

## Approaches of pediatricians about vaccines: Meningococcal, rotavirus and human papillomavirus vaccines

Approaches of pediatricians about vaccines

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### Abstract

**Aim:** Vaccination rates change among countries. Except for vaccinations from the Ministry of Health, special vaccination programs such as meningococcal, rotavirus, and human papillomavirus are also effective for the diseases. In this study, it was aimed to evaluate the knowledge of pediatricians working in the pediatric clinic about meningococcal, rotavirus, and HPV vaccines.

**Material and Methods:** In this cross-sectional survey study, age, gender, and work duration were recorded in the questionnaire. Recommendations for meningococcal, rotavirus, and HPV vaccines, the vaccination preferences of the physicians, and the information about the times and side effects of vaccinations were recorded. Relationships between physicians' knowledge, approaches to these vaccines and gender, and work durations were evaluated.

**Results:** General pediatric residents were 66.3% (n=59) of the physicians, and 43.7% (n=30) were general pediatricians. Twenty-four (27%) of the residents had less than two years, and 35 (39.3%) had more than two years of work. Nearly all physicians recommended meningococcal, rotavirus, and HPV vaccines. Between residents and specialists, no difference was observed. However, it was seen that more accurate vaccination information was chosen in 2-4 years workers of residents and 1-10 years workers of specialists.

**Discussion:** Physicians should have sufficient and updated information about vaccines to prevent diseases. The survey studies like this study provide an opportunity for physicians to update their knowledge, and to be sensitive to these diseases, which are not included in the routine vaccination program.

### Keywords

Human Papillomavirus Vaccines, Meningococcal, Pediatrician, Rotavirus, Vaccine

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## Introduction

Vaccines are the best and most effective public health intervention in all health protection approaches due to protecting against morbidity and mortality from many diseases [1]. Vaccination rates change across countries, but they tend to decrease due to vaccine hesitancy and rejection all over the world [1,2]. With the Immunization Program in our country, significant progress has been made in combating infectious diseases, but the study made by Kara et al., found that the rates of fully vaccinated 18-24 months-old children during the pandemic have decreased by nearly 0.4–6.9% [3].

The recommendation of Meningococcal vaccinations by pediatricians ranks first due to the high morbidity and mortality rates it causes [4,5]. Of the meningococcal vaccines, MenACWY-DT (Menectra®) has been licensed for use in our country since 2012, MenACWY-CRM (Menveo®) since 2016, MenACWY-TT (Nimenrix®) since 2016 and MenB-4C (Bexsero®) since 2018 [5,6].

The most common cause of diarrhea in this age group is rotavirus among viral causes, and its frequency varies between 32.4% and 67.4% in studies [7,8]. There are 2 licensed oral rotavirus vaccines in our country; five-valent RotaTeq® (RV5) and monovalent Rotarix® (RV1) vaccines [7].

Human papillomavirus (HPV) is the most common sexually transmitted viral agent that causes cervical, anogenital, and oropharyngeal cancers [4,9,10]. The quadrivalent vaccine (Gardasil), covering HPV types 6, 11, 16, and 18, was approved for girls aged 9-26 in 2006 and for boys in the same age group in 2009 [4]. In studies of our country, vaccination rates change between 1.4-29% [11,12].

Data showed that pneumococcal vaccines alone are not sufficient to protect against meningitis, and meningococcal infections cause meningitis after the increase in international visits in our country, as in the whole world, and the continuity of vaccination should be ensured in the study of our country; *Neisseria meningitidis* was detected in 56.5%, *Streptococcus pneumoniae* in 22.5%, and *Haemophilus influenzae* type b in 20.5% of the meningitis cases [13,14]. The effectiveness of the rotavirus vaccine in the dehydration period and the absence of side effects like invagination have also been shown. The efficacy and safety of the HPV vaccine have been proven many times. For this reason, the knowledge and approaches of pediatricians should be at such a level as to convince the family of the need for these vaccines.

In this study, we aimed to evaluate the knowledge and preferences of pediatricians working in the pediatric clinic of our tertiary hospital about meningococcal, rotavirus, and HPV vaccines and to draw the attention of our physicians to this issue.

## Material and Methods

In this cross-sectional survey study, a questionnaire prepared by the authors was applied to pediatric residents, pediatric specialists, and pediatric subspecialists working in our hospital between July and September 2022. The study started with the permission of the local ethics committee (18/07/2022, decision no: 2022/07-11). Verbal and written consent was obtained from volunteer physicians before starting the survey. Physicians

whose consent could not be obtained face-to-face due to permissions, physicians who did not consent to participate, or questionnaires with missing data were not included in the study. Age, gender, and work duration were recorded in the questionnaire. Pediatric specialists and pediatric subspecialists were accepted as specialists. Recommendations for Meningococcal, rotavirus, and HPV vaccines, the reasons why the physicians did not recommend it, vaccination preferences of the physicians who recommended it, and information about the times and side effects of vaccinations were recorded. Two months for the first dose of meningococcal vaccine, 6 weeks to 14 weeks-6 days for the first dose of rotavirus vaccine, 8 months for the last dose of rotavirus vaccine, and the age of 9 years for the first dose of HPV vaccine were accepted as correct answers. The duration of practice was grouped as less than two years and more than two years for residents, and less than ten years and more than ten years for specialists. The relationships between physicians' knowledge and approaches regarding meningococcal, rotavirus, and HPV vaccines with gender, and work durations were evaluated.

## Statistical analysis

Statistical analysis was performed in SPSS Software 22.0 (Statistical Package for Social Sciences, Chicago, IL, USA). In the analysis of data on categorical (qualitative) variables, number and percentage values were used. The Chi-square test was used to compare group ratios. Student-t test was used to compare group means. The finding of  $p < 0.05$  as a result of statistical analysis was accepted as significant.

## Ethical Approval

Ethics Committee approval for the study was obtained.

## Results

At the time of the study, there were 82 pediatric specialists and subspecialists, and 65 pediatric residents in the pediatrics clinic of our hospital. A total of 89 physicians participated in the survey. The mean age was  $30.7 \pm 5.0$  years and 83.1% of the cases were female. General pediatric residents were 66.3% ( $n=59$ ) of the physicians, 43.7% ( $n=30$ ) were general pediatricians, and the duration of work was  $6.5 \pm 5.4$  (1-22) years. Twenty-four (27%) of the residents had less than two years, and 35 (39.3%) had more than two years of work. Eight of the specialists (9%) had been practicing for less than ten years and 22 (24.7%) had been practicing for more than ten years.

In this study all physicians recommended meningococcal vaccine, 91% of the physicians recommended the Rotavirus vaccine, and 96.6% of the physicians recommended the HPV vaccine (Table 1). While 92.1% (82) of the physicians suggested all serotypes of meningococcus, 4.5% (4) of them suggested ACWY serotype and 1.1% (1) B serotype, while two physicians stated that they were undecided. 87.6% (78) of the physicians stated that they recommend the HPV vaccine to both genders. The knowledge and approaches of physicians regarding these three vaccines are summarized in Tables 1, 2, 3.

There were no differences between residents and specialists in recommending rotavirus and HPV vaccines, correctly knowing the dose times of vaccines, and adding these vaccines to the routine. When residents and specialists were evaluated according to their duration of work, it was seen that more

accurate vaccination information was chosen in 2-4 years workers of residents and 1-10 years workers of specialists (Table 3).

**Table 1.** Vaccination recommendation status of physicians.

Questionnaire about vaccines	Meningococcal vaccines n (%)	Rotavirus vaccines n (%)	HPV n (%)
Do you recommend the vaccine?			
Yes	89 (100)	81 (91)	86 (96.6)
No		5 (5.6)	3 (3.4)
I am undecided		2 (2.2)	
Should meningococcal vaccine be included in the routine vaccination program?			
Yes	88 (98.9)	75 (84.3)	79 (88.8)
No		7 (7.9)	1 (1.1)
I am undecided	1 (1.1)	7 (7.9)	9 (10.1)

**Table 2.** Side effects and the reason for not recommending the vaccines.

Questionnaire about vaccines	n (%)
What is your reason for not recommending the rotavirus vaccine?	
The vaccine does not 100% prevent the disease	3 (3.4)
The cost of vaccination	2 (2.2)
Side effect, especially fever	0
I do not find it necessary because the disease is not frequent	0
What is your reason for not recommending the HPV vaccine?	
I do not prefer to discuss sexual issues with adolescents	2 (2.2)
I think vaccinations cause thoughts about sexual behavior in parents and adolescents.	1 (1.1)
The cost of vaccination	0
I do not find it necessary because the disease is not frequent	0
What are the side effects of the meningococcal vaccine?	
Local side effects: Pain, sensitivity, and redness	78 (87.6)
Fever	76 (95.4)
Headache, fatigue	51 (57.3)
Anaphylaxis	48 (53.9)
Guillain-Barré syndrome	13 (14.6)
No side effects that I know	5 (5.6)
What are the side effects of the rotavirus vaccine?	
Fever	81 (91.0)
Fatigue	72 (80.9)
Invagination	53 (59.6)
Anaphylaxis	44 (49.4)
Diarrhea, vomiting	3 (3.4)
No side effects that I know	6 (6.8)
What are the side effects of the HPV vaccine?	
Local side effects: Pain, sensitivity, and redness	80 (89.9)
Fever, headache, fatigue	44 (49.4)
Anaphylaxis	38 (42.7)
Guillain-Barré syndrome	3 (3.8)

## Discussion

In this study, nearly all physicians recommended meningococcal, rotavirus, and HPV vaccines. There were no differences between residents and specialists in recommending rotavirus and HPV vaccines, correctly knowing the dose times of vaccines, and adding these vaccines to the routine. However, it was seen

that more accurate vaccination information was chosen among residents working 2-4- years and among specialists working 1-10- years.

The majority of the physicians participating in our study were women. In the pediatric clinic, 37 (25.2%) male and 110 (74.8%) female pediatricians provide health services. Therefore, the participation rate of females was thought to be similar to the rate of total physicians.

In our study, all of the physicians recommended the meningococcal vaccine and almost all wanted it to be added to the routine vaccination program. Nearly 80% of physicians recommended rotavirus and HPV vaccines and wanted them to be added to the routine. In different studies conducted in our country and the world, it has been observed that all physicians recommend the meningococcal vaccine, especially 40.7% of physicians recommend it to all patients regardless of risk, while 80% of physicians recommend rotavirus and HPV [15-17]. After the routine vaccination program for Haemophilus influenzae type b and Streptococcus pneumoniae, N. meningitis ranked first etiology in meningitis [5,17]. The clinical course of N. meningitis cases is severe, the morbidity and mortality are high in these cases, especially in children younger than one year of age [18,19]. This situation was thought to cause physicians to be more sensitive and knowledgeable about meningococcus. However, in the study, it was observed that one-fourth of the physicians did not know the first dose time of the vaccine. There are four licensed vaccines for meningococcus in our country. Due to the different times, and number of doses among vaccinations, it was thought that there were different answers. In the study, 92% of the physicians recommended both strains of the meningococcal vaccine. As in the whole world, meningococcal serotypes vary from year to year and country to country. While A, C, and Y strains were ranked first in the first studies, W and B strains were ranked first in the current studies [20,21]. Our hospital is a comprehensive tertiary hospital located in this region and is a center where severe cases are referred, patients with this condition are treated frequently, and examination and treatment, are considered in every suspected case. It was thought that the data on the meningococcal vaccine was sufficient for our physicians to have sufficient knowledge, but updating the information about licensed vaccines would be beneficial in terms of attracting the attention of physicians, completing their deficiencies, and raising their awareness. There was no difference between residents and specialists in this study. Different results have been reported in many studies about the recommendation of physicians for non-routine vaccines. In many studies, physicians with long working duration were found to recommend non-routine vaccines more frequently due to more experience [22,14]. However, there are studies in which there has been no difference in the duration of working [5,14]. Due to the close follow-up of a healthy child and the frequent training on the importance of vaccines in these pediatric clinics, the information of the residents and specialists was found to be similar. However, it was observed that residents in the last two years had more true information than the first two years. The duration of the first two years of residents is short for the experience. The residents of the first

**Table 3.** Evaluation of vaccination information according to the duration of work of residents-specialist, and gender.

	Gender (n, %)		p	Duration of work of residents (n, %)		p	Duration of work of specialist (n, %)		p
	Female (74,83.1)	Male (15,16.9)		≤2 years (24,27%)	>2 years (35,39.3%)		≤10 years (8,9%)	>10 years (22,24.7%)	
When can the first dose of meningococcal vaccine be given?			0.797			0.015			0.422
Correct answer	51 (68.9)	11 (73.3)		12 (50)	30 (85.7)		7 (87.5)	13 (59.1)	
Incorrect answer	21 (28.4)	4 (26.7)		10 (41.7)	5 (14.3)		1 (12.5)	9 (40.9)	
When do YOU recommend the first dose of meningococcal vaccine?			0.823			0.054			0.109
2 months old	45 (60.8)	9 (60)		13 (54.2)	27 (77.1)		5 (62.5)	9 (40.9)	
3-6 months old	14 (18.9)	4 (26.7)		4 (16.7)	5 (14.3)		2 (25)	7 (31.8)	
6-12 months old	13 (17.6)	2 (13.3)		7 (29.1)	3 (8.6)		1 (12.5)	4 (18.1)	
12 months old	2 (2.7)	0		0	0		0	2 (0.9)	
When can the first dose of rotavirus vaccine be given?			0.153			0.611			0.008
Correct answer	49 (66.2)	7 (46.7)		15 (62.5)	24 (68.6)		8 (100)	9 (40.9)	
Incorrect answer	25 (33.8)	8 (53.3)		9 (37.5)	11 (31.4)		0	13 (59.1)	
When do YOU recommend the first dose of the rotavirus vaccine?			0.108			0.076			0.762
6-8 weeks old	67 (90.5)	11 (73.3)		18 (75)	33 (94.2)		8 (100)	19 (86.4)	
9 weeks 4 months-old	6 (8.1)	4 (26.7)		6 (25)	1 (2.9)		0	3 (13.6)	
Other	1 (1.4)	0		0	1 (2.9)		0	0	
When can the first dose of rotavirus vaccine be given at the latest?			0.071			0.033			0.187
Correct answer	58 (78.4)	10 (66.7)		16 (66.7)	32 (91.4)		7 (87.5)	13 (59.1)	
Incorrect answer	16 (21.6)	4 (26.7)		8 (33.3)	2 (5.7)		1 (22.5)	9 (40.9)	
When can the last dose of rotavirus vaccine be administered at the latest?			0.384			0.089			0.057
Correct answer	31 (41.9)	9 (60)		11 (45.8)	20 (57.1)		4 (50)	5 (22.7)	
Incorrect answer	31 (41.9)	5 (33.3)		8 (33.3)	10 (28.6)		4 (50)	14 (63.6)	
When can the first dose of HPV vaccine be given?			0.183			0.178			0.114
Correct answer	45 (60.8)	6 (40)		13 (54.2)	23 (65.7)		5 (62.5)	10 (45.5)	
Incorrect answer	19 (25.7)	7 (46.7)		9 (37.5)	5 (14.3)		1 (12.5)	11 (54.5)	
When do YOU recommend the first dose of HPV vaccine?			0.255			0.162			0.077
9 years old	50 (67.6)	7 (46.7)		15 (62.5)	27 (77.1)		6 (75)	9 (40.9)	
9-12 years old	19 (25.7)	7 (46.7)		8 (33.3)	7 (20)		1 (12.5)	10 (45.5)	
12-18 years old	5 (6.8)	1 (6.6)		1 (4.2)	1 (2.9)		1 (12.5)	3 (13.6)	

two years generally work in the pediatric service and intensive care units, these physicians have little experience in vaccinations due to their low outpatient experience. In addition, physicians who were in the first 10 years of their specialization in our study had more correct information. Due to the freshness of their educational information, it is seen that physicians who have just started their specialization are more sensitive to these issues. For this reason, the sensitivity about the learning information about vaccines should be imparted for the vaccination of inpatients too, and these physicians with high recommendations rate for vaccinations should be expected to have sufficient data about vaccines.

Vaccine hesitancy has increased in our country as well as all over the world. In addition, the high cost of vaccines that are not in routine vaccination programs according to the countries also causes a decrease in the application of these vaccines. These are reasons for reducing vaccination for families. The most common reason for not recommending vaccines by physicians was generally lack of knowledge [4]. Additionally, the cost of non-routine vaccines cause pediatricians and family members to prefer vaccines such as meningococcus vaccines with a high risk of being fatal when infected, rather than rotavirus and HPV vaccines [4,24,25]. HPV is a sexually transmitted disease and recommending a vaccine against this disease is perceived by

some pediatricians and parents that children under eighteen can be sexually active and be allowed this [21,22]. For this reason, this vaccine is generally recommended at nearly 30%, less than other non-routine vaccines [23-25]. It is even seen that due to the duration of sexual intercourse, some physicians prefer to recommend vaccination after the age of 12 [17,25].

#### Conclusion

Vaccination is the most effective, least costly, and safest approach to protect the health of society. Due to this, physicians should have sufficient and updated information about vaccines to prevent diseases. Also, they should have safe communication with parents, which is seen as the most effective method in reducing vaccine refusal or hesitancy. Survey studies like this study provide an opportunity for physicians to update their knowledge, and to be sensitive to these diseases, which are not included in the routine vaccination program.

#### Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

#### Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical

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**Conflict of interest**

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