

The scientific literature on COVID-19 is rapidly evolving and these articles were selected for review based on their relevance to Washington State decision making around COVID-19 response efforts. Included in these Lit Reps are some manuscripts that have been made available online as pre-prints but have not yet undergone peer review. Please be aware of this when reviewing articles included in the Lit Reps.

Key Takeaways

- **Sequencing of SARS-CoV-2 genomes collected from testing facilities in the U.S. between December 2020 to January 2021 found multiple independent introductions of the B.1.1.7 variant into the U.S. by late November 2020, with community transmission leading to its spread to 30 or more states as of January 2021. [More](#)**
- **A systematic review and meta-analysis of remdesivir for the treatment of COVID-19 showed significant improvement in the 28-day recovery rate, need for low flow oxygen support through day 14, and mechanical ventilation or extracorporeal membrane oxygenation requirement through 14-28 days of follow-up among those receiving remdesivir. [More](#)**
- **A study using a live virus neutralization assay to compare potency of neutralization between people who had been infected with SARS-CoV-2 or had received the Moderna COVID-19 vaccine against a panel of SARS-CoV-2 variants showed that antibodies in sera from both groups were effective at neutralizing the B.1.1.7 variant. [More](#)**
- **Among healthcare workers who received a single dose of the Pfizer/BioNTech vaccine, those who had SARS-CoV-2 infection 30-60 days prior to vaccination (n = 36) had significantly higher antibody levels at 3 weeks post-vaccination than individuals with no prior infection (n = 152). [More](#)**

Non-Pharmaceutical Interventions

- An ecological study conducted from January-October 2020 found differences in median COVID-19 case rates (per 100,000) between states who adopted mask requirements “early” (before June 12, 15 states, rate = 5.7), “late” (after June 12, 19 states, rate = 5.59) or “never” (17 states, rate = 5.99). Models that controlled for confounders and interactions between mask requirement status and period showed lower rates in early vs. never adopter states (adjusted ratio of incidence rate ratios [aIARR]=0.15).

Rebeiro et al. (Feb 7, 2021). The Impact of State Mask-Wearing Requirements on the Growth of COVID-19 Cases in the United States. Clinical Infectious Diseases. <https://doi.org/10.1093/cid/ciab101>

Transmission

- *[Pre-print, not peer-reviewed]* A study of SARS-CoV-2 transmission in schools and daycare centers in Germany from August-December 2020 showed that the risk of infection among contacts of a confirmed COVID-19 case was low but varied depending on type of educational institution and whether the case was a teacher or student/child. Out of 784 index cases, one of six cases caused a transmission in educational institutions. Risk of transmission was higher among teachers than

students/children (IRR = 3.2), and among index cases in day-care centers than secondary schools (IRR = 3.2). In 748 index cases, teachers caused four times more secondary cases than children (IRR = 4.4), mainly attributed to transmission from teacher index case to teacher contact.

Schoeps et al. (Feb 8, 2021). COVID-19 Transmission in Educational Institutions August to December 2020 Rhineland-Palatinate Germany a Study of Index Cases and Close Contact Cohorts. Pre-print downloaded Feb 8 from <https://doi.org/10.1101/2021.02.04.21250670>

- A systematic review and meta-analysis of studies (n = 99) published through January 10, 2021 concluded that the average incubation period for SARS-CoV-2 was 6.4 days, with a range of 2.3 to 17.6 days. 23 cohort studies, 61 case series, and 15 modeling studies were included, most of which reported data from patients with SARS-CoV-2 infection in Asia.

Elias et al. (Feb 2021). Incubation Period of COVID-19: A Meta-Analysis. International Journal of Infectious Diseases. [https://www.ijidonline.com/article/S1201-9712\(21\)00081-3/fulltext](https://www.ijidonline.com/article/S1201-9712(21)00081-3/fulltext)

- *[Pre-print, not peer-reviewed]* A study investigating the potential of shared sporting equipment transmission vectors of SARS-CoV-2 during the reintroduction of sports found that it was unlikely that equipment is a major route of SARS-CoV-2 transmission. Ten different types of equipment were inoculated with 40µl droplets containing clinically relevant high and low concentrations of live SARS-CoV-2 virus. Materials were swabbed at different time points (1, 5, 15, 30, 90 minutes), and the amount of live SARS-CoV-2 recovered at each time point was recorded. At one minute, SARS-CoV-2 virus was recovered in 7/10 types of equipment with the low dose inoculum, while mean recovery of virus from the high dose inoculum fell from 0.74% at 1 minute to 0.39% at 15 minutes and to 0.003% at 90 minutes. Virus was less transferrable from materials such as a tennis ball, red cricket ball and cricket glove.

Edwards et al. (Feb 8, 2021). SARS-CoV-2 Transmission Risk from Sports Equipment (STRIKE). Pre-print downloaded Feb 8 from <https://www.medrxiv.org/content/10.1101/2021.02.04.21251127v1>

Geographic Spread

- *[Pre-print, not peer-reviewed]* Sequencing of 212 B.1.1.7 SARS-CoV-2 variant genomes collected from testing facilities in the U.S. between December 2020 to January 2021 found that while the proportion of B.1.1.7 variants among S gene target failure samples varied by state, detection of the variant had a doubling rate of a little over a week and an increased transmission rate of 35-45%. Multiple independent introductions of B.1.1.7 into the U.S. were observed as early as late November 2020, with onward community transmission enabling the variant to spread to 30 or more states as of January 2021.

Washington et al. (Feb 7, 2021). Genomic Epidemiology Identifies Emergence and Rapid Transmission of SARS-CoV-2 B.1.1.7 in the United States. Pre-print downloaded Feb 8 from <https://doi.org/10.1101/2021.02.06.21251159>

Testing and Treatment

- A study describing an electrochemical biosensor based on multiplex rolling circle amplification (RCA, in which a short DNA or RNA primer is amplified to make a long single strand) to detect the N and S genes of the SARS-CoV-2 virus showed that the assay could detect as few as 1 copy/microliter of the genes in under 2 hours. The sensor was evaluated with 106 clinical samples (41 from SARS-CoV-2 positive individuals and 9 from other respiratory viruses) and showed 100% concordance with qRT-PCR.

Chaibun et al. (Dec 5, 2021). Rapid Electrochemical Detection of Coronavirus SARS-CoV-2. Nature Communications. <https://doi.org/10.1038/s41467-021-21121-7>

- A study analyzing the genetic diversity of the RNA replication complex that is targeted by the antiviral drug remdesivir in a large set of human SARS-CoV-2 isolates (n > 90,000), including the

B.1.1.7 and 501.V2 variants and mink isolate (n>300) sequences, found that previously-identified amino acid substitutions that caused reduced susceptibility to remdesivir in-vitro were observed at very low frequencies (0.002%). There was low genetic variation in the complex in both humans and mink isolates. Furthermore, among the sequence variants observed in $\geq 0.5\%$ clinical isolates, none were located near the established polymerase active site or sites critical for remdesivir activity, suggesting low risk of pre-existing SARS-CoV-2 remdesivir resistance.

Martin et al. (Feb 2021). Genetic Conservation of SARS-CoV-2 RNA Replication Complex in Globally Circulating Isolates and Recently Emerged Variants from Humans and Minks Suggests Minimal Pre-Existing Resistance to Remdesivir. Antiviral Research. <https://doi.org/10.1016/j.antiviral.2021.105033>

- *[Pre-print, not peer-reviewed]* A prospective diagnostic evaluation of the field performance of the Abbott PanBio antigen test indicated that the assay reliably detected SARS-CoV-2 variant 501.V2 (lineage B.1.351) infections in patients presenting at mobile community testing centers in South Africa, with sensitivity strongly dependent on viral load (100% detection if cycle threshold (CT) was <20, 96% if CT was 20-25, 89% if CT was 26-30, and 64% if CT was 31-35). RT-PCR was performed on the original nasopharyngeal antigen swabs to evaluate test performance, and the antigen test had an overall sensitivity of 69.2% and specificity of 99.0% in this clinical context.

Akingba et al. (Feb 5, 2021). Field Performance Evaluation of the PanBio Rapid SARS-CoV-2 Antigen Assay in an Epidemic Driven by 501Y.v2 (Lineage B.1.351) in the Eastern Cape South Africa. Pre-print downloaded Feb 8 from <https://doi.org/10.1101/2021.02.03.21251057>

- *[Pre-print, not peer-reviewed]* A study evaluating an in-house, real-time RT-PCR (qPCR) assay to detect a SARS-CoV-2 variant with an S477N substitution in the receptor binding domain associated with increased binding affinity to ACE2 found that the assay reliably detected this variant. All 6 cDNA samples from the variant strains tested positive using the assay, whereas all 32 cDNA samples from other variants tested negative. In addition, 93% of respiratory samples identified by next-generation sequencing as containing the variant strain were positive and 0/26 samples containing non-variant strains were positive.

Bedotto et al. (Feb 8, 2021). Implementation of an In-House Real-Time Reverse Transcription-PCR Assay for the Rapid Detection of the SARS-CoV-2 Marseille-4 Variant. Pre-print downloaded Feb 8 from <https://doi.org/10.1101/2021.02.03.21250823>

- *[Pre-print, not peer-reviewed]* A meta-analysis of five peer-reviewed randomized controlled trials (n = 7,645 patients) of systemic corticosteroid treatment for COVID-19 showed no overall difference in survival among hospitalized patients who received systemic corticosteroid therapy compared to usual care or placebo (OR = 0.82, 95% CI 0.64 – 1.05). Subgroup analysis of 1,967 critically ill patients in the trials showed improved survival in patients who received systemic corticosteroid therapy (OR = 0.67, 95% CI 0.51 – 0.87). The authors note that 3 RCTs were terminated early due to the preliminary results from the RECOVERY trial, which likely impacted the analysis.

Robinson et al. (Feb 5, 2021). Impact of Systemic Corticosteroids on Hospitalized Patients with COVID-19 January 2021 Meta-Analysis of Randomized Controlled Trials. Pre-print downloaded Feb 8 from <https://doi.org/10.1101/2021.02.03.21251065>

- A systematic review and meta-analysis of remdesivir for the treatment of COVID-19 showed that data from randomized controlled trials (n=5 trials) indicated significant improvement in the 28-day recovery rate, need for low flow oxygen support through day 14, and mechanical ventilation or extracorporeal membrane oxygenation requirement through days 14 to 28 of follow-up in the remdesivir group. Data from non-randomized intervention studies (n=5 studies) showed significantly lower need for low flow oxygen support through days 14 to 28 in the remdesivir group, and lower risk of 28-day mortality. There were no significant differences between the 5- and 10-day remdesivir

courses, and the authors suggest that the 5-day regimen may provide similar benefits while causing fewer adverse reactions.

Rezagholizadeh et al. (Feb 2021). *Remdesivir for Treatment of COVID-19; an Updated Systematic Review and Meta-Analysis*. *European Journal of Pharmacology*. <https://doi.org/10.1016/j.ejphar.2021.173926>

Vaccines and Immunity

- A randomized controlled trial exposing participants to either misinformation or factual information about COVID-19 vaccines found that among people who at baseline stated they would definitely accept the vaccine, exposure to misinformation led to a 6.2 percentage point reduction in vaccine intent among participants in the UK and a 6.4 percentage point reduction among US participants. Before treatment allocation, as of September 2020, 54.1% of UK respondents and 42.5% of US respondents reported that they would 'definitely' accept a COVID-19 vaccine to protect themselves. Exposure to misinformation also differently impacted intent to vaccinate according to different socioeconomic factors.

Loomba et al. (Feb 5, 2021). *Measuring the Impact of COVID-19 Vaccine Misinformation on Vaccination Intent in the UK and USA*. *Nature Human Behaviour*. <https://doi.org/10.1038/s41562-021-01056-1>

- An online discrete choice experiment study enrolling participants in the UK (n = 1,501) to assess the relative impact of vaccine properties, delivery and media coverage on vaccine uptake showed that efficacy was the factor the most influential in uptake (OR = 2.8 for 90% efficacy versus 70% efficacy), and the positive effect of high efficacy was most pronounced among those aged 55 and older. Vaccination location was also important, with participants preferring local general practitioners over mobile vaccination units (OR = 0.8).

McPhedran and Toombs. (Mar 2021). *Efficacy or Delivery? An Online Discrete Choice Experiment to Explore Preferences for COVID-19 Vaccines in the UK*. *Economics Letters*. <https://doi.org/10.1016/j.econlet.2021.109747>

- [Pre-print, not peer-reviewed] Among healthcare workers who received a single dose of the Pfizer/BioNTech vaccine, those who had SARS-CoV-2 infection 30-60 days prior to vaccination (n = 36) had significantly higher antibody levels at 3 weeks post-vaccination than individuals with no prior infection (n = 152). After the first vaccine dose, both previously infected and uninfected individuals' antibody titers were enhanced to all proteins (S1, S2, RBD) with the exception of the nucleocapsid protein, which is not a vaccine antigen.

Bradley et al. (Feb 5, 2021). *Antibody Responses Boosted in Seropositive Healthcare Workers after Single Dose of SARS-CoV-2 MRNA Vaccine*. Pre-print downloaded Feb 8 from <https://doi.org/10.1101/2021.02.03.21251078>

- [Pre-print, not peer-reviewed] A study using a live virus neutralization assay to compare potency of neutralization between people who had been infected with SARS-CoV-2 or had received the Moderna COVID-19 vaccine against a panel of SARS-CoV-2 variants showed that antibodies in sera from both groups were effective at neutralizing the B.1.1.7 variant. Serum neutralization titers were measured using a live-virus Focus Reduction Neutralization Test (FRNT) assay and compared between the B.1.1.7 variant and a non-variant strain among acutely infected COVID-19 patients ($R^2 = 0.7971$), convalescent individuals ($R^2 = 0.8092$), and vaccinated individuals ($R^2 = 0.7639$).

Edara et al. (Feb 5, 2021). *Infection and MRNA-1273 Vaccine Antibodies Neutralize SARS-CoV-2 UK Variant*. Pre-print downloaded Feb 8 from <https://doi.org/10.1101/2021.02.02.21250799>

Modeling and Prediction

- [Pre-print, not peer-reviewed] Using an agent-based modeling approach integrating social contact networks in Virginia, spatiotemporal surveillance data on COVID-19 cases, and models of within- and

between-host disease dynamics, Chen et al. showed that vaccine allocation based on the number of an individuals' social contacts and total social proximity time was significantly more effective at reducing the number of infections, hospitalizations, and deaths than the current age-based strategy. The model suggests that by March 31, 2021, compared to age-based allocation, the proposed degree-based strategy could reduce an additional 56–110k infections, 3.2–5.4k hospitalizations, and 700–900 deaths in Virginia, or 3–6 million fewer infections, 181–306k fewer hospitalizations, and 51–62k fewer for the entire US. The strategy was robust even if social contacts were not estimated correctly, vaccine efficacy was lower than expected, or only a single dose was given, or if there was a delay in vaccine production and deployment.

Chen et al. (Feb 6, 2021). Prioritizing Allocation of COVID-19 Vaccines Based on Social Contacts Increases Vaccination Effectiveness. Pre-print downloaded Feb 8 from <https://doi.org/10.1101/2021.02.04.21251012>

Other Resources and Commentaries

- [How to Vaccinate the World against Covid-19](#) – BMJ (Feb 5 2021)
- [Cross-Reactivity of SARS-CoV Structural Protein Antibodies against SARS-CoV-2](#) – Cell Reports (Jan 2021)
- [Understanding Variants of SARS-CoV-2](#) – The Lancet (Feb 2021)
- [A First Draft of the History of Treating Coronavirus Disease 2019: Use of Repurposed Medications in United States Hospitals](#) – Open Forum Infectious Diseases (Feb 1 2021)
- [Evaluation of Individual and Ensemble Probabilistic Forecasts of COVID-19 Mortality in the US](#) – MedRxiv (Feb 5 2021)
- [Summary of Adverse Drug Events for Hydroxychloroquine, Azithromycin, and Chloroquine during the COVID-19 Pandemic](#) – Journal of the American Pharmacists Association : JAPhA (Jan 2021)
- [How Scientists Are Fighting the Novel Coronavirus: A Three Minute Guide](#) – Nature (Feb 7 2021)
- [Inclusion of Pregnant Individuals among Priority Populations for COVID-19 Vaccination for All 50 US States](#) – American Journal of Obstetrics and Gynecology (Feb 2021)
- [Could Mixing COVID Vaccines Boost Immune Response?](#) – Nature (Feb 4 2021)
- [COVID-19 Antibody Tests and Their Limitations](#) – ACS Sensors (Feb 2021)
- [Monoclonal Antibodies for COVID-19](#) – JAMA (Feb 5 2021)
- [Avoiding a Legacy of Unequal Non-Communicable Disease Burden after the COVID-19 Pandemic](#) – The Lancet Diabetes & Endocrinology (Feb 2021)
- [What's the Risk of Dying from a Fast-Spreading COVID-19 Variant?](#) – Nature (Feb 5 2021)
- [Mental Health, COVID-19, and the Invisible Pandemic on the Horizon](#) – Mayo Clinic Proceedings (Feb 2021)
- [Pandemic Precarity: COVID-19 Is Exposing and Exacerbating Inequalities in the American Heartland](#) – Proceedings of the National Academy of Sciences of the United States of America (Feb 2021)
- [Coronapod: Variants – What You Need to Know](#) – Nature (Feb 5 2021)
- [Introduction of Brazilian SARS-CoV-2 484K.V2 Related Variants into the UK](#) – Journal of Infection (Feb 2021)
- [WHO Team Begins COVID-19 Origin Investigation](#) – The Lancet (Feb 2021)

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