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Transmission of SARS-CoV-2 Delta Variant Among Vaccinated Healthcare Workers, Vietnam

31 Pages

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Nguyen Van Vinh Chau (https://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=4787200)

Hospital for Tropical Diseases

Nghiem My Ngoc (https://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=4787201)

Hospital for Tropical Diseases

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Abstract

Background: Data on breakthrough SARS-CoV-2 Delta variant infections are limited.

Methods: We studied breakthrough infections among healthcare workers of a major infectious diseases hospital in Vietnam. We collected demographics, vaccination history and results of PCR diagnosis alongside clinical data. We measured SARS-CoV-2 (neutralizing) antibodies at diagnosis, and at week 1, 2 and 3 after diagnosis. We sequenced the viruses using ARTIC protocol.

Findings: Between 11th–25th June 2021 (week 7–8 after dose 2), 69 healthcare workers were tested positive for SARS-CoV-2. 62 participated in the clinical study. 49 were (pre)symptomatic with one requiring oxygen supplementation. All recovered uneventfully. 23 complete-genome sequences were obtained. They all belonged to the Delta variant, and were phylogenetically distinct from the contemporary Delta variant sequences obtained from community transmission cases, suggestive of ongoing transmission between the workers. Viral loads of breakthrough Delta variant infection cases were 251 times higher than those of cases infected with old strains detected between March–April 2020. Time from diagnosis to PCR negative was 8–33 days (median: 21). Neutralizing antibody levels after vaccination and at diagnosis of the cases were lower than those in the matched uninfected controls. There was no correlation between vaccine-induced neutralizing antibody levels and viral loads or the development of symptoms.

Interpretation: Breakthrough Delta variant infections are associated with high viral loads, prolonged PCR positivity, and low levels of vaccine-induced neutralizing antibodies, explaining the transmission between the vaccinated people. Physical distancing measures remain critical to reduce SARS-CoV-2 Delta variant transmission.

Funding: Wellcome (106680/B/14/Z and 204904/Z/16/Z).


Declaration of Interest: None to declare.

Ethical Approval: The study was approved by the Institutional Review Board of HTD and the Oxford Tropical Research Ethics Committee, University of Oxford, UK.

Keywords: Delta variant, Oxford-AstraZeneca, COVID-19, vaccine breakthrough, Vietnam

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1. Sixty-two consented to have their demographics and clinical features reported. Of these, 193 two received one dose, and 60
2. At diagnosis, median PCR Ct value was 31.7 (range: 37.6-14.0)
Crossref (<https://doi.org/10.1787/888932914710>)
3. During the course of infection, peaks 208 of viral loads measured at any time point of the symptomatic cases were higher than that of 209 asymptomatic cases
The viral loads of the 49 (pre)symptomatic cases peaked within 2-3 days before and after 206 symptom onset, with a median Ct value (range) of, volume 16, p. 16 - 24
4. A Bolze, E T Cirulli, S Luo, S White, D Wyman, Dei Rossi, A Cassens, T Jacobs, S
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