EVIDENCE SYNTHESIS BRIEFING NOTE

TOPIC: SARS-COV-2 TRANSMISSION AMONG HEALTH CARE WORKERS AND THE GENERAL POPULATION FOLLOWING VACCINATION

Information finalized as of Sept 3, 2021.[a] This Briefing Note was completed by the Evidence Synthesis Unit (Research, Analysis and Evaluation Branch, Ministry of Health) in collaboration with members of the COVID-19 Evidence Synthesis Network. Please refer to the Methods section for further information.

Purpose: To summarize the evidence on SARS-CoV-2 transmission to others following vaccination among health care workers (HCWs) and the general population.

Key Findings:

- There is limited evidence to inform secondary transmission risk from partially and fully vaccinated cases, as well as the factors that may increase that risk. There is also limited evidence for individual-level factors that may reduce a person's protection from vaccination (e.g., age, co-morbid conditions), and the differential risk for secondary transmission from an asymptomatic versus a symptomatic case. There is high heterogeneity across study designs, which may impact overall conclusions.
- Emerging data suggest that vaccination may not only be associated with the reduction of SARS-CoV-2 infections among vaccinated individuals, but may also be associated with reductions in transmission to close contacts (e.g., household contacts). This may be due to a reduction in viral loads or duration of infectiousness in vaccinated individuals infected with SARS-CoV-2.
  - There is limited evidence regarding secondary transmission from vaccinated cases to individuals outside of the household setting, such as within health care settings and congregate care settings, where there is a lower risk tolerance for any transmission to vulnerable patients/residents from vaccinated cases.
- Some studies indicate there may be a higher risk of vaccine breakthrough and transmission with the Delta variant compared to other variants of concern (VOC).
- Some jurisdictions (i.e., Alberta, British Columbia, Manitoba, Quebec, United States, European Center for Disease Control and Prevention, United Kingdom, and Australia) have maintained public health isolation requirements for fully vaccinated cases, likely due to the uncertainty around the vaccine effectiveness in sub-populations (e.g., elderly, immune-suppressed) and against the emerging VOC with immune escape potential.
  - Germany is the only jurisdiction identified with updated management guidance for fully vaccinated cases and has reduced their isolation time to five days if a negative test result is subsequently obtained and the case remains asymptomatic. Otherwise, if the PCR follow-up test result remained positive or if the individual became symptomatic, the routine isolation requirements apply.

Ontario Analysis: With some exceptions, all confirmed COVID-19 cases, regardless of vaccination status, must isolate for at least 10 days from symptom onset (or 10 days from positive test collection date if they never had symptoms). Thus, current guidance does not account for the potential for lower risk of secondary transmission from vaccinated cases (particularly from asymptomatic cases), the potential for shorter duration of infectiousness in vaccinated cases, or the implication of a negative test after a positive result in a vaccinated case.

Implementation Implications: Limited emerging data suggests that vaccination may reduce transmission, but more robust studies are needed.

[a] This briefing note includes current available evidence as of the noted date. It is not intended to be an exhaustive analysis, and other relevant findings may have been reported since completion.

Supporting Evidence

Table 1 lists and describes scientific evidence and jurisdictional experiences regarding SARS-CoV-2 transmission to others following vaccination among health care workers (HCWs) and the general population. In the Appendix, Table 2 provides detailed summaries of the scientific evidence. The majority of the information presented is taken directly from the identified sources.

The following limitations should be noted:

- Limited information was identified on the topics of interest. Moreover, there are limited studies that "directly" evaluate transmission, and studies may use different proxy measures to evaluate transmission (e.g., viral load, infection rate). Heterogeneity across study designs, which may also impact study comparisons, could be attributed to follow-up duration, frequency of testing, comorbidity adjustments, underlying seroprevalence, household size, failure to report vaccine status of household contacts, transmission mitigation strategies after index case diagnosis, missing data, and other factors.
- The methodological quality of most of the sources identified are unclear as the Research, Analysis, and Evaluation Branch does not have the expertise to make such assessments; methodological assessments published by other research groups are reported where available.

Please refer to the following previously completed Evidence Synthesis Briefing Notes for other relevant information on the topics of interest:

- 67. Evidence Synthesis Briefing Note on COVID-19 Immunization Policies for Hospitals and Health Care Workers (June 8, 2021)
- 71. Evidence Synthesis Briefing Note on Mandatory COVID-19 Vaccination Policies for Health Care Workers (August 13, 2021)

Table 1: Summary of Scientific Evidence and Jurisdictional Experiences Regarding SARS-CoV-2 Transmission following Vaccination among Health Care Workers (HCWs) and the General Population

Scientific Evidence	• Most of the identified studies regarding transmission of SARS-CoV-2 among vaccinated (partially or fully) HCWs or the general population suggest that those who do become infected are less likely to pass the virus on to contacts than those who are unvaccinated, thus helping to control outbreaks. Some studies indicate there may be a higher risk of transmission with the Delta variant compared to other variants of concern (VOC). However, there is heterogeneity across the study designs, which may impact the overall findings. For example: ○ A review (Aug 9, 2021) noted that although vaccination has been reported to reduce symptomatic COVID-19 cases, the direct evidence for vaccine-reduced transmission is limited. Reduced viral load has been observed in individuals vaccinated with the Pfizer vaccine, and as lower viral load has been associated with a reduction in onward transmission, these data together suggest that vaccination could reduce transmission.[1] ○ The COVID-19 Living Evidence Synthesis (last updated Aug 25, 2021),[2] published by the Coronavirus Variants Rapid Response Network and the COVID-19 Evidence Network to support Decision-making (COVID-END) in Canada, examines the efficacy and effectiveness

	of available COVID-19 vaccines for VOC.[b] In terms of transmission outcomes, the review indicated: ▪ **Household of Vaccinated Individual/HCW (VOC Alpha)**: Two studies from England and Scotland showed that Pfizer and AstraZeneca vaccines reduced transmission of VOC Alpha from a vaccinated index case (14 to 21 days after the first dose) to household contacts compared to households of unvaccinated index cases (range of mean estimates across the studies: 30-49% from infection).[3,4] A Finnish study found that Pfizer and Moderna vaccines reduced transmission of VOC Alpha from a vaccinated HCW (10 weeks after the first dose) to a household spouse (42.9% [95% CI, 22.3 to 58.1] from infection).[5] ▪ **Vaccinated Close Contacts of COVID+ (VOC Alpha)**: Two studies showed that the Pfizer vaccine reduced transmission to close contacts of COVID+ index cases at least seven to 14 days after the second dose (range of mean estimates across the studies: 65-80% from infection; 94% [95% CI, 60 to 99] from hospitalization).[6,7] One of these studies also showed that the AstraZeneca vaccine reduced transmission to close contacts of COVID+ index cases at least 14 days after the first dose (44% [95% CI, 31 to 54] from infection and 92% [95% CI, 46 to 99] from hospitalization).[8] ▪ **Vaccinated HCW versus Unvaccinated Community (VOC Beta and Gamma)**: A Canadian study found that the Pfizer vaccine reduced transmission of VOC Beta or Gamma from vaccinated HCWs compared to unvaccinated community members ≥14 days after the first dose (54.7% [95% CI, 44.8 to 62.9] from infection) and ≥ seven days after the second dose (84.8% [95% CI, 75.2 to 90.7] from infection).[9] ○ A Public Health Ontario evidence brief on risk of COVID-19 transmission from vaccinated cases (June 2021) reported that lower viral loads and reduced duration of infectiousness are observed in vaccinated individuals infected with SARS-CoV-2. Limited evidence suggests a reduced risk of transmission to household members from infected vaccinated HCWs, including infection from VOC Alpha and Beta.[10] ○ Two studies on HCWs raised concerns about limited protection offered by available vaccines on COVID-19 transmission. One study reported on the case of a breakthrough infection of a fully vaccinated HCW with onward transmission to an unvaccinated partner,[11] and another study found a similar viral load in vaccinated and non-vaccinated HCWs infected by VOC Alpha.[12]
International Scan	• The Public Health Ontario evidence brief (June 2021) on risk of COVID-19 transmission from vaccinated cases reported that the United States, European Center for Disease Control and Prevention (ECDC), United Kingdom, and Australia have maintained public health isolation requirements for fully vaccinated cases in the general population, likely due to the uncertainty around the vaccine effectiveness in sub-populations (e.g., elderly, immune-suppressed) and against the emerging VOC with immune escape potential. No change in the management of contacts of these breakthrough cases was also noted. The evidence brief also highlighted that: ○ The ECDC's interim guidance on the benefits of full vaccination against COVID-19 for transmission (Apr 21, 2021) has taken a risk assessment approach through synthesizing

[b] The authors assess risk of bias, direction of effect, and certainty of evidence. Risk of bias: Assessed in duplicate for individual studies using an adapted version of ROBINS-I. Direction of vaccine effect: "Prevented" or "protects" was applied to mean estimates or range of mean estimates of effect that are greater than or equal to 50% (the lowest acceptable limit for vaccine effectiveness as determined by WHO). Certainty of evidence: Assessed for the collection of studies for each vaccine according to variant of concern using a modified version of GRADE (COVID-END, Aug 25, 2021).

	the evidence to date. They concluded that the likelihood that a fully vaccinated person will transmit SARS-CoV-2 to a unvaccinated individual is very low to low and that the impact of the unvaccinated contact developing severe disease if transmission has occurred is low to high, depending on their age and underlying medical conditions. Other modulating factors may affect the risk of transmission, such as presence of VOC, the nature and duration of contact, the use of prevention measures, the type of vaccine received, and the length of time since vaccination (as duration of immunity following vaccination is not known to date). The ECDC also concluded that the risk of infection and onward transmission of SARS-COV-2 in fully vaccinated individuals should not be considered in isolation, but should always be assessed in the broader epidemiological context of SARS-CoV-2. ○ Germany was the only jurisdiction identified with updated management guidance for fully vaccinated cases and has reduced their isolation time to five days if a negative test result is subsequently obtained and the case remains asymptomatic. Otherwise, if the PCR follow-up test result remained positive or if the individual became symptomatic, the routine isolation requirements apply.[13]
Canadian Scan	• The Public Health Ontario evidence brief on risk of COVID-19 transmission from vaccinated cases (June 2021) reported that Alberta, British Columbia, Manitoba, and Quebec have maintained public health isolation requirements for fully vaccinated cases, likely due to the uncertainty around the vaccine effectiveness in sub-populations (e.g., elderly, immunosuppressed) and against the emerging VOC with immune escape potential. No change in the management of contacts of these breakthrough cases has also been noted.[14]
Ontario Scan	• According to the Public Health Ontario evidence brief on risk of COVID-19 transmission from vaccinated cases (June 2021): ○ Most fully vaccinated individuals with high risk exposures are advised to be tested, but in general, do not have to quarantine if they remain asymptomatic after exposure. This guidance is based on current evidence of vaccine effectiveness and lower risk of secondary transmission if an exposed vaccinated individual was to become infected. However, all confirmed COVID-19 cases, regardless of vaccination status, must isolate for at least 10 days from symptom onset (or 10 days from positive test collection date if they never had symptoms), provided that the individual is afebrile (without the use of fever-reducing medications) and symptoms are improving for at least 24 hours, unless they have severe disease or severe immune compromise. Therefore, current guidance does not account for the potential for lower risk of secondary transmission from vaccinated cases (particularly from asymptomatic cases), the potential for shorter duration of infectiousness in vaccinated cases, or the implication of a negative test after a positive result in a vaccinated case. ○ The current Management of Cases and Contacts of COVID-19 in Ontario (Version 12.0) allows for local public health units to discontinue case and contact management if they assess a low likelihood of infectiousness from a positive result (e.g., in an asymptomatic individual with low pre-test probability, regardless of vaccination status, and a high cycle threshold value with repeat negative test result). Vaccination status may be another factor in assessing a "low pre-test probability" for such cases, given the lower likelihood of infection despite exposure with vaccination, and may support discontinuation of case and contact management.[15]

Methods

The COVID-19 Evidence Synthesis Network is comprised of groups specializing in evidence synthesis and knowledge translation. The group has committed to provide their expertise to provide high-quality, relevant, and timely synthesized research evidence about COVID-19 to inform decision makers as the pandemic continues. The following member of the Network provided an evidence synthesis product that was used to develop this Evidence Synthesis Briefing Note:

- Iorio, A., Little, J., Linkins, L., Abdelkader, W., Bennett, D., & Lavis, J.N. COVID-19 living evidence synthesis #6 (version 6.17): What is the efficacy and effectiveness of available COVID-19 vaccines in general and specifically for variants of concern? Hamilton: Health Information Research Unit, 25 August 2021.

Appendix

Table 2: Summary of Scientific Evidence regarding SARS-CoV-2 Transmission following Vaccination among Health Care Workers (HCWs) and the General Population

Reference	Summary
Health Care Workers (HCWs)	
Deiana M, Mori A, Piubelli C, Perandin F, Treggiari D, Martini D, Chesini F, Angheben A, Bonfante F, Terregino C, Bisoffi Z, Pomari E. (Aug 14, 2021). Impact of Full Vaccination with mRNA BNT162b2 on SARS-CoV-2 Infection: Genomic and Subgenomic Viral RNAs Detection in Nasopharyngeal Swab and Saliva of Health Care Workers. *Microorganisms*; 9(8):1738.	• **Objective**: The aim was to closely monitor the incidence of SARS-CoV-2 infection, using genomic viral RNA detection, in subjects who were fully vaccinated. In order to infer the replication capacity of the virus in subjects that tested positive for SARS-CoV-2 after receiving the entire vaccination cycle, SARS-CoV-2 subgenomic RNA (sgRNA) was investigated using RT-PCR. Viral mutations were also investigated. Nasopharyngeal swab (NPS) was compared with salivary testing for SARS-CoV-2 RNA detection. • **Methods**: SARS-CoV-2 infection was monitored in 1,898 health care workers (HCWs) after receiving full vaccination with BNT162b2. • **Results**: Until 30 June 2021, 10 HCWs tested positive for SARS-CoV-2 using real time RT-PCR, resulting in a four-month cumulative incidence of 0.005%. The infection was mildly symptomatic in six (60%) and asymptomatic in four (40%) individuals. Among the infected HCWs, eight consenting individuals provided paired NPS and saliva during the course of infection, for the purpose of the analysis performed in the present study. Genomic and subgenomic viral RNAs were investigated using real-time RT-PCR in both biological specimens. The temporal profile of viral load was measured using ddPCR. Viral mutations were also analyzed. Subgenomic viral RNA was detected in 8/8 (100%) NPS and in 6/8 (75%) saliva specimens at the baseline. The expression of subgenomic RNA was observed for up to seven days in 3/8 (38%) symptomatic cases. Moreover, concordance was observed between NPS and saliva in the detection of viral mutations, and both N501Y and 69/70del (associated with the B.1.1.7 variant) were detected in the majority 6/8 (75%) of subjects, while the K417T mutation (associated with the P.1-type variants) was detected in 2/8 (25%) individuals. • **Conclusion**: The findings report a low frequency of infected HCWs after full vaccination. It is, therefore, important to monitor the vaccinees in order to identify asymptomatic infected individuals. Saliva can be a surrogate for SARS-CoV-2 surveillance, particularly in social settings such as hospitals.
Inge, K., Mecklenburg, I., Schneiderat, P., et al. (July 29, 2021). Vaccine breakthrough infection and onward transmission of SARS-CoV-2 Beta (B.1.351) variant, Bavaria, Germany, February to March 2021. *Euro Surveill*. 26(30)	• **Objective**: During a case cluster of SARS-CoV-2 B.1.351 variant (Beta variant) in a Bavarian hospital in Germany, in mid-February 2021, several transmissions to HCWs occurred. The study reports the case of a breakthrough infection in a fully vaccinated HCW and the subsequent transmission of the virus to their spouse. • **Methods**: The first cases were diagnosed on 11 February and subsequent daily screening by rapid antigen test and twice weekly by RT-PCR of all staff and newly admitted patients identified several infected patients and 18 infected HCWs. • **Results**: Eight of the infected HCWs had already received one dose of Comirnaty (BNT162b2, BioNTech-Pfizer, Mainz, Germany/New York, United States) and one was fully vaccinated with two doses. No community transmission of the SARS-CoV-2 Beta variant outside the hospital was reported at that time. • **Conclusion**: The breakthrough infection of a fully vaccinated HCW with onward transmission to an unvaccinated partner highlights the risk of transmission by fully vaccinated individuals to their close contacts. This might be especially applicable for individuals with high occupational risk for an infection, in outbreak situations, and if working in hospital wards with acute COVID-19 cases.
Bergwerk, M., Gonen, T., Lustig, Y., Amit, S., Lipsitch, M.,	• **Objective**: Despite the high efficacy of the BNT162b2 messenger RNA vaccine against SARS-CoV-2, rare breakthrough infections have been reported, including infections among HCWs. Data are needed to characterize these infections and define correlates of breakthrough and infectivity.

Reference	Summary
Cohen, C., Mandelboim, M., Gal Levin, E., Rubin, C., Indenbaum, V., Tal, I., Zavitan, M., Zuckerman, N., Bar-Chaim, A., Kreiss, Y., & Regev-Yochay, G. (July 28, 2021). COVID-19 Breakthrough Infections in Vaccinated Health Care Workers. The New England Journal of Medicine.	• **Methods**: At the largest medical center in Israel, the authors identified breakthrough infections by performing extensive evaluations of HCWs who were symptomatic (including mild symptoms) or had known infection exposure. These evaluations included epidemiologic investigations, repeat reverse-transcriptase-polymerase-chain-reaction (RT-PCR) assays, antigen-detecting rapid diagnostic testing (Ag-RDT), serologic assays, and genomic sequencing. Correlates of breakthrough infection were assessed in a case-control analysis. The authors matched patients with breakthrough infection who had antibody titers obtained within a week before SARS-CoV-2 detection (peri-infection period) with four to five uninfected controls and used generalized estimating equations to predict the geometric mean titers among cases and controls and the ratio between the titers in the two groups. The authors also assessed the correlation between neutralizing antibody titers and N gene cycle threshold (Ct) values with respect to infectivity. • **Results**: Among 1,497 fully vaccinated HCWs for whom RT-PCR data were available, 39 SARS-CoV-2 breakthrough infections were documented. Neutralizing antibody titers in case patients during the peri-infection period were lower than those in matched uninfected controls (case-to-control ratio, 0.361; 95% confidence interval, 0.165 to 0.787). Higher peri-infection neutralizing antibody titers were associated with lower infectivity (higher Ct values). Most breakthrough cases were mild or asymptomatic, although 19% had persistent symptoms (>six weeks). The B.1.1.7 (alpha) variant was found in 85% of samples tested. A total of 74% of case patients had a high viral load (Ct value, <30) at some point during their infection; however, of these patients, only 17 (59%) had a positive result on concurrent Ag-RDT. No secondary infections were documented. Thorough epidemiologic investigations of data regarding in-hospital contact tracing did not detect any cases of transmission from infected HCWs (secondary infections) among the 39 primary infections. Among the 31 cases for whom data regarding household transmission (including symptoms and RT-PCR results) were available, no secondary infections were detected, including 10 case patients and their 27 household members in whom the HCW was the only index case patient. • **Conclusion**: Among fully vaccinated HCWs, the occurrence of breakthrough infections with SARS-CoV-2 was correlated with neutralizing antibody titers during the peri-infection period. Most breakthrough infections were mild or asymptomatic, although persistent symptoms did occur.
Yassi, A., Grant, J. M., Lockhart, K., Barker, S., Sprague, S., Okpani, A. I., Wong, T., Daly, P., Henderson, W., Lubin, S., & Kim Sing, C. (July 16, 2021). Infection control, occupational and public health measures including mRNA-based vaccination against SARS-CoV-2 infections to protect healthcare workers from variants of concern: A 14-month observational study using surveillance data. *PloS one*, 16(7), e0254920.	• **Objective**: The study evaluated measures to protect HCWs in Vancouver, Canada, where variants of concern (VOC) went from <1% VOC in February 2021 to >92% in mid-May. Canada has amongst the longest periods between vaccine doses worldwide, despite Vancouver having the highest P.1 variant rate outside Brazil. • **Methods**: With surveillance data since the pandemic began, the authors tracked laboratory-confirmed SARS-CoV-2 infections, positivity rates, and vaccine uptake in all 25,558 HCWs in Vancouver Coastal Health, by occupation and subsector, and compared to the general population. Cox regression modelling adjusted for age and calendar-time calculated vaccine effectiveness (VE) against SARS-CoV-2 in fully vaccinated (≥ seven days post-second dose), partially vaccinated infection (after 14 days) and unvaccinated HCWs; the authors also compared with unvaccinated community members of the same age-range. • **Results**: Only 3.3% of the HCWs became infected, mirroring community rates, with peak positivity of 9.1%, compared to 11.8% in the community. As vaccine coverage increased, SARS-CoV-2 infections declined significantly in HCWs, despite a surge with predominantly VOC; unvaccinated HCWs had an infection rate of 1.3/10,000 person-days compared to 0.89 for HCWs post first dose, and 0.30 for fully vaccinated HCWs. VE compared to unvaccinated HCWs was 37.2% (95% CI: 16.6–52.7%) 14 days post-first dose, 79.2% (CI: 64.6–87.8%) 7 days post-second dose; one dose provided significant protection against infection until at least day 42. Compared with community infection rates, VE after one dose was 54.7% (CI: 44.8–62.9%); and 84.8% (CI: 75.2–90.7%) when fully vaccinated. • **Conclusion**: Rigorous droplet-contact precautions with N95s for aerosol-generating procedures are effective in preventing occupational infection in HCWs, with one dose of mRNA vaccination further reducing infection risk despite VOC and transmissibility concerns. Delaying second doses to

Reference	Summary
	allow more widespread vaccination against severe disease, with strict public health, occupational health and infection control measures, has been effective in protecting the health care workforce.
Salo, J., Hagg, M., Kortelainen, M., et al. (July 10, 2021). The indirect effect of mRNA-based COVID-19 vaccination on unvaccinated household members. *Medrxiv*. Preprint.	• **Objective**: The study used nationwide administrative datasets on SARS-CoV-2 infections, vaccination records, demographics, and unique household IDs to examine the direct and indirect effectiveness of COVID-19 vaccines in reducing infections among vaccinated individuals and their unvaccinated household members. • **Methods**: The analysis exploits the rollout of the mass vaccine program in a large cohort of HCWs in Finland, allowing the authors to estimate the indirect effects of vaccines in a large sample of household members with discordant vaccination status. The authors used national databases that record all polymerase chain reaction (PCR)-confirmed SARS-CoV-2 infections and mRNA-based (BNT162b2 by Pfizer-BioNTech or mRNA-1273 by Moderna) vaccine doses administered in Finland since the beginning of the epidemic. These data were merged with administrative full-population datasets that include information on each person's occupation and unique identifiers for spouses and children living in the same household. To estimate the direct and indirect effectiveness of mRNA-based vaccines, the authors compared the cumulative incidence of SARS-CoV-2 infections between vaccinated and unvaccinated HCWs as well as between their unvaccinated spouses and children living in the same household. • **Results**: The estimates for adults imply indirect effectiveness of 8.7% (95% CI: -28.9 to 35.4) two weeks and 42.9% (95% CI: 22.3 to 58.1) 10 weeks after the first dose. The indirect effect of COVID-19 vaccines is smaller and less precise for unvaccinated children aged between three to 18 years than for adults. • **Conclusion**: These results provide household-level evidence that vaccines do not only protect vaccinated individuals but provide indirect protection to unvaccinated individuals in a real-world setting.
Prato, S., Paladino, M.E., Riva, M.A., Deni, M., and Belingheri, M. (July 2021). SARS-CoV-2 Transmission Risk to Household and Family Contacts by Vaccinated Healthcare Workers. *Journal of Occupation and Environmental Medicine*. 63(7):e474-476.	• **Objective**: The aim of the study was to evaluate the risk of SARS-CoV-2 transmission when new infection occurs after vaccination. Crowded indoor environments, such as domestic settings, are high-risk transmission environments for SARS-CoV-2 as contact is more likely to occur over a long period of time without personal protective equipment. Accordingly, we investigated SARS-CoV-2 transmission among a cohort of vaccinated healthcare workers (HCWs) and their household and other family contacts. The study investigated SARS-CoV-2 transmission among a cohort of 1,196 vaccinated healthcare workers (HCWs) and their household and other family contacts. • **Methods**: In order to detect new cases of COVID-19 among vaccinated subjects, nose swab tests with real-time polymerase chain reaction (RT-PCR) were performed on asymptomatic, vaccinated HCWs of a hospital in northern Italy from February to March 2021. All workers were vaccinated with two doses of Comirnaty. • **Results**: From February to March 2021, 40 of 1,196 asymptomatic HCWs were RT-PCR positive at least seven days after the second vaccine dose. The median age was 35 years (range: 27 to 69 years), and the majority were women (n = 31). In addition, there were seven HCWs who already had a previous COVID-19 infection. During the quarantine period with a median duration of 10 days (range: 10 to 25 days), 37 of the 40 HCWs remained asymptomatic. Of the 40 cases, 33 HCWs were RT-PCR negative after 10 days. From there, the authors identified 74 close contacts of the 40 vaccinated HCWs who tested positive for RT-PCR. A total of eight close contacts were excluded; four were excluded because of a higher risk of exposure to SARS-CoV-2 due to their jobs, and the other four were excluded because they had already been vaccinated. RT-PCR was performed on 46 close contacts at the beginning, 49 at the end, and 39 at both the beginning and end of the quarantine period. Negative RT-PCR results were observed in 43 of the 46 cases at the beginning of the quarantine period and in all cases (n = 49) at the end of the incubation period.

Reference	Summary
	• **Conclusion**: The findings may be explained by the effectiveness of Comirnaty in preventing person-to-person SARS-CoV-2 transmission. This may be due to a reduction in viral loads, which appears to be the leading indicator of SARS-CoV-2 transmission prevention, as well as the absence of symptoms in the index cases.
Ioannou, P., Karakonstantis, S., Astrinaki, E., Saplamidou, S., Vitsaxaki, E., Hamilos, G., Sourvinos, G., and Kofteridis, D.P. (June 26, 2021). Transmission of SARS-CoV-2 variant B.1.1.7 among vaccinated health care workers, *Infectious Diseases*.	• **Objective**: The aim of this study was to compare viral load, clinical presentation at diagnosis and type of exposure among vaccinated (with BNT162b2) and non-vaccinated HCWs. • **Methods**: Prospective cohort of HWCs diagnosed with COVID-19 by nasopharyngeal PCR from 4 January to 14 April. Viral loads were expressed by the cycle threshold (Ct) in PCR. • **Results**: During the study period 55 HCWs were found positive for SARS-CoV-2, most of whom (44/55) were identified from March 28 to April 14 during an in-hospital COVID-19 outbreak. Of the 55 HCWs, 21 were fully vaccinated and another three had received one dose. Most cases (54/55) were due to variant B.1.1.7. Vaccinated and unvaccinated HCWs did not differ significantly in regard to age, gender, site of acquisition, presence of symptoms at diagnosis and viral load. • **Conclusion**: This study found a similar viral load in vaccinated and non-vaccinated HCWs infected by SARS-CoV-2 variant B.1.1.7, suggesting potentially reduced efficacy of BNT162b2 in preventing transmission of B.1.1.7. This finding raises concerns about limited protection offered by available vaccines on COVID-19 transmission.
Coppeta L, Balbi O, Grattagliano Z, Mina GG, Pietroiusti A, Magrini A, Bolcato M, Trabucco Aurilio M. (June 17, 2021). First Dose of the BNT162b2 mRNA COVID-19 Vaccine Reduces Symptom Duration and Viral Clearance in Healthcare Workers. *Vaccines*, 9(6):659.	• **Objective**: Data from a large hospital in central Italy was used to evaluate the impact of the first dose of the BNT162b2 mRNA vaccine on SARS-CoV-2 infections in terms of the prevalence of symptomatic cases, symptom duration, and viral clearance timing. • **Methods**: All vaccinated HCWs with positive RT-PCR by nasopharyngeal (NP) swabs were divided into two cohorts (positive RT-PCR within day 12 and positive RT-PCR between day 13 and day 21 after first dose administration) and compared for the presence and duration of symptoms and the timing of viral clearance. The same variables were evaluated across HCWs with positive RT-PCR within six days after first dose administration and non-vaccinated HCWs with positive RT-PCR between October 1, 2020 and February 28, 2021. • **Results**: Eighteen HCWs tested positive on RT-PCR by NP swab from day one to day 12 after the first dose administration (incidence rate 6.2×10^{-4}) and five HCWs from day 13 to day 21 (incidence rate 2.3×10^{-4}). • **Conclusion**: Symptom duration and viral clearance timing are significantly shorter in the cohort of HCWs with positive RT-PCR 12 days after the first dose of the BNT162b2 mRNA vaccine. The administration of the first dose proved effective in reducing presence, symptom duration, and viral clearance even in HCWs vaccinated for less than six days. These results could have implications on public health and post-exposure prophylaxis.
Levine-Tiefenbrun, M., Yelin, I., Katz, R. et al. (Mar 29, 2021). Initial report of decreased SARS-CoV-2 viral load after inoculation with the BNT162b2 vaccine. *Nat Med* 27, 790-792.	• **Objective**: To examine positive SARS-CoV-2 test results after inoculation with the BNT162b2 messenger RNA vaccine. • **Methods**: As of February 11, 2021, Maccabi Healthcare Services (MHS) in Israel has vaccinated more than one million of its members as part of a national rapid rollout of the vaccine. MHS member SARS-CoV-2 tests are often carried out in the MHS central laboratory, which offers the opportunity to track post-vaccination infections. The authors retrospectively collected and analyzed the quantitative reverse transcription PCR (RT–qPCR) test measurements of three SARS-CoV-2 genes – E, N, and RdRp (Allplex 2019-nCoV assay, Seegene) – from positive post-vaccination tests performed at the MHS central laboratory between December 21, 2020, and February 11, 2021 (n = 4,938 patients, study population). The study period was characterized by high and steady rates of positive COVID-19 tests, indicating an ongoing epidemic wave. • **Conclusion**: This analysis of a real-world dataset of positive SARS-CoV-2 test results after inoculation with the BNT162b2 vaccine found that the viral load was substantially reduced for infections occurring 12-37 days after the first dose of vaccine. These reduced viral loads hint at a potentially lower infectiousness, further contributing to vaccine effect on virus spread.

Reference	Summary
Shah, A. S., Gribben, C., Bishop, J., Hanlon, P., Caldwell, D., Wood, R., et al. (Mar 21, 2021). Effect of vaccination on transmission of COVID-19: an observational study in healthcare workers and their households. *MedRxiv*. Preprint.	• **Objective**: The effect of vaccination for COVID-19 on onward transmission is unknown. • **Methods**: A national record linkage study determined documented COVID-19 cases and hospitalizations in unvaccinated household members of vaccinated and unvaccinated HCWs from 8th December 2020 to 3rd March 2021. The primary endpoint was COVID-19 14 days following the first dose. • **Results**: The cohort comprised of 194,362 household members (mean age 31.1 ± 20.9 years) and 144,525 HCWs (mean age 44.4 ± 11.4 years). 113,253 (78·3%) of HCWs received at least one dose of the BNT162b2 mRNA or ChAdOx1 nCoV-19 vaccine and 36,227 (25.1%) received a second dose. There were 3,123 and 4,343 documented COVID-19 cases and 175 and 177 COVID-19 hospitalizations in household members of HCWs and HCWs respectively. Household members of vaccinated HCWs had a lower risk of COVID-19 case compared to household members of unvaccinated HCWs (rate per 100 person-years 9.40 *versus* 5.93; HR 0.70, 95% confidence interval [CI] 0.63 to 0.78). The effect size for COVID-19 hospitalization was similar, with the confidence interval crossing the null (HR 0·77 [95% confidence interval (CI) 0·53 to 1.10]). The rate per 100 person years was lower in vaccinated compared to unvaccinated HCWs for documented (20.13 *versus* 8.51; HR 0.45 [95% CI 0.42 to 0.49]) and hospitalized COVID-19 (0.97 versus 0.14; HR 0.16 [95% CI 0.09 to 0.27]). Compared to the period before the first dose, the risk of documented COVID-19 case was lower at ≥ 14 days after the second dose for household members (HR 0.46 [95% CI 0.30 to 0.70]) and HCWs (HR 0.08 [95% CI 0.04 to 0.17]). • **Conclusion**: Vaccination of health care workers was associated with a substantial reduction in COVID-19 cases in household contacts consistent with an effect of vaccination on transmission.
General Population	
Luo, C.H., Morris, P., Sachithanandham, J., et al. (Aug 20, 2021). Infection with the SARS-CoV-2 Delta Variant is Associated with Higher Infectious Virus Loads Compared to the Alpha Variant in both Unvaccinated and Vaccinated Individuals. *Preprint*.	• **Objective**: This study analyzed a large cohort of samples diagnosed at Johns Hopkins clinical virology laboratory between January and July 2021 and compared the clinical presentations and disease outcomes in patients infected with the Delta versus the Alpha variants. • **Methods**: Surveillance data was collected from a wide 235 geographical region in Washington DC, Virginia, and Baltimore. Whole genome sequencing of 2,785 clinical isolates was used to characterize the prevalence of SARS-CoV-2 lineages circulating in the National Capital Region between January and July 2021. Clinical chart reviews were performed for the Delta, Alpha, and B.1.2 (a control predominant lineage prior to both VOCs) variants to evaluate disease severity and outcome and Cycle threshold values (Cts) were compared. The presence of infectious virus was determined using Vero-TMPRSS2 cells and anti-SARS-CoV-2 IgG levels were determined from upper respiratory specimen. An analysis of infection in unvaccinated and fully vaccinated populations was performed. • **Results**: The Delta variant displaced the Alpha variant to constitute 88.2% of the circulating lineages in the National Capital Region by July 2021. The Delta variant associated with increased breakthrough infections in fully vaccinated individuals that were mostly symptomatic when compared to the Alpha breakthrough infections, though it is important to note there was a significantly longer period of time between vaccination and infection with Delta infections. The recovery of infectious virus on cell culture was significantly higher with the Delta variant compared to Alpha in both vaccinated and unvaccinated groups. The impact of vaccination on reducing the recovery of infectious virus from clinical samples was only observed with Alpha variant infections but was strongly associated with low localized SARS-CoV-2 IgG for both variants. A comparison of Ct values showed a significant decrease in the Delta compared to Alpha with no significant differences between unvaccinated and vaccinated groups. • **Conclusion**: The data indicate that the Delta variant is associated with increased infectious virus loads when compared to the Alpha variant and decreased upper respiratory antiviral IgG levels. Measures to reduce transmission in addition to increasing vaccinations rates have to be implemented to reduce Delta variant spread.
Harris, R.J., Hall, J.A., Zaidi, A., et al. (Aug 19, 2021). Effect of	• **Objective**: Whether vaccination would reduce transmission in the household setting in the context of post-vaccination infection.

Reference	Summary
Vaccination on Household Transmission of SARS-CoV-2 in England. *N Engl J Med.* 385:759-760.	• **Methods**: The authors analyzed data from the Household Transmission Evaluation Dataset (HOSTED), which has information on all laboratory-confirmed cases of COVID-19 in England and in which data on all persons sharing the same address are linked. The authors then linked to individual-level data on all COVID-19 vaccinations in England. The authors compared the risk of secondary infection (defined as a positive SARS-CoV-2 test two to 14 days after the positive test for the index case) among unvaccinated household contacts of persons with SARS-CoV-2 infection who had received at least one dose of the ChAdOx1 nCoV-19 or BNT162b2 vaccine 21 days or more before testing positive with the risk among unvaccinated household contacts of unvaccinated persons with infection. The authors fitted logistic-regression models with adjustment for the age and sex of the person with the index case of COVID-19 (index patient) and the household contact, geographic region, calendar week of the index case, deprivation (a composite score of socioeconomic and other factors), and household type and size. We also considered the timing of effects among index patients who had been vaccinated at any time up to the date of the positive test. • **Results/Conclusion**: Between January 4 and February 28, 2021, there were 960,765 household contacts of unvaccinated index patients, and there were 96,898 secondary cases of COVID-19 (10.1%).Overall, the likelihood of household transmission was approximately 40 to 50% lower in households of index patients who had been vaccinated 21 days or more before testing positive than in households of unvaccinated index patients; the findings were similar for the two vaccines. Most of the vaccinated index patients in our data set (93%) had received only the first dose of vaccine. Assessment of infection risks among household contacts according to the timing of vaccination of the index patient showed protective effects when the vaccine had been administered at least 14 days before the positive test.
Braeye, T., Cornelissen, L., Catteau, L., Haarhuis, F., Proesmans, K., De Ridder, K., Djiena, A., Mahieu, R., De Leeuw, F., Dreuw, A., Hammami, N., Quoilin, S., Van Oyen, H., Wyndham-Thomas, C., & Van Cauteren, D. (Aug 19, 2021). Vaccine effectiveness against infection and onwards transmission of COVID-19: Analysis of Belgian contact tracing data, January-June 2021. *Vaccine*, S0264-410X(21)01108-7.	• **Objective**: To investigate vaccine-induced protection against infection and onward transmission after high-risk contact under extensive and systematic testing of symptomatic and asymptomatic contacts. The study period coincided with the early roll-out of Belgium's vaccination campaign and all EMA-authorized vaccines were included. • **Methods**: In Belgium, high-risk contacts of an infected person were offered PCR-testing irrespective of their vaccination status. The study estimated vaccine effectiveness (VE) against infection and onwards transmission, controlling for previous infections, household-exposure, and temporal trends. The study included 301,741 tests from 25 January to 24 June 2021. ○ A contact tracing system to limit the spread of COVID-19 in Belgium is in place since May 2020. A positive laboratory test will trigger a process in which the person with the positive test, referred to as index case, is asked to provide details on whereabouts and contacts. High-risk contacts (HRC) will subsequently be contacted and tested. National data from testing, contact tracing, and vaccination are centralized in one data-warehouse. The data are pseudonymized and can be linked through a recoded national identification number of social security (NISS). From this data, the study estimated VE against infection after high-risk contact and onwards transmission. • **Results**: The VE against onwards transmission was estimated at 62% (95% CI 57–67) for BNT162b2 and 52% (95% CI 33–69) for mRNA-1273 for full vaccination. mRNA-vaccines reduced onward transmission: VE estimates increased to >90% when index and contact were fully vaccinated. No significant effect against onward transmission was found for the 'viral-vector'-vaccines, but credibility intervals were large. Vaccination with mRNA-vaccines had a similar effect as previous infection, but two doses were required to achieve this effect. • **Conclusion**: Significant effects on onward transmission in case of breakthrough infections were shown for mRNA-vaccines, leading to high protection when both the index and HRC were fully vaccinated. More data needs to be collected on viral-vector vaccines to estimate their effect on onward transmission.
de Gier, B., Andeweg S., Joosten, R., ter Schegget, R., Smorenburg, N., van de Kassteele, J., RIVM COVID-19 surveillance and epidemiology	• **Objective/Method**: Based on routine contact monitoring data, the study estimated the vaccine effectiveness against transmission (VET) and the vaccine effectiveness against infection (VE) among household and other close contacts of confirmed cases of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection in the Netherlands, between 1 February and 27 May 2021. The Alpha variant (Phylogenetic Assignment of Named Global Outbreak (Pango) lineage designation B.1.1.7) was the dominant variant in the area at that time.

Reference	Summary
team 1, et al. (Aug 5, 2021). Vaccine effectiveness against SARS-CoV-2 transmission and infections among household and other close contacts of confirmed cases, the Netherlands, February to May 2021. Euro Surveill. 26(31).	• **Results**: The secondary attack rate was 31% among household contacts of unvaccinated index cases and 11% among household contacts of fully vaccinated index cases. Adjusting for age of the index and contact, vaccination status of the contact and month of notification date of the index case, the VET to household contacts after full vaccination was 71% (95% CI: 63 to 77). The VET to other close contacts was much lower (22%; 95% CI: −5 to 43), probably because of the larger risk of the contact being infected through another source (i.e., misclassification of the index case). Stratified by vaccine received by the index case, VET values were estimated at 58% for Vaxzevria (ChAdOx1-S; AstraZeneca, Cambridge, United Kingdom), 70% for Comirnaty (BNT162b2; BioNTech/Pfizer, Mainz, Germany/New York, United States (US)), 88% for Spikevax (mRNA-1273, Moderna, Cambridge, US) and 77% for the Janssen vaccine. For all vaccines with a two-dose schedule, the adjusted VET (aVET) after one dose was considerably lower than after two doses: 15% for Vaxzevria, 26% for Comirnaty, and 51% for Spikevax. • **Conclusion**: The study showed that the COVID-19 vaccines not only protect the vaccinee against SARS-CoV-2 infection, but also offer protection against transmission to close contacts after completing the full schedule. This finding underscores the importance of full vaccination of close contacts of vulnerable persons.
Prunas, O., Warren, J.L., Crawford, F.W., Gazit, S., Patalon, T., Weinberger, D.M., and Pitzer, V.E. (July 16, 2021). Vaccination with BNT162b2 reduces transmission of SARS-CoV-2 to household contacts in Israel. *medRxiv*. Preprint.	• **Objective**: The study quantified the effectiveness of vaccination with BNT162b2 (Pfizer-BioNTech mRNA-based vaccine) against household transmission of SARS-CoV-2 in Israel. • **Methods**: The authors fit two time-to-event models – a mechanistic transmission model and a regression model – to estimate vaccine effectiveness against susceptibility to infection and infectiousness given infection in household settings. • **Results**: Vaccine effectiveness against susceptibility to infection was 80-88%. For breakthrough infections among vaccinated individuals, the vaccine effectiveness against infectiousness was 41-79%. The overall vaccine effectiveness against transmission was 88.5%. • **Conclusion**: Vaccination reduced both the rate of infection with SARS-CoV-2 and transmission to household contacts in Israel. Vaccination provides substantial protection against susceptibility to infection and slightly lower protection against infectiousness given infection, thereby reducing transmission of SARS-CoV-2 to household contacts.
Layan, M., Gilboa, M., Gonen, T., Goldenfeld, M., Meltzer, L., et al. (July 16, 2021). Impact of BNT162b2 vaccination and isolation on SARS-CoV-2 transmission in Israeli households: an observational study. *Preprint*.	• **Objective**: This study evaluated the role of vaccination and isolation on SARS-CoV-2 transmission within Israeli household. • **Methods**: From December 2020 to April 2021, confirmed cases were identified among HCWs of the Sheba Medical Centre and their family members. Households were recruited and followed up with repeated PCR for a minimum of 10 days after case confirmation. Symptoms and vaccination information were collected at the end of follow-up. The authors developed a data augmentation Bayesian framework to ascertain how age, isolation, and BNT162b2 vaccination with more than seven days after the second dose impacted household transmission of SARS-CoV-2. • **Results**: 210 households with 215 index cases were enrolled. 269 out of 687 (39%) household contacts developed a SARS-CoV-2 infection. Of those, 170 (63%) developed symptoms. Children below 12 years old were less susceptible than adults/teenagers (Relative Risk RR=0·50, 95% Credible Interval CI 0·32-0·79). Vaccination reduced the risk of infection among adults/teenagers (RR=0·19, 95% CI 0·07-0·40). Isolation reduced the risk of infection of unvaccinated adult/teenager (RR=0·11, 95% CI 0·05-0·19) and child contacts (RR=0·16, 95% CI 0·07-0·31) compared to unvaccinated adults/teenagers that did not isolate. Infectivity was significantly reduced in vaccinated cases (RR=0·22, 95% CI 0·06-0·70). • **Conclusion**: Within households, vaccination reduces both the risk of infection and of transmission if infected. When contacts were not vaccinated, isolation also led to important reductions in the risk of transmission. Vaccinated contacts might reduce their risk of infection if they isolate, although this requires confirmation with additional data.
Farinholt, T., Doddapaneni, H., Qin, X., Menon, V., Meng, Q., et al. (July 4, 2021). Transmission Event of SARS-	• **Objective**: To determine the SARS-CoV-2 variant responsible for six cases of vaccine breakthrough. This study describes a transmission of a Delta variant containing SARS-CoV-2 strain, between family members associated with events surrounding a wedding with 92 attendees, near Houston, Texas. Attendance required guests be fully vaccinated and took place outdoors in a large, open-air tent.

Reference	Summary
CoV-2 Delta Variant Reveals Multiple Vaccine Breakthrough Infections. Preprint. *Epidemiology*.	• **Methods**: Nasopharyngeal swabs from suspected vaccine breakthrough cases were tested for SARS-CoV-2 by qPCR for Wuhan-Hu1 and Alpha variant. Positive samples were then sequenced by Swift Normalase Amplicon Panels to determine the causal variant. • **Results**: Viral sequencing revealed six vaccinated patients were infected with the Delta SARS31 CoV-2 variant. With no histories of vaccine breakthrough, this suggests Delta variant may possess immune evasion in patients that received the Pfizer BNT162b2, Moderna mRNA-1273, and Covaxin BBV152. • **Conclusion**: Delta variant may pose the highest risk out of any currently circulating SARS-CoV-2 35 variants, with increased transmissibility over Alpha variant and possible vaccine breakthrough.
Allen, H., Vusirikala, A., Flannagan, J., et al. Increased household transmission of COVID-19 cases associated with SARS-CoV-2 Variant of Concern B.1.617.2: a national case control study.	• **Objective**: This study indirectly assessed differences in transmissibility between the emergent Delta variant compared to the previously dominant Alpha variant (B.1.1.7). • **Methods**: A matched case-control study was conducted to estimate the odds of household transmission (≥ two cases within 14 days) for Delta variant index cases compared with Alpha cases. Cases were derived from national surveillance data (March to May 2021). One-to-two matching was undertaken on geographical location of residence, time period of testing and property type, and a multivariable conditional logistic regression model was used for analysis. • **Results**: In total 3,765 genomically sequenced index cases in household clusters were matched to 7,530 sporadic index cases (single case within a household). 5.8% (n=220) of cases in household clusters were confirmed Delta variant compared to 4.7% (n= 351) of sporadic cases. The odds ratio of household transmission was 1.64 among Delta variant cases (95% CI 1.26-2.13, p <0.001) compared to Alpha cases after adjusting for age, sex, ethnicity, index of multiple deprivation (IMD) and vaccination status of index case. • **Conclusion**: There was evidence of increased household transmission of SARS-CoV-2 Delta variant, potentially explaining its success at displacing Alpha variant as the dominant strain in England. With the Delta variant now having been detected in many countries worldwide, the understanding of the transmissibility of this variant is important for informing infection prevention and control policies internationally.[c]
Bailly, B., Guilpain, L., Bouiller, K., Chirouze, C., N'Debi, M., Soulier, A., Demontant, V., Pawlotsky, J.M., Rodriguez, C., and Fourati, S. (May 16, 2021). BNT162b2 Messenger RNA Vaccination Did Not Prevent an Outbreak of Severe Acute Respiratory Syndrome Coronavirus 2 Variant 501Y.V2 in an Elderly Nursing Home but Reduced Transmission and	• **Objective**: This study described an outbreak related to SARS-CoV-2 variant 501Y.V2 occurring in an elderly nursing home in France after a vaccination campaign with the BNT162b2 mRNA vaccine (Pfizer), in which more than 80% of residents had received two injections of the vaccine. • **Methods**: The study included 31 residents and 59 staff members from a nursing home unit, prospectively followed for three weeks after a resident had been diagnosed with coronavirus disease 2019 (COVID-19). All residents and staff members were systematically tested at baseline by reverse transcriptase quantitative polymerase chain reaction. The tests were repeated in case of symptoms occurring during the subsequent days, and every 7 days until no further cases were found to be positive in the nursing home. • **Results**: All non-vaccinated residents (5/5) versus half of those vaccinated with BNT162b2 (13/26) were infected. Two of 13 vaccinated versus four of five non-vaccinated residents presented severe disease. All but one of the vaccinated residents had received the second vaccine dose more than one month before the outbreak. The remaining one had received the second dose 11 days before. All but one of the infected residents who had been vaccinated had detectable anti-S antibodies at the time of diagnosis, at levels ranging from 79 to 8188 AU/mL. • **Conclusion**: BNT162b2 did not prevent the outbreak, but reduced transmission and disease severity.

[c] There are some limitations with this study, including: missing data; failure to adjust for comorbidity; inability to exclude exposure to other than index case; large number of exclusions (Pillar 1) with differences between included and excluded index cases; failure to report vaccine status of household contacts; and no information on household size (COVID-END, Sept 2, 2021).

Reference	Summary
Disease Severity. *Clinical Infectious Diseases*, ciab446.	
McEllistrem, M.C., Clancy, C.J., Buehrle, D.J., Lucas, A., Decker, B.K. (Mar 26, 2021). Single Dose of an mRNA Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-Cov-2) Vaccine Is Associated With Lower Nasopharyngeal Viral Load Among Nursing Home Residents With Asymptomatic Coronavirus Disease 2019 (COVID-19), *Clinical Infectious Diseases*, ciab263.	• **Objective**: This study evaluated the effect of a single dose of the BNT162b2 vaccine on viral loads among individuals who developed asymptomatic COVID-19 while residing at a Veterans Affairs (VA) Community Living Center (CLC). • **Methods**: The VA Pittsburgh (Pennsylvania) CLC is a nursing home that houses approximately 150 residents on seven units, which are located on three floors. Subjects in this study had a negative baseline nasopharyngeal reverse transcription–polymerase chain reaction (RT-PCR) test (Palo Alto VA, CA) for SARS-CoV-2 on 2 December 2020. From 8 December 2020 to 2 February 2021, all residents underwent surveillance nares testing for SARS-CoV-2. Residents were screened daily for new or worsening cough, shortness of breath, cold or flu-like symptoms, headache, loss of taste or loss of smell, diarrhea, nausea, or vomiting. After a diagnosis of COVID-19 was established, residents were screened 3 times daily for symptoms as described above. • **Results**: Ten VA Pittsburgh CLC residents were diagnosed with asymptomatic COVID-19 from 2 December 2020 through 6 January 2021, when second doses of the BNT162b2 vaccine were offered at the facility. No further cases of asymptomatic COVID-19 were diagnosed through 2 February 2021. Five residents with asymptomatic COVID-19 received a first dose of the vaccine on 16 December 2020, which was 12–15 days prior to detection of SARS-CoV-2 in nasopharyngeal samples. The five other residents with asymptomatic COVID-19 were unvaccinated prior to diagnosis. Median Ct values among unvaccinated and vaccinated residents with asymptomatic COVID-19 were 12.8 (interquartile range, 12.4–14.9) and 19.4 (interquartile range, 18.9–25.5), respectively (P = .009). Mean $\log_{10}$viral load was significantly higher in unvaccinated residents (9.5; 95% confidence interval [CI], 9.3–9.8) than in vaccinated residents (7.1; 95% CI, 5.4–8.8), respectively (P = .004). Therefore, the viral load was −2.4 mean $\log_{10}$ lower among the vaccinated cohort. • **Conclusion**: In nursing home residents with asymptomatic COVID-19 diagnosed through twice-weekly surveillance testing, single-dose BNT162b2 vaccination (Pfizer-BioNTech) was associated with −2.4 mean $\log_{10}$ lower nasopharyngeal viral load than detected in absence of vaccination (P = .004). Since viral load is linked to transmission, single-dose mRNA SARS-CoV-2 vaccination may help control outbreaks.
Emary, K. R. W., Golubchik, T., Aley, P.K., Ariani, C.V., et al. (Feb 1, 2021). Efficacy of ChAdOx1 nCoV-19 (AZD1222) Vaccine Against SARS-CoV-2 VOC 202012/01 (B.1.1.7). *SSRN Electronic Journal*.	• **Objective**: A new variant of SARS-CoV-2, B.1.1.7, emerged as the dominant cause of COVID-19infection in the United Kingdom from November 2020 with a transmission advantage over the previous variants of the virus. Here we report efficacy of the adenoviral vector vaccine, ChAdOx1 nCoV-19, against this variant in comparison with non-B.1.1.7 lineages. • **Methods**: Volunteers enrolled in phase II/III vaccine efficacy studies in the United Kingdom and randomised 1:1 to receive ChAdOx1 nCoV-19 or a MenACWY control vaccine, provided upper airway swabs every week during the trial and also if they developed possible symptomatic COVID-19 infection. Swabs were tested by nucleic acid amplification test (NAAT) for SARS-CoV-2, and positive samples were sequenced through the COVID-19Genomics UK consortium (COG UK). NAAT data were used to assess the duration of detectable viral RNA in diagnostic specimens and the viral load. Anti-spike IgG was measured by ELISA at baseline, 14 and 28 days after prime and 28 days after booster vaccination. Neutralizing antibody responses were measured using a live virus neutralisation assay against the B.1.1.7 and Victoria lineages of the virus. The efficacy analysis included symptomatic COVID-19 in seronegative participants with a NAAT positive swab more than 14 days after a second dose of vaccine. Participants were analysed according to treatment received, with data cut-off on Jan 14, 2021. Vaccine efficacy was calculated as 1 − relative risk derived from a robust Poisson regression model. This study is ongoing and is registered with ClinicalTrials.gov NCT04400838 and ISRCTN 15281137.5 • **Results**: Between 1 October 2020 and 14 January 2021, 499 participants developed COVID-19 infection. 1,524 NAAT positive nose/throat swabs were collected from these participants during the trial. Of these, 323 swabs from 256 participants were successfully sequenced.ChAdOx1 nCoV-19 recipients had a significantly lower viral load as represented by minimum PCR Ct value (p<0.0001) and were NAAT positive for a shorter time

Reference	Summary
	(p<0.0001) than participants who received the control vaccine. Virus neutralisation activity by vaccine-induced antibodies was 9-fold lower against the B.1.1.7 variant than against a canonical non-B.1.1.7 lineage. Vaccine efficacy against symptomatic NAAT positive infection was similar for B.1.1.7 and non-B1.1.7 lineages (74.6% [95%CI 41.6-88.9] and 84% [95% CI 70.7-91.4] respectively). There was no difference in anti-spike antibody titres between individuals who had received a prior ChAdOx1 vectored vaccine and those who were naïve to ChAdOx1. • **Conclusion**: Efficacy of ChAdOx1 nCoV-19 against the B.1.1.7 variant of SARS-CoV-2 is similar to the efficacy of the vaccine against other lineages. Furthermore, vaccination with ChAdOx1 nCoV-19 results in a reduction in the duration of shedding and viral load, which may translate into a material impact on transmission of disease.

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