e-ISSN 2544-1620

Medical Science Pulse 2021 (15) 1

Original papers

Published online: 31 March 2021

DOI: 10.5604/01.3001.0014.8274

PARENTAL KNOWLEDGE AND ATTITUDES TOWARDS VACCINATION OF CHILDREN UNDER 18 YEARS OF AGE

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A – study design, **B** – data collection, **C** – statistical analysis, **D** – interpretation of data, **E** – manuscript preparation, **F** – literature review, **G** – sourcing of funding

ABSTRACT

Background: Preventive vaccinations are the essence for the protection of humanity against the consequences of infectious diseases. They shape "herd" immunity if the entire population prevent disease incidence, morbidity. This ultimately reduces the number and severity of complications and death in the human population. Effective and active immunization of children and young people depends strongly on society's level of knowledge about preventive vaccinations.

Aim of the study: The study's main objective was to evaluate the level of parental knowledge and attitudes towards preventive vaccinations in children and teens as well as the identification of factors determining the attitudes of parents towards the obligation to conduct preventive vaccinations in children and teens under 18 years of age.

Material and methods: The research group consisted of 170 parents. A diagnostic survey and questionnaire technique was used with the use of the author's original questionnaire. The survey questionnaire consisted of 27 questions.

Results: Most parents had an average level of knowledge (n=136; 79.5%) about preventive vaccinations. It was noticed that the higher the level of parental knowledge about preventive vaccinations, the more often they deemed vaccinations necessary. The level of parental knowledge about preventive vaccinations does not depend on their age or education but rather their domicile location. Parental education, as well as domicile, did not significantly influence their attitudes towards the obligation of preventive vaccinations.

Conclusions: Parental knowledge about preventive vaccinations is on an average level. The relation between the parents' opinions about mandatory immunization in Poland and their knowledge in this field was not noticed. The level of parental knowledge about mandatory immunization was not statistically significant or dependent on age and education. More often than men, women claimed that the vaccination schedule effectively stabilizes and positively influences the epidemiological situation in Poland.

KEYWORDS: vaccination, parents, knowledge, primary prevention

Background

Infectious diseases constitute a global epidemiological threat. The development of vaccinology influenced the individual and mass protection against spreading infectious diseases globally [1,2]. Active immunization as the best form of infectious disease prophylaxis positively influenced the increase of healthiness of people. Mass mandatory immunization eliminated or minimized the incidence of infectious diseases such as smallpox, poliomyelitis, measles, mumps, rubella, tenatus, diphtheria, pertussis, viral hepatitis type B, viral hepatitis type A [3]. The proportion of people in Poland subjected to obliga-

tory active immunoprophylaxis is enough to effectively protect the population from spreading these diseases. Yet, the phenomenon of increase, especially in the last five years, in the proportion of children and teens who were not vaccinated is disturbing. It negatively influences the stable epidemiological situation in Poland. The proof of that is the return of incidence of infectious diseases, the morbidity of which was minimized throughout the years due to mandatory immunization [4,5].

Parental/legal guardians refuse to vaccinate their children as they distrust the effectiveness of active immunization and are afraid of the possibility of adverse events following immunization. The primary influencers of parents' negative attitudes towards vaccinations are often vigorously developing anti-vaccine associations that use parental knowledge deficits in the field of vaccinology. They direct their actions towards accepting negative attitudes towards immunization in children by parents/legal guardians [6].

The effective realization of active immunoprophylaxis in children and teens depends strongly on parental/legal guardians' level of knowledge in the field of vaccinology. The nurse in the vaccination room who has up-to-date and evidence-based knowledge about immunization plays the part of the educator [7–10].

The activity of anti-vaccine movements increased in the second part of the 20th century as a response to the rapid development of vaccinology. The development of the anti-vaccine theories is a result of a deficit in the health education of the society, a low number of healthcare workers as well as lack of communication between healthcare workers and parents [11]. False information reaching parents about the harmfulness of vaccinations and serious complications related to their administration raise concerns and doubts, at the same time causing an increase in the number of children whose parents avoid compulsory vaccination. National Institute of Public Health in Poland collects information on the number of people avoiding compulsory vaccination [12].

From the data of quarterly reports of the Main Pharmaceutical Inspectorate and Central Statistical Office in Poland indicate that the number of unvaccinated children increases dynamically every year. These data show that the number of avoidance vaccines has increased significantly over the past 10 years. In 2010, there were 3.437 refusals, while in 2019 – 48.609 refusals from compulsory vaccinations. In 2019, a record number of vaccination refusals was recorded in the Śląskie Voivodeship – 8147. The situation is also alarming in the provinces of Wielkopolskie (6.914 refusals) and Pomorskie (5.768 refusals). The lowest number of refusals was recorded in Podlaskie Voivodeship – according to the data, in 2019 there were 353 cases [13].

The way to combat the rapidly growing anti-health promotion attitudes on the Internet is reliable education of parents in the field of immunoprophylaxis based on current scientific and medical data in relation to the validity of mass mandatory and recommended immunization [14] as well as providing information about the possible adverse events following vaccination and the procedure in case of their occurrence [15]. A systematic increase of the qualifications in the field of vaccinology of medical workers and students of different fields and specializations may positively influence the active immunization [16]. Effective opposition towards anti-vaccine propaganda is a vital element of strengthening society's trust in the significance of immunoprophylaxis. Such conduct affects the shaping of the positive attitude of parents and the entire society [17].

Aim of the study

The main objective of the study was the evaluation of the level of parental knowledge and attitudes towards preventive vaccinations in children and teens, as well as the identification of factors determining the attitudes of parents towards the obligation of conducting preventive vaccinations in children and teens under 18 years of age.

Material and methods

Study design

Parents who have at least one child below 18 years of age were included in the observational study.

Setting

The research was conducted between September and November 2019. The research was carried out in Medical Centre MEDEOR in Leszno, Specialist Medical Centre VIGOMED in Leszno, Family Medicine Clinic SKARBOWA in Leszno, Health Centre in Święciechów.

Study participants were informed about the aim of the research and the full anonymity of the study. The clinic employees handed out questionnaires. Respondents returned the filled in questionnaires to the clinic's registration.

The study was carried out in the spirit of the Declaration of Helsinki dated on 1975 and amended in 2013, as well as Good Clinical Practice.

Participants

170 parents who have at least one child in the age lower than 18 years who consciously agreed to par-

ticipate in the study were included in the research. Filling in the questionnaire indicated agreement to participate in the study. Participation in the survey was voluntary and anonymous. Inclusion criteria: age>18 years and having children were applied.

Data sources/measurement

The research was conducted by means of a diagnostic survey method with the application of the original questionnaire. There were 27 questions in the questionnaire. Questions 1–6 concerned sociodemographic data (age, sex, place of residence, education, occupation, number of children). Questions 7–9 concerned preventive vaccinations performed on children according to the vaccination schedule. Question 10 regarded the self-assessment of parental knowledge about the aspects connected with immunization, while question 11 concerned the sources of parental knowledge about preventive vaccinations. Question 12 touched upon the issue associated with parental attitudes towards preventive vaccinations. Questions 13–27 concerned the parental knowledge about immunization.

All questions included in the questionnaire were closed questions with only one correct answer. Questions were evaluated in 0–1 p. system.

Statistical methods

Data obtained from the questionnaire underwent a detailed statistical analysis with the application of SPSS for Windows 11.5 software. Data was presented in division into questions with the obtained quantitative results (N) and percentage (%). In the case of quantitative variables, mean value, standard deviation and median were calculated as well as the minimal and maximal values were indicated for individual answers. Data was additionally presented in for of a bar chart. The research also evaluated the general level of parental knowledge in the field of immunization (questions 13–27). For every correct answer to these questions, respondents received one point. The total of the points allowed to determine the level of knowledge. The following interpretation of the obtained results was assumed for the study: low knowledge level – 0-6 p.; average knowledge level – 7011 p.; high knowledge level – 12–15 p.

The data obtained in the course of the research were verified against the assumed hypotheses. The results of the conducted reasoning were additionally presented in the form of tables. The significance level for the analyzed hypotheses amounted to $p<0.05$. The following tests were used: X2 test (qualitative variables), Kruskal-Wallis test (comparison of more than two groups/one quantitative variable), and the Mann-Whitney test (comparison of two groups/one quantitative variable).

Results

Descriptive data

The majority of respondents were women (86.5%; n=148), whereas men constituted (13.5%;n=23) of the study participants. Study participants were divided into four groups according to age:

- Group I – respondents below the age of 20 (5.3%; n=9)
- Group II – respondents in the age 21-30 (23.4%; n=9)
- Group III – respondents in the age 31-40 (54.4%; n=93)
- Group IV – respondents in the age above 40 (17%; n=29).

The majority of respondents had higher (39.8%; n=68) or secondary (35.7%; n=61) education. Vocational education was declared by (22.2%; n=38) respondents, whereas respondents with primary education constituted the smallest group (2.3%; n=4).

More than half of the study participants come from the rural environment (60.8%; n=104). Respondents living in a city >20 000 inhabitants constituted (25.7%; n=44) of all study participants. 13.5%; n=23 respondents lived in towns up to 20 000 inhabitants.

The results showed that 32.7%; n=56 of the respondents worked manually and 22.2%; n=38 were pensioners or retirees. Mental work was performed by 29.2%; n=49 of the study participants. There were also 15.6%; n=27 parents who determined their occupation as social work.

The gathered data show that 43.9%; n=75 of respondents are parents to two children, while 32.7%; n=56 study participants have one child. 15.8%; n=27 of respondents have three children. There were 5.8%; n=10 study participants who had four children and two couples (1.2%; n=2), who have five or more children.

Immunization of children is obligatory and recommended

The majority of respondents (62.0%; n=106), while answering the question about the range of vaccinations performed on their children, stated that their children received several of the obligatory vaccinations included in the Vaccination Schedule, regardless of the number of children in their family (Table 1).

Table 1. The obligatory and recommended vaccinations with regard to the number of children

Variables	Obligatory vaccinations		Recommended vaccinations	
	%	n	%	n
Child I	100	170	35.3	60
Child II	100	111	31.5	35
Child III	100	39	25.6	10
Child IV	100	12	0	0
Child V and further	100	3	33.3	1

n – number of study participants; % – the proportion of number against the number of all study participants

The level of parental knowledge about immunization

The analysis of the results showed that the respondents' knowledge level was the highest in the field of the familiarity with the immunization program effective in Poland M 2.84±1.12. In regard to consequences suffered by people eluding the mandatory immunization of their children, the average value of respondents' knowledge amounted to 2.68±1.3. The respondents equally evaluated their knowledge about the recommended vaccinations and the possibility of occurrence of reactions and adverse events following vaccination. The mean amounted to 2.62±1.11.

A vast majority of respondents, 81.9%; n=140, claim that immunization ensures 100% protection infection which the vaccination concerned, while 18.1%; n=31 of the study participants does not consider it certain.

The evaluation of the general level of knowledge of the study participants

Data obtained from questions connected with parental knowledge about immunization allowed to evaluate the general level of knowledge of the respondents. According to the rules assumed for the interpretation of data, it was noticed that the majority presents an average level of knowledge, 79.5%; n=136. 10.5%; n=18 of respondents presented a high level of knowledge, while the knowledge level of 9.4%; n=17 respondents was evaluated as low. The mean obtained from the data concerning the level of knowledge about immunization amounted to 8.90±1.99 Me 900 (min 3–max 13).

The number of respondents who presented a low level of knowledge concerning immunization amounted to 17.5%; n=7 of study participants in the age of 21-30 years, 11.1%; n=1 in the age group below 20 and 9.7%; n=9 in the age group 31-40. Low knowledge level was not noticed in the case of respondents above 40 years of age.

Data obtained for the analyzed variables as well as the result of statistical reasoning by $p<0.05$ allowed the statement that age and education of parents were not factors significantly influencing the level of knowledge about immunization $X2=7.043$; $p>0.05$ ($p=0.317$).

Data analyses revealed that the bigger the location where parents live, the better the knowledge about the matters connected with immunization (Table 2).

Table 2. Parental domicile and the level of knowledge about immunization

Variables	Village		Town <20 thousand inhabitants		City >20 thousand inhabitants	
	n	%	n	%	n	%
Low	10	9.6	4	17.4	3	6.8
Average	90	86.5	15	65.2	31	70.5
High	4	3.8	4	17.4	10	22.7
Total	104	100.0	23	100.0	44	100.0

n – number of study participants; % – the proportion of number against the number of all study participants

The opinion of the parents who participated in the study about the possibility of deciding about performing immunization of their children concerned more those of the respondents who showed a low level of knowledge (2.94±1.78). This opinion was presented by a lower number of respondents with an average (2.50±1.54) and a high (2.50±1.79) level of knowledge. The imperative to increase the number of reimbursed vaccines in Poland is an opinion shared more often by parents with an average (4.44±1.08) or high (4.28±1.12) knowledge level. The mean of this opinion in parents with a result showing low knowledge level amounted to 3.94±1.79.

It was observed on the basis of the obtained mean results for the opinion of punishing parents who elude the obligation of immunization with a fine were similar to those in levels of knowledge. The mean for respondents with a low level of knowledge about the vaccinations amounted to 3.35±1.69, for parents with an average knowledge level – 3.53±1.53 and those with a high knowledge level – 3.67±1.60.

It was observed that the opinion that children vaccinated according to the vaccination schedule should be prioritized in admission to public kindergartens and schools was shared more often by parents with a high level of knowledge about immunization (4.33±1.18). Opinions on this topic decreased together with the knowledge level. The mean in the case of respondents with average knowledge level amounted to 4.03±1.41, and in the case of study participants with a low level of knowledge – 3.94±1.60. It was also observed in the case of opinion about the stabilization and positive influence of immunization on the epidemiological situation

in Poland that the higher level of parental knowledge, the more often this opinion was shared. The mean in the case of parents with a low level of knowledge about immunization amounted to 3.88±1.57, in the group of parents with an average knowledge level – 4.26±1.05 and in the case of parents with a high knowledge level – 4.39±1.09.

Data analyses revealed that the higher the level of parental knowledge about immunization, the more often they noticed the need to not only perform immunizations but also perform them according to the recommendations (Table 3).

It was observed that the opinion about the punishing parents eluding children's obligatory immunization was more often shared among those in the age above 40 (4.14±1.30) and the age between 20-30 (3.72±1.43). The mean in the case of respondents under 20 amounted to 3.11±1.76 and for the age group 31–40 – 3.29±1.61. The opinion that children vaccinated according to the immunization schedule should be prioritized in admission to kindergartens and schools was observed more often among parents under 20 (4.44±0.88) and over 40 (4.45±1.15). The mean for this opinion in the case of age group 20-30 amounted to 4.15±1.31 and for respondents in the age between 31–40 – 3.85±1.53. A similar situation was noticed in the case of opinion that the vaccination schedule effectively stabilizes and positively influences the epidemiological situation in Poland. The mean for this opinion for respondents under 20 amounted to 4.33±0.86 and above 40 – 4.66±0.72. For respondents in the age group 21-30 it amounted to 4.13±1.09. and in the age group 31–40 – 4.14± 1.23 (Table 4).

Table 3. The analysis of the relation between the level of parental knowledge and the attitude towards immunization

Variables	Low level of knowledge		The average level of knowledge		High level of knowledge		X2	p
	M	SD	M	SD	M	SD		
Access to information about immunization is limited	2.94	1.43	2.68	1.25	2.50	1.42	0.693	0.707*
Immunization should be obligatory	4.18	1.38	4.38	1.14	4.61	0.97	1.010	0.603*
Parents should decide about immunization	2.94	1.78	2.50	1.54	2.50	1.79	1.071	0.585*
The number of reimbursed vaccines should be higher	3.94	1.79	4.44	1.08	4.28	1.12	1.065	0.587*
Avoiding the mandatory immunization should be punishable by fine	3.35	1.69	3.53	1.53	3.67	1.60	0.358	0.836*
Children vaccinated according to vaccination schedule should have the priority of admission to kindergartens and schools	3.94	1.60	4.03	1.41	4.33	1.18	0.538	0.764*
Vaccination schedule effectively stabilizes and positively influences the epidemiological situation	3.88	1.57	4.26	1.05	4.39	1.09	0.792	0.673*

M – mean; SD – standard deviation; p – the calculated significance level for X2 and Kruskal-Wallis tests.

Table 4. The analysis of dependence between parental age and their attitudes towards immunization

Variables	Up to 20 years		21–30 years		31–40 years		Above 40 years		X2	p
	M	SD	M	SD	M	SD	M	SD		
Access to information about immunization is limited	2.67	1.11	2.55	1.39	2.92	1.20	2.10	1.29	9.435	0.024
Immunization should be obligatory	3.89	1.26	4.53	0.87	4.24	1.31	4.83	0.65	10.223	0.017
Parents should decide about immunization	3.67	1.41	2.50	1.53	2.57	1.58	2.17	1.64	6.428	0.093
The number of reimbursed vaccines should be higher	4.78	0.66	4.38	1.14	4.24	1.32	4.69	0.66	3.414	0.332
Avoiding the mandatory immunization should be punishable by fine	3.11	1.76	3.72	1.43	3.29	1.61	4.14	1.30	7.746	0.052
Children vaccinated according to vaccination schedule should have the priority of admission to kindergartens and schools	4.44	0.88	4.15	1.31	3.85	1.53	4.45	1.15	4.607	0.203
Vaccination schedule stabilizes and positively influences the epidemiological situation	4.33	0.86	4.13	1.09	4.14	1.23	4.66	0.72	5.876	0.118

M – mean; SD – standard deviation; p – the calculated significance level $p<0.05$; X2 and Kruskal-Wallis tests.

Table 5. Parent gender and their attitude towards immunization

Variables	F		M		p
	M	SD	M	SD	
Access to information about immunization is limited	2.10	1.30	2.57	1.19	0.624
Immunization should be obligatory	4.44	1.07	4.04	1.52	0.347
Parents should decide about immunization	2.46	1.56	3.09	1.70	0.088
The number of reimbursed vaccines should be higher	4.41	1.14	4.13	1.32	0.241
Avoiding mandatory immunization should be punishable by fine	3.54	1.55	3.43	1.59	0.710
Children vaccinated according to vaccination schedule should have the priority of admission to kindergartens and schools	4.09	1.39	3.78	1.47	0.283
The vaccination schedule stabilizes and positively influences the epidemiological situation	4.31	1.06	3.74	1.42	0.046

F – Female; M – male; M – mean; SD –standard deviation; p – the calculated significance level $p<0.05$ ($p=0.005$).

We observed on the basis of the obtained data that women more often than men perceive the benefits resulting from performing immunization and the necessity of their performance. Only in the case of the opinion about the positive influence of immunization on the epidemiological situation in Poland there was a statistically significant relationship between the studied groups divided accordingly to sex. In the case of other opinions no such relationship was noticed (Table 5).

Limitations in the access to reliable information about immunization in Poland were most often noticed by parents living in town up to 20 000 inhabitants (2.74±1.17).

The mean result for this opinion in the case of respondents living in rural areas amounted to 2.69±1.25 and for inhabitants of cities above 20 000 inhabitants – 2.64±1.44.

Discussion

Key results

It was stated on the basis of conducted research that an effective method of increasing the proportion of immunization is the implementation of permanent educational activities in the society. especially among parents on children and teens under 18 years old carried out by medical personnel qualified in the field of vaccinology. A significant element of the process of education is access to credible. scientifically proven reports about the safety and benefits of immunization. Educational activities aimed at obtaining a sufficient level of parental knowledge and awareness about the safety and benefits of mass immunization will improve the epidemiological situation in Poland and around the world.

Interpretation

Protective vaccinations are one of the most effective methods of prevention and battling infectious diseases. Due to mass immunizations. the level of resilience of a certain population and thereby the risk of infecting the not immunized society members who are potentially prone to infection is lowered [18].

Incessant education of parents by healthcare professionals and providing them with access to credible. scientifically proven reports about the safety and benefits of immunization seems to be an effective method of increasing the proportion of immunization [19]. Yet. it should be underlined that conducting an effective and reliable education of parents. especially during direct contact. that is. in vaccination rooms and during the appointments with general practitioners. is possible only due to ongoing training of doctors and nurses [20]. It results from the data obtained in the study that for parents. the medical personnel is the primary source of information about immunization of children. Therefore. it can be stated that doctors' and nurses' role in the propagation of the obligation of vaccination and nullifying the propaganda of the anti-vaccine movement is a vital element of actions connected with the immunization of children. This statement was not confirmed by the results of research carried out by E. Łopata et al. For the study participants. the primary source of immunization information was the Interned and acquaintances. not professional healthcare personnel [21].

Parents included in the authors' research most often had two children. It was proven that all of them performed mandatory immunization. and every third also performed the recommended immunization. None of the study participants was eluding the mandatory immunization in children.

CBOS announcement from 2019 about the attitude of Poles towards immunization informs about an increase in views regarding the safety of vaccinations. negating the influence of vaccines on the increase of developmental disorders as well as the opinion about the effectiveness of vaccines in battling infectious diseases [22].

Considering the data concerning the self-evaluation of knowledge about the matters connected with the immunization obtained in the research it was stated that parents gave the highest marks to the recommended protective vaccination program and consequences that arise from eluding mandatory immunization. The general. actual knowledge of parents was average. Scientific reports also underline the level of actual knowledge about immunization presented by parents. According to K. Faleńczyk et al. in their publication about factors influencing parental attitudes towards immunization. the level of their knowledge is on the border between average and high [19].

As shown in this study parental age and education did not have a significant influence on their level of knowledge about the protective vaccination. Yet it was stated that parents living in towns and cities had better knowledge in the field of immunization than parents living in rural areas. The influence of factors like age. place of residence education or sex of the parents on the level of knowledge about vaccination was also the topic of the publication by P. Kalinowska et al. concerning the relation between having children and opinions on immunization. Authors underline the lack of relation between the environment of residence and age of parents and the knowledge about protective vaccination but they state relation in reference to sex [23]. Therefore it can be assumed that these data partially overlap the results obtained in the authors' research and differences probably arise from the application of different research tools.

On the basis obtained in the research a tendency of increase of parent's awareness and level of knowledge about immunization including undergoing immunization and benefits connected with it. was observed. Yet it should be underlined that the observed tendency is not statistically significant. According to the thesis by A. Kotwas et al. on the topic of immunization in the opinions of parents. The awareness of the necessity to undergo immunization is high, despite the actions of the anti-vaccine movements. Yet Parents underline the limited access to creditable information, which may influence the range of their knowledge and impede the aware decision making about child's immunization [24]. In the research attention was paid to the influence of the respondents' age on their attitude towards vaccinations. It was stated that the opinion that protective vaccinations should be mandatory increased with parental age. It was proven that parents between the ages of 31 and 40 and those under 20 more frequently claimed that access to immunization information is limited. There was no significant proof for the relation between other opinions about immunization and parental age.

According to data obtained in the study. mothers more often than fathers noticed the positive influence of immunization on the stabilization of the epidemiological situation in Poland. This result may be proof of a higher awareness of Mothers about the benefits of mandatory immunization. The analysis also included the influence of education and domicile on the attitudes towards mandatory immunization. It was stated that these factors did not have a significant influence on the presented views and attitudes of the respondents in this matter.

Recommendations

The author's own research and the comparison of the obtained results with other authors interested in this matter showed that parental awareness of the necessity and benefits of immunization was satisfactory. Shortcomings in the parental knowledge result from sources where the parents gain their knowledge. and sometimes from contradictory opinions broadcast in mass media and confrontation with information obtained from medical personnel. The necessity to provide parents with credible education in this matter should be one of the primary elements of activities of employees of medical facilities conducting immunizations.

Generalizability

Analyzing the results presented above. the necessity to conduct systematic educational actions among parents that would increase their level of knowledge and awareness about the benefits of immunizations seems important.

Limitations of study

The study's limitations fall into a small research sample and a non-standard tool used to collect data. However. conducting research in four different health care centers and considering multiple aspects examining the level of parental knowledge about preventive vaccinations in the research tool are its great asset and may constitute a sound basis for further studies in the subject.

Conclusions

1. Parental knowledge about preventive vaccinations is on an average level.

2. The level of parent's knowledge about mandatory immunization was not statistically significant or dependent on age and education.

3. The relation between the parents' opinions about mandatory immunization in Poland and their knowledge in this field was not noticed.

4. Women more often than men claimed that the vaccination schedule effectively stabilizes and positively influences the epidemiological situation in Poland.

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Word count: 3792 • Tables: 5 • Figures: 0 • References: 24

Sources of funding:
The research was funded by the authors.

Conflicts of interests:
The authors report that there were no conflicts of interest.

Cite this article as:
Sochocka L, Lorych L, Gawlik M.
Parental knowledge and attitudes towards vaccination of children under 18 years of age
Med Sci Pulse 2021; 15(1): 24-32. DOI: 10.5604/01.3001.0014.8274.

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Received: 29.01.2021
Reviewed: 28.02.2021
Accepted: 29.03.2021