



2019-nCoV Literature Situation Report (Lit Rep)

April 20, 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

- ② **Another study finds no mother-to-child transmission of SARS-CoV-2 during breastfeeding, and suggests that the benefits of breastfeeding may outweigh the risk of infection.**
- ② **A study that tested the diagnostic value of ELISA and 9 commercially available lateral flow immunoassay (LFIA) devices in detecting SARS-CoV-2 antibodies found LFIA devices to be inadequate for most individual-level applications.**
- ② **A study suggests that recovered patients may still be carriers and could require an additional round of testing and isolation.**
- ② **A simulation study reports on optimal rotation of schedules for inpatient physicians and nurses, determining that rotations of at least 3 consecutive days and longer nursing shifts can reduce risk of HCW-to-patient, patient-to-HCW, and HCW-HCW transmission.**

Transmission

- Yang et al conduct a systematic review of case reports and series involving a total of 16 mothers with COVID-19 and 42 mothers with influenza to investigate mother-to-child transmission of SARS-Cov-2 during breastfeeding and conclude that current evidence indicates that SARS-CoV-2 viral nucleic acid has not been detected in breast milk.
- Based on these findings, the benefits of breastfeeding may outweigh the risk for SARS-CoV-2 infection in infants, however mothers with COVID-19 should take appropriate precautions to reduce the risk of transmission via droplets and close contact during breastfeeding.
Yang et al. (Apr 19, 2020). Breastfeeding of Infants Born to Mothers with COVID-19: A Rapid Review. Pre-print downloaded Apr 20 from <https://doi.org/10.1101/2020.04.13.20064378>
- Setti et al share some preliminary evidence that SARS-CoV-2 RNA can be present on outdoor particulate matter (PM), indicating that the persistence of SARS-CoV-2 may be enhanced in conditions of atmospheric stability and high concentrations of PM. Further studies to assess the vitality and virulence of SARS-CoV-2 when adsorbed on PM are needed and correlations between viral presence on PM and COVID-19 transmissibility cannot be made at this time.
Setti et al. (Apr 18, 2020). SARS-CoV-2 RNA Found on Particulate Matter of Bergamo in Northern Italy: First Preliminary Evidence. Pre-print downloaded Apr 20 from <https://doi.org/10.1101/2020.04.15.20065995>

Geographic Spread

- Using data on daily reported new cases and population movement during the month of January, Liu et al observe a significant positive association between population movement and the number of COVID-19 cases. Spatial distribution of cases indicate that some areas with large outflow (i.e. Henan and Hunan) might have been underestimated in disease spread.
- The authors highlight that the policy of city closure was effective in controlling the epidemic in China, which could have implications for cities in the U.S. with high burden of disease and a high level of outflow.

Liu et al. (Apr 17, 2020). Population movement, city closure in Wuhan and geographical expansion of the 2019-nCoV pneumonia infection in China in January 2020. Clin Infect Dis. <https://doi.org/10.1093/cid/ciaa422>

Testing and Treatment

- Recognizing the need for robust antibody detection testing, Crook tested plasma for SARS-CoV-2 IgM and IgG antibodies by ELISA and 9 different commercially available lateral flow immunoassay (LFIA) devices. ELISA has a sensitivity of 85% (34/40) ≥ 10 after symptom onset and a specificity of 100% (142/142), whereas the performance of LFIA was much lower with point estimates for sensitivity ranging from 55-70% and specificity from 95-100%.
- If antibody tests are deployed as an individual-level approach to inform release from quarantine, then high-specificity is essential, as false-positive results return non-immune individuals to risk of exposure. The author concludes that LFIA devices may be useful for population-level surveys, but are currently inadequate for individual patient applications.

Crook (Apr 20, 2020). Evaluation of antibody testing for SARS-CoV-2 using ELISA and lateral flow immunoassays. Pre-print downloaded Apr 20 from <https://doi.org/10.1101/2020.04.15.20066407>

- To assess the spectrum of symptoms at onset of illness among 48 healthcare personnel (HCP) in King County and to evaluate current screening criteria for early detection of COVID-19, the authors find that screening for only fever, cough, shortness of breath or sore throat may have missed 17% of symptomatic HCP, while expanding criteria to include symptoms of muscle aches and chills may still have missed 10%.
- Some intervention to prevent transmission from HCP include expanding symptoms-based screening criteria, furloughing symptomatic HCP, facilitating testing of symptomatic HCP, face mask use by all HCP, and creating sick leave policies that are non-punitive, flexible, and consistent with public health guidance.

Chow et al. (Apr 17, 2020). Symptom Screening at Illness Onset of Health Care Personnel With SARS-CoV-2 Infection in King County, Washington. JAMA. <https://jamanetwork.com/journals/jama/fullarticle/2764953>

- Long et al compared the diagnosis value of CT vs real-time RT-PCR (rRT-PCR) in 36 patients, reporting sensitivities of 97.2% and 83.3%, respectively, at the time of initial testing. Six patients were missed in the first round of rRT-PCR, indicating that this method may produce initial false negative results. The authors suggest that patients with typical CT findings of COVID-19 infection but negative rRT-PCR results should be isolated and rRT-PCR should be repeated to avoid misdiagnosis.

Long et al. (Mar 25, 2020). Diagnosis of the Coronavirus disease (COVID-19): rRT-PCR or CT? Eur J Radiol. <https://doi.org/10.1101/2020.04.15.20066407>

Clinical Characteristics and Health Care Setting

- This study found evidence of COVID-19 infection in the nervous, digestive, reproductive, respiratory, circulatory and urine systems using scRNA-Seq data collected from 31 organs from 9 major human systems. The lungs, large intestine, fallopian tube and nose were found to be the most susceptible organs, indicating that SARS-CoV-2 mainly attacks the respiratory, digestive and reproductive systems.
- Studying viral susceptibility of multiple organs can aid clinical diagnosis and treatment of patients and contribute to a deeper understanding of viral pathogenesis.

Qi et al. (Apr 18, 2020). The scRNA-seq expression profiling of the receptor ACE2 and the cellular protease TMPRSS2 reveals human organs susceptible to COVID19 infection. Pre-print downloaded Apr 20 from <https://doi.org/10.1101/2020.04.16.045690>

- Ye et al reviewed clinical and lab records, and chest CT scans for 55 patients with lab-confirmed COVID-19 pneumonia admitted to a hospital in Wuhan, 5 of whom presented with SARS-CoV-2 reactivation after hospital discharge. The time from SARS-CoV-2 negative to positive ranged from 4 to 17 days, suggesting that recovered patients may still be carriers and require an additional round of testing and isolation.
- While the results should be interpreted with caution given the small sample size, the findings are important to understand the clinical characteristics and SARS-CoV-2 reactivation potential in COVID-19 patients.

Ye et al. (Mar 20, 2020). Clinical characteristics of secure acute respiratory syndrome coronavirus 2 reactivation. Journal of Infection. <https://doi.org/10.1016/j.jinf.2020.03.001>

Modeling and Prediction

- Using available clinical data, Hu et al developed a machine learning model to predict the outcomes of COVID-19 patients early on, in which the individual risk score based on the four selected variables (age, high-sensitivity C-reactive protein level, lymphocyte count and d-dimer level) and the corresponding probability of death can be used to assess the mortality risk of COVID-19 patients.
- The authors provide a web link to their predictive model, and suggest its use by clinicians who can determine appropriate interventions early on to improve patient outcomes.

Hu et al. (Apr 19, 2020). Early prediction of mortality risk among severe COVID-19 patients using machine learning. Pre-print downloaded Apr 20 from <https://doi.org/10.1101/2020.04.13.20064329>

Public Health Policy and Practice

- Kluger et al modeled various inpatient rotation schedules of physicians and nurses to determine patterns associated with optimal workforce preservation and lower nosocomial infections in settings with inadequate PPE availability. Results from Monte-Carlo simulations showed that alternative staffing methods, in which groups of physicians and nurses share rotations that are at least 3 consecutive days and longer nursing shifts (12 versus 8 hours) led to better team outcomes.

Kluger et al. (Apr 18, 2020). Impacts of healthcare worker shift scheduling on workforce preservation during the COVID-19 pandemic. Pre-print downloaded Apr 20 from <https://doi.org/10.1101/2020.04.15.20061168>

Other Resources and Commentaries

- [Clinical Characteristics of Covid-19 in New York City](#)—NEJM (Apr 17)

- This retrospective case series describes demographic and baseline health data and disease progression and outcomes of 393 patients from two NYC hospitals, and compares findings to a large case series from China.
- [Expert consensus for managing pregnant women and neonates born to mothers' with suspected or confirmed novel coronavirus infection](#)—Intl J Gynecol Obstet (Apr 1)
- [Occupational skin disease among health care workers during the coronavirus epidemic](#)—J Am Acad Dermatol (Mar 18)
 - The authors highlight that skin disease accounts for a large proportion of occupational injury and days lost from work among healthcare workers, and provide some interventions and suggestions to preserve the workforce.
- [International Electronic Health Record-Derived COVID-19 Clinical Course Profile: The 4CE Consortium](#) – MedRxiv (Apr 18)
 - Efforts by an international community of researchers to answer critical clinical and epidemiological questions around COVID-19 are described here.