



4/12/2021

COVID-19 Literature Review Group

Prepared by The Ohio State University

COVID-19 Variants,
Dining in Restaurants,
COVID and Indoor
Spaces, Antibody
Responses, and Studies
Overseas

ODH Literature Review Group
THE OHIO STATE UNIVERSITY

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COVID-19 Literature Review

Prepared by Eliana Burlotos, The Ohio State University

April 9, 2021

Topic: COVID-19 Variants

Title: Infection sustained by lineage B.1.1.7 of SARS-CoV-2 is characterized by longer persistence and higher viral RNA loads in nasopharyngeal swabs

Source: ScienceDirect

Publication Date: March 5, 2021

Link: <https://www.sciencedirect-com.proxy.lib.ohio-state.edu/science/article/pii/S1201971221002101>

Study Period: December 2020 to February 2021

Study Location: Abruzzo region in Italy

Sample Size: 1724 positive samples for SARS-CoV-2 RNA with S-negative readout pattern

Summary: This article discusses a surveillance plan for the SARS-CoV-2 B.1.1.7 lineage performed by the Istituto Zooprofilattico Sperimentale dell’Abruzzo e del Molise. Samples from Italy collected from December 2020 to February 2021 were analyzed. There were 313 B.1.1.7 cases found, which were then compared with 2364 non-B.1.1.7 cases for viral load (CtN) at first positive test. The means were not statistically significant (15.4 B.1.1.7 vs. 16.4 non-B.1.1.7), but the medians did show statistical significance (15.8 vs. 16.9). A smaller subset was used to analyze duration of positivity. Again, means were not statistically significant (17.4 days B.1.1.7 v. 17.1 days non-B.1.1.7), but medians were statistically significant (16.0 days v. 14.0 days.) Clinical data was available for a subset as well and showed similar clinical courses across both groups. Whether this study is clinically meaningful is a good question considering duration of positivity for both groups exceed current US isolation recommendations. There is no age data available for the cases included in this analysis.

Key Findings Relevant to Ohio’s Response: The B.1.1.7 variant is now the most dominant variant in the US. Thus, it is important to understand the variant in order to respond and reduce its disastrous effects. Perhaps different measures like instituting another stay-at-home order is necessary to reduce transmission of the B.1.1.7 variant.

COVID-19 Literature Review

Prepared by Elena McGoey, The Ohio State University

April 9, 2021

Topic: Dining in restaurants

Title: Probable airborne transmission of SARS-CoV-2 in a poorly ventilated restaurant

Source: *Building and Environment*

Publication: March 13, 2021

Link: <https://www.sciencedirect.com/science/article/pii/S0360132321001955>

Study Period: N/a

Study Location: Restaurant in Guangzhou, China

Sample Size: N/a

Summary: This study analyzed a COVID-19 outbreak involving 10 individuals from 3 families who all ate at the same restaurant on January 24, 2020. The average ventilation rate for the restaurant was 0.9 L/s per person. Review of video recordings and seating records revealed no close contact or fomite contact among the families. Analyses and computer simulations of airflow revealed that the distribution of infection followed a spread pattern typical of long-range exhaled virus-laden aerosol transmission. Airborne transmission of SARS-CoV-2 is possible under similar ventilation conditions in crowded spaces.

Key findings most relevant to Ohio's response: There is still debate concerning aerosol transmission of SARS-CoV-2, but this study confirms that airborne transmission is possible. Public spaces that are likely to become crowded may find this of interest and should maintain proper ventilation practices to reduce transmission via aerosols. Poor ventilation and air distribution can lead to outbreak, so businesses and other places where the public gathers in large numbers should ideally be held accountable to high ventilation standards. Sufficiently low occupancy remains of importance within buildings where people gather.

Title: Mask Mandates, On-Premises Dining, and COVID-19

Source: *JAMA*

Publication: April 1, 2021

Link: <https://jamanetwork.com/journals/jama/fullarticle/2778233>

Study Period: N/a

Study Location: N/a

Sample Size: N/a

Summary: State-issued mask mandates were associated with decreases in both daily COVID-19 case growth rates and death growth rates within 20 days of implementation. Allowing on-premises dining in restaurants was associated with increases in both daily COVID-19 case growth rates (41 to 100 days after implementation) and daily death growth rates (61 to 100 days after implementation). Since these trends reflect daily changes in rates, mask mandates and/or allowing on-premises restaurant dining can substantially affect the number of COVID-19 cases and deaths. Studies suggest that adopting mask mandates as a preventive measure can aid in counteracting anticipated growth in both COVID-19 cases and deaths due to re-opening of restaurants for dining.

Key findings most relevant to Ohio's response: This commentary provides a detailed account of how restaurants can modify their practices and safety measures to reduce the risk of transmission for patrons and staff of these restaurants; the suggestions in this commentary would be beneficial if distributed to restaurant staff and owners within Ohio for implementation. Policies that require universal mask use and/or restrict restaurant dining are anticipated to reduce community transmission and deaths and thus reduce local health system strains, and these preventive measures are especially important with the emergence of highly transmissible variants of SARS-CoV-2.

COVID-19 Literature Review

Prepared by Anjali Prabhakaran, The Ohio State University

April 11, 2021

Topic: COVID and Indoor Spaces

Title	Why indoor spaces are still prime COVID hotspots
Source	Nature
Publication Date	03/30/2021
Link	https://www.nature.com/articles/d41586-021-00810-9
Study Period	n/a
Study Location	United States
Sample Size	n/a
Summary	<p>Poor indoor ventilation remains a defining quality of COVID-19 hotspots. Recent outbreaks at gyms and bars, despite limited contact and social distancing measures, have highlighted the role that ventilation, or lack thereof, plays in the transmission of COVID-19. Indoor spaces with poor ventilation allow exhaled virus to accumulate and infect other individuals, even if they remain far from 'patient zero'. WHO's delayed acknowledgement that the COVID-19 virus is airborne, and the excess investment into surface decontamination by national governments (despite evidence indicating that it is rare for COVID-19 to be transmitted through surface decontamination) has led to few countries focusing on ventilation. Given that there are no clear standards set by WHO or ASHRAE regarding safe CO2 ppm levels or the number of air exchanges necessary to reduce infection risk, indoor ventilation must become a topic of focus in order to improve overall indoor environmental quality and reduce mortality rates for future pandemics.</p>
Key Findings Relevant to Ohio's Response	<p>Policymakers can use the information from this article to set new public health guidelines for indoor public spaces. As businesses and schools begin to open their doors again, it will be important to clearly communicate which safety precautions must be taken to prevent another COVID surge. Some of these precautions, as stated in the article, can include opening windows and improving ventilation.</p>

COVID 19 Literature Review

Prepared by Amanda Seiffert, The Ohio State University

April 9, 2021

Topic: Antibody Responses

Title: Systems Serology Detects Functionally Distinct Coronavirus Antibody Features in Children and Elderly

Source: Nature Communications

Publication Date: 04/01/2021

Link: <https://www.nature.com/articles/s41467-021-22236-7>

Study Period: N/A

Study Location: Australia

Sample Size: 287

Summary: This article investigates the mechanisms behind the higher Covid-19 mortality among elderly individuals compared to children. Moreover, researchers used systems serology to analyze antibody responses among 4 groups of people: pre-pandemic healthy children, adults, elderly, and Covid-19 patients. They discovered moderate levels of cross-reactive but non-neutralizing antibodies among healthy individuals prior to SARS-CoV-2 infection. They also discovered SARS-CoV-2 antigen-specific Fc receptors that accurately differentiated infected and healthy individuals. This led them to conclude that SARS-CoV-2 infection induces changes to Fc antibodies, enhancing the activity of Fc receptors. Additionally, researchers found distinct differences in immune responses between elderly and children. Furthermore, higher levels of cross reactive SARS-CoV-2 IgA and IgG were found within healthy elderly participants, but higher levels of SARS-CoV-2-IgM were found within healthy children. Researchers hold that this indicates higher polyreactive humoral immunity and stronger Fc responses within children.

Key Findings Relevant to Ohio's Response: This study indicates that children may have better antibody responses to SARS-CoV-2, resulting in milder illness. This pattern of illness severity has been long observed, and this study provides a potential explanation. It also further indicates the need for the prioritization of the elderly in vaccination programs.

Title: Antibody Responses to the BNT162b2 mRNA Vaccine in Individuals Previously Infected with SARS-CoV-2

Source: Nature Medicine

Publication Date: 04/01/2021

Link: <https://www.nature.com/articles/s41591-021-01325-6>

Study Period: N/A

Study Location: Southern California

Sample Size: 1,090

Summary: Researchers investigated the suggestion that a single dose of the Covid-19 vaccine would suffice for individuals with previous SARS-CoV-2 infection. In order to do so, they analyzed SARS-CoV-2 specific antibody responses following the administration of first and second dose vaccines to a large cohort of health care workers. Subsequently, they compared the responses between previously infected and non-infected individuals. More specifically, they used IgG(N) antibodies to identify immunity achieved through prior infection, but IgG(S-RBD) to denote immunity evoked from vaccination, as mRNA vaccines only elicit IgG(S-RBD) antibodies. They found that previously infected individuals had higher IgG(S-RBD) antibody levels during all time points. Interestingly, they also discovered that IgG(S-RBD) levels were only slightly lower in previously infected individuals who had not received any vaccine dose compared to never-infected individuals who had received one dose. Similarly, IgG(S-RBD) levels were not significantly different between previously-infected individuals with one dose and never-infected individuals with two doses.

Key Findings Relevant to Ohio's Response: The findings from this study indicate that one dose of the Pfizer mRNA vaccine for previously infected individuals elicits similar immunity as two doses for never-infected individuals. With many previously-infected individuals in the population, this study demonstrates the importance of administering at least

one dose to start with. Some countries have adopted a one dose approach, seeking to vaccinate as many people as possible with the first dose before considering the availability of second doses. Findings from this study indicate that such a strategy could be effective.

COVID-19 Literature Review

Prepared by Greta Warmbier, The Ohio State University

April 7, 2021

Topic: Norway Study of Household Attack Rate

Title: Attack rates amongst household members of outpatients with confirmed COVID-19 in Bergen, Norway: A case-ascertained study

Source: Science Direct

Publication Date: March 31, 2021

Link: <https://www.sciencedirect.com/science/article/pii/S2666776220300144>

Study Period: 2/28/2020 – 4/4/2020

Study Location: Bergen, Norway

Sample Size: 291

Summary:

The overall attack rate was 45% assessed by serology, and 47% when also including seronegative RT-PCR positives. Serology identified a higher number of infected household members than RT-PCR. Attack rates were equally high in children and young adults. The attack rate was 16% in asymptomatic household members and 42% in RT-PCR negative contacts. Older adults had higher antibody counts than younger adults. The risk of household transmission was higher when the index patient had fever or dyspnea during acute illness, but not having a cough.

This study was designed to estimate household attack rates based on the detection of SARS-CoV-2 specific antibodies in household members of RT-PCR confirmed index cases, in a low community spread setting (early in the pandemic, during the first wave and lockdown). Possible household clusters of 6 or 9 co-primary cases had symptom onset within 24 or 48 hours, respectively, after symptom onset in the index patient. Household size was not convincingly associated with household transmission. As only symptomatic people were tested, RT-PCR positivity amongst asymptomatic household members was not assessed.

Relevance to Ohio's COVID-19 Response:

Children are more susceptible to household transmission than previously reported and relying on RT-PCR for diagnosis may miss many infected children.

Topic: Church Study in Australia

Title: Epidemiologic Evidence for Airborne Transmission of SARS-CoV-2 during Church Singing, Australia, 2020

Source: CDC

Publication Date: June 2021 (early release)

Link: https://wwwnc.cdc.gov/eid/article/27/6/21-0465_article

Study Period: July 2020

Study Location: Sydney, Australia

Sample Size: n/a

Summary:

On July 18, 2020, the Western Sydney Public Health Unit was notified of a positive SARS-COV-2 test result for an 18-year-old man who had sought testing the day before, after learning of a SARS-COV-2 exposure at a venue he attended on July 11. He reported symptoms of malaise and headache on July 16 and cough and fever on July 17. He was a church chorist

and, during his infectious period had sung at four 1-hour services on July 15, 16, and 17. He had sung from a choir loft, elevated 3.5 m above the congregation, which he entered before and left after the service. He denied touching objects in the church or mixing with the general congregation. Video recordings of the services corroborated this. Initially, 10 other chorists and staff were classified as close contacts and required to quarantine. On July 19, the church informed the community about the case-patient. On July 20, the Western Sydney Public Health Unit was notified of 2 additional case-patients who reported attendance on July 15 and 16. Neither was known by the primary case-patient.

12 secondary case-patients among 508 service attendees were detected, yielding an overall secondary attack rate of 2.4% across the 4 services. Five case-patients attended only the service on July 15 and 7 attended only on July 16. One case-patient who attended on July 16 also attended on July 17; however, no case-patients were identified who attended only a service on July 17. Secondary case-patients showed development of symptoms 2–12 days after exposure. Five of the secondary case-patients were from the same households as earlier cluster case-patients. Thus, these case-patients might have been infected within the household rather than the church. No secondary case-patients reported other exposures outside these services. There were no deaths; 3 case-patients were hospitalized. Genome sequencing was performed for the primary case-patient and 10 secondary case-patients. These case-patients formed a single genomic cluster with a maximum of 2 nt changes from the SARS-CoV-2 genome of the primary case-patient.

The church was round, and pews were located circumferentially. The location of 10 of the 12-secondary case-patients were determined by using the recordings. All secondary case-patients sat within a 70° section, below and 1–15 m from the primary case-patient. The primary case-patient faced away from this area and used a microphone. None of the other choristers showed development of symptoms or tested positive. Use of masks was not in place. The church had a high conical roof, and the ventilation system at the apex was not in operation during the services. The doors and windows were largely closed, except as persons entered and exited, and the wall fans were off, meaning there was minimal ventilation.

A limitation was that most contacts were tested within a week of exposure, which could have been too early to detect some asymptomatic infections. Second, this investigation only provides circumstantial evidence of airborne transmission.

Relevance to Ohio's COVID-19 Response:

This cluster occurred despite adherence to guidelines requiring microphone use and a 3-m cordon around singers. Guidelines for places of worship were tightened after this cluster was detected, including increasing the distance required around a singer to 5 m. However additional mitigation measures might be necessary to prevent airborne infection during church services and singing, including increased natural or artificial ventilation, or moving activities outdoors.

