Экспериментальная и профилактическая медицина

UDC 616.914-036.2
DOI: 10.54503/0514-7484-2024-64.4-57

Knowledge, Attitude and Beliefs Regarding Varicella Infection and Immunization among Healthcare Workers in Armenia: A Cross-Sectional Survey, 2023

A.H. Manukyan[1], S.S. Grigoryan[1], A.R. Badalyan[2], L.G. Karapetyan[1], G.V. Mheryan[1], M.A. Ghukasyan[1], N.P. Khachatryan[1], G.F. Sahakyan[1]

[1] "National Center for Disease Control and Prevention" SNCO, 0025, Yerevan, 12 Mkhitar Heratsi Str.
[2] Yerevan State Medical University, 0025, Yerevan, 2 Koryun Str.

Keywords: KAB, HCWs, varicella, vaccination, Armenia

Introduction

Varicella (also called chickenpox) is a highly transmissible viral disease caused by the varicella-zoster virus (VZV), an alpha herpes virus [3, 5, 11, 17]. It is estimated that in the absence of universal varicella immunization, a total of 5.5 million (95% CI: 4.7–6.4) varicella cases would occur annually throughout European countries [14]. Varicella is usually benign, self-limited disease predominantly in childhood (<6 years), however it is often more severe in adults. The most serious complications in children are secondary bacterial infections and in adults, it is pneumonia which can lead to deaths in both healthy and immunocompromised persons [3, 5, 14, 17]. Following primary infection, the VZV becomes lifelong latent in sensory nerve ganglia and later manifests as herpes zoster (HZ, shingles) [10, 12, 14]. Varicella is a vaccine-preventable disease. The first varicella vaccine was introduced in the childhood immunization schedule of the United States in 1995 with a single dose [2, 4]. However, a large proportion of vaccinated children afterwards developed breakthrough disease [10]. In the European Union (EU), two monovalent varicella live-attenuated vaccines (Varilrix and Varivax) and two combined measles, mumps, rubella and varicella (MMRV) live-attenuated vaccines (Priorix-Tetra and ProQuad) are currently licensed [5]. Varicella vaccine effectiveness for a single dose is relatively low, only administration of two-doses has an increased protective effect [1, 4, 6, 16].

Varicella is notifiable in Armenia. However, its burden to the society is unknown. Varicella immunization is not included in the National Immunization Schedule (NIS). The introduction of the varicella vaccine into NIS is planned in 2024

with two doses given to 1-year-old children, 15-16-year-old pre-military adults, and according to epidemiological indications. If the doctor records the disease in the medical documents, the child, who already has protection, will not be vaccinated. According to the data of the National Centre for Disease Control and Prevention (NCDC Armenia), the cumulative incidence of the disease has increased from 184 (in 2005) to 691 (in 2011) and 503 (in 2019) per 100,000 population (Figure 1).

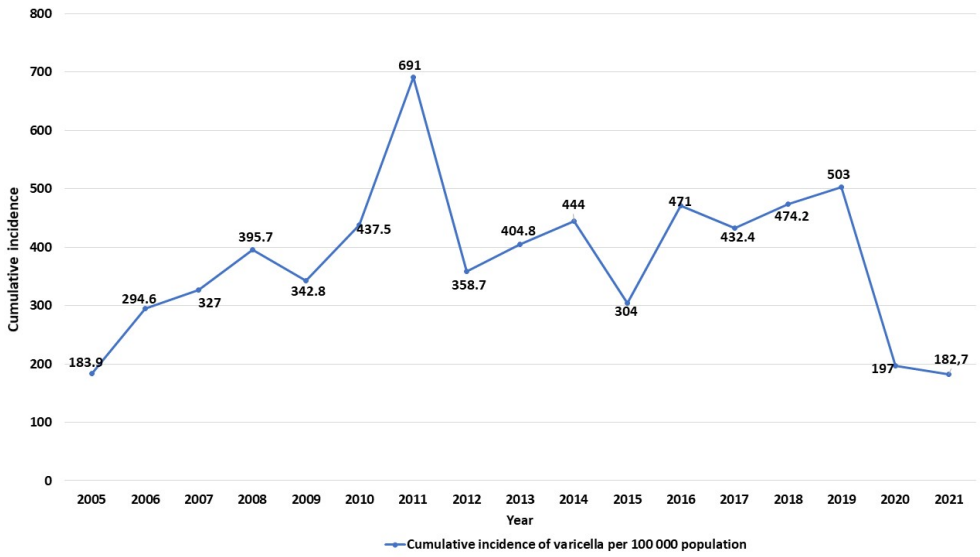

Fig. 1. Cumulative incidence of varicella per 100 000 population in Armenia

The disease is most frequently notified among children and adolescents (<18 years). During 2016-2019, the incidence was 1,727, 1,554, 1,737, 1,840 per 100,000 population, respectively. Overall, 59 cases of varicella have been registered among pregnant women for the period from 2019 to 2021. The existing surveillance system does not capture cases that do not seek medical care. Therefore, these data could be affected by considerable underreporting. Healthcare workers (HCWs) play an essential role in delivering information about vaccines to the public, which in turn influences the decision-making process [7, 8, 13, 15]. Moreover, pediatricians and family physicians as the main healthcare providers for babies and children, may underestimate the potential risk of the disease and not all HCWs are well equipped with information [13, 15]. HCWs may be the main source of information for parents, so lack of knowledge, mistrust and misinformation can affect the acceptance of the national immunization program [9]. We aimed to evaluate the knowledge, attitudes and personal beliefs (KAB) of HCWs toward varicella infection and immunization in order to inform changes in the Armenian NIS.

Material and Methods

Study Design

We conducted cross-sectional survey among HCWs with a convenience sample. From October 15 to November 30, 2023, the Department on Immunoprophylaxis and Epidemiology of Vaccine Preventable Diseases organized a series of 1-day free training courses on "The core principles of vaccination", for the immunization specialists mostly in the capital Yerevan, as well as in all regions. A circular letter was sent to both urban and rural healthcare facilities. The director-general of the healthcare facility nominated physicians and nurses who are responsible for immunization process or have other narrow specialization to attend the training. Before starting the training session, we asked attendees for their consent to participate in the survey. All participants who gave consent were asked to complete an anonymous questionnaire in Armenian.

Informed Consent Form (ICF)

Before enrollment in the study, the potential participant was given a written explanation about the study. Participants were informed that their participation is voluntary and that they might refuse to participate or withdraw consent at any time. The participant had sufficient time to read the ICF and the opportunity to ask questions. The consent form was signed before performance of any study-related activity.

Questionnaire

The questionnaire was pilot-tested on approximately 40 HCWs prior to the study onset, and revised to improve questions clarity and relevance. The questionnaire including 16 open- and closed-ended questions was divided in three sections: the first section involved questions regarding demographic characteristics of the study participants (age, gender, profession, residence, education level, occupation, work experience). The second section was about the knowledge on varicella, transmission route of the infection and immunization. The third section investigated the overall attitude and personal beliefs towards varicella and the vaccination.

For the knowledge section (total score: 9), 1 point was assigned for each correct response, and 0 point for incorrect responses. Overall, knowledge score based on nine specific questions (0–9) was categorized using Bloom's cut-off point of 80%, as good for a ≥8 points, moderate for a 5–7 points, and poor for a ≤4 points.

Data analysis

The data were analyzed using EpiInfo v7.2 statistical software. Univariate analysis was performed. The categorical data were analyzed using descriptive statistic, count, percentage and 95% confidence interval (CI) was calculated. Mean, standard deviation (SD), median, range were calculated for the continuous variables. Linear regression analysis was used to evaluate the association between the demographic variables and the knowledge score. In addition, we investigated the

association between the knowledge level and the expressed attitude. A p-value < 0.05 is generally considered statistically significant.

Results and Discussion

Socio-Demographic Characteristics

Of 846 HCWs contacted, 779 (92%) responded to the survey. Majority of respondents were women (751/779 [96%]), aged 40-60 years (469/779 [60%]), from urban areas (460/779 [59%]), with higher professional education (368/779 [48%]) (Table 1).

Table 1

Socio-demographic characteristics of the study participants, KAP survey on varicella infection and immunization among HCWs, Armenia, October-November 2023

Characteristics	n	Percentage (95%CI)
Age group		
20-29	19	2.5 (1.6-3.8)
30-39	94	12 (10-14.5)
40-49	171	22 (19-25)
50-59	298	38 (35-41.7)
60-69	163	21 (18-24)
70-79	34	4.5 (3-6)
Gender		
Female	751	96.4 (94.8-97.5)
Male	28	3.6 (2.5-5)
Residence		
Urban	460	59 (55.5-62.4)
Rural	319	41 (37.5-44.4)
Education level		
Higher professional	370	47.5 (43.8-51.6)
Secondary vocational	409	52.5 (49-56)

Age of participants ranged from 21-77 years with a median of 53 yrs., SD 11 years and a mean of 52 years. Regarding occupation: 409/779 [52%] were nurses, 370/779 [48%] were physicians (Table 2).

Table 2

Occupation of the study participants, KAP survey on varicella infection and immunization among HCWs, Armenia, October-November 2023

Occupation	Frequency	Percent	Cum. Percent	Wilson 95% LCL	Wilson 95% UCL	
Nurse	409	52,50%	52,50%	48,99%	55,99%	
Family doctor	155	19,90%	72,40%	17,24%	22,85%	
Pediatrician	93	11,94%	84,34%	9,85%	14,40%	
Therapist	39	5,01%	89,35%	3,68%	6,77%	
Gynecologist	16	2,05%	91,40%	1,27%	3,31%	
Cardiologist	10	1,28%	92,68%	0,70%	2,35%	
Otolaryngologist	8	1,03%	93,71%	0,52%	2,01%	
Epidemiologist	7	0,90%	94,61%	0,44%	1,84%	
Ophthalmologist	7	0,90%	95,51%	0,44%	1,84%	
Endocrinologist	6	0,77%	96,28%	0,35%	1,67%	
Infectious disease doctor	6	0,77%	97,05%	0,35%	1,67%	
Surgeon	5	0,64%	97,69%	0,27%	1,49%	
Laboratory doctor	4	0,51%	98,20%	0,20%	1,31%	
Neurologist	4	0,51%	98,72%	0,20%	1,31%	
Dermatovenerologist	3	0,39%	99,10%	0,13%	1,13%	
Oncologist	3	0,39%	99,49%	0,13%	1,13%	
Phthisiatrician	2	0,26%	99,74%	0,07%	0,93%	
Gastroenterologist	1	0,13%	99,87%	0,02%	0,72%	
Pharmacist	1	0,13%	100,00%	0,02%	0,72%	
TOTAL	**779**	**100,00%**	**100,00%**			

Work experience of HCWs ranged from 1-57 years with a mean of 26.8±12.6 yrs. As the sources of information, 592 (76%) respondents stated trainings, 492 (63%) guidelines, 270 (34.6%) scientific materials, 160 (20.5%) other colleagues, 125 (16%) medical journals. On the other hand, only 155 (20%) respondents stated social media as their source of information.

Knowledge

The average knowledge score was 7±1.26, ranging from 3 to 9. Questions about vaccination were not answered correctly (Table 3). Only 52% (95% CI:48.8-55.8) answered correctly that a vaccine against varicella exists and 24% (95% CI:21-27) answered correctly about the number of vaccine doses in the schedule (Table 3).

Regarding knowledge score, only 256/779 (33%, 95% CI:28-38) had a good level of knowledge, 495/779 (63%, 95% CI:56-72) had a moderate level of knowledge, 28/779 (4%, 95% CI:2.4-5.7) had a poor level of knowledge. The mean score for nurses was 6.7 in contrast with the 7.4 mean score for physicians. Physicians were more likely to have high knowledge level ($\beta = 0.498$, $p<0.05$) compared to nurses.

Attitudes and beliefs

85% of HCWs would advise others to get immunized, 83% would vaccinate their child in the future, and 86.5% will need additional information on varicella infection and vaccination (Table 4).

Table 3

Knowledge on varicella infection and immunization among HCWs, KAP survey on varicella infection and immunization among HCWs, Armenia, October-November 2023

Knowledge	**n (%)**	
	Correct answer	**Wrong answer**
K1. What kind of disease is varicella?	774 (99)	5 (1)
K2. What causes varicella?	773 (99)	6 (1)
K3. How is varicella transmitted?	762 (98)	17 (2)
K4. What are the symptoms of varicella?	766 (98)	13 (2)
K5. Overall, is there a vaccine against varicella in the world?	408 (52)	371 (48)
K6. How many doses are needed for a complete vaccination?	187 (24)	592 (76)
K7. Is there a vaccine only for adults?	450 (58)	329 (42)
K8. Can the vaccine prevent complications of the disease?	686 (88)	93 (12)
K9. Do the benefits of the vaccine outweigh the risks of disease?	652 (84)	127 (16)

Table 4

Attitudes on varicella vaccination among HCWs, KAP survey on varicella infection and immunization among HCWs, Armenia, October-November 2023

Attitude	**n (%)**		
	Yes	**No**	**Don't know**
A1. Would you recommend your patient to get vaccinated against varicella?	661 (85)	36 (4.5)	82 (10.5)
A2. If you are offered vaccination, would you vaccinate yourself?	644 (83)	45 (5.7)	90 (11.5)
A3. Do you feel the need of more information about the varicella vaccine?	674 (86.5)	73 (9.4)	36 (4.6)

74% of HCWs recommended scheduling the varicella vaccine for 1-year-old children (Fig. 2).

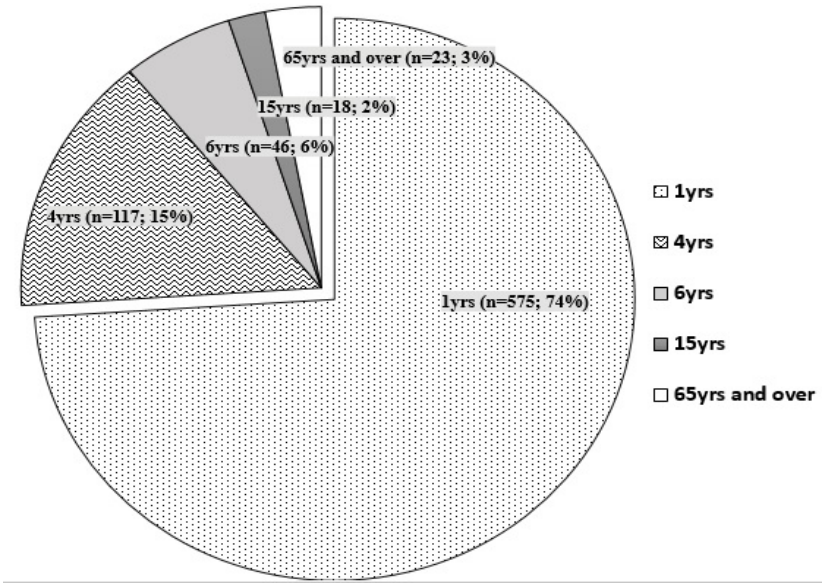

Fig. 2. Recommended age to get the varicella vaccine in Armenia

88% of HCWs considered vaccine as a measure to protect themselves, their families and patients. Regarding the reasons that can hinder from getting vaccinated, the vast majority of HCWs indicated that they had no reason not to get vaccinated and had never been offered a vaccine (Table 5).

Table 5

Reasons for not getting the vaccine, KAP survey on varicella infection and immunization among HCWs, Armenia, October-November 2023

Reason (s) for not getting the vaccine	Frequency	Percent	Cum. Percent	Wilson 95% LCL	Wilson 95% UCL	
None of the above	349	44,80%	44,80%	41,34%	48,31%	
Never offered a vaccine	238	30,55%	75,35%	27,42%	33,88%	
It is not necessary because it is a mild disease	55	7,06%	82,41%	5,46%	9,08%	
I do not need a vaccine because I have immunity	49	6,29%	88,70%	4,79%	8,22%	
Additional visits	23	2,95%	91,66%	1,98%	4,39%	
The vaccine is expensive	22	2,82%	94,48%	1,87%	4,24%	
It has serious side effects	21	2,70%	97,18%	1,77%	4,09%	
Fear of needles and injections	14	1,80%	98,97%	1,07%	2,99%	
Not included in the national calendar	3	0,39%	99,36%	0,13%	1,13%	
The vaccine is not effective	2	0,26%	99,61%	0,07%	0,93%	
Anaphylaxis after the first dose	1	0,13%	99,74%	0,02%	0,72%	
I have been vaccinated	1	0,13%	99,87%	0,02%	0,72%	
Vaccination of children is meaningless	1	0,13%	100,00%	0,02%	0,72%	
TOTAL	**779**	**100,00%**	**100,00%**			

HCWs who were ready to get the vaccine in the future were more likely to have high knowledge ($\beta = 1.1$, $p<0.05$) and those who would not be vaccinated ($\beta = -1.3$, $p<0.05$) or still didn't know ($\beta = -1.01$, $p<0.05$) were more likely to have lower knowledge score.

The study highlights insufficient knowledge regarding varicella immunization among Armenian HCWs. The knowledge gap is quite extensive, with only 33% scoring a good level of knowledge on varicella infection and immunization. Survey respondents considered varicella a mild disease, not acknowledging possible complications of varicella infection. On the other hand, since vaccinations are not carried out in the country, HCWs are not oriented in ways to prevent the disease and avoid complications. Only half of the participants were aware of the existing vaccine, and 24% correctly mentioned the number of doses needed for primary immunization. Accurate knowledge and adequate personal beliefs regarding prevention measures may constitute the main strategy for improving the utilization of preventive care services [8]. HCWs with higher education were more likely to be vaccinated in the future, similar to the findings of Italian and Hungarian studies. Notably, only 20% of HCWs considered social media as one of the information sources. 74% of HCWs recommended offering the varicella vaccine for 1-year-old babies. In comparison, few HCWs in the Netherlands supported this idea [7]. Most HCWs (75%) revealed that they had no reason not to get vaccinated and had never been offered a vaccine. This fact can be seen positively, as most parents seek advice for guidance on child immunization, regardless of whether they are qualified and competent to do so. Nowadays parents are asking more questions due to information on the internet and HCWs often fail to adequately clarify them the scope of vaccines. Thus, we recommend regular training updates on immunization and communication skills.

This study has several limitations. First, convenience sampling may result in more respondents who are better informed, have favorable attitudes towards immunization because of their profile and decision to attend the course. Considering the fact that most of the participants are mainly involved in the implementation of the immunization activities (nurses, family doctors, pediatricians), selection bias may be introduced. Also, the participants were mainly recruited from Yerevan city (22%), Syunik, Vayots Dzor, Shirak and Ararat regions. It should be noted that the number of courses varied by regions, with a half of the courses have been organized in Yerevan, since 63% of Armenian physicians and other medical professionals are located in the capital Yerevan, also 3-5 training courses were organized in regions. Second, due to the self-administered questionnaire, information bias may arise, in particular, misclassification errors of the knowledge measurement. Besides, it remains unclear whether HCWs with a positive attitude toward varicella vaccination would recommend getting a vaccine or actually vaccinate their child in the future. Moreover, there was a lack of previous studies in the research area, as well as a lack of available or reliable data on Armenia.

The study highlights inadequate knowledge regarding varicella immunization, especially among nurses. There is a need for educational campaigns and trainings about varicella vaccines in order to prepare the future changes to the NIS and the introduction of varicella vaccine. In addition, efforts should be put to understand beliefs that may lead to vaccine hesitancy. Using bullet points for the communication

will effectively convey the message to the population. Achievement of high vaccine coverage should be targeted.

Accepted 16.04.24

Знания, отношение и убеждения относительно инфекции ветряной оспы и иммунизации среди медицинских работников в Армении: перекрёстное исследование, 2023

А.Г. Манукян, С.С. Григорян, А.Р. Бадалян, Л.Г. Карапетян, Г.В. Мгерян, М.А. Гукасян, Н.П. Хачатрян, Г.Ф. Саакян

Ветряная оспа – высококонтагиозное вирусное заболевание. В 2024 году Армения планирует включить вакцину против ветряной оспы в Национальный календарь иммунизации. Целью данного исследования было оценить знания, отношение и личные убеждения медицинских работников по поводу инфекции ветряной оспы и вакцинации, чтобы предоставить информацию об изменениях в календаре иммунизации Армении. Всего в опросе приняли участие 779 медработников. 96% опрошенных составили женщины в возрасте от 21 до 77 лет (средний возраст 53±11 лет). Средний балл знаний медсестер составил 6,7 по сравнению со средним баллом 7,4 у врачей. Врачи с большей вероятностью имеют высокий показатель знаний (β =0,498, $p<0,05$) по сравнению с медсестрами. Результаты исследования свидетельствуют о недостаточности знаний о вакцинации против ветряной оспы, особенно среди медсестер. Рекомендуется организовать занятия по вакцинации против оспы, чтобы подготовить последующие изменения в Национальном календаре иммунизации и внедрения вакцины против ветряной оспы.

Հայաստանում բուժաշխատողների շրջանում ջրծաղիկ հիվանդության և դրա դեմ պատվաստանյութերի վերաբերյալ գիտելիքի, վերաբերմունքի և համոզմունքների խաչաձև հետազոտություն, 2023

Ա.Հ. Մանուկյան, Ս. Ս. Գրիգորյան, Ա.Ռ. Բաղալյան, Լ.Գ. Կարապետյան, Գ.Վ. Մհերյան, Մ.Ա. Ղուկասյան, Ն.Պ. Խաչատրյան, Գ.Ֆ. Սահակյան

Ջրծաղիկը խիստ վարակիչ վիրուսային հիվանդություն է: 2024 թվականին նախատեսվում է Հայաստանի Պատվաստումների ազգային օրացույց ներառել ջրծաղիկի դեմ պատվաստանյութը: Այս հետազոտությունը նպատակ ունի գնահատելու բուժաշխատողների գիտելիքները, վերաբերմունքը և անձնական համոզմունքները ջրծաղիկ հիվանդության և դրա դեմ պատվաստա-

նյութերի վերաբերյալ՝ Հայաստանում Պատվաստումների ազգային օրացույցում պատվաստանյութի ներդրման նպատակով: Հարցաթերթիկը լրացրել է 779 բուժաշխատող: Հարցվածների 96%-ը կանայք էին՝ 21-ից 77 տարեկան, միջինը՝ 53±11 տարի: Բուժքույրերի գիտելիքի միջին միավորը եղել է 6,7՝ ի տարբերություն բժիշկների 7,4 միջին միավորի: Բժիշկներն ավելի հավանական է, որ բուժքույրերի հետ համեմատած ունեն գիտելիքի ավելի բարձր մակարդակ (β =0,498, p<0,05): Հետազոտության արդյունքներն ընդգծում են, որ ջրծաղիկի դեմ պատվաստումների վերաբերյալ գիտելիքներն անբավարար են հատկապես բուժքույրերի շրջանում: Խորհուրդ է տրվում կազմակերպել ջրծաղիկի դեմ պատվաստումների վերաբերյալ կրթական դասընթացներ՝ հետագայում Պատվաստումների ազգային օրացույցում փոփոխություններ իրականացնելու և ջրծաղիկի դեմ պատվաստումները ներդնելու նպատակով:

References

1. *Arnheim-Dahlström L., Zarabi N., Hagen K., Bencina G.* (2021). Parental acceptance and knowledge of varicella vaccination in relation to socioeconomics in Sweden: A cross-sectional study. PLoS One. Oct 21,16(10):e0256642. doi: 10.1371/journal.pone.0256642.
2. *Baxter R., Ray P., Tran TN., Black S., Shinefield HR., Coplan PM., Lewis E., Fireman B., Saddier P.* (2013). Long-term effectiveness of varicella vaccine: a 14-Year, prospective cohort study. Pediatrics. May,131(5): e1389-96. doi: 10.1542/peds.2012-3303.
3. *Bollaerts K., Riera-Montes M., Heininger U., Hens N., Souverain A., Verstraeten T., Hartwig S.* (2017). A systematic review of varicella seroprevalence in European countries before universal childhood immunization: deriving incidence from seroprevalence data. Epidemiol Infect. Oct, 145(13):2666-2677. doi: 10.1017/S0950268817001546.
4. *Cenoz MG., Martínez-Artola V., Guevara M., Ezpeleta C., Barricarte A., Castilla J.* (2013). Effectiveness of one and two doses of varicella vaccine in preventing laboratory-confirmed cases in children in Navarre, Spain. Hum Vaccin Immunother. May,9(5):1172-6.doi: 10.4161/hv.23451.
5. ECDC guidance: Varicella vaccination in the European Union (2015). Available online: http://ecdc.europa.eu/en/publications/Publications/Varicella-Guidance-2015.pdf.
6. *Hu P., Yang F., Li X., Wang Y., Xiao T., Li H., Wang W., Guan J., Li S.* (2021). Effectiveness of one-dose versus two-dose varicella vaccine in children in Qingdao, China: a matched case-control study. Hum Vaccin Immunother. Dec 2,17(12):5311-5315.doi: 10.1080/21645515.2021.1982281.
7. *Huber A., Gazder J., Dobay O., Mészner Z., Horváth A.* (2020). Attitudes towards varicella vaccination in parents and paediatric healthcare providers in Hungary. Vaccine. Jul 14,38(33):5249-5255. doi: 10.1016/j.vaccine.2020.05.091.
8. *Ho EW., Ereno IL., Ibrahim M., Yeo CL.* (2012). Knowledge, attitudes, and practices regarding chickenpox disease and its prevention in Singapore: Comparison between Parents and Medical Students. Proceedings of Singapore Healthcare. December:257-264. doi:10.1177/201010581202100407.

9. *Jackson C., Nielsen S.M., Simonyan B. et al.* Medical specialists' attitudes and practices towards childhood vaccination: a qualitative study in Armenia. BMC Pediatr. 22, 620 (2022). https://doi.org/10.1186/s12887-022-03687-3.
10. *Kauffmann F., Bechini A., Bonanni P., Casabona G. & Wutzler P.* (2020). Varicella vaccination in Italy and Germany-different routes to success: a systematic review, Expert Review of Vaccines, 19:9, 843-869. DOI: 10.1080/14760584.2020.1825947.
11. *Marin M., Seward JF., Gershon AA.* (2022). 25 Years of Varicella Vaccination in the United States. The Journal of Infectious Diseases. Volume 226, Issue Supplement_4, 1 November. pp. S375–S379. https://doi.org/10.1093/infdis/jiac251.
12. *Papaloukas O., Giannouli G., Papaevangelou V.* (2014). Successes and challenges in varicella vaccine. Ther Adv Vaccines. Mar,2(2):39-55. doi: 10.1177/2051013613515621.
13. *Papazoglou A., Giamaiou K., Stavroula Poulopoulou S., Pavlopoulou I. & Tsoumakas K.* (2013). The National Vaccination Programme in Greece: Factors affecting parents' knowledge. Global Journal of Medical research (K). Volume 13, Issue 3, Version 1.0. Online ISSN: 2249-4618 & Print ISSN: 0975-5888.
14. *Riera-Montes M., Bollaerts K., Heininger U. et al* (2017). Estimation of the burden of varicella in Europe before the introduction of universal childhood immunization. BMC Infect Dis 17, 353. https://doi.org/10.1186/s12879-017-2445-2.
15. *Streng A., Seeger K., Grote V., Liese JG.* (2010). Varicella vaccination coverage in Bavaria (Germany) after general vaccine recommendation in 2004. Vaccine. Aug 9,28(35):5738-45. doi: 10.1016/j.vaccine.2010.06.007.
16. *Vezzosi L., Santagati G. & Angelillo IF.* (2017). Knowledge, attitudes, and behaviors of parents towards varicella and its vaccination. BMC Infect Dis 17, 172. https://doi.org/10.1186/s12879-017-2247-6.
17. WHO position paper: Varicella and herpes zoster vaccines (2014). Available online: https://www.who.int/publications/i/item/who-wer-8925-265-288 (accessed on 05 August 2023).