Kowacka Ewa. Preventive vaccinations in the prophylaxis of infectious diseases in children of clinical risk group. Journal of Education, Health and Sport. 2019;9(1):191-200. eISNN 2391-8306. DOI http://dx.doi.org/10.5281/zenodo.2547092 http://ojs.ukw.edu.pl/index.php/johs/article/view/6498

The journal has had 7 points in Ministry of Science and Higher Education parametric evaluation. Part B item 1223 (26/01/2017).
1223 Journal of Education, Health and Sport eISSN 2391-8306 7

The authors declare that there is no conflict of interests regarding the publication of this paper.

Received: 03.01.2019. Revised: 11.01.2019. Accepted: 23.01.2019.

PREVENTIVE VACCINATIONS IN THE PROPHYLAXIS OF INFECTIOUS DISEASES IN CHILDREN OF CLINICAL RISK GROUP

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Preliminary remarks

Despite the past years and intensifying attacks of so-called anti-vaccinationists against the idea and practice of preventive vaccinations, especially in children, the opinion that they are "one of the greatest benefits and health achievements of humanity" remains valid[1]. The vaccine is a biological immune care product containing specific antigen or antigens that provide immunity to infection with one or more pathogenic microorganisms.

The importance of implementing the concept of preventive vaccinations on the general scale consists primarily in the fact that they have eliminated from the life of societies, or at least from significant areas of the world known to us, traumatic experiences of epidemics decimating human communities, both on a local and regional, and sometimes even, as infamous Spanish influenza, which a hundred years ago consumed, as estimated even 100 million victims, on a global scale. As specialists point out, "even the invention of antibiotics has not had such a significant impact on reducing mortality and increasing human health. Vaccinations have significantly reduced the incidence of infectious diseases [...]. They practically eliminated diseases such as

[1] O. Branicka, J. Glück *Bezpieczeństwo szczepień profilaktycznych u chorych na choroby alergiczne*, "Alergologia Polska" 2016, no. 3, p.90.

smallpox, diphtheria, tetanus, measles or poliomyelitis. Therefore, there is no doubt that the impact of vaccination on the health and development of each of us, regardless of age and gender, is unquestionable"[2]. In many modern countries, including Poland, the issue of preventive vaccinations, especially in children, is an inherent component of the state health policy. The scope, principles and procedures for the implementation of the Preventive Vaccination Schedule are regulated in the generally applicable provisions of law[3].

However, it should not be forgotten that the introduction of any biologically active substance into the human body is not indifferent to its functioning. This consideration also applies to vaccines, and the risks associated with their administration are emphasized in particular in connection with preventive vaccinations in children. In view of the generally recognized achievements of medicine of infectious diseases and vaccinology, current vaccines are completely safe. The data of the World Health Organization (WHO) demonstrate that the probability of death because of their administration, as well as of the disease that they are supposed to protect against, is statistically so small that it is not really possible[4]. It does not change the fact that in certain cases preventive vaccinations should be preceded by a medical qualification test, and where appropriate, an assessment of the risk associated with the administration of the vaccine[5]. Therefore, before proceeding with the implementation of the POS, not

[2] *Szczepienia ochronne. Obowiązkowe i zalecane od A do Z*, ed. E. Bernatowicz and P. Grzesiowski, Warsaw 2017, p. 9.

[3] The statutory premise for undergoing preventive vaccinations is article 5 section 1 point 1 letter b in connection with article 17 section 1 of the *Act on preventing and combating infections and infectious diseases among people* (hereinafter: UZ), Journal of Laws from 2008 No. 234, item 1570 as amended), obliging all people staying on the territory of Poland to undergo specific preventive vaccinations. Detailed conditions for submission to such an obligation are specified in the Regulation of the Minister of Health of 18 August 2011 on mandatory preventive vaccinations (hereinafter: ROSO), Journal of Laws from 2011 No. 182 item1086, issued on the basis of article 10 section 10 of the UZ. The list of vaccinations is defined in the Preventive Vaccination Schedule (PSO), announced on the basis of the delegation contained in article 15 section 5 by the Chief Sanitary Inspector (GIS) in the form of an annual announcement. In 2019, the announcement of the Chief Sanitary Inspector of 25 October 2018 regarding the Preventive Vaccination Schedule for 2019, Official Journal of Laws of the Minister of Health section 104 (hereinafter: POS'19) is applicable. The POS includes the following lists of vaccinations: 1) mandatory for children and adolescents, according to the vaccination schedule; 2) mandatory for people exposed in a special way to infection due to clinical or epidemiological reasons; 3) post-exposure vaccinations; 4) recommended vaccinations; 5) vaccinations against selected infectious diseases. PSO'19; A. Bednarek, M. Bartkowiak-Emeryk, J. Wysocki (hereinafter: A. Bednarek et al.), *Szczepienia ochronne w profilaktyce chorób zakaźnych u dzieci*, Warsaw 2018; J. Wysocki, H. Czajka, *Szczepienia w pytaniach i odpowiedziach*, Warsaw 2018. This study is focused on the issue of vaccinations of children and adolescents. The physician who provides patients with preventive care shall notify them about the obligation to undergo certain protective vaccinations. In the case of children, such information is provided in writing by the physician to their legal or de facto guardian, about which a territorially competent health inspector is informed. See also: A. Bednarek et al., *Szczepienia ochronne…,* pp. 47-61; N. Szczęch, *Problematyka przymusowych szczepień ochronnych u dzieci na tle orzecznictwa sądów administracyjnych*, "Roczniki Administracji i Prawa" 2016, no. 1, pp. 187-211; A. Augustynowicz, I. Wrześniewska-Wal, *Aspekty prawne obowiązkowych szczepień ochronnych u dzieci*, "Pediatria Polska" 2013, no. 88, pp. 120-126.

[4] *Six common misconceptions about immunization,* material available in its electronic version at the Internet address: https://www.who.int/vaccine_safety/initiative/detection/immunization_misconceptions/en/

[5] Risk assessment form of preventive vaccination see: J. Wysocki, H. Czajka, *Szczepienia w pytaniach…, p. 119.*

only the legal aspect of this issue, but also clinical contraindications to the administration of the vaccine should be considered.

Particular care and compliance with the legal procedures is recommended for the implementation of PSO in children and adolescents. This applies in particular to people of the group of clinical risk. It includes premature infants, children with immunodeficiency, cancer, rheumatic disease, after spleen removal, suffering from sickle cell disease, with allergy, cystic fibrosis, nervous system diseases, autoimmune diseases (e.g. diabetes), etc.[6] Presentation of this issue in the context of legal conditions of preventive vaccinations in children and adolescents, as well as published research, is the primary purpose of this study.

Keywords: vaccinatons

1. Preventive Vaccination Schedule

The POS is, as already signalled, an annual legal act issued by the GIS regulating the subjective (people covered by the POS) and the objective (list of infectious diseases, which POS concerns) scope. The current legal status in this regard, in relation to children and adolescents, specified by the POS'19, has been synthetically summarized in Table 1.

Table 1 Mandatory and recommended vaccinations in Poland in the light of legal regulations

Type of vaccination	Vaccination against	Period	Additional indications concerning the period and other recommendations
mandatory	Tuberculosis (BCG vaccine)	1 year of life	24 hours after birth
	Hepatitis B	1 year of life	24 hours after birth (first dose, the second one after 6 weeks of life, the third one in the seventh month of life)
	diphtheria, tetanus, pertussis	1-2 year of life	after six weeks of life (first dose, the second one in the fourth month, the third one in the 5-6 month, the fourth one in the 16-18 month)
	diphtheria, tetanus, pertussis – booster vaccination	6, 14 and 19 years old	the first dose after the age of five, the second one after the age of thirteenth, and the third after the age of eighteenth years old
	invasive infection with *haemophilus influenzae* type b	1 year of life	after the the sixth week of life (first dose, the second one eight weeks later, the third one, eight weeks after the

[6] For a detailed list of childhood diseases that constitute the premise to include children in the clinical risk group, see, among others:: A. Bednarek et al., *Szczepienia ochronne…,* A. Bednarek et al., *Szczepienia ochronne…,* J. Wysocki, H. Czajka, *Szczepienia w pytaniach…*

			second one)
	invasive infection with *streptococcus pneumoniae*	1-2 year of life	after the the sixth week of life (first dose, the second one eight weeks after the first one, the third one in the 13-15 month of life)
	infantile paralysis (poliomyelitis)	1 year of life	after four months of life (first dose, the second one after the expiration)
	infantile paralysis (*poliomyelitis*) – booster vaccination	6 year of life	after five years of age
	measles, mumps, rubella	2 year of life	in 13-15 year of life
	measles, mumps, rubella – booster vaccination	6 and 10 years old	the first dose after the age of five, the second one after the 9th year of age
	chickenpox	until 12th year of life	covered by detailed recommendations in the POS
recommended	Hepatitis A	adults and children	trips to countries with high and moderate endemicity of infections with hepatitis A and in people due to the type of work exposed to contact with hepatitis A viruses (e.g. food production)
	Hepatitis B	adults	persons exposed to contact with hepatitis B viruses (e.g. planned surgery)
	measles, mumps, rubella	children and adults	people not vaccinated under the POS
	chickenpox	children and adults	1) not vaccinated as part of mandatory and recommended vaccinations; 2) women planning to get pregnant
	influenza	children and adults	due to clinical or individual reasons
	rotaviruses	6-24 week of life	Based on the decisions of legal or de facto guardians
	diphtheria, tetanus, pertussis	19 years old	instead of the third booster dose
	invasive infection with *streptococcus pneumoniae*	6th week of life – 18 years old and above 50 years old	children and adolescents not covered by mandatory vaccinations and over 50 years old with decreased immunity or as a preventive measure
	invasive infection with *neisseria meningitidis*	children from 2nd month of age, adults	from risk groups for immune disorders
	Invasive infection	from 6th	children not covered by mandatory

	with *haemophilus influenzae* type b	year of life	vaccinations
	tick-borne encephalitis	children and adults	people present in areas with an increased incidence of this disease
	cholera	adults and children	people travelling to countries covered by the cholera epidemic
	typhoid fever	adults and children	people travelling to countries with the endemic incidence of this disease
	rabies	adults and children	people travelling to countries with the endemic incidence of this disease
	infantile paralysis (*poliomyelitis*),	adults and adolescents	1) above 19 years old not vaccinated as part of mandatory vaccinations; 2) people travelling to countries with the endemic incidence of this disease
	yellow fever	adults and children	people travelling to countries with the endemic incidence of this disease
	human papillomavirus (HPV)	adolescents	before sexual initiation
	tuberculosis	up to 15 years old	people not vaccinated as part of preventive vaccinations

Source: own work based on the Annex to the GIS Communication of October 25, 2018 – Protective Vaccination Program for 2019.

The mandatory vaccination group in practice should also include so-called post-exposure vaccinations, i.e. used as a result of a person's contact with a source of certain diseases. This group includes diphtheria (the obligation applies to those had contact with a sick person), tetanus (the obligation applies to injured people) and rabies (the obligation applies to people who had contact with a sick animal)[7].

The POS analysis suggests that the POS mainly focuses on mandatory vaccinations, applied almost exclusively, if booster vaccinations are not included, during childhood, especially in its very early and early period. The first vaccines are applied as early as in the first day of life (tuberculosis and hepatitis B), and most of the others in the first three years of life. This results in the imperative of special safety measures in relation to children from clinical risk groups, especially premature infants. In the early stages of life, it is often not possible to fully and adequately qualify them for this group. In the case of older children, adolescents and adults, the resulting dangers are smaller, but they also occur. For the above reasons, the POS practice should fully consider medical knowledge about the conditions for the administration of vaccines to people from the clinical risk group.

2. Conditions of the POS implementation towards people from the clinical risk group

In the preliminary remarks it has been mentioned that currently used vaccines, which is confirmed by the authority of the WHO, are completely safe, and thus any doubts raised in this respect are inaccurate. This opinion of the indisputability of the very idea of preventive vaccinations in the prophylaxis of infectious diseases is of a

[7] POS'19, p. 19.

categorical nature. This does not mean, however, that the implementation of the PSO is free from doubts as to the justifiability and scope of their use in people included in the clinical risk group. Vaccines can also, like any biologically active substance, generate unwanted reactions in the body.

The probability of this kind of reaction is higher, for example, in premature infants than in children born full term. Preterm labour itself is a background for threats that should be considered when implementing the mandatory vaccination schedule. The literature draws attention to the fact that low birth weight and premature labour (these circumstances usually coexist) strongly increase the risk of invasive pneumococcal disease. Therefore, vaccinations against this disease in premature infants should be performed as early as possible[8]. Although generally low birth weight is not a contraindication to vaccinations (the exception is BCG, which is administered to premature infants over 2000 g), and premature infants should be vaccinated according to the chronological age, the implementation of the vaccination schedule in premature infants is carried out according to slightly modified principles in comparison to children born full term and with normal birth weight. In this context, the following issues should be considered: 1) the need to use modifications in vaccinations against pertussis (consideration of contraindications, or in their absence, in children born before 37 weeks old with birth weight below 2500 g, application of the diphtheria-tetanus-pertussis vaccine with acellular pertussis component (DTaP [9]) and hepatitis B vaccine (adoption of another vaccination schedule than in children born full term); 2) the application of the cocoon strategy in protection against severe infections, or a recommendation that all people in the immediate vicinity of a prematurely born child should undergo vaccinations against influenza, pertussis and chickenpox[10]; 3) the application in a vaccination against pneumococci in premature infants born before 27 weeks of gestation of PCV13 vaccine without any restrictions (it is postulated that this principle should be extended to all premature infants, as according to empirical research, some premature infants carry an innate immunity defect responsible for inhibiting the inflammatory response and previously unknown mutations responsible for infections)[11]. In general, however, it is recommended that vaccinations other than those mentioned above should be carried out in premature infants in the same way as in the group of children born full term.

Slightly different types of problems occur when using vaccinations in people suffering from diseases, which are reasons for their inclusion in the clinical risk group. Administration of a vaccine to such a person may be ineffective, cause exacerbation of the medical condition, or lead to anaphylaxis, or a rapid allergic reaction to a repeated vaccination in adults or a new vaccination in children. The last of these cases is extreme and unlikely in the light of empirical research. However, it can not be excluded, due to the fact that episodes of anaphylactic reaction after vaccination were found to be real. This is because, as M. M. McNeil state, in the conclusion of research concerning this issue, "vaccine-induced anaphylaxis is rare in all age groups. Despite this, it is a

[8] M. Bartkowiak-Emeryk, A. Emeryk, I. Małecka, J. Stryczyńska-Kazubska, J. Wysocki (hereinafter: M. Bartkowiak-Emeryk et al., "*Szczepienia ochronne u dzieci z grup ryzyka klinicznego*, [in:] *Szczepienia ochronne w profilaktyce*…, p. 151.

[9] Annex to the GIS Communication of October 25, 2018: POS'19. p. 9.

[10] M. Bartkowiak-Emeryk et al., , *Szczepienia ochronne*…, pp. 152-153.

[11] E. Bernatowska, B. Mikołuć, M. Pac, *Czy program obowiązkowych szczepień ochronnych na rok 2018 zapewnia dostępność szczepionki PCV13 dla wszystkich dzieci z grup ryzyka?* , "Zakażenia XXI wieku". 2018, no. 1, 17..

potentially life-threatening condition, and people who perform vaccinations should be prepared for the treatment of anaphylaxis"[12]. Then, although the risk of an anaphylactic shock after vaccination is rather low, the mere fact of the possibility of its occurrence seems to be an argument sufficient to maximally exclude the possibility of its occurrence while administering a vaccine. Care should be maintained in this respect, all the more that anaphylaxis after the administration of a vaccine may happen both in a sick and a healthy person.

The problem is exacerbated in the case of people suffering from allergic diseases. This especially concerns the occurrence of hypersensitivity reactions. As a matter of fact, anaphylactic reactions after administration of a vaccine to allergy sufferers are very rare (5 per approx. 7.7 million cases), but more frequent milder forms of hypersensitivity reactions both immediate (hives, erythema, edema) and delayed, after a few hours, and even weeks (hives, generalized erythema, serum sickness) are much more frequent. Moreover, delayed reactions without the participation of immunological processes, especially nodules or thickening at the injection site are observed[13].

In the light of current recommendations, an allergic reaction is not a contraindication to vaccination. In this situation, a vaccine free from a sensitizing substance, e.g. chicken protein or thiomersal or aluminium, which are used as stabilizers, should be applied[14]. Generally, however, which should be emphasized, the allergic disease itself is not a reason for the withdrawal of the application of preventive vaccinations in allergy sufferers. The only thing to do is to minimize the risk of hypersensitivity reactions, especially of the most serious one which is anaphylaxis.

This remark should be generally applied to the occurrence of any chronic disease. This issue is raised, among others, in connection with the mandatory vaccinations against pneumococci introduced to the vaccination schedule in 2016. Therefore, many physicians have doubts about whether to vaccinate sick children. However, the prevailing view is that "a disease is not a contraindication to vaccination, on the contrary, it is necessary to protect children against serious consequences of pneumococcal infection"[15]. However, to make this help effective, all children, not only premature infants, as previously discussed in a different context, should be provided with the most modern PCV13 vaccine. This is because, it turns out that many children from the clinical risk group are not vaccinated, not so much because of doctors' doubts, as lack of access to the vaccine. This situation does not largely coincide with the categorical demand of epidemiologists that "children of the risk groups should be provided with the most effective protection in the first year of life"[16]. This postulate should be extended to all vaccinations from the preventive vaccination schedule in the first year of life. The schedule of these vaccinations should provide children from the clinical risk group with the most effective protection against infectious diseases, and the best possible effectiveness of the vaccines themselves.

The disease should not be treated as a reason for abandoning or delaying vaccinations in people, especially children, with autoimmune diseases. These diseases,

[12] M. M. McNeil, E. S. Weintraub, J. Duffy, L. Sukumaran, S. J. Jacobsen, N. P. Klein, S. J. Hambidge, G. M. Lee, L. A. Jackson, S. A. Irving, J. P. King, E. O. Kharbanda R. A. Bednarczyk, F. De Stefano (hereinafter: M.M. McNeil et al.), *Ryzyko anafilaksji po szczepieniach ochronnych u dzieci i dorosłych*, "Alergologia Polska" 2015, Vol. 50.
[13] O. Branicka, J. Glück *Bezpieczeństwo szczepień profilaktycznych*…, p. 91.
[14] O. Branicka, J. Glück *Bezpieczeństwo szczepień profilaktycznych*…, p. 92.
[15] E. Bernatowska, B. Mikołuć, M. Pac, *Czy program obowiązkowych szczepień*…, p. 17.
[16] E. Bernatowska, B. Mikołuć, M. Pac, *Czy program obowiązkowych szczepień*…, p. 18.

"because of their pathomechanism and because of the treatment used, are associated with the decrease in immunity. Therefore, in patients suffering from this type of disorders, the course of some infectious diseases may be more severe and associated with complications. Preventive vaccinations in these patients are extremely important. It is important to appropriately select vaccinations, not only mandatory, but often also recommended ones, as well as indicate the optimal treatment of the underlying disease based on the most frequent diseases of this group"[17]. As emphasized by M. Bernatowicz and P. Grzesiowski, mandatory and recommended vaccinations not only in autoimmune diseases, but also in other chronic diseases, ""should be carried out in the stable period of the disease process. There is no evidence that vaccinations caused exacerbation or were the cause" of these diseases. However, each vaccination should be consulted with the attending physician[18].

Therefore, preventive vaccinations in autoimmune diseases should be treated as a form of support for sick people. They are for patients in whom the immune system is strongly weakened, a specific shield against additional damages that an attack of infectious disease could cause to them. For this reason, people with autoimmune diseases should not only be strictly covered by the mandatory vaccination schedule, but they should also undergo recommended vaccinations. This is because the research proves that, for example, diabetes increases the risk of developing infectious diseases and exacerbates their course. In diabetics, there is an increased risk of the infection with hepatitis B and a progression of the acute phase into a chronic one. There is a positive correlation between the hospitalization and mortality of diabetics due to influenza. Studies have also demonstrated that in the case of pneumonia with pneumococcal etiology in patients with diabetes the development of the disease towards bacteremia is more frequent[19]. The data support the previously made observation that patients suffering not only from autoimmune diseases but also from other diseases from the clinical risk group should, and in the case of children it concerns their legal or de facto guardians, pay special attention to the implementation of the mandatory vaccination schedule and, if possible and according to their health needs, receive vaccines from the recommended list.

Conclusion

In conclusion, it should be repeated with absolute certainty that belonging to a risk group cannot in any way be considered as a reason for lack of vaccination or its delay. In the case of premature infants that are born with decreased immunity, vaccination protects against severe, often fatal infections. Studies provide convincing evidence that vaccination in patients suffering from autoimmune diseases is particularly important: the infection can dramatically worsen their health condition.

At the same time, it cannot be underestimated that the administration of the vaccine may cause adverse reactions of the body, including anaphylactic shock. However, the occurrence of this type of reaction is so unlikely that it is sufficient to apply special rules and procedures that minimize the risk of adverse reactions and improve the effectiveness and efficiency of vaccinations. In other words, the risks

[17] M. Bartkowiak-Emeryk et al., "*Szczepienia ochronne*…, p. 187.
[18] E. Bernatowska, P. Grzesiowski, [Pytania do specjalisty], "Pediatria po Dyplomie" 2010, no. 2 (April), p.113.
[19] M. Bartkowiak-Emeryk et al., "*Szczepienia ochronne*…, p. 190.

associated with the prevention of infectious diseases in the clinical risk group should not be considered as an argument for not following the POS, because it is a system of great importance for both the health safety of citizens and public health.

References:

1. O. Branicka, J. Glück *Bezpieczeństwo szczepień profilaktycznych u chorych na choroby alergiczne*, "Alergologia Polska" 2016, no. 3, p.90.
2. *Szczepienia ochronne. Obowiązkowe i zalecane od A do Z*, ed. E. Bernatowicz and P. Grzesiowski, Warsaw 2017, p. 9.
3. The statutory premise for undergoing preventive vaccinations is article 5 section 1 point 1 letter b in connection with article 17 section 1 of the *Act on preventing and combating infections and infectious diseases among people* (hereinafter: UZ), Journal of Laws from 2008 No. 234, item 1570 as amended), obliging all people staying on the territory of Poland to undergo specific preventive vaccinations. Detailed conditions for submission to such an obligation are specified in the Regulation of the Minister of Health of 18 August 2011 on mandatory preventive vaccinations (hereinafter: ROSO), Journal of Laws from 2011 No. 182 item1086, issued on the basis of article 10 section 10 of the UZ. The list of vaccinations is defined in the Preventive Vaccination Schedule (PSO), announced on the basis of the delegation contained in article 15 section 5 by the Chief Sanitary Inspector (GIS) in the form of an annual announcement. In 2019, the announcement of the Chief Sanitary Inspector of 25 October 2018 regarding the Preventive Vaccination Schedule for 2019, Official Journal of Laws of the Minister of Health section 104 (hereinafter: POS'19) is applicable. The POS includes the following lists of vaccinations: 1) mandatory for children and adolescents, according to the vaccination schedule; 2) mandatory for people exposed in a special way to infection due to clinical or epidemiological reasons; 3) post-exposure vaccinations; 4) recommended vaccinations; 5) vaccinations against selected infectious diseases. PSO'19; A. Bednarek, M. Bartkowiak-Emeryk, J. Wysocki (hereinafter: A. Bednarek et al.), *Szczepienia ochronne w profilaktyce chorób zakaźnych u dzieci*, Warsaw 2018; J. Wysocki, H. Czajka, *Szczepienia w pytaniach i odpowiedziach*, Warsaw 2018. This study is focused on the issue of vaccinations of children and adolescents. The physician who provides patients with preventive care shall notify them about the obligation to undergo certain protective vaccinations. In the case of children, such information is provided in writing by the physician to their legal or de facto guardian, about which a territorially competent health inspector is informed. See also: A. Bednarek et al., *Szczepienia ochronne…,* pp. 47-61; N. Szczęch, *Problematyka przymusowych szczepień ochronnych u dzieci na tle orzecznictwa sądów administracyjnych*, "Roczniki Administracji i Prawa" 2016, no. 1, pp. 187-211; A. Augustynowicz, I. Wrześniewska-Wal, *Aspekty prawne obowiązkowych szczepień ochronnych u dzieci*, "Pediatria Polska" 2013, no. 88, pp. 120-126.
4. *Six common misconceptions about immunization,* material available in its electronic version at the Internet address: https://www.who.int/vaccine_safety/initiative/detection/immunization_misconceptions/en/
5. Risk assessment form of preventive vaccination see: J. Wysocki, H. Czajka, *Szczepienia w pytaniach…, p. 119.*

6. For a detailed list of childhood diseases that constitute the premise to include children in the clinical risk group, see, among others:: A. Bednarek et al., *Szczepienia ochronne…,* A. Bednarek et al., *Szczepienia ochronne…,* J. Wysocki, H. Czajka, *Szczepienia w pytaniach…*
7. POS'19, p. 19.
8. M. Bartkowiak-Emeryk, A. Emeryk, I. Małecka, J. Stryczyńska-Kazubska, J. Wysocki (hereinafter: M. Bartkowiak-Emeryk et al., "*Szczepienia ochronne u dzieci z grup ryzyka klinicznego,* [in:] *Szczepienia ochronne w profilaktyce*…, p. 151.
9. Annex to the GIS Communication of October 25, 2018: POS'19. p. 9.
10. M. Bartkowiak-Emeryk et al., , *Szczepienia ochronne*…, pp. 152-153.
11. E. Bernatowska, B. Mikołuć, M. Pac, *Czy program obowiązkowych szczepień ochronnych na rok 2018 zapewnia dostępność szczepionki PCV13 dla wszystkich dzieci z grup ryzyka?* , "Zakażenia XXI wieku". 2018, no. 1, 17..
12. M. M. McNeil, E. S. Weintraub, J. Duffy, L. Sukumaran, S. J. Jacobsen, N. P. Klein, S. J. Hambidge, G. M. Lee, L. A. Jackson, S. A. Irving, J. P. King, E. O. Kharbanda R. A. Bednarczyk, F. De Stefano (hereinafter: M.M. McNeil et al.), *Ryzyko anafilaksji po szczepieniach ochronnych u dzieci i dorosłych*, "Alergologia Polska" 2015, Vol. 50.
13. O. Branicka, J. Glück *Bezpieczeństwo szczepień profilaktycznych*…, p. 91.
14. O. Branicka, J. Glück *Bezpieczeństwo szczepień profilaktycznych*…, p. 92.
15. E. Bernatowska, B. Mikołuć, M. Pac, *Czy program obowiązkowych szczepień*…, p. 17.
16. E. Bernatowska, B. Mikołuć, M. Pac, *Czy program obowiązkowych szczepień*…, p. 18.
17. M. Bartkowiak-Emeryk et al., "*Szczepienia ochronne*…, p. 187.
18. E. Bernatowska, P. Grzesiowski, [Pytania do specjalisty], "Pediatria po Dyplomie" 2010, no. 2 (April), p.113.
19. M. Bartkowiak-Emeryk et al., "*Szczepienia ochronne*…, p. 190.