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Evaluation of parents' knowledge of mandatory and recommended vaccinations for children in the city of Zielona Góra, taking into account medical and non-medical professions

Abstract

All children born and temporarily residing in Poland are required to be vaccinated. Parents have a choice between free vaccines, which are funded by the state budget, and recommended multivalent vaccines for which they have to pay. The number of parents who refuse to have their children vaccinated remains relatively low. Unfortunately, the percentage of unvaccinated children increases every year, despite the best efforts of healthcare professionals and comprehensive public health education. It can be assumed that the reason for the increasing number of refusals to vaccinate children is the lack of knowledge of vaccination demonstrated by their parents and guardians.

The study was conducted in 2022 using a proprietary, anonymous survey of 138 parents who had their children vaccinated.

Keywords: knowledge, vaccination, medical staff, adverse post-vaccination reaction.

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INTRODUCTION

Unfortunately, rapid globalization and the ability to travel easily are associated with the wider and faster spread of diseases. Nevertheless, according to the World Health Organization (WHO), about 4-5 million deaths per year can be prevented through the introduction of vaccinations [1]. Cyclical vaccination of the population has a significant impact on its general level of protection by creating specific immunity [2]. All countries that are members of the European Union have a very long tradition of detailed vaccination programs. As a result of the widespread introduction of vaccination, it was possible to completely eradicate or reduce the incidence of very dangerous diseases, including smallpox [3]. All children born and temporarily residing in Poland are required to be vaccinated.

Parents have a choice between free vaccines, which are funded by the state budget, and recommended multivalent vaccines for which they have to pay [4]. The number of parents who refuse to have their children vaccinated remains relatively low. Unfortunately, the percentage of unvaccinated children increases every year, despite the best efforts of health care professionals and comprehensive public health education. It can be assumed that the reason for the increasing number of refusals to vaccinate children is the lack of knowledge of vaccination demonstrated by their parents and guardians. The knowledge of immunization is constantly growing through careful

observation of the development of new vaccine preparations and detailed research. Although vaccines, like any other drug, can cause side effects, they are one of the safest preparations for use in the global human population.

The vaccination program is announced in the fourth quarter of each year by the Communication of the Chief Sanitary Inspector in the Official Journal of the Ministry of Health [5]. Vaccinations are given according to the schedule of the vaccination program in place for a given year and in accordance with the product characteristics of each vaccine preparation [6]. In the current vaccination program, there are 12 types of diseases against which every child in Poland should be vaccinated.

Vaccinations are divided into those that are mandatory and those that are recommended. Mandatory vaccinations, i.e., those funded by the state budget, are for children and adolescents up to the age of 19. Recommended vaccinations are not funded by the Ministry of Health – any parent or legal guardian, who chooses to have this vaccination, must pay for the vaccine of their choice. Similarly, recommended vaccines are not mandatory in our country [7].

In the territory of the Republic of Poland, there is an obligation to receive vaccines in place in the Protective Vaccination Program. Only people who stay in Poland temporarily – not longer than three months – are exempt from the vaccination requirement. The exceptions are post-exposure vaccinations, which can actually threaten the health or life of a patient who

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has been exposed, for example, after a deep cut caused by a dirty, sharp tool. The basic act on vaccination in Poland is the Act of December 5, 2008 on the prevention and control of human infections.

Any vaccine should be received after prior medical qualification – physical examination which is valid only 24 hours from the date and time of its completion. Vaccines are performed by nurses who completed a specialized course in vaccination or are after completing a specialization in which the subject of vaccination was discussed in detail (e.g., specialization in family nursing) [8].

Vaccinations financed by the National Health Fund are given on the basis of a previously concluded contract for the provision of guaranteed services with a specific Primary Health Care facility. Before starting to perform specialized procedures in the field of vaccination, the facility is required to submit an application for the readiness to perform the above-mentioned procedures, confirming that it meets all the necessary conditions for operating a vaccination point [9].

Adverse post-vaccination reaction (APR) is a disturbing symptom that occurs up to 4 weeks after vaccine is received. The exception is the reaction to the tuberculosis vaccine, which can occur up to six months after vaccination. For the purposes of epidemiological surveillance, there are three main types of adverse reactions after vaccination: severe adverse reaction after vaccination, serious adverse reaction after vaccination, and mild adverse reaction after vaccination [10].

AIM

The aim of our research was to assess parents' knowledge of mandatory and recommended vaccinations for children in the city of Zielona Góra.

MATERIAL AND METHODS

An anonymous authors' questionnaire was used as a research tool in the study. The research material for the analysis was collected by means of paper questionnaires filled in by the parents of patients at the Family Medicine Clinic, WIGOR, located in Zielona Góra. The collection period was from the beginning of July to the end of December 2022.

The questionnaire was divided into two parts. The first part included questions about the basic socio-economic data of the subjects of the study, i.e., their sex, age, education, profession (nurse, midwife, doctor and unrelated to the medical community), place of residence, economic situation and number of children.

The second part included detailed questions about the vaccination program and issues related to vaccination. The questionnaire consisted of 30 closed questions,

A total number of 138 subjects participated in the study, including 94 women and 44 men. Individuals who participated in the study were divided into four age groups. The first group of up to 25 years of age accounted for 9.4%, the second largest group of 26–35 years of age accounted for 50.7%, the third group of 36–45 years of age accounted for 31.8% and the least numerous, fourth group of over 46 years of age accounted for only 8.1%. Most of the subjects had higher education (72.5%), 21.7% of all subjects had secondary education and 5.8% of them had vocational education. When it comes to 42% of individuals, they were in a medical profession, while 58% of subjects were not in a medical or medical-related profession.

The PQStat program, version 1.8.4, was used to perform detailed statistical calculations. Empirical values and percentages for each category were entered into the contingency table (cross-tabulation). Statistical results were obtained using Pearson's chi-squared test. Statistical significance was set at $p < 0.05$ for all calculations.

RESULTS

The level of knowledge of the surveyed individuals with regard to updating the vaccination program depended on the frequency of responses in a given occupational group. Nurses and midwives (54.3%), doctors (52.4%) and subjects without medical education (7.3%) reported they had extensive knowledge ($\chi^2=40.6$; $df=6$; $p < 0.000001$; Table 1).

TABLE 1. Reported level of knowledge by the surveyed parents depending on medical education.

| | Knowledge of vaccinations | | | |
|-------------------------|---------------------------|------------|------------|------------|
| | large | mean | sufficient | little |
| nurses and midwives | 19 (54.3%) | 10 (28.6%) | 5 (14.3%) | 1 (2.9%) |
| doctors | 11 (52.4%) | 5 (23.8%) | 5 (23.8%) | 0 (0%) |
| non-medical professions | 6 (7.3%) | 29 (35.4%) | 36 (43.9%) | 11 (13.4%) |

Among the surveyed individuals without medical education, 30.49% had no adequate knowledge of the vaccination schedule. Annual updates of the vaccination program were reported by 33.3% of doctors and 31.4% of nurses and midwives. On the other hand, almost twice as many doctors (over 57.1%) and 29% of nurses and midwives believed that the vaccination program is updated only according to the epidemic situation in the country. About 37% of nurses and midwives believed that the vaccination program is not updated at all. The answers obtained from the subjects of the study indicate that the differences are statistically significant ($\chi^2=26.5$; $df=6$; $p=0.00018$; Table 2).

TABLE 2. Opinions of the surveyed individuals about the frequency of vaccination schedule updates.

| | Frequency of vaccination schedule updates | | | |
|-------------------------|---|---------------------|-------------------|--|
| | once a year | I have no knowledge | it is not updated | it is updated depending on the epidemic situation in the country |
| nurses and midwives | 11 (31.4%) | 1 (2.9%) | 13 (37.1%) | 10 (28.6%) |
| doctors | 7 (33.3%) | 1 (4.8%) | 1 (4.8%) | 12 (57.1%) |
| non-medical professions | 12 (14.6%) | 25 (30.5%) | 20 (24.4%) | 25 (30.5%) |

The state of knowledge in the medical community shows that only every fourth person with medical education knows that the HPV vaccine is intended for both sexes and there is no upper age limit. When it comes to 41.1% of individuals with medical education, they believe that the vaccine can be received before starting sexual initiation. On the other hand, 37.8% of those with no medical education believe that the HPV vaccine is only intended for girls before sexual intercourse ($\chi^2=24.02$; $df=6$; $p=0.00052$; Table 3).

TABLE 3. The knowledge of the surveyed individuals about who the HPV vaccine is for.

| | Who is the HPV vaccine for? | | | |
|-------------------------|---|--|---|---|
| | Only for girls before sexual initiation | Only for boys before sexual initiation | For both sexes with no upper age limit, regardless of when sexual initiation begins | For girls and boys before sexual initiation |
| nurses and midwives | 17 (48.6%) | 0 (0%) | 10 (28.6%) | 8 (22.9%) |
| doctors | 2 (9.5%) | 0 (0%) | 4 (19.1%) | 15 (71.4%) |
| non-medical professions | 31 (37.8) | 0 (0%) | 34 (41.5%) | 17 (20.7%) |

As many as 31.4% of nurses or midwives answered that no vaccination can be given during pregnancy, while 17.1% of individuals claimed the opposite. As far as 45.7% of respondents is concerned, they did not get injected while pregnant. With regard to the staff of physicians, 47.6% of subjects were male, therefore the question did not apply to them. Only 3 women practicing medicine chose to be vaccinated during pregnancy (14.3%). When it comes to 9.52% of doctors, they stated that vaccination cannot be performed during pregnancy. The number of 14.6% of individuals, who do not practice medicine, chose to be vaccinated during pregnancy. While 35.4% of individuals did not come to their clinic for vaccination ($\chi^2=18.8$, $df=6$, $p=0.00445$, Table 4).

TABLE 4. Opinions of the surveyed individuals on the possibility of vaccination during pregnancy.

| | Were you vaccinated while pregnant? | | | |
|-------------------------|--|------------|------------|----------------|
| | You cannot get vaccinated while pregnant | Yes | No | Not applicable |
| nurses and midwives | 11 (31.4%) | 6 (17.1%) | 16 (45.7%) | 2 (5.7%) |
| doctors | 2 (9.5%) | 3 (14.3%) | 6 (28.6%) | 10 (47.6%) |
| non-medical professions | 9 (11.0%) | 12 (14.6%) | 29 (35.4%) | 32 (39.0%) |

Other medical professionals, such as doctors (17.6%), nurses (31.6%), and midwives (9.6%), were the main source of knowledge for healthcare professionals. Television and press were identified as a source of knowledge by the smallest number of people working in healthcare — only one person (0.7%) chose this option. While 22.8% of parents working in healthcare reported that they gained their knowledge from the Internet.

Non-medical professionals often acquired knowledge from medical professionals – 22.2% from doctors, 22.8% from nurses, and 8.99% from midwives. Most non-medical individuals learned about vaccinations from the Internet (up to 28.0%) as well as from family and friends (16.9%).

The most significant number of individuals, regardless of gender, reported that their parents refused vaccination because they lacked adequate knowledge of immunization. This was true for 43.6% of women and 40.9% of men.

When it comes to 19.1% of women and 13.6% of men, they are afraid of having mandatory vaccinations because of the substantial number of preservatives present in the vaccine. The subjects believe that the adjuvants used in the production of vaccine may negatively affect further development of the child. As many as 31.8% of male subjects, compared to about

10% of women, believe that the possibility of a serious adverse reaction to vaccination, including the diagnosis of autism in children, is responsible for not complying with the obligation to vaccinate ($\chi^2=12.01$, $df=3$, $p=0.00733$).

DISCUSSION

Vaccination can be considered one of the most cost-effective public health interventions. The main obstacles to vaccinating in accordance with the current vaccination schedule are concerns about vaccine safety and side effects, along with the lack of confidence on the part of guardians of children who are directly subject to vaccination according to the schedule in place in a given country [11].

There should be no significant differences in the knowledge of immunization among healthcare professionals. More than half of the medical professionals who participated in our study rated their knowledge as high – 53% on average. Individuals with higher education, regardless of their occupation, considered their knowledge as high in 30% of cases.

The study by Cepuch and co-authors shows that the parents' level of knowledge was not high. People who had the highest knowledge of the topic of immunization most often chose to vaccinate their children with additional recommended vaccines [12]. According to Malinowska and Włoszczak-Szubzdza, women who live in cities and have higher education are the most knowledgeable. When it comes to 54.3% of all subjects, they knew what the recommended vaccinations were, while 10.9% of individuals chose the wrong answer thinking that those vaccines were funded by the National Health Fund [13]. According to Widok, the level of knowledge among medical and non-medical students differs significantly. As many as 55.7% of students of medical universities rated their level of knowledge as very high. Students of other faculties gave this answer only in 22.7% [14].

In their study, Jagieła and co-authors showed that the subjects' self-assessment of their knowledge of vaccinations was satisfactory. They rated their knowledge as high (33%) and medium (57%). As far as 9% of individuals participating in the study is concerned, they had low knowledge and only 1% of subjects said that they had no knowledge of immunization [15].

In their studies, Nitsch-Osuch and co-authors presented the state of knowledge regarding vaccinations in the adult population from the perspective of doctors and nurses. In the self-assessment only 6% of doctors and almost twice as many nurses (11%) reported having sufficient knowledge.

In other studies, subjects most often chose the answer indicating that they were fairly knowledgeable about vaccination – as many as 55% of doctors and 44% of nurses. It was found that 4.5% of healthcare workers reported their knowledge as definitely insufficient [16]. The research analysis conducted by Dąbek and co-authors showed that the Protective Vaccination Program in place in the year when the study was conducted was known to 77% of subjects. The remaining 23% of subjects admitted that they knew nothing about the vaccination schedule [17]. In her study, Komorowska-Szczepeńska showed that the level of knowledge of the subjects of the study was the most satisfactory. Nearly 100% of subjects had a good knowledge of vaccinations to which their children had been subjected [18]. Analyzing the answers to the three questions presented in the hypotheses regarding our own research, it was

found that medical professionals rated their level of knowledge as extremely high. For example, only 32.1% of medical professionals believed that the Vaccination Program was updated every year.

In our research, more than half of the subjects gained knowledge about vaccination from healthcare professionals (55.9%). Parents had the highest level of trust in nurses (26.5%). It was from them that one in four subjects received answers to the questions asked in the field of the current vaccination program. When it comes to 20.06% of all subjects, they reported a pediatrician as a source of knowledge. Surprisingly, only 9.3% of subjects reported a midwife as the main source of their knowledge. They are at the forefront of immunization education, as they are the first healthcare professionals to establish direct contact and educate parents in the first weeks of their newborn's life. The next most common source of information for parents was the Internet (25.9%), followed by family and friends (17.2%). Television and the press had the least impact on the knowledge of the surveyed individuals in the field of vaccination – only in about 1%.

People with higher education acquire knowledge on their own, mainly through the Internet (17.3%), information brochures (14.2%) and a conversation with a doctor (13.4%) [19]. According to Gawlik and co-authors, the subjects of their study learned about vaccination from several sources. The main source of information was a conversation with a doctor (71.5%), equally followed by a chat with a primary care nurse and access to the Internet (43.1%) [20]. In their study, Szymoniak and co-authors showed that as many as 81% of subjects gained most of their knowledge from healthcare professionals – doctors, nurses and midwives – and from the Internet. Opinions of other parents and medical literature were cited as sources of knowledge by 66% and 41%, respectively [21].

The research by Nitsch-Osuch and co-authors on vaccination in the adult population shows that patients receive the most knowledge from the doctor – as much as 46% of all subjects. Further down the list of sources of vaccine information were the media (37%), the Internet (24%) and friends (15%). It was surprising that the nurse received only 2% of the votes from all parents who participated in the study [16].

According to Łopata and co-authors, the medical staff did not discuss vaccinations with the parents – this was claimed by as many as 87.13% of subjects. Families gained knowledge about vaccinations mainly from the Internet (89 subjects). The subjects of the study did not indicate the nurse as the person who had conducted a conversation about artificial immunization while visiting the clinic. A total number of 80 individuals reported the family as advisors, and only 22 considered a doctor as a source of knowledge [22].

Another issue that causes a lot of anxiety among parents are adverse reactions after vaccination. Subjects responded to the question of how long after vaccination one can speak of the occurrence of a post-vaccination adverse reaction. Studies have shown that only 16.7% of all subjects know that an adverse post-vaccination reaction can be observed up to one month after vaccination. According to the majority of parents, the reaction may occur only up to 72 hours after vaccination – as many as 52.7% of subjects claim this. The subjects believe that the fear of the possibility of adverse reactions affects the decision to refrain from vaccination (16.67% of cases).

According to Jagiela and co-authors, parents in the survey expressed significant concerns about their children's vaccina-

tion. As many as 68% of all subjects are afraid of major (31%) or minor (37%) complications that may occur after vaccination [15]. Parella and co-authors conducted a study in South Australia on parental perspectives on vaccine safety and vaccine adverse events. It was found that 25% of all subjects stated that their child had an adverse reaction after vaccination.

Because of the occurrence of the reaction, parents were concerned about vaccine safety and often hesitated to continue the vaccination program. The most common post-vaccination reactions in children reported by their caregivers included convulsions, which most likely resulted from high fever that persisted after vaccine administration.

It is important to note that as many as 95% of Australians surveyed believe that vaccines are safe [23]. The study conducted in Croatia by Makarić and co-authors shows that the attitude of parents significantly affects the occurrence of adverse post-vaccination reactions. Parents who willingly vaccinated their children and had no comments regarding, e.g., vaccine composition, most often indicated that their child had a mild reaction or that no dangerous reaction was observed [24]. According to Loharikar and co-authors, parental anxiety after the occurrence of an adverse reaction may negatively affect the continuation of the vaccination schedule.

In most cases, parents choose to postpone vaccination, thus disrupting the schedule in place in a given country. The occurrence of a post-vaccination abnormality in a child reduces social trust in immunization and negatively affects further relationships with healthcare professionals [25]. Kędzierska et al. in their research conducted on 300 subjects discussed the problem of informing parents about post-vaccination complications. Only 44.33% of subjects were informed by healthcare professionals about possible side effects. As many as 61.33% of parents observed an adverse post-vaccination reaction in their child. The most common reactions were symptoms classified as mild NOP, such as local swelling (42.67%), redness (41.67%) or fever (21.67%). As many as 30.9% of parents opted out of vaccination after an adverse reaction in their child [26].

Parents do not have adequate knowledge about adverse post-vaccination reactions. Healthcare professionals do not provide detailed information about side effects that may occur in a child after receiving the vaccine. After receiving specific information, parents would be much calmer, because they would know what symptoms to expect. In the opinion of most parents, the diagnosis of even the mildest form of post-vaccination reaction caused fear and anxiety in them, and that is why they refrained from further immunization of their children.

CONCLUSIONS

Regardless of their level of education and occupation, parents' knowledge of vaccinations is unsatisfactory. Although parents who work in the healthcare sector rate their knowledge as high, the results show that there are significant gaps in the basic knowledge of immunization.

According to the surveyed individuals, the primary and most reliable source of information about vaccinations are healthcare professionals. Nurses, physicians or midwives have the greatest influence on the subjects who make the decision to vaccinate their children. Parents most often refrain from subjecting their children to mandatory vaccinations due to insufficient knowledge about them.

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