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Modeling suggests rapid spread of omicron in England but same severity as delta

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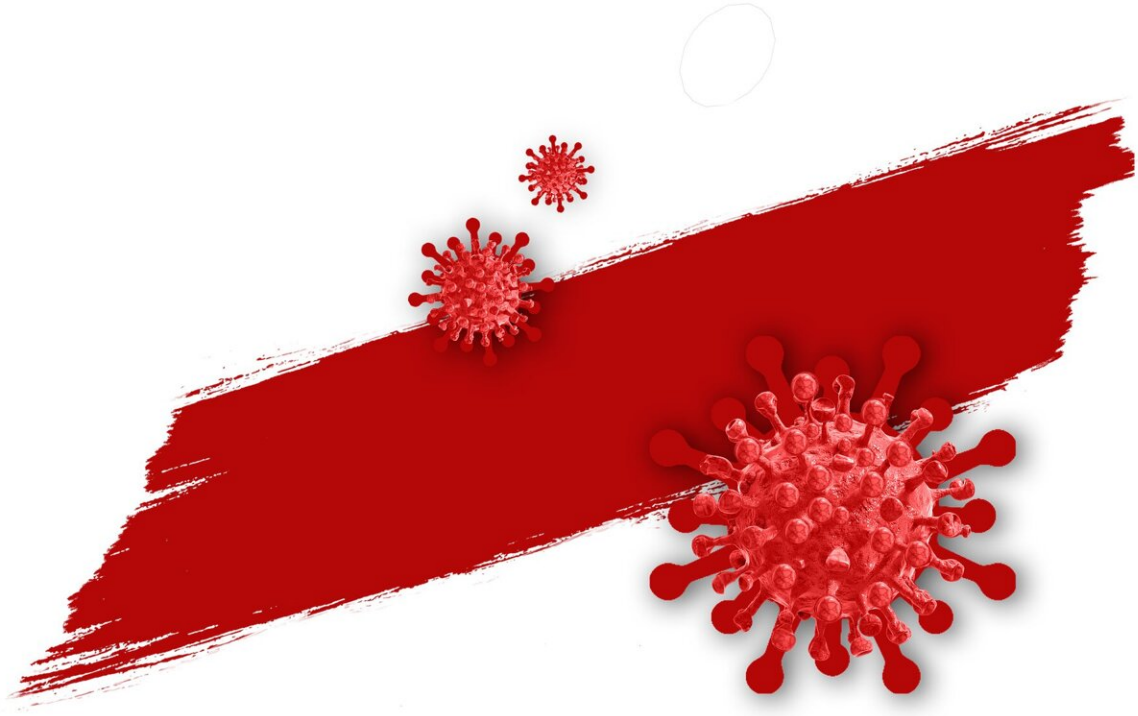

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Omicron largely evades immunity from past infection or two vaccine doses, according to Imperial's latest report.

The new report from the Imperial College London COVID-19 response team estimates that the risk of reinfection with the omicron variant is 5.4 times greater than that of the delta variant. This implies that the protection against reinfection by omicron afforded by past infection may be as low as 19%.

Researchers estimate the growth and immune escape of the omicron variant in England. They used data from the UKHSA and NHS for all PCR-confirmed SARS-CoV-2 cases in England who had taken a COVID test between November 29th and December 11th 2021.

he study includes people identified as having omicron infection due to an S gene target failure (SGTF), as well as people with genotype data that confirmed omicron infection. Overall, 196,463 people without S gene target failure (likely to be infected with another variant) and 11,329 cases with it (likely to be infected with omicron) were included in the SGTF analysis, as well as 122,063 delta and 1,846 omicron cases in the genotype analysis.

Growth of omicron

Firstly, the report looks at factors associated with testing positive for omicron compared to non-omicron (mostly delta) cases. The results suggest that the proportion of omicron among all COVID cases was doubling every 2 days up to December 11th, estimated from both S-gene Target Failure and genotype data. Based on these results they estimate that the reproduction number (R) of omicron was above 3 over the period studied.

The distribution of omicron by age, region and ethnicity currently differs markedly from delta, with 18–29-year-olds, residents in the London region, and those of African ethnicity having significantly higher rates of infection with omicron relative to delta. London is substantially ahead of

other English regions in omicron frequency.

Omicron transmission is not yet uniformly distributed across the population. However, the researchers note that given its immune evasion, the age distribution of omicron infection in the coming weeks may continue to differ from that of delta.

The study finds no evidence of omicron having lower severity than delta, judged by either the proportion of people testing positive who report symptoms, or by the proportion of cases seeking hospital care after infection. However, hospitalization data remains very limited at this time.

Reinfection rates

To assess the impact of omicron on reinfection rates the researchers used genotype data, since even prior to omicron, reinfection was correlated with negative S gene Target Failure data, likely due to random PCR target failure caused by the lower viral loads associated with reinfections.

Controlling for vaccine status, age, sex, ethnicity, asymptomatic status, region and specimen date, omicron was associated with a 5.40 (95% CI: 4.38-6.63) fold higher risk of reinfection compared with delta. To put this into context, in the pre-omicron era, the UK "SIREN" study of COVID infection in healthcare workers estimated that prior infection afforded 85% protection against a second COVID infection over 6 months. The reinfection risk estimated in the current study suggests this protection has fallen to 19% (95%CI: 0-27%) against an omicron infection.

Vaccine effectiveness against omicron

The researchers found a significantly increased risk of developing a symptomatic omicron case compared to delta for those who were two or more weeks past their second vaccine dose, and two or more weeks past their booster dose (for AstraZeneca and Pfizer vaccines).

Depending on the estimates used for vaccine effectiveness against symptomatic infection from the delta variant, this translates into vaccine effectiveness estimates against symptomatic omicron infection of between 0% and 20% after two doses, and between 55% and 80% after a booster dose. Similar estimates were obtained using genotype data, albeit with greater uncertainty.

Prof Neil Ferguson from Imperial College London said: "This study provides further evidence of the very substantial extent to which omicron can evade prior immunity given by both infection or vaccination. This level of immune evasion means that omicron poses a major, imminent threat to public health."

Prof Azra Ghani from Imperial College London said: "Quantifying reinfection risk and vaccine effectiveness against omicron is essential for modeling the likely future trajectory of the omicron wave and the potential impact of vaccination and other public health interventions."

The work, which is not yet peer-reviewed, is presented in the latest report from the WHO Collaborating Centre for Infectious Disease Modeling within the MRC Centre for Global Infectious Disease Analysis, Jameel Institute, Imperial College London.

Provided by Imperial College London

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