

A Critical Assessment of Omicron Variant: The Effects and Preventive Measures

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ABSTRACT

The paper investigated the effects and preventive measures of omicron variant. The Omicron variant was discovered on November 22, 2021, in South Africa and Botswana, and has since spread to a number of other countries. On November 26, 2021, the WHO designated it as a variant of concern and named it "Omicron." The Omicron variant is a variant of SARS-CoV-2, the virus that causes COVID-19. In the UK, Omicron cases first began in mid-November 2021, identified through whole genome sequencing detected in specimens. Whereas in the U.S., the variant is found in the majority of states and is increasing in the percent of circulating SARS-Cov-2 viruses. S-gene Target Failure (SGTF) is a marker for identifying Omicron cases. Preliminary analysis of SGTF data from testing completed through a national chain of pharmacies also observes regional increases in this proxy measure of the Omicron variant. Likewise, preliminary results of vaccine effectiveness based on clinical outcomes in England and South Africa have emerged, indicating a reduction in vaccine effectiveness for Omicron against infection, symptomatic disease, and hospitalization. In England, vaccine effectiveness estimates were based on 581 symptomatic Omicron cases. Among those who had received 2 doses of Pfizer BioNTech-Comirnaty, vaccine effectiveness was 88.0% (95%CI: 65.9 to 95.8%) 2–9 weeks after dose 2 for the Omicron variant, dropping to 34% (95%CI: -7.0 to 59.0%) after 25 weeks. The paper concluded that Omicron, a new SARS-CoV-2 variant, has been identified in many countries and categorized as a Variant of Concern by the World Health Organization. Little is known about Omicron currently, it is important for the public health and medical communities, as well as the general public, to remain vigilant to reduce potential exposure. One of the recommendations made in this study was that there should be adequate case identification and reporting by the health care officials responsible for early combat against the emerging variants.

KEYWORDS: Omicron Variant, Effects and Preventive Measures

Introduction

Since its identification in November 2021, the Omicron variant has been reported in South Africa, Botswana, and numerous countries where it is driving rapid epidemic growth. In the U.S., the variant has been found in the majority of U.S. states. The Omicron variant is increasing in the percent of circulating SARS-Cov-2 viruses in the United States (CDC, 2021). In the UK, Omicron cases identified through whole genome sequencing first began

to be detected in specimens from mid-November 2021. Initially, cases occurred primarily in travelers and their close contacts, but there was evidence of community transmission from late November (UK Health Security Agency, 2021). S-gene Target Failure (SGTF) is a marker for identifying Omicron cases. The preliminary analysis of SGTF data from testing completed through a national chain of pharmacies also observes regional increases in this proxy measure of the Omicron variant. Modeling of both genomic surveillance and SGTF data predicts that Omicron will become the most common variant nationally by December 25, 2021, with some regions exceeding this threshold earlier. Furthermore, multiple large clusters of Omicron variant cases have demonstrated the rapid spread of the virus. Upcoming holiday gatherings may further accelerate these trends (CDC, 2021).

The rapid growth rate in Omicron infections is believed to result from a combination of increased transmissibility and the ability to evade immunity conferred by past infection or vaccination (i.e., immune evasion) (Kupferschmidt & Vogel, 2021). Data from laboratory experiments and epidemiologic studies suggest that immune evasion plays a larger role than increased transmissibility; immunity conferred by prior infection or vaccination is likely to be reduced but not completely overcome when compared to Delta (Pulliam, Schalkwyk, Govender, Gottberg, Cohen, Groome, Dushoff, Mlisana, and Moultrie, 2021). Data also show that vaccinated people who receive a booster dose or who have previously been infected are more likely to be protected against Omicron (Garcia-Beltran, St. Denis, Hoelzemer, Lam, Nitido, Sheehan, Berrios, Ofoman, Chang, Hauser, & Balazs, 2021). The clinical severity profile of Omicron infection will strongly influence its impact on future U.S. hospitalizations and deaths. Early evidence suggests that Omicron infection is less severe than previous variant infections; however, reliable data on clinical severity is still lacking (Karim & Karim, 2021). Even if the proportion of infections associated with severe outcomes is lower than with previous variants, given the likely increase in the number of infections, the absolute numbers of people with severe outcomes could be substantial. In addition, demand for ambulatory care, supportive care for treatment of mild cases, and infection control requirements such as quarantining or isolation of exposed or infected workforce could also stress the healthcare system. These stressors likely will be in addition to the ongoing Delta variant infections and a rising burden of illness caused by other respiratory pathogens, such as influenza, which have begun circulating at greater frequencies (CDC, 2021).

Concept of Omicron Variant

The Omicron variant of COVID-19 has been called a variant of concern by WHO based on evidence that it has several mutations that may have an impact on how it behaves. There is still substantial uncertainty regarding Omicron and a lot of research is underway to evaluate its transmissibility, severity, and re-infection risk. Omicron spreads more quickly than other variants. Based on the information available, WHO believes it is likely that Omicron will outpace the Delta variant where there is COVID-19 transmission in the community. However, being vaccinated and taking precautions such as avoiding crowded spaces, keeping your distance from others, and wearing a mask are critical in helping to prevent the spread of COVID-19, and we know these actions have been effective against other variants (UNICEF, 2021). Preliminary evidence suggests there may be an increased

risk of reinfection with Omicron (i.e., people who have previously had COVID-19 could become re-infected more easily with Omicron), as compared to other variants of concern. New variants like Omicron are a reminder that the COVID-19 pandemic is far from over (WHO, 2021). It is therefore essential that people get the vaccine when it is available to them and continue to follow existing advice on preventing the spread of the virus, including physical distancing, wearing masks, regular hand washing, and keeping indoor areas well ventilated.

Symptoms of Omicron Variant

The list of symptoms of COVID-19 has grown longer and stranger throughout the pandemic. With so many people now vaccinated, the warning signs of infection have grown more subtle and vague. That's becoming especially evident as the omicron variant gallops around the world, squeezing through the nooks and crannies in the wall of immunity that's been built over the past two years. Even so, some people with omicron will fall severely ill. According to the Centers for Disease Control and Prevention, the COVID-19 symptoms that demand emergency medical care include sudden confusion; inability to stay awake; persistent chest pain or pressure; trouble breathing; and lips, fingernail beds, and skin turning blue, pale, or gray. In addition, severe illnesses often start out with mild symptoms, and many COVID-19 treatments are most effective in the early stages of the disease (Deseret News 2021).

Some common omicron variant symptoms include:

1. Muscle aches.
2. Fatigue.
3. Scratchy throat.
4. Night sweats.
5. Runny nose.
6. Headache.
7. Fatigue (either mild or severe).
8. Sneezing.
9. Sore throat

It's crucial to take mild COVID-19 symptoms seriously and just as important to prevent infections in the first place. That requires getting vaccinated against COVID-19, getting a booster dose if eligible, wearing an effective face mask in public settings, and social distancing (Irfan, 2021). Despite the latest twists in the pandemic, these measures remain the best bets for keeping the omicron variant in check.

Origin of Omicron Variant

The new variant was first detected on November 22, 2021 in laboratories in Botswana and South Africa based on samples collected on November 11–16, 2021 (Schrieber, 2021). The Omicron variant is a variant of SARS-CoV-2, the virus that causes COVID-19 (WHO, 2021). On November 26, 2021, the WHO designated it as a variant of concern and named it "Omicron" (Parekh, Platt, Global Health Security Team, & Barnes, 2021). The first known

sample was collected in South Africa on 8 November (The Guardian, 2021). In other continents, the first known cases were a person arriving in Hong Kong from South Africa via Qatar on 11 November, and another person who arrived in Belgium from Egypt via Turkey on the same date (Lambrecht, 2021). As of December 16, 2021, the variant has been confirmed in more than 80 countries (WHO, 2021). The World Health Organization further estimated that by mid-December, Omicron was likely in most countries, whether they had detected it or not.

Omicron is unlike any other variant currently in circulation. The variant carries 60 (50 nonsynonymous, 8 synonymous, and 2 non-coding) mutations compared to the original Wuhan strain. The three most likely origin stories are that Omicron emerged from an immune compromised patient; that it emerged from reverse zoonotic human-to-animal transmission followed by animal-to-human transmission; or that it emerged from the treatment of a Covid-19 patient with the mutagenic drug molnupiravir (Haseltine, 2021). Perhaps the most troubling one is that Omicron is a result of our own doing, through the treatment of a COVID-19 patient with the highly mutagenic antiviral drug molnupiravir. Molnupiravir works by introducing errors into the virus's genetic code. When enough errors are introduced, virus replication slows and the patient clears the virus. Under less than ideal conditions—when the full dose of molnupiravir is not taken over the full period of five days, for example—the drug could lead to the creation of highly mutated, but viable, strains of SARS-CoV-2. Even under ideal conditions, patients treated with molnupiravir produced viable viruses a few days into their course of treatment. The extent of the mutations that appeared due to molnupiravir is significant (Haseltine, 2021). As WHO named the variant of the COVID-19 virus "omicron", they further stressed that the variant has become a concern since it was first identified in South Africa and that it poses a "very high" global risk with potentially severe consequences.

Effects of Omicron Variant

Infections with the recently identified Omicron variant of SARS-CoV-2, the virus that causes COVID-19, are exponentially increasing in multiple countries (CDC, 2021). Increases in infections are most likely due to a combination of two factors: increased transmissibility and the ability of the variant to evade immunity conferred by past infection or vaccination (i.e., immune evasion). Though the precise contribution of each of the two factors remains unknown, a substantial degree of immune evasion is likely, as has been demonstrated in early in vitro studies (CDC, 2021). This variant is approximately twice as contagious as the Delta variant, which was already substantially more infectious than the earlier variants and the original parent virus. Preliminary evidence suggests there may be an increased risk of re-infection with Omicron (i.e., people who have previously had COVID-19 could become re-infected more easily with Omicron) as compared to other variants of concern, but information is limited (WHO, 2021).

According to Sharfstein (2021), when the U.S. administration imposed the travel ban on the nine southern African countries, including South Africa and its neighbors, they explicitly said, "This is not going to protect us from the introduction of this variant. It's just to buy time." From a public health perspective, it is important to understand that these travel bans

and restrictions do not necessarily contain highly infectious variants, but do have big impacts on economies and people's lives. They are, in a sense, prolonging the economic and social impacts of the pandemic more than they are affecting public health. Three million people have lost their jobs, mostly women. Restaurants, the tourism industry, and the hotel industry have taken a severe knock. Closing down our summer season and preventing people from traveling is devastating to any country's economy (Sharfstein, 2021).

Currently, it is unknown how efficiently the Omicron variant can spread from person to person. It is unknown whether Omicron is more transmissible than other variants, but preliminary data from South Africa suggests that the mutations to the receptor binding protein of the variant virus will confer increased infectivity (CDC, 2021). Likewise, there is limited information about the clinical manifestations of infection due to the Omicron variant, and given the small number of identified cases attributed to the Omicron variant to date, current assessment of disease severity and response to vaccines and therapeutics is difficult. Preliminary information from South Africa indicates that there are no unusual symptoms associated with Omicron variant infection, and as with other variants, some patients are asymptomatic. Symptoms may be milder in people who have been vaccinated or previously infected with SARS CoV-2 (National Institute for Communicable Diseases, 2021).

Preventions and Control of Omicron Variant

As with other variants, the WHO recommended that people continue to keep enclosed spaces well ventilated, avoid crowding and close contact, wear well-fitting masks, clean hands frequently, and get vaccinated (Nebhay, & Winning, 2021). Important thing you should do to prevent and control the spread of omicron variant:

- Wear a mask that covers your nose and mouth. Make sure that your hands are clean when you put on and remove your mask.
- Keep a physical distance of at least 1 metre from others.
- Avoid poorly ventilated or crowded spaces.
- Open windows to improve ventilation indoors.
- Wash your hands regularly.
- When it's your turn, get vaccinated. WHO-approved COVID-19 vaccines are safe and effective.

Treatment of Omicron Variant

Current vaccines are expected to protect against severe illness, hospitalizations, and deaths due to infection with the Omicron variant. However, breakthrough infections in people who are fully vaccinated are likely to occur. With other variants, like Delta, vaccines have remained effective at preventing severe illness, hospitalizations, and death. The recent emergence of Omicron further emphasizes the importance of vaccination and boosters.

Impact of Vaccines on Omicron Variant

Preliminary results of vaccine effectiveness based on clinical outcomes in England and South Africa have emerged, indicating a reduction in vaccine effectiveness for Omicron against infection, symptomatic disease, and hospitalization compared to earlier variants (WHO, 2021). In England, vaccine effectiveness estimates (Andrews, Stowe, Kirsebom, Toffa, Rickeard, & Gallagher, 2021) were based on 581 symptomatic Omicron cases, 56 439 eligible Delta cases, and 130 867 test-negative controls. Among those who had received 2 doses of Pfizer BioNTech-Comirnaty, vaccine effectiveness was 88.0% (95%CI: 65.9 to 95.8%) 2–9 weeks after dose 2 for the Omicron variant, dropping to 34% (95%CI: -7.0 to 59.0%) after 25 weeks, compared with vaccine effectiveness of 63.5% (95%CI: 61.4 to 65.5%) against Delta in the same time period. Among those who had received 2 doses of AstraZeneca-Vaxzevria, there was no protective effect of vaccination against symptomatic disease with Omicron from 15 weeks after the second dose. However, these estimates are based on relatively small numbers and are likely to reflect an older population and a population with more co-morbidities than those given the Pfizer BioNTech-Comirnaty vaccine. Vaccine effectiveness two weeks after a Pfizer BioNTech-Comirnaty booster dose was estimated at 71.4% (95%CI: 41.8 to 86.0%) in those who received AstraZeneca-Vaxzevria as the primary course and 75.5% (95%CI: 56.1 to 86.3%) in those who had received Pfizer BioNTech-Comirnaty as the primary course (Andrews et al., 2021).

A more recent analysis by Ferguson, Ghani, and Cori (2021) at Imperial College London compared the relative risk of symptomatic infection with Omicron compared to Delta for different vaccine schedules (two doses of Pfizer BioNTech-Comirnaty or AstraZeneca-Vaxzevria, with or without an mRNA vaccine booster) based on PCR-confirmed symptomatic infections in England, United Kingdom, excluding international travelers, and matching by day, age, sex, region, and ethnicity. The preliminary results suggest a higher risk of infection for Omicron than Delta, translating into estimates of vaccine effectiveness against symptomatic infection between 0% and 20% following two doses, and between 55% and 80% after a booster dose. Accordingly, in South Africa, the insurance company Discovery Health posted a press release on preliminary findings of vaccine effectiveness against infection and hospitalization. They report a vaccine effectiveness of the Pfizer BioNTech-Comirnaty vaccine of 33% against infection and 70% against hospitalization, but uncertainty estimates around these figures and details of methods were not included (Discovery Health, 2021). Likewise, the World Health Organization closely assessed the impact of vaccines on Omicron through a research and development network by setting up and coordinating a live repository of reagents to facilitate research focusing on the understanding of vaccine effectiveness through animal model studies, antibody neutralization activity, and cellular protection (WHO, 2021).

Conclusion

Omicron, a new SARS-CoV-2 variant, has been identified in many countries and categorized as a Variant of Concern by World Health Organization (WHO). Little is known about Omicron currently, it is important for the public health and medical communities as well as the general public to remain vigilant to reduce potential exposure.

Recommendations

1. There should be adequate case identification and reporting from the health care officials responsible for early combat against the emerging variants
2. Facilities should be prepared for proper surveillance of emerging variants.
3. Government should lay out programmes to enlighten the general public on the prevention and control against the emerging variants.
4. Adequate number of the approved vaccines should be provided to the public.
5. The general public should observe the most effective steps so as to reduce the spread of omicron variants which is to keep a physical distance of at least 1 metre from others; wear a well-fitting mask; open windows to improve ventilation; avoid poorly ventilated or crowded spaces; keep hands clean; cough or sneeze into a bent elbow or tissue; and get vaccinated when it's their turn.

REFERENCES

- Andrews, N., Stowe, J., Kirsebom, F., Toffa, S., Rickeard, T. and Gallagher, E. (2021). *Effectiveness of COVID-19 vaccines against the Omicron (B.1.1.529) variant of concern*. UK Health Security Agency (UKHSA), London, United Kingdom.
- Centers for Disease Control and Prevention (2021). *Increasing Seasonal Influenza A (H3N2) Activity, Especially Among Young Adults and in College and University Settings, During SARS-CoV-2 Co-Circulation*. CDC Health Alert Network (HAN) Health Advisory.
- Centers for Disease Control and Prevention (2021). *New SARS-CoV-2 Variant of Concern Identified: Omicron (B.1.1.529) Variant*. CDC Health Alert Network.
- Centers for Disease Control and Prevention (2021). *Potential Rapid Increase of Omicron Variant Infections in the United States*. Retrieved from: <https://www.cdc.gov/>
- Deseret News (2021). *4 common omicron variant symptoms you might have missed*. Retrieved from: <https://www.deseret.com/coronavirus/omicron-variant-symptoms-common-signs-side-effects>
- Discovery Health (2021). *Real-world analysis of Omicron outbreak based on 211 000 COVID-19 test results in South Africa*. Available from: <https://www.discovery.co.za/corporate/newsroom>
- Ferguson, N., Ghani, A. and Cori, A. (2021). *Growth, population distribution and immune escape of the Omicron in England*. Imperial College London.
- Garcia-Beltran, W. F., St. Denis, K. J., Hoelzemer, A., Lam, E. C., Nitido, A. D., Sheehan, M. L., Berrios, C., Ofoman, O., Chang, C. C., Hauser, B. M. and Balazs, A. B. (2021). mRNA-based COVID-19 vaccine boosters induce neutralizing immunity against SARS-CoV-2 Omicron variant. *medRxiv*, 21(26), 755.
- Haseltine, W. A. (2021). *Omicron Origins*. Forbes print.
- Irfan, U. (2021). *How to recognize Covid-19 symptoms from the omicron variant*. Retrieved from: <https://www.vox.com/22851808/omicron-symptoms-covid-19-vaccine-mild-variant>
- Karim, S. S. A. and Karim, Q. A. (2021). Omicron SARS-CoV-2 variant: a new chapter in the COVID-19 pandemic. *The Lancet Journal*, 398(10317), 2126-2128.
- Kupferschmidt, K. and Vogel, G. (2021). How bad is Omicron? Some clues are emerging, and they're not encouraging. *Science*, 374(6573), 789.

- Lambrecht, P. (2021). *Wat weten we al over de nieuwe coronavariant, de omikron?* [What do we already know about the new coronavirus variant, Omicron?]. De Tijd (in Dutch). Belgium.
- National Institute for Communicable Diseases (2021). *SARS CoV-2 Genomic Surveillance Update*. Retrieved from: <https://www.nicd.ac.za/diseases-a-z-index/disease-index-covid-19/sars-cov-2-genomic-surveillance-update/>
- Nebehay, S. and Winning, A. (2021). *WHO names new COVID variant omicron, cautions against travel measures*. Reuters.
- Parekh, M., Platt, P., Global Health Security Team and Barnes, J. (2021). *Coronavirus latest news: EU suspends all flights to southern Africa over omicron Covid variant fears*. The Telegraph.
- Pulliam, J. R. C., Schalkwyk, C., Govender, N., Gottberg, A., Cohen, C., Groome, M. J., Dushoff, J., Mlisana, K. and Moultrie, H. (2021). Increased risk of SARS-CoV-2 reinfection associated with emergence of the Omicron variant in South Africa. *medRxiv*, 21(26), 60-68
- Schrieber, M. (2021). *The scientist in Botswana who identified omicron was saddened by the world's reaction*. Goats and Soda. NPR.
- Sharfstein, J. (2021). *Omicron in South Africa: The Latest News*. Johns Hopkins Bloomberg School of Public Health.
- The Guardian (2021). *Omicron becomes dominant variant in South Africa*. Achieved from The Guardian: <https://www.theguardian.com/>
- UK Health Security Agency (2021). *SARS-CoV-2 variants of concern and variants under investigation in England: Omicron VOC-21NOV-01 (B.1.1.529) update on cases, S-gene target failure and risk assessment*.
- UNICEF (2021). *What we know about the Omicron variant*. Retrieved from: <https://www.unicef.org/coronavirus/>
- WHO (2021). *Classification of Omicron (B.1.1.529): SARS-CoV-2 Variant of Concern*. World Health Organization.
- WHO (2021). *Enhancing Readiness for Omicron (B.1.1.529): Technical Brief and Priority Actions for Member States*. WHO.
- WHO (2021). *Enhancing Readiness for Omicron (B.1.1.529): Technical Brief and Priority Actions for Member States*. World Health Organization.
- WHO (2021). *SARS-CoV-2 Omicron variant assays and animal models study tracker*. World Health Organization.

World Health Organization (2021). *Update on Omicron*. Retrieved from:
<https://www.who.int/news/item/28-11-2021-update-on-omicron>