

The Omicron Variant

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Abstract

The WHO designated the variant B.1.1.529 a variant of concern (VOC) on 26th November 2021, based on the advice from the organization's Technical Advisory Group on Virus Evolution, naming the variant Omicron. It is a highly dissimilar variant with multiple numbers of mutations, including up to 32 mutations in the spike (S) protein, possibly associated with humoral immune escape potential and higher transmissibility. Until 22nd December 2021, the Omicron variant had been identified in 110 countries, though this variant continues to be more understood as more data are available.

There are four key questions that highlight the overall threat posed by the Omicron variant: 1) transmissibility; 2) effectiveness of vaccines and previous infections against infection, transmission, clinical disease, and death; 3) comparative virulence; 4) reaction of the public (including public health and social measures). These questions provide the basis for public health advice. This paper would attempt to answer some of the questions, focusing on early evidence on transmission, severity, effectiveness of intervention techniques (including diagnostics, therapeutics, and vaccines), and priority actions for Member states.

What are the Variants of concern (VOC)?

Utilizing genomic sequencing data comparative assessment by bioinformatic methods, if the new genomic sequencing of the SARS-COV-2 strand showing “increase in transmissibility or detrimental change in COVID-19 epidemiology, increase in virulence or change in clinical disease presentation, or decrease in effectiveness of public health and social measures or available diagnostics, vaccines, therapeutics.”

Therefore, this variant of interest (VOI) meets the requirements for conditions of variant of concern to be associated with changes at a degree of global health significance. The WHO currently, according to the above definition of a VOI, designated a total of five types of variants of concern, including alpha, beta, gamma, delta, and omicron.

The Symptoms of Omicron

These reports show that typically, those who have been fully vaccinated exemplify omicron symptoms as mild illnesses, resembling the common cold. A member of the Advisory Committee on Immunization Practices, Poehling, who helps guide the Centers for Disease Control and Prevention's decisions on vaccinations, discusses the notable symptoms of the omicron variant: coughing, fatigue, congestion, and runny nose. This differs from previous variants of the COVID-19, she says, as there typically seem to not be a loss of taste and smell. However, Poehling and other experts say that the previously discussed symptoms are based on early reports of the omicron variant, rather than scientific studies.

Dr. Bruce Y. Lee, professor of health policy and management at the City University of New York School of Public Health emphasizes on the reliability of the evidence, because “anecdotal reports represent just one person.”

Testing and Treatment

Initial data from numerous non-peer reviewed studies show that the neutralizing titers against Omicrons in primary vaccinated or previously infected individuals are reducing. Furthermore, the increased rate of reinfection in England, UK, Denmark, and Israel could possibly be due to the immune evasion of this variant.

Up-till now, there is not yet enough data nor peer-reviewed evidence to show the effectiveness of vaccination for the Omicron variant. Test-negative designed vaccine efficacy tests released from South Africa and the UK should be interpreted with caution for selection bias in subjects, as numbers tested are a relatively small ratio in comparison to the rest of the world. Data from the UK show a considerable decrease in vaccine effectiveness against symptom-related conditions for Omicron in comparison to Delta after two doses of vaccines (either Pfizer or AstraZeneca). However, after two weeks of the Pfizer vaccine, there seems to be higher effectiveness, though still slightly lower compared to Delta. South African researchers conducted a non-peer-reviewed study using private health insurance data that showed reduction of vaccine efficacy of Pfizer against infection, and even less for hospitalization, though details not yet provided.

The accuracy of diagnosing using PCR and rapid antigen test (though comparative sensitivity is still ongoing) does not seem to be impacted by the new variant. Most Omicron variants show a deletion in the spike (S) gene, possibly causing an S-gene target failure in some PCR assays. Although minor groups lack this deletion, SGTF (S gene target failure) can be used as a proxy marker to specify the Omicron variant. Confirmation, though, should still be obtained by sequencing, as other VOC's also exhibit this trait (including alpha and other subsets of the

Gamma and Delta variant).

Therapeutic interventions with severe or critical Omicron-associated COVID-19 (e.g. corticosteroids, interleukin 6 receptor blockers) are hypothesized to remain as effective as previously. However, evidence suggest that some monoclonal antibodies against COVID-19 may have decreased neutralization for the Omicron variant. Monoclonal antibodies will have to be tested individually for antigen binding and virus neutralizing properties — aspects that should be prioritized.

The Omicron's Infection Location in the Human Body

There has been more evidence which demonstrated that omicron tends to not infect as deeply into the lungs as previous variants. A study, posted online by the University of Hong Kong (not yet peer-reviewed), shows that while the omicron variant is less severe in the lungs, it can replicate at a higher speed up towards the respiratory tract.

Dr. Hugh Cassiere, director of critical care services for Sandra Atlas Bass Heart Hospital at the North Shore University Hospital (Long Island, New York), believes that due to this nature of the omicron, it acts more like bronchitis than pneumonia, stating that “usually patients with acute bronchitis tend not to be short of breath... [instead] they tend to cough and produce sputum.” Contrasting between bronchitis and pneumonia, where those diagnosed with pneumonia tend to suffer from shortness of breath and fatigue.

Summary

Evidence persists that the Omicron variant has a significant growth advantage over the Delta variant; documented community transmission spreading considerably faster in multiple countries with around 2-3 days of doubling time. Encouraged mostly by the declining rates in the Gauteng province, the growth rate estimations in South Africa are decreasing, though it is not known the extent of growth rate, and whether or not it is due to immune evasion, intrinsic increased transmissibility, though is likely a combination of both. The observed dynamics of the Omicron variant is yet understood enough for its generation times.

There is not yet sufficient data of patients infected with Omicron to study the severity, though early evidence from South Africa, UK, and Denmark show that it has a reduced risk of hospitalization in comparison to the Delta variant. However, multiple studies are needed, since that is only one aspect of the Omicron variant, which may even be altered by admission practices. Cross-examination of data is required to understand the associations of clinical

markers of severity (e.g. the usage of oxygen, mechanical ventilation, and deaths) with Omicron. Currently, it is not known the extent at which the observed reduction in risk of hospitalization leads to immunity from previous infections or vaccinations, as well as the believed decreasing virulent of the Omicron.

All in all, the risk for the Omicron variant remains high for the following reasons: 1) the global risk of the pandemic remains very high; 2) currently, the Omicron variant has significant growth advantage in comparison to Delta, rapidly spreading in the community. The high infection rates will continue to later cause an increase in hospitalizations, and will burden health systems affected by the Omicron variant. More research is taking place to enhance understanding, as more information becomes available when risk assessments are updated.

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