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ATTITUDES AND AWARENESS OF THE POPULATION OF CENTRAL AND WESTERN REGIONS OF UKRAINE TOWARDS VACCINATION.

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Summary

In the modern world, vaccination is the most effective and evidence-based method of preventing the onset and severity of infectious diseases. Today, the WHO has identified vaccine hesitancy as a global public health threat [25]. The social and cultural background of people influences their perception of vaccines, which prompted us to investigate this problem.

Aim. *To study the influence of sociodemographic factors on vaccination attitudes of children and adults in the central and western regions of Ukraine.*

Materials and methods. *A cross-sectional study was conducted, which included a survey of the population of different social status. The study was conducted in accordance with the tenets of the Declaration of Helsinki. The study protocol was approved by the bioethics committee. We also analyzed literature data from PubMed, Medscape and CSC. The work was performed within the framework of the research project 0122U000039 «Improvement of methods of diagnosis, treatment and rehabilitation of the most common diseases of childhood». No conflicts of interest exist.*

Research results and discussion. *1000 respondents were interviewed by questionnaire from Kyiv, Cherkasy, Kirovograd, Khmelnytsky, Zhytomyr, Chernivtsi, Ternopil, Rivne, Volyn, Ivano-Frankivsk, Lviv regions. The data obtained indicate that barriers to vaccination are caused by low awareness of vaccination, excessive negative influence of opinion leaders, prevalence of myths and falsifications about vaccination, lack of health care resources and low supply of recommended vaccines, and forced migration. Low awareness and low vaccination coverage are also associated with low awareness among health workers who do not work directly with vaccines, falsification of vaccination data, and the presence of anti-vaccine health workers. The negative attitude of parents towards vaccination is also very important, as it affects their children.*

Conclusions.

1. Fear of side effects, long-term complications, and doubts about the quality of vaccines have been identified as factors in vaccine refusal.

2. The most common groups of vaccine refusers are the elderly (53.3 %) and men (16.8 %).

3. The high cost of vaccines that are not included in the list of mandatory vaccines is one of the reasons for the decrease in vaccination rates.

4. Improved communication between the doctor and the patient is one of the factors increasing the vaccination rate among the population.

5. Information about the availability of vaccines and places of vaccination, peculiarities of the post-vaccination period and information about the possible consequences of ignoring vaccination should be provided in the media (television, radio), especially among the elderly.

Keywords: *Vaccination; COVID-19; Prevention; Serological Studies; Children; Adults; Vaccination Schedule; Pertussis; Influenza; Chickenpox; Pneumococcal Polysaccharide Vaccine; PPSV19.*

Introduction

Vaccination is an important method of preventing both mortality and morbidity among the population. However, one of the most acute problems facing public health is lack of awareness and refusal of this method. People's reluctance to receive safe and recommended vaccines, known as «vaccine hesitancy», was a growing concern even before the COVID-19 pandemic [6,9,15,20,25,28]. Vaccination is critical for the prevention of infectious diseases, and identifying the impact of vaccine hesitancy on immunization programs is essential for early intervention and policy development to overcome vaccine hesitancy.

Many countries in Western Europe face the problem of late and inadequate childhood immunization coverage, resulting in failure to meet WHO targets. For example, vaccination coverage among Swiss children is still below 90 %, and many vaccinations are delayed. Given regional variations, missed or delayed revaccinations, and differences in the tolerability of individual vaccines, further efforts may be needed to achieve national immunization targets [11].

Several studies were conducted to determine the level of vaccine acceptance among the population. It was possible to survey 1000 respondents by questionnaire from Kyiv, Cherkasy, Kirovohrad, Khmelnytsky, Zhytomyr, Chernivtsi, Ternopil, Rivne, Volyn, Ivano-Frankivsk and Lviv regions. It was found that low public awareness (myths, falsifications), both among the population and health workers, and excessive negative influence of opinion leaders can be an obstacle to vaccination. Strategies to combat vaccine refusal should be developed after careful consideration of a regional assessment of the main reasons why people refuse vaccination.

Materials and methods

The respondents were asked to complete a questionnaire in written or electronic form. The questionnaire included a list of questions to assess attitudes and awareness of the main types of vaccines that are included in the list of recommended and mandatory vaccines in Ukraine (Table 1). The data were collected through a personal

survey. The general population was selected by simple random sampling. The survey was conducted among people of different ages and different social categories (except health care workers). In the first part of the questionnaire, the participants were informed about the purpose of the study and their consent was obtained. After that, the participants agreed to participate and gave their consent, and the questionnaire was distributed to them. The questionnaire consisted of questions about the socio-demographic characteristics of the participants and information about their attitudes and availability of different vaccines. The first part of the questionnaire included questions on demographic variables such as age, sex, educational status, occupation, place of residence, economic status, and presence of children. The study was conducted in accordance with the tenets of the Declaration of Helsinki. The study protocol was approved by the bioethics committee. The work was performed within the framework of the research project 0122U000039 «Improvement of methods of diagnosis, treatment and rehabilitation of the most common diseases of childhood». There is no conflict of interest. Literature data were analyzed in PubMed, Medscape, and CDC.

Results of the study and their discussion. 1000 respondents from Kyiv, Cherkasy, Kirovohrad, Khmelnytsky, Zhytomyr, Chernivtsi, Ternopil, Rivne, Volyn, Ivano-Frankivsk, and Lviv regions were interviewed by questionnaire. The questionnaire included questions about age, field of activity (different specialists, except for doctors and other health care workers, participated). There were also questions about the availability of immunization, as well as the reasons for refusing immunization against both influenza and COVID-19.

Table 1

Percentage of vaccinated and unvaccinated persons among different social categories

Question.	Categories	Vaccinated	Unvaccinated
Field of work	Education (teachers)	58 (85 %)	10 (15 %)
	Students	19 (46,34 %)	22 (53,65 %)
	Economic sphere + trade	49 (39,2 %)	76 (60,8 %)
	Employees of enterprises	275 (42,2 %)	376 (57,75 %)
	IT technology, art industry	105 (71 %)	42 (29 %)
Age	0-10 (Children of respondents)	15 (100 %)	0 %
	10-18 (Children of respondents)	20 (80 %)	5 (20 %)
	18-30	356 (80 %)	89 (20 %)
	31-50	246 (72,1 %)	125(28,9 %)
	50 and more	86 (46,7 %)	98 (53,3 %)

All survey results are presented in diagrams and tables, which allowed us to evaluate the results. According to the analysis of the collected data, unvaccinated people visit their family doctor more often. It was also found that among the surveyed respondents, 56.4 % had not been revaccinated against COVID-19. (Fig. 1)

One of the reasons for the low vaccination rate is the lack of awareness among patients about more specific vaccines: against influenza, oncogenic strains of human papillomavirus, varicella, etc. 67 % of respondents have never heard of the vaccine against oncogenic strains of human papillomavirus. And 24 % heard about the influenza vaccine for the first time. (Fig. 2)

The most common reason for refusing vaccination was doubts about the quality of the vaccine or fear of adverse reactions [24]. Another reason was economic problems, namely high cost (for those not included in the list of mandatory vaccines (Fig 3).

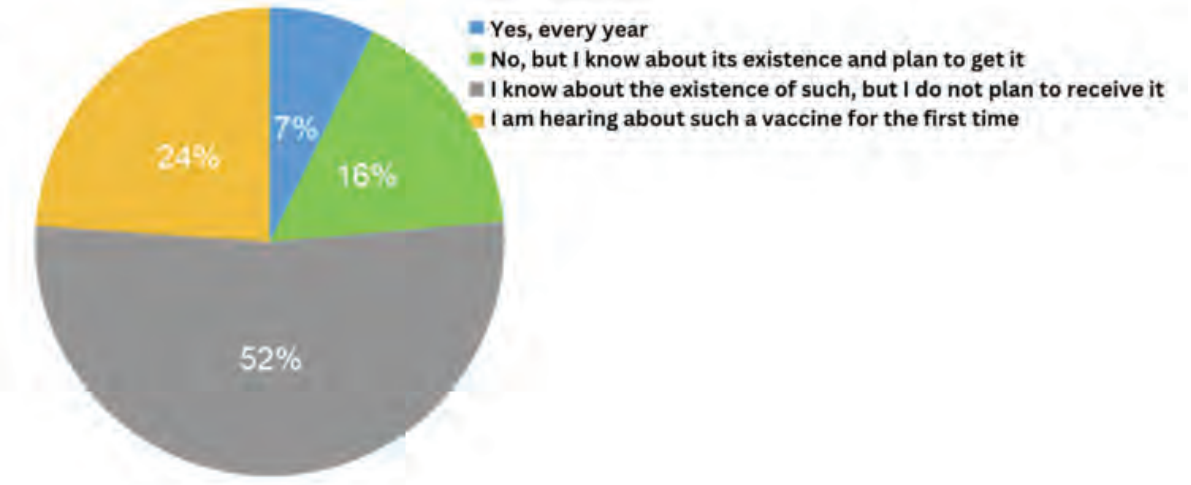

Fig. 1. Revaccination against COVID-19

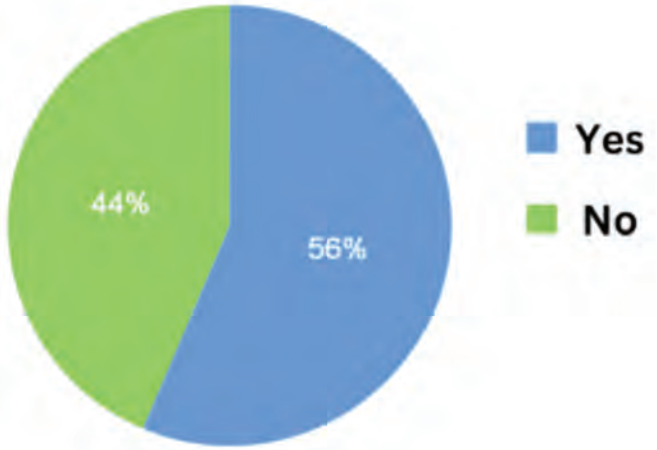

Fig. 2. Vaccination against influenza

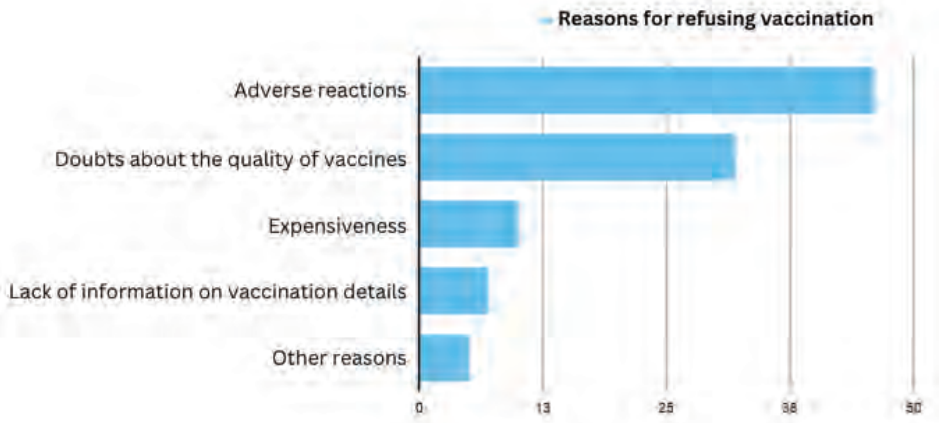

Fig. 3. Reasons for refusing vaccination.

The importance of vaccines in limiting infection has been mathematically demonstrated using a robust fractional order model. The study found that as vaccine efficacy increased, the number of infections decreased [16]. Nevertheless, vaccine hesitancy is one of several challenges in the fight against novel coronavirus disease (COVID-19). Previous literature has shown that vaccine hesitancy is a global problem, with wide variations in prevalence ranging from 30 % to 40 % [8,14,21]. This study was conducted to investigate the reasons for not taking the COVID-19 vaccine among the unvaccinated and partially vaccinated population. The willingness to be vaccinated among the unvaccinated was 90 %. Most of the study participants were aged 18-30 years, with a predominance of males from urban areas. The current study found that vaccine non-adherence among the older population and the upper middle class was explained by all four subcategories: fear, mistrust, administrative problems, and awareness.

Failure to vaccinate children and adults against COVID-19 has led to severe complications of previously common diseases [17]. 12 % of respondents were reluctant to vaccinate their children. A scientific study presents a fractional order mathematical model in the sense of Caputo to investigate the importance of vaccines in the fight against COVID-19 [2]. Numerical modeling was performed and clearly showed the importance of the vaccine. The model was validated by fitting it to real COVID-19 infection data in Thailand over a four-month period.

Evidence suggests that parents rely on the risk-benefit ratio. Parents who believe that the perceived risk of their children contracting an infectious disease is lower than the perceived risk of the vaccine's effectiveness are more likely to refuse vaccination. After analyzing the statistical data, it was observed that post-vaccination side effects among children who received the Pfizer-BioNTech COVID-19 mRNA vaccine were reported to be mild and mainly manifested as local reactions such as pain, swelling and redness at the injection site (22 %), subfebrile fever (15.6 %), fever (1.8 %) and rhinorrhea (1 %). According to a study led by Jingrui Wang's team [2]. Unsuccessful vaccination experiences can change people's attitudes toward vaccination. To analyze the impact of vaccine efficacy on vaccination behavior with adaptive perceptions, we propose a new game model of vaccination. The results show that at a moderate cost of vaccination, the introduction of adaptive perceptions can promote vaccination behavior, and this effect becomes more pronounced in a population with less perceptual variation. Nevertheless, vaccination behavior is still constrained by the large number of «free» vaccinations when vaccine efficacy is high. By analyzing the distribution of strategies among individuals with different

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degrees, it was found that the decrease in the number of vaccinated individuals under the influence of freeriders occurs mainly among individuals with low degrees. In addition, the authors investigated the combined effect of vaccination cost and vaccine efficacy on vaccination behavior, regarding different levels of perception fluctuation.

In order to analyze the impact of vaccine efficacy on vaccination behavior with adaptive perception, we propose a new game model of vaccination. The results show that at a moderate cost of vaccination, the introduction of adaptive perception can promote vaccination behavior, and this effect becomes more pronounced in a population with less perception fluctuation.Nevertheless, vaccination behavior is still constrained by the large number of «free» vaccinations when vaccine efficacy is high. Analyzing the distribution of strategies among individuals with different degrees, we find that the decrease in the number of vaccinated individuals under the influence of freeriders occurs mainly among individuals with low degrees.

Twenty-eight nationally representative samples (n = 58,656) from 13 countries show that as the pandemic progressed, the percentage of people intending to be vaccinated decreased and the percentage of people intending to refuse vaccination increased. Pooled data from surveys conducted between June and October show that 60 % (95 % CI: 49 % to 69 %) intend to be vaccinated and 20 % (95 % CI: 13 % to 29 %) intend to refuse vaccination, although intentions vary widely between samples and countries (I2 > 90 %). Female sex, younger age, lower income or education, and ethnic minority status were consistently associated with lower vaccination intentions [18].

Therefore, government organizations need to effectively inform, educate and communicate with parents to reduce the impact of negative information from various online sources. Previous literature has also highlighted the fact that lack of knowledge about a vaccine, its side effects, efficacy, etc. increases the likelihood of perceived risks and thus undermines vaccine acceptance [4]. In this case, the source of information plays an important role. In addition to reliable sources of information, social media are full of questionable information about vaccines [1].

During the COVID-19 pandemic, almost all countries introduced COVID-19 vaccination programs. At the same time, countries had a wide range of program experiences. This analysis aims to identify national characteristics associated with the success of COVID-19 vaccination programs. [The following outcome measures were used: national capacity for COVID-19 vaccination and COVID-19 vaccination coverage in December 2021, June 2022 and December 2022. We developed a standardized metric to assess national capacity for COVID-19 vaccination as a proxy for speed of implementation. We developed this metric based on an adaptation of WHO guidelines for an expanded immunization review program and consultations with technical experts specializing in vaccine implementation and emergency introduction, surveillance and data, programs for children, adolescents, and adults, and COVID-19 vaccine introduction. We used multivariable linear regression to assess whether having a good immunization program for children, adolescents, and adults; recent use of emergency vaccination; World Bank income classification; a history of early introduction of new vaccines; health worker density; and/or trust in science and government were associated with higher COVID-19 vaccination capacity and coverage. COVID-19 vaccination capacity scores ranged from 0 to 5, with a global median of 2 and an interquartile range of 1;4. After adjustment for World Bank income classification, having a mature influenza vaccination program was independently associated with statistically significantly higher estimates of national COVID-19 vaccination capacity and higher COVID-19 vaccination coverage in December 2021, June 2022, and December 2022. Trust in government was also associated with higher coverage at all three time points. WHO and CDC recommend that CSWs at risk for hepatitis B virus infection be vaccinated early in their adult lives with 3 doses of HBV vaccine at 0, 1, and 6 months and serologic testing 1-2 months after vaccination. This study evaluated adherence to all three components of the hepatitis B vaccination program. [11,22] HBV vaccination coverage was 60.9 %, and adherence to the 3-dose, 0.1.6, and post-vaccination serology schedules was 46.8 %, 38 %, and 13 %, respectively. Overall adherence at the population level was moderate, with only 6.2 % of study participants adhering to all three components of the HBV vaccination protocol.

The results indicate that the cost of vaccination plays a crucial role in shaping vaccination behavior, and the preliminary findings are consistent across scenarios with different vaccination costs. An important reason for this is the lack of awareness and availability of certain vaccines. This includes vaccines against human papillomavirus. For example, vaccination against human papillomavirus (HPV) is offered free of charge to children aged 10-12 years in Finland [3,12,13]. Nationally, approximately 80 % of girls are vaccinated, with regional differences in first dose coverage ranging from 62 % to 82 % among girls born in 2011. This study examined factors associated with intention to vaccinate against HPV. It also assessed HPV vaccination uptake among the daughters of parents who participated in the study. Despite low knowledge of HPV-related diseases, most parents had a positive intention to vaccinate their daughter. The implementation of intention in our study was high, higher than the national average. Parents of foreign origin had a lower intention to vaccinate their children. Since information about HPV and the HPV vaccine is available in 11 languages, it is necessary to rethink its accessibility. In-depth interviews are needed to better understand the reasons for vaccine refusal. In terms of vaccine availability, a high proportion of maternity units in the UK offer both pertussis and influenza vaccination, despite the negative impact of the pandemic [10,13].

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A study of adjuvant vaccinations was conducted. Three hundred and ninety-two patients were included; the mean age was 8.8 years. Only 40 patients (10.2 %) had documented proof of PPSV23 vaccination. Patients had an average of three clinic visits in 2019. There were 114 cases of pneumonia in patients before receiving PPSV23 and one case after receiving PPSV23. The PPSV23 vaccination rate in pediatric patients with high-risk CHD was low, with many documented missed vaccination opportunities. This may be due to the fact that PPSV23 is not a routine vaccination in the pediatric calendar [19].

The authors conducted a cohort study [5] and included people who were of appropriate age (≥65 years) for routine pneumococcal vaccination of the elderly between April 2015 and March 2020. Monthly data from residents of two communities from April 2014 to March 2020 and vaccination records from April 2015 to March 2020 were used. Five cohorts were identified according to the year in which routine vaccination was available. Each group was followed for two years, with the first year being the «baseline» period and the second year being the «vaccination follow-up» period. Pneumococcal vaccination data were obtained from «first dose» vaccination records. Age, sex, socioeconomic status, comorbidities, history of hospital visits, history of hospitalization, participation in special medical examinations, and information about hospitals contracted to provide pneumococcal vaccination were used as covariates. A multivariable logistic regression model was used to examine the association between pneumococcal vaccination and vaccination-related factors. Odds ratios (ORs) and 95 % confidence intervals (95 % CIs) were calculated. A total of 17,991 patients were included in the analysis. Vaccination coverage was 33.6 % for all subjects. Multivariate analysis revealed the following significant factors associated with vaccination: female sex (OR: 1.18, 95 % CI: 1.11-1.26), not having low income (1.76, 1.17-2.76), visiting the hospital ≥ 1 time per month (1.27, 1.19-1.35), and attending special medical examinations (2.10, 1.95-2.27). No significant results were found for the hospitals where pneumococcal vaccination was provided.Individual factors such as gender and participation in special medical examinations were found to be important factors influencing pneumococcal vaccination among older adults in Japan. Environmental factors, such as characteristics of residential areas, should be evaluated in future studies [19].

A study led by Micaela Seazzu in 2023 [27] included 392 patients with a mean age of 8.8 years. Only 40 patients (10.2 %) had documentation of PPSV23 vaccination. There were 114 cases of pneumonia in patients before PPSV23 vaccination and one case after PPSV23 vaccination.

Our data indicate that barriers to vaccination are caused by low awareness of immunization, excessive negative influence of opinion leaders, prevalence of myths and falsehoods about vaccination, lack of health care resources and low supply of recommended vaccines; forced migration. Low awareness and low vaccination coverage are also associated with low awareness among health workers who do not work directly with vaccines, falsification of vaccination data, and the presence of anti-vaccine health workers.

Conclusions

1. Fear of side effects, long-term complications and doubts about the quality of vaccines were identified as factors leading to vaccine refusal.
2. The most common groups of vaccine refusers were the elderly (53.3 %) and men (16.8 %).
3. The high cost of vaccines that are not included in the list of mandatory vaccines is one of the reasons for the decline in vaccination rates.
4. Improved communication between the doctor and the patient is one of the factors increasing the vaccination rate among the population.
5. Information about the availability of vaccines and places of vaccination, peculiarities of the post-vaccination period and information about the possible consequences of ignoring vaccination should be provided in the media (television, radio), especially among the elderly.

Conflict of interest. The authors declare that they have no conflict of interest.

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СТАВЛЕННЯ ТА ОБІЗНАНІСТЬ НАСЕЛЕННЯ ЦЕНТРАЛЬНИХ І ЗАХІДНИХ ОБЛАСТЕЙ УКРАЇНИ ДО ВАКЦИНАЦІЇ

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Резюме.

Вакцинація в сучасному світі – найбільш дієвий та доказовий метод профілактики захворюванності й важкого перебігу інфекційних хвороб. На сьогодні ВООЗ визнала нерішучість населення щодо щеплення глобальною небезпекою для здоров'я населення [25]. Соціально – культурне походження людей впливає на сприйняття вакцин, що спонукало нас до вивчення даної проблеми.

Мета. Вивчити вплив соціально – демографічних факторів на ставлення щодо проведення щеплень серед дитячого та дорослого населення центрального та західного регіонів України.

Матеріали та методи. Проведено перехресне дослідження, що включало опитування населення різного соціального статусу. Дослідження виконано відповідно до принципів Гельсінської декларації. Протокол дослідження ухвалено біоетичною комісією. Також проведено аналіз літературних даних PubMed, Medscape, CDC. Робота виконана в рамках НДР 0122U000039 «Удосконалення методів діагностики, лікування та реабілітації найбільш поширених захворювань дитячого віку». Конфлікт інтересів відсутній.

Результати досліджень і їх обговорення. Опитано 1000 респондентів шляхом анкетування з Київської, Черкаської, Кіровоградської, Хмельницької, Житомирської, Чернівецької, Тернопільської, Рівненської, Волинської, Івано – Франківської, Львівської областей. Анкети включали запитання щодо віку, статі, професії. Отримані нами дані свідчать про перешкоди до вакцинації, спричинені низькою обізнаністю населення щодо імунізації, надмірним негативним впливом лідерів думок, поширеністю міфів та фейків про вакцинацію, браком ресурсів охорони здоров'я та низьким постачанням рекомендованих вакцин; вимушеною міграція населення. Також низька обізнаність та низький рівень охоплення вакцинацією пов'язані з недостатньою обізнаністю медичного персоналу, який безпосередньо не працює з вакцинами; підробка даних про імунізацію, наявність антивакцинаторів серед медичних працівників. Також дуже вагомим є негативне ставлення батьків до імунізації, оскільки від цього страждають їх діти.

Висновки.

1. Одним із встановлених факторів відмови від вакцинації були побоювання побічних ефектів, довготривалих ускладнень і сумніви щодо якості вакцин.
2. Найбільш поширеною групою відмови від вакцинації є люди похилого віку (53,3 %), чоловіки (16,8 %).
3. Дороговартісність вакцин, які не включені до списку обов'язкових, є однією з причин зниження показників вакцинації.
4. Покращення комунікації між лікарем та пацієнтом є одним із факторів підвищення рівня вакцинації серед населення.
5. Слід інформувати про наявність вакцин і місця вакцинації, особливості поствакцинаційного періоду та про можливі наслідки ігнорування вакцинації у засобах масової інформації (телебачення, радіо), особливо серед людей похилого віку.

Ключові слова: вакцинація; COVID – 19; профілактика; серологічні дослідження; діти; дорослі; календар щеплень; кашлюк; грип; вітряна віспа; пневмококова полісахаридна вакцина; PPSV19.

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