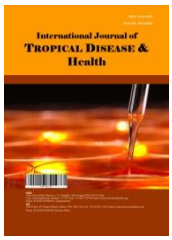

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The Current Situation and Management of Omicron with Children in Russia: A Review

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Authors' contributions

This work was carried out in collaboration among all authors All authors read and approved the final manuscript.

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Review Article

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ABSTRACT

Omicron is a newly discovered new variant virus, which spreads rapidly around 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 is still being observed and summarized, and Clinical manifestations of COVID-19 infection are nonspecific, especially in preterm infants. Since there are few reports on

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the diagnosis and treatment of children with this infection. This article studies the diagnosis, treatment, and prevention of omicron in Russian children, to improve the understanding and attention to the disease.

Keywords: Russia; Omicron; children; prevention; treatment.

1. INTRODUCTION

Now a days, the epidemic of COVID-19 has a huge impact on global public health and economic development. While people are busy coping with the Delta variant strain, the fifth generation of the Omicron variant strain is sweeping the world, making the global epidemic prevention and control situation grim again. Whereas the 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 623,470,447 cases and 6,551,678 cases died on 20 October 2022. There were 371,876 newly confirmed cases and 1,143 new deaths in a single day in the world. Recent Data show that Europe, the Americas, Western Pacific, South-East Asia, Eastern Mediterranean, and Africa are the five areas with the largest number of newly confirmed cases. The United States, Europe, South-East Asia, Eastern Mediterranean, Western Pacific, and Africa are the five areas with the largest number of new deaths. [1]

Since October 20, the World Health Organization (WHO) has reported 21,354,915 cases of coronavirus revealed in the Russian Federation in 85 regions. Among all these cases 389,266 deaths and as of 16 October 2022, 179,202,586 vaccine doses have been administered. [1] Currently, the daily increase in Russia is a little over 10,000 cases.[2] The epidemic situation in Russia is complex, and the health system is under great pressure.

2. CLINICAL MANIFESTATIONS AND CHARACTERISTICS OF CHILDREN INFECTED WITH OMICRON

Current data suggests that children represent up to 10% of the structure of all infected with SARS-CoV-2 and up to 2% of the structure of patients with diagnosed clinical cases of COVID-19. Children represent 6-7% of reported COVID-19 cases in the 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 a few fatal cases among children for the

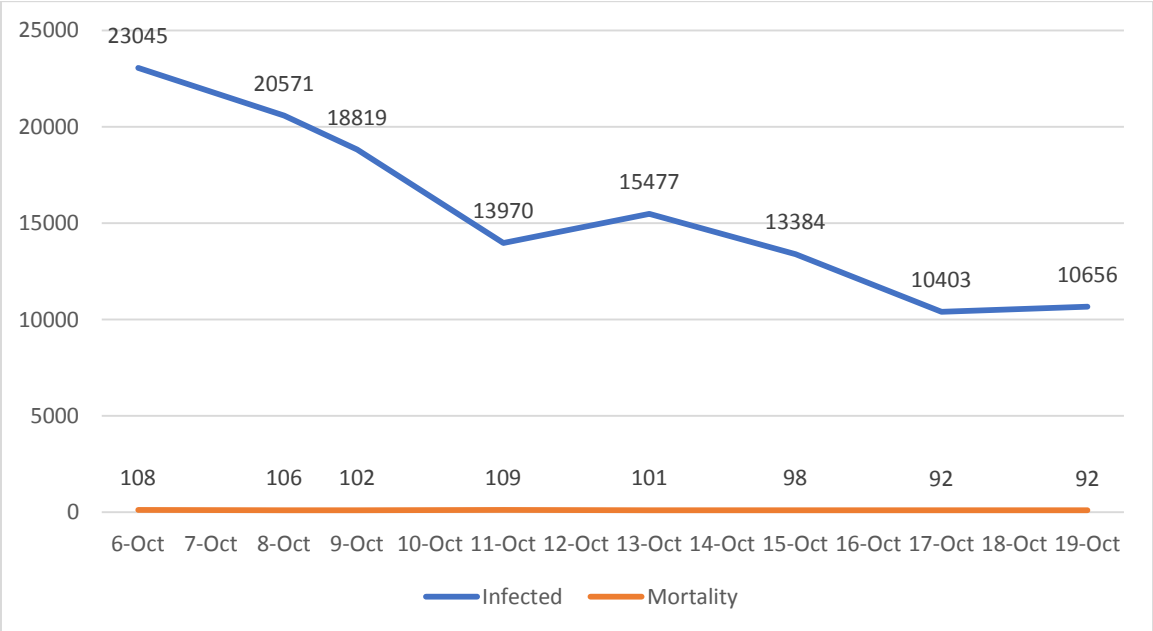

Fig. 1. Daily dynamics over the last 2 weeks on morbidity, recovery, and mortality at 19.10.2022 in Russia [1,3]

Table 1. Statistics of known cases in different countries on 19.10.2022 [3]

Country	Contaminated	Death	Mortality,%
U.S.A	97,139,323	1,067,105	1.10
France	36,692,887	157,296	0.43
Germany	35,098,062	152,278	0.43
Britain	24,078,702	209,227	0.87
Italy	23,254,633	178,359	0.77
Russia	21,041,184	381,402	1.81
Türkiye	16,919,638	101,203	0.60
Spain	13,462,593	114,641	0.85
China	10,218,568	27,666	0.27
Iran	7,555,555	144,536	1.91

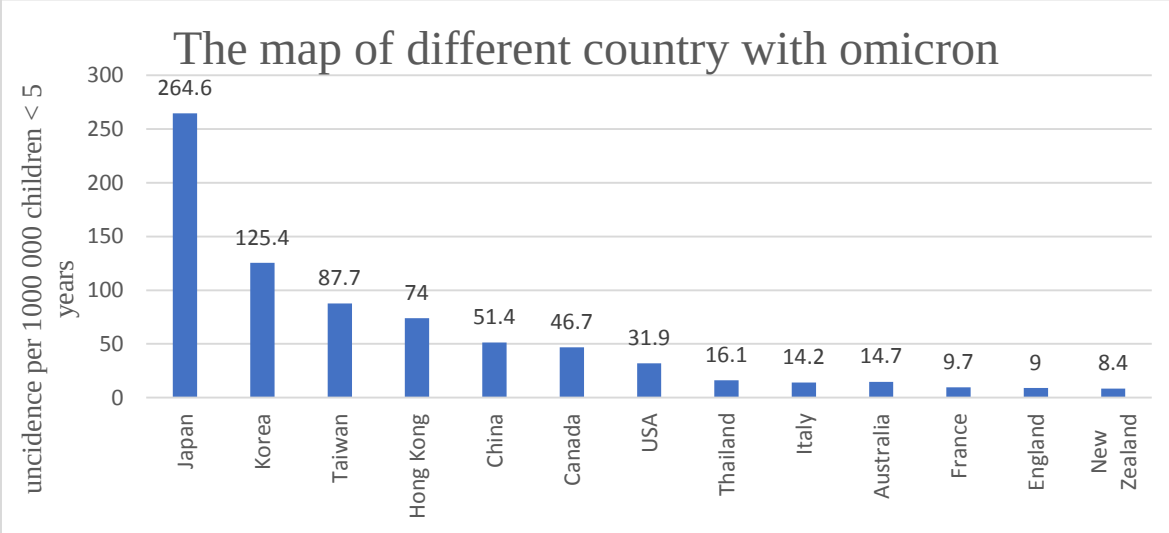

Fig. 2. The map of different countries with omicron

entire pandemic period according to world statistics. According to available information, children get sick less often, with less significant clinical symptoms, and they require hospitalization less often [4]. The disease course is usually less severe than for an adult, however, there are reports of severe cases as well.

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 [5]. Explains why Omicron spreads rapidly, but the symptoms of upper respiratory tract infection are common. Most of all described cases of the disease in children are associated with contact with sick adults. The clinical picture of the disease in children is prevailed with fever and respiratory syndrome and less sever than adults [6]. The most frequent symptoms in children are fever, non-productive cough, and intoxication signs (myalgia, nausea, weakness) are possible and less sever than adults [7]. Some children have a sore throat, nasal stuffiness, gastrointestinal symptoms (abdominal pain, diarrhea, vomiting) and smell and taste dysfunction [8]. Respiratory symptoms may include tachypnea, grunting breathing, nasal flaring, enhanced respiratory muscles' function, apnea, cough, and tachycardia, and temperature liability can be noted. Children and adolescents are hospitalized with such complications as bronchiolitis and pneumonia. Typically, complicated forms develop in children with severe comorbidities and chronic diseases. MIS can develop in children who have undergone COVID-19 [9]. 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, and mortality is extremely rare.

Diarrhea in COVID-19 children is more common than in adults [10],[11]. Sometimes there is weak sucking, fatigue, regurgitation, diarrhea, and

bloating. The pathognomonic for adult 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 [12]. 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 months 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. A quarter of all children hospitalized with Covid-19 or those who had associated risk factors had persistent symptoms a few months after hospitalization, one in ten had a multisystem lesion and had the same oral manifestations as Kawasaki disease [13] (data according to the study estimating long-term outcomes of Covid-19 in children in 2021). Older age and allergic diseases were associated with a higher risk of persisting symptoms during follow-up [14]. 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, which was the most common [15].

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 lymph histiocytosis/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. 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 [16].

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 pathogenies.

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 [17]. 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.

The incubation period of "omicron" is from 3-4 days. [18] Children usually have a mild course of disease with complete recovery within 3 days. 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 [19]. The risk of hospitalization in "omicron"-infected children is lower than in the "delta" variant. [20] However, children of any age should be the focus since they play a huge role in disease spreading.

3. 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 risks group for the development of a 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 the state healthcare system of Moscow).

3.1 Prevention and Vaccination

According to the Order of the Ministry of Health of the 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 a written statement from one of the parents (or legal representative) in 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. [21]

The number of vaccinated with at least one dose of vaccine was 83,674,549, and two doses – were 79,269,115 as of January 28, 2022. Collective immunity – 64.4%. [22] A booster of the existing mRNA vaccine can improve the therapeutic effect of the Omicron strain based on preventing the original strain. [23] [24] [25] [26]

3.2 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 the citizens' economy. Further dissemination may overwhelm the medical system of the European Union / European economic area. Therefore, to cope with the high incidence rate and spread rate of Omicron VOC, and prevent the spread of this mutation. [27] All countries should continue to implement and strengthen non-pharmaceutical interventions (NPI). [19]

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 gatherings 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 the 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 a 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 a diagnosis or close contact.
2. Block the areas with many cases, isolated at home, work and study online.
3. Plan immediately to improve health care capacity.

4. DISCUSSION AND CONCLUSION

"Omicron" contains more than 30 mutations in the spike protein [28]. 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 like "delta" is more tropic to the epithelium of the lower respiratory tract, thus, pneumonia can develop within 3-5 days.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 humeral immunity caused by infection or vaccination than previous variants. "Omicron" is not yet studied well but scientists note that it differs by increased contagiousness and "potential to cause faster body response" [29] [30]. This strain can be dangerous both for those who have already had the disease and who have been vaccinated. This strain is diagnosed much more often in children than other SARS-CoV-2 variants. And showed greater transmissibility in individuals who had previously been infected with COVID-19 [31].

At present, the emerging Omicron variant (b.1.1.529) of SARS-CoV-2 ACE2 spreads faster and wider than other strains [32]. The COVID-19 epidemic has been going on for nearly four years. The ever-mutating strains and increasing infectivity are affecting the lives of countless people, leading to increased unemployment, reduced income, increased poverty, psychological stress, and serious impact on life and health. At the same time to the world economic development, trade exchanges have produced a huge impact. Epidemic prevention and control are common responsibilities of everyone. More and more people, including children, have been infected with the Omicron variant. Therefore, we must take more strict measures for protection. 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.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. WHO. WHO Coronavirus (COVID-19) Dashboard [EB/OL]. Available:https://covid19.who.int/region/euro/country/ru Accessed 20 Oct 2022.
2. Worldometer. Reported Cases and Deaths by Country or Territory [EB/OL]. Available:https://www.worldometers.info/coronavirus/ Accessed 20 Oct 2022.
3. Yandex, DataLens. All known cases in Russia [EB/OL]. Available:https://datalens.yandex/7o7is1q6ikh23?tab=X1&utm_source=cbmain&state=61bb132687 Access on 22 Oct 2022.
4. Derhami S, Rahmani S, Jalalimanesh N. Are children less susceptible to COVID-19? A case series. Mashhad University of Medical Sciences; 2020.
5. 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] Available:https://www.med.hku.hk/en/news/press/20211215-omicron-sars-cov-2-infection,2021-12-22 HKU Med Access on 20 Oct 2022.
6. Liguoro I, Pilotto C, Bonanni M et al. SARS-COV-2 infection in children and

newborns: A systematic review. Eur J Pediatr. 2020;179:1029-1046.
7. Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet. 2020;395:497-506.
8. Púa Torrejón RC, Ordoño Saiz MV, González Alguacil E, et al. Smell and taste dysfunction in pediatric patients with sars-cov-2 infection. Pediatr Neurol. 2022;136: 28-33.
9. Gruber CN, Patel RS, Trachtman R, et al. Mapping systemic inflammation and antibody responses in multisystem inflammatory syndrome in children (MIS-C). Cell. 2020;183:982-995.e914.
10. Sultan K, Mone A, Durbin L, et al. Review of inflammatory bowel disease and COVID-19. World Journal of Gastroenterology. 2020;26:9.
11. Pinto IMC, Helito AC, Fonseca RLA, et al. Comparison between pediatric patients with and without close contact with COVID-19 in a Brazilian city during SARS-CoV-2 pandemics. Clin Pediatr (Phila). 2022;99228221124662.
12. JF L. Convulsions in children with COVID-19 during the Omicron wave. Acta Paediatr 2022.
13. Nascimento RB, Araujo NS, Silva JC, Xavier FCA. Oral manifestations of multisystemic inflammatory syndrome in children (MIS-C) and kawasaki disease associated to COVID-19: A systematic review. Spec Care Dentist. 2022;42:266-280.
14. Liu Y, Yang S, Zeng Y et al. Influence of the COVID-19 pandemic on the prevalence pattern of allergens. int arch allergy immunol. 2022;1-11.
15. 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.
16. 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 2022; 2021.2012.2030.21268495.
17. Hamidi OP, Lijewski V, Sheeder J et al. Adverse perinatal outcomes in pregnancies affected by severe COVID-19 infection. AJOG Glob Rep. 2022;2:100118.
18. Liu Y, Zhao S, Ryu S et al. Estimating the incubation period of SARS-CoV-2 Omicron BA.1 variant in comparison with that during the delta variant dominance in South Korea. One Health. 2022;15:100425.
19. Distributed via the CDC health alert network. New SARS-CoV-2 variant of concernidentified:Omicron(B.1.1.529) variant. [EB/OL].
Available:https://emergency.cdc.gov/han/2021/han00459.asp
Access on 20 Oct 2022.
20. Butt AA, Dargham SR, Loka S et al. Coronavirus disease 2019 disease severity in children infected with the omicron variant. Clin Infect Dis. 2022;75:e361-e367.
21. 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
Available:http://publication.pravo.gov.ru/Document/View/0001202112200070
Access on 20 Oct 2022.
22. Национальные, приоритеты. Operational data [EB/OL].
Available:https ://xn--80aesfpebagmfblc0a.xn-p1ai/
Access on 22 Oct 2022.
23. Organization WH. Enhancing response to Omicron SARS-CoV-2 variant: Technical brief and priority actions for Member States; 2021.
Available:https://www.who.int/publications/m/item/enhancing-readiness-for-omicron-(b.1.1.529)-technical-brief-and-priority-actions-for-member-states.
24. Cloete J, Kruger A, Masha M et al. Paediatric hospitalisations due to COVID-19 during the first SARS-CoV-2 omicron (B.1.1.529) variant wave in South Africa: A multicentre observational study. Lancet Child Adolesc Health. 2022;6:294-302.
25. Higdon MM, Baidya A, Walter KK et al. Duration of effectiveness of vaccination against COVID-19 caused by the omicron

variant. Lancet Infect Dis. 2022;22:1114-1116.
26. Wang X, Chang H, Tian H et al. Epidemiological and clinical features of SARS-CoV-2 infection in children during the outbreak of Omicron variant in Shanghai. Influenza Other Respir Viruses. 2022;16:1059-1065.
27. 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]. European Centre for Disease Prevention and Control.
Available:https://www.ecdc.europa.eu/en/publications-data/covid-19-assessment-further-emergence-omicron-18th-risk-assessment
Access on 8 Feb 2022.
28. Hu B, Chan JF, Liu H et al. Spike mutations contributing to the altered entry preference of SARS-CoV-2 omicron BA.1 and BA.2. Emerg Microbes Infect. 2022;11:2275-2287.
29. Garcia-Beltran WF, St Denis KJ, Hoelzemer A et al. mRNA-based COVID-19 vaccine boosters induce neutralizing immunity against SARS-CoV-2 Omicron variant. Cell. 2022;185:457-466.e454.
30. Yamasoba D, Kimura I, Nasser H et al. Virological characteristics of the SARS-CoV-2 Omicron BA.2 spike. Cell. 2022;185:2103-2115,e2119.
31. Pulliam JRC, van Schalkwyk C, Govender N et al. Increased risk of SARS-CoV-2 reinfection associated with emergence of Omicron in South Africa. Science 2022; 376: eabn4947.
32. Rana R, Kant R, Huirem RS, et al. Omicron variant: Current insights and future directions. Microbiol Res. 2022;265: 127204.

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