In brief

Omicron (B.1.1.529)

updated 27 January 2022

Summary

- Omicron (B.1.1.529) was designated a variant of concern by the World Health Organization on 26 November 2021. It was first reported to WHO from South Africa on 24 November 2021. It has 50 mutations, including 26-32 mutations on its spike protein.[1, 2]
- Omicron has been separated into two lineages: BA.1 and BA.2. BA.2 does not contain the spike deletion and therefore is S-gene positive (SGTP). BA.1 was previously dominant, however BA.2 is increasing in India, South Africa, Denmark and the UK. The UK designated BA.2 as a 'variant under investigation' on 21 January 2022.[3, 4]
- The World Health Organization notes that based on current evidence, Omicron has a substantial growth advantage over Delta.[2] Likely factors contributing to the growth rate include immune evasion and potential intrinsic increased transmissibility.[5] One study estimates that Omicron is 36.5% more transmissible than Delta and that Omicron erodes 63.7% of the population immunity accumulated from prior infection and vaccination.[6]
- Omicron infections feature lower peak viral RNA and a shorter clearance phase than Delta. Preliminary data suggests that the amount of viral RNA is highest three to six days after diagnosis or symptom onset.[7, 8]
- Household secondary attack rate estimates range from 15.8% to 31% for Omicron compared to 10.3% to 21% for Delta. One study suggests increased transmission for unvaccinated individuals, and reduced transmission for booster-vaccinated individuals, compared to fully vaccinated individuals.[9, 10]
- Epidemiological data in the Gauteng Province, South Africa, showed SARS-CoV-2 infection rates increased more rapidly than in previous waves but have now plateaued.[11]
- The risk of reinfection is estimated to be 16 times higher than Delta. Unvaccinated individuals are twice as likely to be reinfected than people who had their second vaccine 14 to 89 days ago. Individuals are more likely to be reinfected if they had lower viral loads at their first infection. Reinfection has been reported in several countries including South Africa, Denmark, Israel and the United Kingdom.[12, 13]
- Preliminary data from South Africa, England, Scotland and Denmark show that people infected with the Omicron variant are less likely to require hospitalisation compared with Delta. This ranges from 40-45%, up to 90% less likely.[3, 14-17] Length of stay is significantly shorter for Omicron compared to Delta.[18]
- International data shows an increase in hospital admissions for children under five years old. Expert comment suggests few children admitted to hospital are needing intensive care.[3, 19]
- Laboratory studies suggest Omicron does not infect cells deep in the lungs as readily as it does those in the upper airways.[20]
- Therapeutic interventions for the management of severe or critical COVID-19 that target host responses (such as corticosteroids, interleukin-6 receptor blockers and prophylaxis with anticoagulation) are expected to remain effective.[2] Evidence for other interventions include:

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  - Antiviral medications will still likely be effective for managing COVID-19, including Paxlovid (nirmatrelvir plus ritonavir), molnupiravir and remdesivir.[21-23]
  - Treatments that target the spike protein of the virus, such as monoclonal antibodies, may be less effective, but this will require assessment.[9, 23, 24] Early findings suggest Omicron will likely compromise the binding of many monoclonal antibodies.[25, 26]
  - Preprint results for monoclonal antibody sotrovimab show it retains neutralising activity against all tested individual Omicron substitutions in laboratory tests, while early tests show Regen-Cov (casirivimab and imdevimab) is not as effective against Omicron.[22, 27, 28]

- Studies are underway to understand the effectiveness of vaccines. Early estimates of vaccine effectiveness against symptomatic infection indicate significantly lower effectiveness against Omicron compared with Delta. However, moderate to high vaccine effectiveness of up to 70% against symptomatic infection is seen in the early period after a booster dose.[29] Early results have found:
  - The T-cell immune response in previously infected, and most likely vaccinated individuals, should still be effective against Omicron.[30]
  - Neutralising activity of sera from individuals who are vaccinated plus infected, or infected plus vaccinated (also called hybrid immunity), holds well against Omicron.[31]
  - Studies on specific vaccines include:
    - Comirnaty
      - A 20- to 40-fold reduction in neutralising activity by two doses of Comirnaty compared with other strains.[32]
      - A booster dose of Comirnaty resulted in an increase in neutralising activity irrespective of primary vaccination type (approximately 71% for those who received Vaxzevria as the primary course and approximately 76% for those who received Comirnaty).[32]
      - Two doses of Comirnaty offers 70% protection against hospitalisation [33] and up to 92% following three doses. [3]
    - Spikevax
      - preliminary data suggests an unadjusted vaccine effectiveness of 16.5% for two doses of Spikevac and 100% for three doses.[34]
      - a booster dose of Spikevax at 50 microgram (ug) level increases Omicron neutralising antibody levels approximately 37-fold compared to pre-boost level. A booster dose at 100ug increased the Omicron neutralising antibody levels approximately 83-fold.[35]
    - Vaxzevria
      - Preliminary studies suggest a significant reduction in vaccine effectiveness at 15 weeks after the second dose of Vaxzevria.[36]
    - Johnson & Johnson
      - Preliminary data suggests vaccine effectiveness of two doses of Janssen-Ad26.COV2.S against hospitalisation with Omicron 14-27 days post booster, as compared to unvaccinated healthcare workers, was 84% (67 to 92%), which was maintained 1-2 months after a booster. [37]

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- News reports from Israel on four doses of COVID-19 vaccine suggest threefold protection against serious illness and twofold protection against infection in the current wave driven by Omicron. [38]
- The diagnostic accuracy of routinely used polymerase chain reaction (PCR) and antigen-based rapid diagnostic test (Ag-RDT) assays does not appear to be influenced by Omicron.[2]
- Most Omicron variant sequences reported include a deletion in the S gene, causing some S gene targeting PCR assays to appear negative, and so S gene target failure can be used as a useful proxy marker of Omicron for surveillance.[2]

To inform this brief, PubMed and Google searches were conducted using terms related to Omicron on 9 December 2021 and updated on 24 January 2022. Wording of the summary was updated on 9 March 2022 but an updated search was not carried out. The Critical Intelligence Unit maintains a living evidence table on SARS-CoV-2 variants. [39]

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