



2019-nCoV Literature Situation Report (Lit Rep)

May 26, 2020

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

- **A double-blind randomized trial found that remdesivir use in hospitalized adult COVID-19 patients results in faster recovery. There was non-significant evidence of lower mortality by 14 days.**
- **A literature review found that fetal distress, premature rupture of membranes, and preterm labor were the most common obstetric complications among women with SARS-CoV-2 infection.**
- **Hierarchical clustering of COVID-19 patients based on clinical and laboratory results identified five clusters that successfully group those at highest and lowest risk of severe disease and death.**
- **A risk score tool identifies members of the general population at high risk of severe COVID-19 disease or death with high sensitivity while resulting in half the number classified as high risk by CDC criteria. This would enable improved targeting with minimal loss of sensitivity.**
- **A longitudinal cohort study in Washington State found the age distribution of cases to be decreasing, with fewer cases in older age groups over time, but without similar declines in younger age groups.**
- **A county-level analysis in New England, New York, and California classified super-spreader business types and found a positive association between density of such businesses and COVID-19 incidence.**
- **67% of US participants in an online survey reported they would accept a COVID-19 vaccine. Acceptance varied by demographic and socioeconomic factors and geographically.**
- **Modeling based on seroprevalence studies found that in the presence of a large amount of asymptomatic transmission, controlling the COVID-19 outbreak will require continued social distancing and behavioral changes, in addition to isolation and contact tracing**

Transmission

- *[pre-print, not peer reviewed]* While there is no evidence to suggest household pets can infect humans with COVID-19, there is mounting evidence that transmission from humans to pets occurs. Across 17 case reports on confirmed SARS-CoV-2 infection in animals as of May 15, all but two animals had recovered fully and had only mild respiratory or digestive symptoms. Data from probable cat-to-cat transmission in Wuhan, China estimated the R_0 to be 1.09 (95% CI 1.05, 1.13); this is much lower than the value for humans, suggesting transmission from cats is less important than that from humans.

Akhmetzhanov et al. (May 25, 2020). Rising Evidence of COVID-19 Transmission Potential to and between Animals Do We Need to Be Concerned. Pre-print downloaded May 26 from

<https://doi.org/10.1101/2020.05.21.20109041>



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Testing and Treatment

- *[pre-print, not peer reviewed]* A meta-analysis of 22 studies comprising 650 COVID-19 patients found that the duration of positive detection of SARS-CoV-2 following symptom onset among mild cases was 12.1 days in samples from the upper respiratory tract (URT), 24.1 days in samples from the lower respiratory tract (LRT), and 15.5 days in fecal samples. Differences in the duration of viral detection between mild and moderate-severe patients are limited in the LRT, but there is an indication of longer duration of viral detection in feces and the URT for moderate-severe patients. Findings are similar in children with mild symptoms.

Weiss et al. (May 23, 2020). *Spatial and Temporal Dynamics of SARS-CoV-2 in COVID-19 Patients A Systematic Review*. Pre-print downloaded May 26 from

<https://doi.org/10.1101/2020.05.21.20108605>

- A double-blind, randomized, placebo-controlled trial of IV remdesivir (200mg on day 1, then 100mg daily for up to 9 days) in adults hospitalized with COVID-19 with evidence of lower respiratory tract involvement (n=1,059) found that, compared to placebo, recovery was 32% faster in those who received remdesivir (95%CI 12% to 55%; median recovery time 11 vs 15 days).
- Though not statistically significant, Remdesivir treatment was associated with a slower time to mortality (HR 0.70, 95%CI 0.47 to 1.04 and mortality by 14 days (7.1% vs 11.9%). Serious adverse events were reported in 21.1% of patients in the remdesivir group and 27% of patients in the placebo group.

Beigel et al. (May 22, 2020). *Remdesivir for the Treatment of Covid-19 - Preliminary Report*. *The New England Journal of Medicine*. <https://doi.org/10.1056/NEJMoa2007764>

Vaccines

- *[pre-print, not peer reviewed]* Out of 672 US adults surveyed during an online platform in May 2020, 450 (67%) said they would accept a COVID-19 vaccine if recommended for them. A greater acceptance the vaccine was found among males (72% vs 63%), adults older than 55 (78% vs 56-64%), Asians (81% vs 40-74%), and college and/or graduate degree holders (75% vs 51-63%). Acceptance of a COVID-19 vaccine was generally higher than for an influenza vaccine. Among respondents from Department of Health and Human Services regions 2 (New York) and 5 (Chicago), there was less than 50% COVID-19 vaccine acceptance.

Malik et al. (May 24, 2020). *Determinants of COVID-19 Vaccine Acceptance in the U.S.* Pre-print downloaded May 26 from <https://doi.org/10.1101/2020.05.22.20110700>

- A phase 1 trial of an adenovirus type-5 vectored COVID-19 vaccine expressing the spike glycoprotein of SARS-CoV-2 was conducted in Wuhan, China (dose-escalation, single-center, open-label, non-randomized). Thirty-six participants received each dose of the vaccine (low, middle, high). At least one adverse reaction within 7 days of vaccination was reported in 83% of participants in the low-dose group, 83% in the middle-dose group, and 75% in the high-dose group, including pain (54%), fever (46%), fatigue (44%), headache (39%) and muscle pain (17%). No serious adverse events were noted within 28 days post-vaccination.
- ELISA antibodies and neutralizing antibodies increased significantly at day 14, and peaked 28 days post-vaccination. Specific T-cell response peaked at day 14 post-vaccination.

Zhu et al. (May 2020). *Safety, Tolerability, and Immunogenicity of a Recombinant Adenovirus Type-5 Vectored COVID-19 Vaccine: A Dose-Escalation, Open-Label, Non-Randomised, First-in-Human Trial*. *Lancet*. [https://doi.org/10.1016/S0140-6736\(20\)31208-3](https://doi.org/10.1016/S0140-6736(20)31208-3)

Clinical Characteristics and Health Care Setting

- Out of over 9 million healthcare plan enrollees in northern California, southern California, and Washington State, the cumulative incidence of first hospital admission for COVID-19 by April 22 was 15.6 per 100,000 persons in northern California, 23.3 per 100,000 persons in southern California, and 14.7 per 100,000 persons in Washington.
- Median duration of hospital stay was 9.3 days among survivors and 12.7 days among non-survivors. Probability of ICU admission was 48.5% for male patients and 32% for female patients and median duration of ICU stay was 10.6 days.
- Case fatality among admitted patients was 23.5% among male patients and 14.9% among female inpatients, with case fatality increasing by age for both sexes.
- The reproductive number declined during the study period in each region.

Lewnard et al. (May 22, 2020). *Incidence, Clinical Outcomes, and Transmission Dynamics of Severe Coronavirus Disease 2019 in California and Washington: Prospective Cohort Study*. *BMJ*. <https://doi.org/10.1136/bmj.m1923>

- A descriptive study of all laboratory-confirmed COVID-19 adult patients admitted to an academic medical center in Seattle, WA between March 2 and March 26, 2020 (n=105) found that 35% were admitted from a senior home or skilled nursing facility. Median age was 69 years and half were women. Three or more comorbidities were present in 55% of patients, and 63% had symptoms for 5 or more days prior to admission. Only 39% had fever in the first 24 hours, while 41% had hypoxia at admission and 73% had low lymphocytes. Severe disease occurred in 49%, 18% received mechanical ventilation, and overall case fatality was 33%. No co-infections with other viruses were identified in a subset of 50 samples.

Buckner et al. (May 2020). *Clinical Features and Outcomes of 105 Hospitalized Patients with COVID-19 in Seattle, Washington*. *Clinical Infectious Diseases: An Official Publication of the Infectious Diseases Society of America*. <https://doi.org/10.1093/cid/ciaa632>

- A systematic literature review that included 9 studies corresponding to 89 pregnant women with SARS-CoV-2 infection and their neonates found low-grade fever and cough were the predominant symptoms, and that fetal distress, premature rupture of membranes, and preterm labor were the most common prenatal complications. Two women required ICU admission and ventilation, and one developed multi-organ dysfunction. No maternal deaths were observed at study publication, and no fetal infections through vertical transmission were documented.

Muhidin et al. (2020). *Analysis of Maternal Coronavirus Infections and Neonates Born to Mothers with 2019-NCoV; a Systematic Review*. *Archives of Academic Emergency Medicine*. PMID: [PMCID: PMC7211430](https://pubmed.ncbi.nlm.nih.gov/3211430/)

- PCR tests on nasopharyngeal and anal swabs from 60 patients who had been hospitalized for COVID-19 found evidence of persistent viral shedding following discharge. Samples were collected 4-24 days after index hospital discharge and 10 out of 60 patients had positive results (16.7%; 5 nasopharyngeal and 6 anal). None of these patients had clinical symptoms of COVID-19 at the time of sample collection except for occasional cough in two patients older than 70 with multiple comorbidities; one such patient was PCR positive by both samples 56 days after illness onset.

Wu et al. (May 22, 2020). Coronavirus Disease 2019 Test Results After Clinical Recovery and Hospital Discharge Among Patients in China. *JAMA Network Open*.

<https://doi.org/10.1001/jamanetworkopen.2020.9759>

- [pre-print, not peer reviewed] Comparing clinical and laboratory results from 719 influenza and 973 COVID-19 patients from January to April, using parameters that are most significantly different between COVID-19 and influenza, COVID-19 patients were sub-classified into 5 clusters through a hierarchical clustering analysis. Risk stratification of these clusters using medical record review found that the highest-risk cluster had a 27.8% case fatality, 94% ICU admission, 94% intubation, and 28% discharge rates (vs. 0%, 38%, 22%, and 88% in the lowest risk cluster).

Mei et al. (May 22, 2020). Risk Stratification of Hospitalized COVID-19 Patients through Comparative Studies of Laboratory Results with Influenza. Pre-print downloaded May 26 from <https://doi.org/10.1101/2020.05.18.20101709>

Modeling and Prediction

- [pre-print, not peer reviewed] Peirlinck et al. used reported symptomatic case data, antibody seroprevalence studies, a mathematical epidemiology model, and a Bayesian framework to infer the epidemiological characteristics of COVID-19 and predict R_t . This approach found outbreak dynamics to be sensitive to R_t , the ratio of symptomatic to asymptomatic populations, and the infectious periods of both groups.
- For three locations for which seroprevalence data are available, this model estimated the proportion of the population that has been infected and recovered by May 13 to be 6.2% (Santa Clara, CA), 22.7% (New York, NY) and 20.5% Heinsberg (Germany).

Peirlinck et al. (May 26, 2020). Visualizing the Invisible: The Effect of Asymptomatic Transmission on the Outbreak Dynamics of COVID-19. Pre-print downloaded May 26 from <https://doi.org/10.1101/2020.05.23.20111419>

- [pre-print, not peer reviewed] Dagan et al. used retrospective data from all COVID-19 patients diagnosed by April 1, 2020 in a large healthcare organization (n=2,421) to develop a tool that sums over 10 risk factors to predict risk of severe COVID-19 illness or death (basic risk, high risk, very high risk). The risk score had similar sensitivity to detect severe cases of COVID-19 disease compared to the CDC criteria (92% versus 96%) but resulted in far fewer members of the general population who would be classified as being at high risk of COVID-19 disease. Such a risk score could enable better targeting of risk mitigation strategies while planning a lockdown exit strategy.

Dagan et al. (May 23, 2020). A Score-Based Risk Model for Predicting Severe COVID-19 Infection as a Key Component of Lockdown Exit Strategy. Pre-print downloaded May 26 from <https://doi.org/10.1101/2020.05.20.20108571>

- [pre-print, not peer reviewed] Zou et al. propose the SuEIR model, which extends the SEIR model by accounting for untested/unreported cases of COVID-19, and train this model using machine learning algorithms. Forecasts from the model predict the peak dates of the outbreak in the US (June 1), New York State (May 10), and California (July 1). Estimated basic reproduction numbers (R_0) are 2.5 for the US, 3.6 for New York, and 2.2 for California. Results for all states: <https://covid19.uclaml.org>. These predictions have been adopted by the CDC for COVID-19 death forecasts.

Zou et al. (May 25, 2020). Epidemic Model Guided Machine Learning for COVID-19 Forecasts in the United States. Pre-print downloaded May 26 from <https://doi.org/10.1101/2020.05.24.20111989>

Public Health Policy and Practice

- *[pre-print, not peer reviewed]* A longitudinal cohort study found that from March 1 to April 19, 2020, the age distribution of confirmed COVID-19 cases in Washington State shifted, with a 10% decline in cases 60 years or older and a 20% increase in cases 0-39 years old. After the peak (March 22), there was no decline among cases 0-19 years old, and the decline among ages 20-39 was less than older age groups. A targeted approach for awareness and safety measures is advisable as states and counties enter phased re-opening lead to an increase in non-essential work and social activities.
Malmgren et al. (May 23, 2020). COVID-19 Confirmed Case Incidence Age Shift to Young Persons Age 0-19 and 20-39 Years Over Time Washington State March - April 2020. Pre-print downloaded May 26 from <https://doi.org/10.1101/2020.05.21.20109389>
- *[pre-print, not peer reviewed]* O'Donoghue et al. classified businesses by their transmission risk based on the frequency and duration of visits and square footage of businesses pre-pandemic (2019) in 8 states (New England, New York, California). Using this information they classified businesses as potential "super-spreaders." In a county-level analysis they quantified the relationship between the density of super-spreader businesses and COVID-19 cases and found a 1% higher density of super-spreader businesses was associated with a 5% higher rate of COVID-19 cases after controlling for population density and demographic variables.
O'Donoghue et al. (May 25, 2020). Super-Spreader Businesses and Risk of COVID-19 Transmission. Pre-print downloaded May 26 from <https://doi.org/10.1101/2020.05.24.20112110>

Other Resources and Commentaries

- [Peer Influence in Adolescence: Public-Health Implications for COVID-19.](#) – Trends in Cognitive Sciences
- [Labor and Delivery Visitor Policies During the COVID-19 Pandemic: Balancing Risks and Benefits.](#) – JAMA (May 22)
- [Dynamics of Population Immunity Due to the Herd Effect in the COVID-19 Pandemic](#) – vaccines (April 23)
- [Translating Science on COVID-19 to Improve Clinical Care and Support the Public Health Response](#) – JAMA (May 22)
- [Nursing Home Care in Crisis in the Wake of COVID-19](#) – JAMA (May 22)
- [Study on the expression levels of antibodies against SARS-CoV-2 at different period of disease and its related factors in 192 cases of COVID-19 patients](#) – pre-print (May 26)
- [Clinical Characteristics of COVID-19 Infection in Newborns and Pediatrics: A Systematic Review](#) – Archives of Academic Emergency Medicine
- [A future vaccination campaign against COVID-19 at risk of vaccine hesitancy and politicisation](#) – Lancet Infectious Diseases (May 20)
- [The transmission of SARS-CoV-2 is likely comodulated by temperature and by relative humidity](#) – pre-print (May 26)
- [Meteorological Conditions and Covid-19 in Large U.S. Cities](#) – pre-print (May 22)
- [Prevalence of SARS-CoV-2 infection among asymptomatic healthcare workers in greater Houston: a cross-sectional analysis of surveillance data from a large healthcare system](#) – pre-print (May 25)

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