

Vaccination of Patients at Risk Against COVID-19: Pros and Cons

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ABSTRACT

To date, the wave-like development of coronavirus infection continues, and each new round of morbidity takes human lives with it. In this regard, WHO calls on all citizens of the world to be vaccinated in order to avoid the negative consequences of a new coronavirus infection.

Vaccination against COVID-19 is not mandatory, but the priorities that vaccinated people receive largely separate them from those who oppose vaccination. Among the reasons why people refuse vaccination is the presence of chronic diseases that, in their opinion, may worsen after the introduction of the vaccine or even lead to death. In addition, patients aged 60+ believe that against the background of vaccination, they may develop other diseases that will result from a decrease in immunity due to age.

Accordingly, the debate about whether there is a need to vaccinate people from the risk group is quite hot, so this problem appears as relevant in modern conditions. The purpose of the work is to consider the priorities that vaccination gives to patients at risk, as well as to investigate the risks that may reduce the benefits of vaccination for such citizens.

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INTRODUCTION

Coronavirus infection continues its undulating development in the world. The end of the third wave of morbidity did not lead, as expected by doctors, to a reduction in the risk of infection for most citizens of our planet - the 'delta' strain was replaced by a particularly highly contagious 'omicron', which, despite the initiation of a milder course of the disease, can still cause complications in patients and lead to death.^[1] For this reason, the issue of vaccination for the formation of collective immunity is quite acute today. Despite the opinion that omicron may become one of the last strains of the new coronavirus, the forecast of the end of the epidemic in the world is very inaccurate, for this reason, vaccination propaganda is gaining momentum in almost all countries of the world.

People at risk today are in the most unenviable position, because the venerable age and the presence of chronic diseases can, as they believe, cause a number of complications and even death. However, discussions on this topic are quite heated, because there is an opinion that certain vaccines cannot negatively affect the body even of people at risk, but, on the contrary, they can save their lives if infected. In this regard, the aim of the work is to consider the priorities that vaccination gives to patients at risk, as well as to investigate the risks that may reduce the benefits of vaccination for such citizens.^[2]

MATERIALS AND METHODS

When writing the paper, a study of articles devoted to the problem of vaccination was conducted over the past two years, the data obtained were summarized and analyzed. Comparative research methods have been used in the current work.

KEYWORDS:

COVID-19,
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RESULTS

The COVID-19 pandemic, caused by the global spread of the SARS-CoV-2 virus, has caused a high level of morbidity, mortality and various health consequences, including physical and mental illnesses, as well as serious social problems.

At the international level, the strategies of governments and authorities to reduce the spread of COVID-19 include rules or recommendations, such as self-isolation, hand washing, travel bans, social distancing and wearing masks. It has been observed that social distancing reduces the transmission of the virus and a number of measures for its consequences.

The factors underlying compliance with the recommendations can be complex. It has been shown that individual protective behavior is predetermined by fear of the disease, less susceptibility to misinformation about the pandemic, or the belief that such interventions are effective.^[3] As for demographic correlates, men and young people are less likely to comply with publicly available guidelines against COVID-19. In addition, it has been suggested that compliance with virus prevention measures may also be influenced by political beliefs and moral values.^[4]

Unwillingness to be vaccinated is a serious problem during the COVID-19 pandemic, and data are emerging on its prevalence and correlation with this particular infection. In addition, there is alarming evidence that resistance to a potential vaccine appears to increase over time in the early stages of a pandemic. Vaccination readiness has been studied in a number of studies, although most of them rather assessed willingness to take a hypothetical vaccine before COVID-19 vaccines were available.

Early results have shown that younger age and less confidence in science, female gender, low level of education, or an assumed lower risk of infection are factors associated with unwillingness to vaccinate. A review document preceding the availability of COVID-19 vaccines demonstrated, among other factors, that vaccine resistance in general was associated with a reluctance to use the COVID-19 vaccine, but more COVID-19 specific reasons were also involved, for example, indecision regarding vaccine production in a hurry during a pandemic or an underestimation of the severity of COVID-19.^[5]

Similarly, it has been suggested that political identification and the type of media use, as well as attitudes towards conspiracy theories, influence the availability of the COVID-19 vaccine.^[6]

Most often, unwillingness to be vaccinated, as expected, was associated with a low level of fear of COVID-19 and with the report of an infection that has already been transmitted.

Hypothetical willingness to get vaccinated is associated with a belief in a higher risk of infecting. The association between rejection of vaccination and younger age, as well as the perception that they do not belong to the risk group, is consistent with previous data, such as an online study in Japan showing higher readiness for vaccination in older people and people with more severe concomitant diseases.^[7]

In addition, data from Australia in early 2020 showed that resistance to a possible vaccine against COVID-19 (not available at the time) was associated with the belief that the danger of COVID-19 was exaggerated, and with a lower level of education.^[8]

The same association with a lower level of education was observed in samples from the United States investigated for hypothetical vaccination against COVID-19.^[9] These results are consistent with the data of the present study, in which a low level of education was one of the factors associated with the refusal of vaccination.

The reasons for refusing the vaccine are often related to safety concerns, such as concerns about side effects, or due to a mild fear of COVID-19 disease.^[10] The decision to vaccinate all children against COVID-19 on a regular basis is complex and depends on scientific, ethical, political, epidemiological and economic factors. The infection is asymptomatic or mild in most pediatric cases, and less than 2% of pediatric patients with symptoms need hospitalization, many of whom have COVID-19, but are hospitalized for other reasons.

Although infection, like any other, is not absolutely safe, the most severe cases of COVID-19 in the pediatric population occur in children with other risk factors and concomitant diseases, as well as in adults. Thus, vaccination against COVID-19 in children with risk factors or concomitant diseases is not subject to discussion, since their risk status puts them on the same priority level as other risk groups, regardless of age.^[11]

As soon as the vaccines are approved for use in the children's age group, an active search should be conducted to identify children at risk and offer them vaccination. Children with cancer, obesity, Down syndrome or severe neurological diseases are among the established priority groups, but not all high-risk conditions have been identified in children as clearly as in adults. For this reason, in any case, when there is uncertainty about a particular disease and the risk associated with it, the most reasonable and appropriate action after an individual assessment of its indications is vaccination. Similarly, it would be reasonable to consider children and adolescents living with immunocompromised persons or with a high risk of severe COVID-19 as a priority group for vaccination.

On the other hand, the direct benefits of universal vaccination of healthy children are insignificant compared to universal vaccination of adults. The burden of the disease is low and light, with the exception of multisystem inflammatory syndrome in children temporarily associated with SARS-COV-2, which, although rare, is associated with high mortality (1-2%) and develops in children without identifiable risk factors, and it is currently unknown how effective vaccines can be to prevent this form of the disease. The real contribution of children to collective immunity against SARS-COV-2, actively pursued through vaccination, remains unknown, although in the case of adolescents it should not be less than in young people. Nevertheless, they should be very careful in their decision on vaccinating all healthy children against COVID-19, especially in conditions where vaccination coverage of the target population is very high and the global incidence is not decreasing nowadays.

People around the world will be able to restrain the pandemic only if they act globally and fairly, and vaccination of healthy children is unacceptable as long as there is at least one child or adult from a high-risk group in the world who has not yet received the first dose of the vaccine. In addition, the use of this

Table 1: Arguments for and against universal vaccination against SARS-COV-2 among pediatricians [12]

Indicator	Arguments 'for'	Arguments 'against'
Disease burden	Although the global burden of disease in children is small, it should not be neglected.	The direct benefits of vaccination are very limited, and the most severe cases occur in children with concomitant diseases and/or risk factors.
Practical	Multisystem inflammatory syndrome in children, temporarily associated with SARS-COV-2, although rare, is severe.	It is not yet known whether vaccination can prevent multisystem inflammatory syndrome in children temporarily associated with SARS-COV-2.
	Encourage a free lifestyle of children by reducing the duration of quarantine periods, allowing free movement, reducing the intensity of other measures.	These practical aspects could be implemented through other measures, taking into account the special characteristics of children.
Justice - Ethics	Refusing to vaccinate children when vaccination is possible does not guarantee fairness	Vaccination of children contributes to injustice, because there are other groups with a higher priority, and global vaccine stocks are limited.
	Reducing the minimum requirements for inclusion in the calendar of routine immunization of children should facilitate the inclusion of other more important vaccines.	COVID-19 vaccination follows an independent funding line from other vaccines, but may further delay the inclusion of other higher priority vaccines for children.
Transmission of infection	Potential impact on disease transmission and contribution to indirect protection	Few objective data confirm the effect on transmission, especially in children under the age of 9-10 years.
Post-COVID and/or other consequences	Potential benefits of vaccination in the prevention of long-term COVID-19 in children	There is no clear evidence of the prevalence of long-term COVID in children, that its severity is comparable to long-term COVID in adults, or that it can be prevented with a vaccine.
	Perhaps there are additional consequences that have yet to be identified.	No new complications have been identified, and major studies in the pediatric population have already been published.
Economical	Accelerate the return to pre-pandemic activity and stability	Prioritization of resources for vaccination against SARS-COV-2, postponement of the introduction of other vaccines
Safety	Vaccines are safe. Cases of myopericarditis observed in vaccinated individuals over the age of 12 years were self-canceling and benign, and this phenomenon has not been observed in children aged 5-12 years to date.	Myopericarditis associated with vaccination in the pediatric population, although rare, has been observed in vaccinated children over 12 years old and may have a negative impact in terms of public confidence in this and other vaccines.
Proactive actions before new options appear	In case of new variants that are particularly dangerous for children, it would be useful for children to be vaccinated in advance.	None of the variants that have emerged to date have demonstrated a different behavior in children, and none of them should necessarily be expected.
Endemic	In conditions of endemic disease, leaving children unvaccinated creates a potential reservoir for the emergence of new options.	Taking into account that the disease occurs in children in a mild form, leaving them as a potential reservoir will lead to a mild primary infection and a natural increase in immunity in adults.

approach is not complete, but guarantees that SARS-COV-2 can continue to develop and that new options will appear that will threaten what has been achieved in regions that have advanced further in the fight against the pandemic. Nevertheless, the fact that vaccination against SARS-COV-2 in healthy children is not a priority compared to vaccination of other groups or the introduction of other vaccines does not mean that it will not be useful for children or that the refusal of vaccination when health deteriorates, the authorities admit that this will resolve the current situation of global inequality.

DISCUSSION

Among the reasons that indicate the need to ban vaccination of people at risk is the occurrence of various complications, which then turn into a chronic form.

Thus, cases of thyroiditis have been identified among those who have been vaccinated against coronavirus. Thus, a total of 10 cases of subacute thyroiditis were registered after vaccination against COVID-19. Four of them were registered after the inactivated vaccine against the COVID-19 CoronaVac® virus.^[13] In addition, two cases of CAT were reported after the introduction of the BNT162B2 SARS-CoV 2 mRNA vaccine

(Pfizer-BioNTech),^[14] three cases after the introduction of the ChAdOx1 nCoV-19 vaccine (AstraZeneca) and one case after the Spikevax vaccine (Moderna Biotech).

A new syndrome of vaccine-induced immune thrombotic thrombocytopenia (VITT) has emerged as a rare side effect of vaccination against COVID-19. Cerebral venous thrombosis is the most common manifestation of this syndrome.

Neurological complications are associated with vaccination. Opticneuromyelitis spectrum disorder (ONMSD) is a rare but severe disease manifested by unilateral neuritis and/or longitudinally widespread myelitis. Several neurological complications related to vaccination have been reported in China.^[15] There was an unexpectedly high incidence of acute transverse myelitis (ATM) as a neurological complication after COVID-19 infection (approximately 1.2-3.2%)^[16] and 11 cases of ATM after vaccination with several types of COVID-19 vaccines. It was reported on the 7th of October in 2021.

However, studies have also been conducted on the analysis of the results of vaccination of patients suffering from severe ailments. For example, one of the cases studied was the results of vaccination of patients who were diagnosed with immune thrombocytopenia (ITP). It is an acquired autoimmune disease

characterized by a low platelet count and an increased risk of bleeding. Vaccination against COVID-19 has been described as a risk factor for developing ITP *de novo*, but the effects of vaccination against COVID-19 in patients with ITP are unknown.

The effect of vaccination against COVID-19 in patients with ITP on the number of platelets, hemorrhagic complications and exacerbation of ITP was studied (any of: a decrease in the number of platelets by $\geq 50\%$ or a minimum number of platelets $< 30 \times 10^9/L$ with a decrease of $> 20\%$ compared to the baseline level; or use emergency therapy). Platelet counts in patients with ITP and in healthy controls were collected immediately before, 1 and 4 weeks after the first and second vaccination. Linear modeling of mixed effects was applied to analyze the number of platelets over time. We included 218 patients with ITP (50.9% women, average age 55 years and average platelet count $106 \times 10^9/L$) and 200 healthy individuals (60.0% women, average age 58 years and average platelet count $256 \times 10^9/L$).

The study highlights the safety of vaccination against COVID-19 in patients with ITP and the importance of careful monitoring of platelet count in a subgroup of patients with ITP. ITP patients with exacerbation responded well to therapy.^[17]

CONCLUSION

Mass vaccination will be required to achieve collective immunity quickly. However, in addition to the logistical problem of reaching enough people, there is an even bigger problem of convincing people who doubt vaccination to get vaccinated.

Vaccination has always been controversial, and throughout history, part of the population has always resisted it. In recent years, researchers have observed a significant and growing level of indecision among the population regarding vaccines, often associated with the fact that infectious diseases and their consequences disappear from public memory, as well as partly due to misinformation spread on the Internet.

WHO has identified vaccine hesitancy as one of the top ten threats to global health in 2019, along with, for example, resistance for antimicrobial medicine or air pollution and climate change.

In the context of the Covid-19 vaccine, the decisive success factor will be politicians dealing with indecision and skepticism about vaccines. Therefore, it is important that those who are responsible for developing vaccination policies have a good understanding of the profiles of people who are likely to refuse vaccination or postpone it. This will allow them to target communication campaigns and develop vaccination strategies that take into account the clustering of susceptibility in profiles that are likely to refuse.

Global vaccination is very important, however, in addition to the common and usually mild side effects of approved vaccines, some rare serious adverse reactions are increasingly reported worldwide at the stage of post-registration monitoring of the spread of vaccines, such as anaphylaxis, vaccine-induced thrombotic thrombocytopenia, myopericarditis, Guillain-Barre syndrome, etc. Despite rare cases of complications from COVID-19 vaccines, the ratio of net benefit and risk shows a

clearly favorable balance in relation to vaccination against COVID-19 for all age and gender groups.

Side effects of the vaccine should be detected at an early stage and carefully monitored. Since many aspects of these side effects remain unclear to the medical community and relevant stakeholders, it is also very important to report them in a timely manner. However, these complications should not be a reason to change the vaccination policy, and further research is needed to reduce fears and reluctance to be vaccinated against COVID-19.

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