The Current Situation and Management of Omicron with Children in Russia

Abstract :

Omicron is a newly discovered new variant virus, which spreads rapidly around in Russia and the world and has a great impact. It is designated as a variant of concern (VOC) by the World Health Organization. Its characteristic of epidemiology, distribution , pathogenic and clinical diagnosis, treatment and prevention are still being observed and summarized, especially there are few reports on the diagnosis and treatment of children with infected. This article introduces its influence on prevention, diagnosis and treatment of children in Russia , in order to improve the understanding and attention to the disease.

[Key words] Russia ,Omicron; children;prevention; treatment,

Introduction

Nowadays, the epidemic of COVID-19 has a huge impact on the global public health and economic development. When people are busy coping with the Delta variant strain, the fifth generation of Omicron variant strain is sweeping the world, making the global epidemic prevention and control situation grim again. And Omicron strain has significant transmission advantages and is rapidly replacing other strains as the main epidemic strain. According to reports, novel coronavirus pneumonia cases were diagnosed in 400,110,920 cases and 577,886,7 cases died in February 9, 2022. There were 245,691,6 newly confirmed cases and 133,69 new deaths in a single day in the world. Data show that the United States, Germany, Brazil, Russia and Turkey are the five countries with the largest number of newly confirmed cases. The United States, India, Brazil, Russia and Italy are the five countries with the largest number of new deaths.

Since February 9, internet reported,131,476,66 cases of coronavirus were revealed in Russian Federation in 85 regions. Among all these cases mortality rate is 336,721 and as of 31 January 2022, 154,084,022 vaccine doses have been administered. [1] Currently, the daily increase in Russia is a little over 140,000 cases and nearly 12% of these cases are hospitalized. [2] The epidemic situation in Russia is complex, and the health system is under great pressure.

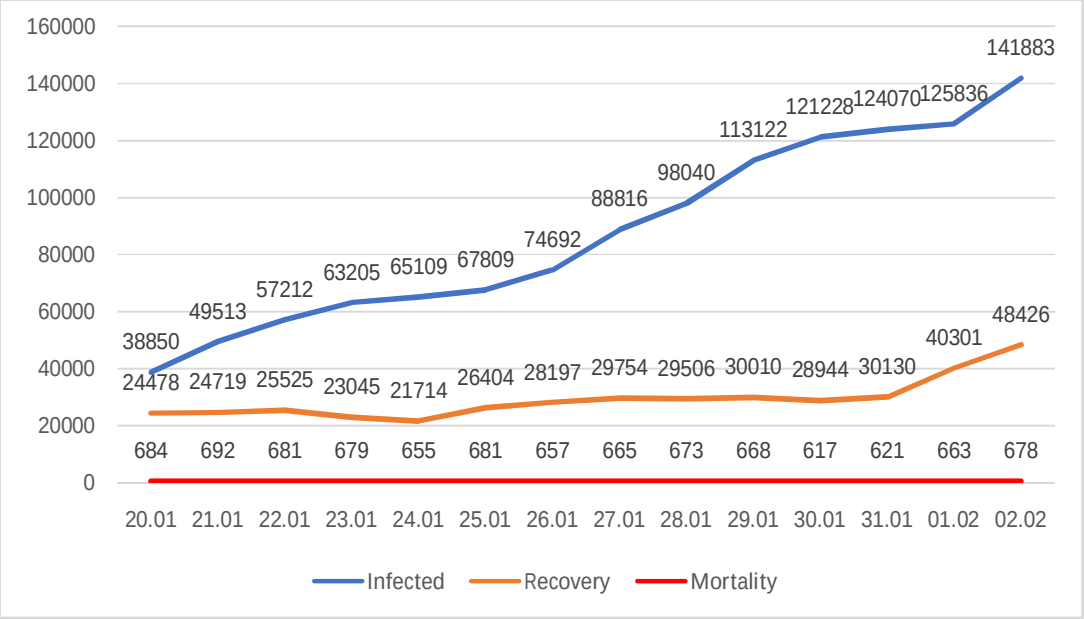

Fig. 1. Daily dynamics over the last 2 weeks on morbidity, recovery, and mortality as at 02.02.2022. [1], [3]

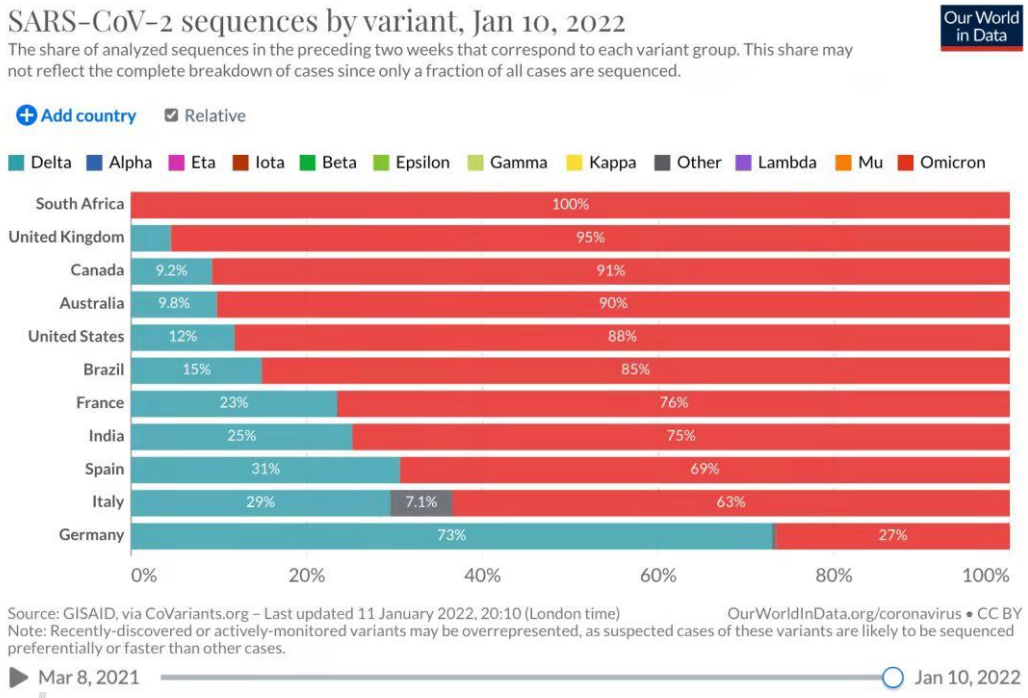

Fig. 2. Omicron strain has significant transmission advantages and is rapidly replacing other strains as the main epidemic strain.

WHO Region	New cases in last 7 days (%)	Change in new cases in last 7 days *	Cumulative cases (%)	New deaths in last 7 days (%)	Change in new deaths in last 7 days *	Cumulative deaths (%)
Europe	7 145 424 (47%)	31%	110 413 718 (36%)	20 696 (48%)	-10%	1 695 819 (31%)
Americas	6 115 409 (40%)	78%	111 063 942 (36%)	14 489 (33%)	26%	2 427 710 (44%)
Western Pacific	732 464 (5%)	122%	12 124 225 (4%)	2 781 (6%)	0%	159 296 (3%)
South-East Asia	699 635 (5%)	418%	45 734 456 (15%)	2 309 (5%)	-6%	724 249 (13%)
Africa	261 720 (2%)	-11%	7 611 721 (3%)	2 130 (5%)	84%	158 581 (3%)
Eastern Mediterranean	200 014 (1%)	86%	17 401 381 (6%)	1 056 (2%)	-11%	317 197 (6%)
Global	**15 154 666 (100%)**	**55%**	**304 350 207 (100%)**	**43 461 (100%)**	**3%**	**5 482 865 (100%)**

Fig. 3. Novel coronavirus pneumonia cases were confirmed in more than 15 million cases in the world from January 3rd to January 9th. The incidence rate in Europe is still the highest.

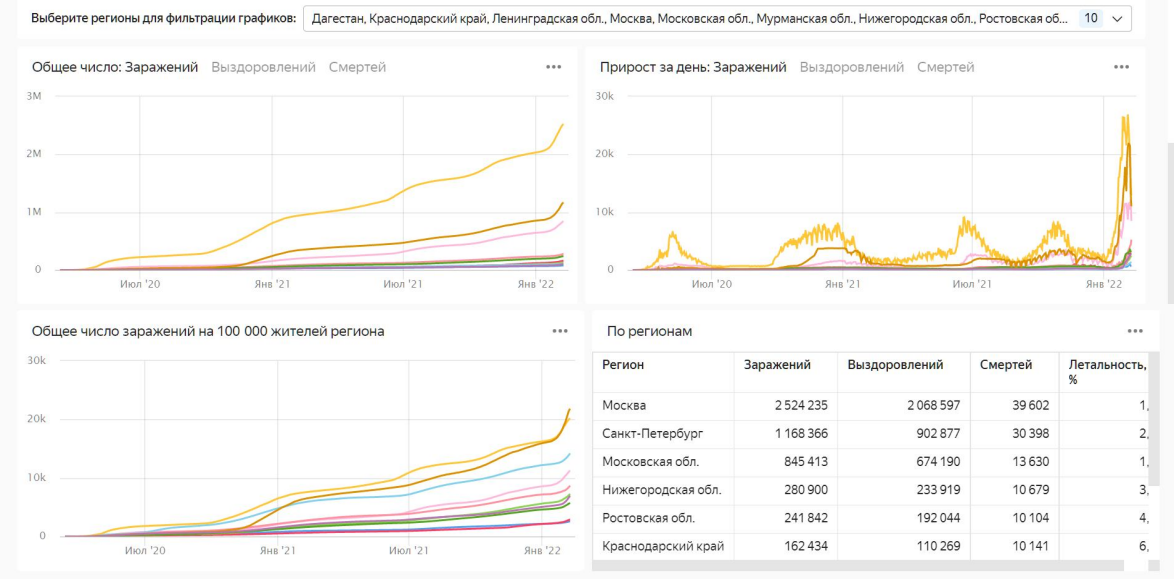

Fig. 4. Statistics of known cases in different regions of Russia

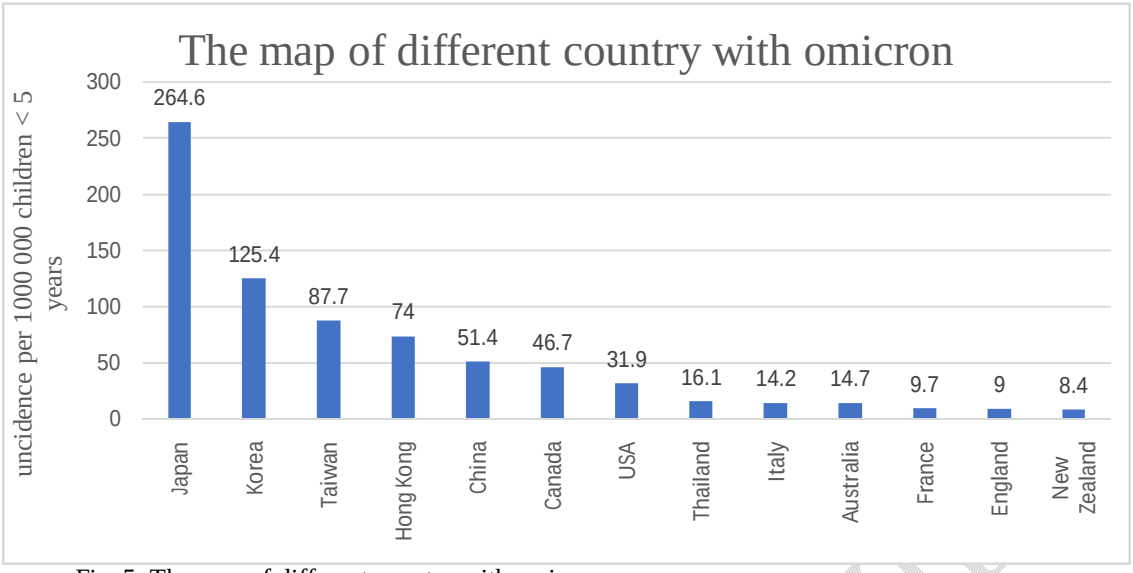

Fig. 5. The map of different country with omicron

1. Clinical manifestations and Characteristics of Children infected with Omicron

According to available information, children get sick less often, with less significant clinical symptoms, they require hospitalization less often. The disease course is usually less severe for them, thus, there are reports on severe cases as well.

Current data suggests that children represent up to 10% in the structure of all infected with SARS-CoV-2 and up to 2% in the structure of patients with diagnosed clinical cases of COVID-19. Children represent 6-7% of reported COVID-19 cases in Russian Federation. The diversity in statistics can be determined by the differences in SARS-CoV-2 DNA-tested patients' cohorts. The disease is also recorded in newborns. There are only few fatal cases among children for the entire pandemic period according to the world statistics.

Most of all described cases of the disease in children are associated with contacts with sick adults. The most frequent symptoms in children are fever, non-productive cough, intoxication signs (myalgia, nausea, weakness) are possible. Some children have sore throat, nasal stuffiness, gastrointestinal symptoms (abdominal pain, diarrhea, vomiting), "covid" fingers (like frostbitten). One study showed that the infection and reproduction rate of Omicron in human bronchus was 70 times that of delta variant and original sars-cov-2, but the infection rate in lung was significantly lower than that of original sars-cov-2. [4] This explains why Omicron spreads rapidly, but the symptoms of upper respiratory tract infection are common.

Diarrhea in COVID-19 children is more common than in adults. The pathognomonic for adults symptom of COVID-19 – hyposmia/anosmia and/or dysgeusia – is also observed in children, thus, they do not complain so much due to their age. Recovery usually occurs within 1-2 weeks. At least a quarter of all children undergo the infection asymptomatically.

In addition, convulsions may suggest that covid-19 children are infected with the Omicron variant. [5] In Switzerland, Omicron accounted for more than 98% of the confirmed cases of covid-19. It was reported that three boys, two of whom were 3 months and 21 months old respectively, tested positive for virus and developed fever. A 14-year-old boy tested negative but developed symptoms of upper respiratory tract infection, and his family members tested positive. None of the three had a history of epilepsy or febrile

convulsion. 3-month-old children twitch repeatedly for hours, 21 month old children twitch continuously for 15-20 minutes, and teenagers twitch for 30-60 seconds, accompanied by atypical aggression.

Up to 10% of children require hospitalization. Severe course is observed averagely in 1% of children with COVID-19, most often complicated disease forms develop in children with any other severe comorbidities.

Clinically apparent COVID-19 infection manifests with the following forms:

- mild acute respiratory viral infection;
- pneumonia without respiratory failure;
- pneumonia with acute respiratory failure (ARF);
- acute respiratory distress syndrome (ARDS);
- multisystem inflammatory syndrome (MIS) in children associated with SARS-CoV-2 and occurred with the symptoms of incomplete Kawasaki syndrome and hemophagocytic lymphohistiocytosis/macrophage activation syndrome/hemophagocytic syndrome (HPS).

Complications:

- sepsis;
- septic (toxic) shock

There is mild, moderate, and severe course of COVID-19 infection.

In most countries the assessment of severity is based on the presence or absence of signs of respiratory failure, development of pneumonia and ARDS. So it is possible to identify asymptomatic, mild, moderate, severe (severe pneumonia) and critical (ARDS, septic shock, sepsis, MIS) forms. Compared with delta variant, the hospitalization rate, ICU admission, implementation rate of mechanical ventilation, emergency visit rate and hospitalization rate of children under five years old in patients with primary infection of Omicron variant were significantly lower than those in patients with primary infection of delta variant. [6]

2.Risk factors for severe course of disease are:

- negative premorbid history (overweight and obesity, diabetes mellitus, glucose intolerance, arterial hypertension, cardio-vascular diseases, pulmonary diseases, including various congenital disorders, oxygen-dependent children with bronchopulmonary dysplasia);
- immune deficiency of different genesis;
- co-infection with respiratory syncytial virus (RSV), influenza virus or other pathogenes.

There is no evidence of prenatal infection vertical mother-to-child transmission. All cases are considered as acquired after birth. The number of newborns from mothers with COVID-19 has increased alongside with the morbidity increase. The criteria for neonatal COVID-19 infection diagnosis according to the available data are:

- at least one clinical symptom including unstable body temperature, low activity or malnutrition, or dyspnea;
- changes on chest tomography images representing anomalies including unilateral or bilateral “frosted glass” changes;
- presence (among family members or caregivers) of people with confirmed COVID-19 infection;
- close contact with people with confirmed COVID-19 infection, or patients with severe pneumonia.

Clinical manifestations of COVID-19 infection are nonspecific, especially in preterm infants. Temperature lability can be noted; respiratory symptoms may include tachypnea, grunting breathing, nasal

flaring, enhanced respiratory muscles' function, apnea, cough, and tachycardia. Sometimes there is weak sucking, fatigue, regurgitation, diarrhea, and bloating.

Thus, the clinical picture of the disease in children, as well as in adults, is prevailed with fever and respiratory syndrome. However, the experience of different countries during the pandemic period has shown that children, compared to adults, have a smoother disease course, lower respiratory tract lesion in the form of viral pneumonia is less typical, symptoms are usually mild, while mortality is extremely rare.

However, children of any age should be in the focus since they play a huge role in disease spreading. (Methodological guidelines. Features of clinical manifestations and management of the disease caused by new coronavirus infection (COVID-19) in children. Version 2. (approved by Ministry of Health of Russian Federation)).

The new "omicron" variant of SARS-CoV-2 is much more common among children than previous ones. Moreover, the younger the child the higher the risk of developing the disease and complications.

"Omicron" contains more than 30 mutations in the spike protein, thus, it is more virulent and less vulnerable to neutralizing antibodies (including therapeutic monoclonal antibodies).

Nowadays, more than 100 complete genetic successors of new coronavirus subspecies are known. The new strain as like "delta" is more tropic to the epithelium of lower respiratory tract, thus, pneumonia can develop within 3-5 days.

"Omicron" is not yet studied well but scientists note that it differs by increased contagiousness and "potential to cause faster body response". This strain can be dangerous both for those who has already had the disease and who has been vaccinated. This strain is diagnosed much more often in children than other SARS-CoV-2 variants.

Approximately 16-17% of laboratory-confirmed cases of COVID-19 occur in children and adolescents (<18 years old) at this stage of the pandemic according to CDC (Centers for Disease Control and Prevention, USA).

Data on the clinical effects of omicron are preliminary and rare. However, it can be assumed most likely that this strain has advantageous replication over the "delta" strain, and it is more resistant to humoral immunity caused by infection or vaccination than previous variants.

The risk of hospitalization in "omicron"-infected children is 20% higher than in "delta" variant (according to preliminary data). Moreover, the maximum number of hospitalizations was recorded in children under 5 years of age (according to WHO). Children and adolescents are hospitalized with such complications as bronchiolitis and pneumonia. Diarrhea, vomiting, and dehydration are also observed frequently.

The incubation period of "omicron" is from 3-4 days. Children usually have mild course of disease with complete recovery within 3 days.

The risk of severe course in "omicron" cases is more uncertain. The infection may have more severe course in infants according to preliminary data.

Typically, complicated forms develop in children with severe comorbidities and chronic diseases. MIS can develop in children who have undergone COVID-19.

The risk group for the development of severe course of COVID-19 ("omicron" as well) includes children under one year of age and those with comorbidities:

- genetic

- neurologic
- metabolic
- cardiovascular
- congenital heart disorders
- obesity
- diabetes mellitus
- asthma or any other chronic lung disease
- sickle cell disease
- autoimmune
- oncologic and hematologic
- primary immunodeficiency conditions and secondary (in case of immunosuppression and genetically engineered biologic therapy) immunodeficiency conditions.

Up to 10% of children, mainly with severe and critical forms or with complications (such as MIS), required hospitalization. (Clinical protocol for the management of children with a new coronavirus infection (COVID-19) who are on hospital stay in medical facilities of state healthcare system of Moscow).

3.Prevention and vaccination

Number of vaccinated with at least one dose of vaccine was 83,674,549, two doses – 79,269,115 as at January 28, 2022. Collective immunity – 64.4%. [7] A booster does of the existing mRNA vaccine can improve the therapeutic effect of Omicron strain on the basis of preventing the original strain. [8]

According to the Order of the Ministry of Health of Russian Federation on December 06, 2021, the vaccination against coronavirus infection caused by SARS-CoV-2 was implemented in the calendar of preventive vaccinations for 12-17 years old children (inclusively) according to epidemic indications. It requires written statement from one of the parents (or legal representative) additionally to voluntary informed consent on medical intervention signed by the parent (or legal representative) of children under 14 years of age and/or the teenager himself if he or she is 15-17 years of age. [9]

Quarter of all children hospitalized with Covid-19 or those who had associated risk factors had persistent symptoms few months after hospitalization, and one in ten had multisystem lesion (data according to the study estimating long-term outcomes of Covid-19 in children in 2021). Older age and allergic diseases were associated with higher risk of persisting symptoms during follow-up. The most common were fatigue, sleep disturbance and sensory processing disorders. Although, the symptoms that were present at hospital discharge decreased over time, even eight months after discharge, many children experienced persistent symptoms such as fatigue, sensory processing disorders, and sleep disturbance, that were the most common. [10]

4.Recent progress and changes in preventive diagnosis and treatment

A recent rapid risk assessment pointed out that Omicron VOC has a high possibility of further dissemination, a wide range and great harm to public health and citizens' economy. Further dissemination may overwhelm the medical system of the European Union / European economic area. Therefore, in order to cope with the high incidence rate and spread rate of Omicron VOC, and prevent the spread of this mutation. [11] All countries should continue to implement and strengthen non-pharmaceutical interventions (NPI). [12]

For public,

1. Insist on wearing masks in public. In epidemic areas, everyone in public indoor places should wear protective masks.
2. Maintain social distancing. Try to avoid crowd gathering and reduce contact with others in social networking.
3. Actively carry out health testing. In case of symptoms, do nucleic acid immediately. If diagnosed, follow the doctor's advice and do a good job of isolation and protection. People who have had close contact with someone who has COVID-19 should be tested for nucleic acid within 5 ~ 7 days, wear masks and isolate until the test result is negative.
4. Strengthen vaccination. People aged five and older should be vaccinated against COVID-19 as soon as possible. People over the age of 18 should be vaccinated with booster doses as required.

For Healthcare Providers,

1. Continue to pay close attention to the official 2019 coronavirus disease treatment guidelines.
2. Do a good job of epidemic prevention and publicity to the public.
3. Inform the health department as soon as possible to isolate and treat the patients with Omicron variant and their families.
4. If the confirmed case has a recent travel history, the action track should be informed to the local health department as soon as possible.

For Public Health Departments and Public Health Jurisdictions,

1. Strictly implement the protection work. Isolate the people with diagnosis and those in close contact, conduct regular nucleic acid testing, investigate their action track and travel history, and do not leave any people with diagnosis or close contact.
2. Block the areas with many cases, isolate at home, work and study online.
3. Plan immediately to improve health care capacity.

5. Discussion

At present, the emerging Omicron variant (b.1.1.529) of sars-cov-2 ACE2 spreads faster and wider than other strains. More and more people, including children, have been infected with Omicron variant. Therefore, we must take more strict measures for protection.

Epidemic prevention and control is the common responsibility of everyone. In complex and difficult situations, we should unite to fight the virus and protect our family, friends and children. We will certainly get through this difficulty together.

References

1. WHO. WHO Coronavirus (COVID-19) Dashboard [EB/OL]. https://covid19.who.int/region/euro/country/ru Accessed 8 Feb 2022.
2. Worldometer. Reported Cases and Deaths by Country or Territory [EB/OL]. https://www.worldometers.info/coronavirus/ Accessed 8 Feb 2022.
3. Yandex, DataLens. All known cases in Russia [EB/OL] https://datalens.yandex/7o7is1q6ikh23?tab=X1&utm_source=cbmain&state=61bb132687. Accessed 8 Feb 2022.
4. HKUMed finds Omicron SARS-CoV-2 can infect faster and better than Delta in human bronchus but with less severe infection in lung [Internet]. The University of Hong Kong.[EB/OL] https://www.med.hku.hk/en/news/press/20211215-omicron-sars-cov-2-infection,2021-12-22. HKU Med Accessed 8 Feb 2022.
5. JF L. Convulsions in children with COVID-19 during the Omicron wave. Acta Paediatr 2022.

6. Wang L BN, Kaelber DC, Davis PB, Volkow ND, Xu R. . Comparison of outcomes from COVID infection in pediatric and adult patients before and after the emergence of Omicron. medRxiv [Preprint] 2022; 2021.2012.2030.21268495.
7. Национальные, приоритеты. Operational data [EB/OL] https ://xn--80aesfpebagmfblc0a.xn-p1ai/. Accessed 8 Feb 2022.
8. Khoury DS, Steain M, Triccas JA et al. Analysis: A meta-analysis of Early Results to predict Vaccine efficacy against Omicron[J]. 2021.
9. The Order of the Ministry of Health of Russian Federation, December 6, 2021 №1122n "On approval of the national calendar of preventive vaccinations, the calendar of preventive vaccinations on epidemic indications, and the procedure for preventive vaccinations implementation" was registered in Ministry of Justice of Russian Federation on December 20, 2021, registration №66435, came into on December 31, 2021.[EB/OL]. Официальный интернет-портал правовойинформации http://publication.pravo.gov.ru/Document/View/0001202112200070 Accessed 8 Feb 2022.
10. Osmanov IM, Spiridonova E, Bobkova P et al. Risk factors for post-COVID-19 condition in previously hospitalised children using the ISARIC Global follow-up protocol: a prospective cohort study. Eur Respir J 2022; 59: 2101341.
11. Assessment of the further emergence of the SARS-CoV-2 Omicron VOC in the context of the ongoing Delta VOC transmission in the EU/EEA [EB/OL] https://www.ecdc.europa.eu/en/publications-data/covid-19-assessment-further-emergence-omicron-18th-risk-assessment,. European Centre for Disease Prevention and Control. Accessed 8 Feb 2022.
12. Distributed via the CDC Health Alert Network.New SARS-CoV-2 Variant of ConcernIdentified:Omicron(B.1.1.529)Variant. [EB/OL] https://emergency.cdc.gov/han/2021/han00459.asp. Accessed 8 Feb 2022.