancer prevention. *J Clin Oncol*. 2016;34:1803–1812.
- Global Advisory Committee on Vaccine Safety. *Safety of HPV Vaccines*. WHO Weekly Epidemiological Record; 22 January 2016. [http://www.who.int/vaccine\\_safety/committee/topics/hpv/Dec\\_2015/en/2015](http://www.who.int/vaccine_safety/committee/topics/hpv/Dec_2015/en/2015). Accessed 5 september 2016.
- Reagan-Steiner S, Yankey D, Jeyarajah J, et al. *National, Regional, State, and Selected Local Area Vaccination Coverage Among Adolescents Aged 13–17 Years—United States, 2015*. 65. 2016:850–858.
- Office of Disease Prevention and Health Promotion. *Healthy People 2020: HPV Vaccine, Adolescents, 2008–2012*; 2012. <https://www.healthypeople.gov/2020/topics-objectives/national-snapshot/hpv-vaccine-adolescents-2008%E2%80%932012>. Accessed 5 september 2016.
- Stokley S, Jeyarajah J, Yankey D, et al. Human papillomavirus vaccination coverage among adolescents, 2007–2013, and postlicensure vaccine safety monitoring, 2006–2014—United States. *MMWR Morb Mortal Wkly Rep*. 2014;63:620–624.
- Gilkey MB, Malo TL, Shah PD, Hall ME, Brewer NT. Quality of physician communication about human papillomavirus vaccine: findings from a national survey. *Cancer Epidemiol Biomarkers Prev*. 2015;24:1673–1679.
- Centers for Disease Control and Prevention. *HPV. You Are the Key to Cancer Prevention*; 2015. <http://www.cdc.gov/vaccines/who/teens/for-hcp-tipsheet-hpv.html>. Accessed 6 september 2016.
- McRee AL, Gilkey MB, Dempsey AF. HPV vaccine hesitancy: findings from a statewide survey of health care providers. *J Pediatr Health Care*. 2014;28:541–549.
- Gorkem U, Togrul C, İnal HA, Salman-Ozgu B, Gungor T. Knowledge and attitudes of allied health personnel in university hospital related to Human Papilloma Virus and the vaccine. *Turk Hij Den Biyol Derg*. 2015;72:303–310.
- Dursun P, Kusu E, Zeyneloğlu HB, Yanik FB, Ayhan A. Maternal Factors affecting HPV Vaccine Acceptance for their adolescent children aged between 10 and 15. *Turk J Obstet Gynecol*. 2009;6:206–210.
- de Martel C, Ferlay J, Franceschi S, et al. Global burden of cancers attributable to infections in 2008: a review and synthetic analysis. *Lancet Oncology*. 2012;13:607–615.
- Markowitz LE, Dunne EF, Saraiya M, et al. Human papillomavirus vaccination: recommendations of the advisory committee on immunization practices (ACIP). *MMWR Recomm Rep*. 2014;63:1–30.
- Hamlisch T, Clarke L, Alexander KA. Barriers to HPV immunization for African American adolescent females. *Vaccine*. 2012;30:6472–6476.
- Chesson HW, Dunne EF, Hariri S, Markowitz LE. The estimated lifetime probability of acquiring human papillomavirus in the United States. *Sexually Transmitted Diseases*. 2014;41:660–664.
- Collins S, Mazloomzadeh S, Winter H, et al. High incidence of cervical human papillomavirus infection in women during their first sexual relationship. *British Journal of Obstetrics and Gynaecology*. 2002;109:96–98.
- Perkins RB, Clark JA, Apte G, Verccruyse JL, Sumner JJ, Wall-Haas CL, et al. Missed opportunities for HPV vaccination in adolescent girls: a qualitative study. *Pediatrics*. 2014;134:e666–e674.
- Hanson CM, Eckert L, Bloem P, et al. Gavi HPV programs: Application to implementation. *Vaccines (Basel)*. 2015;3:408–419.
- Ferrer HB, Trotter C, Hickman M, et al. Barriers and facilitators to HPV vaccination of young women in high-income countries: a qualitative systematic review and evidence synthesis. *BMC Public Health*. 2014;14:700.
- Golbasi Z, Kelleci M. Sexual experience and risky sexual behaviours of Turkish university students. *Arch Gynecol Obstet*. 2011;283:531–537.
- Wellings K, Collumbien M, Slaymaker E, et al. Sexual behaviour in context: a global perspective. *Lancet*. 2006;368:1706–1728.
- Revanli RA, Yuceer C, Senol E, et al. Awareness and attitude of family physicians about human Papilloma Virus and Herpes Zoster vaccines. *Klimik Journal*. 2016;29:15–20.
- Keating KM, Brewer NT, Gottlieb SL, Liddon N, Ludema C, Smith JS. Potential barriers to HPV vaccine provision among medical practices in an area with high rates of cervical cancer. *J Adolesc Health*. 2008;43:S61–S67.