2019-nCoV Literature Situation Report (Lit Rep)

June 1, 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

- **Better ventilation substantially reduces the amount of time respiratory droplets are airborne. This has potential implications for recommendations regarding avoidance of poorly ventilated public spaces and for hospitals to improve ventilation in settings where aerosolization by coughing and close contact with COVID-19 patients is common.**
- **Two subsequent generations of SARS-CoV-2 transmission were identified from persons attending a mass gathering, raising the question of whether testing participants at similar events before cases are identified could prevent additional transmission.**
- **The first case of detectable SARS-CoV-2 RNA in human breastmilk was reported. The significance of this finding regarding the risk of mother-to-child transmission is uncertain given that detectable RNA does not necessarily indicate viable virus.**
- **A multicenter study found no evidence that cancer patients on anticancer treatment are at increased risk of mortality from COVID-19. This raises the possibility that withholding effective cancer treatments may increase risk of cancer morbidity and mortality with no benefit of decreased COVID-19 mortality.**

Non-Pharmaceutical Interventions

- Daughton described the Wastewater-Based Epidemiology (WBE) method as a potential tool for containing and mitigating COVID-19 outbreaks. WBE measures chemical signatures in sewage, such as fragment biomarkers from the SARS-CoV-2, by applying clinical diagnostic testing to the collective signature of entire communities.

  Daughton. (May 20, 2020). Wastewater Surveillance for Population-Wide Covid-19: The Present and Future. The Science of the Total Environment. https://doi.org/10.1016/j.scitotenv.2020.139631

Transmission

- A hamster SARS-CoV-2 model experiment reported the effect of adding a partition that simulates a surgical mask on transmission between hamsters in separate cages with unidirectional airflow. In the absence of a mask partition, 67% (10 of 15) of exposed hamsters became infected. Adding the surgical mask partition reduced transmission to between 17 and 25%, depending on configuration.

  Chan et al. (May 30, 2020). Surgical Mask Partition Reduces the Risk of Non-Contact Transmission in a Golden Syrian Hamster Model for Coronavirus Disease 2019 (COVID-19). Clinical Infectious Diseases. https://doi.org/10.1093/cid/ciaa644

- He et al. performed a meta-analysis of 22 studies that evaluate measures of COVID-19 dynamics and estimated the basic reproduction number (R_0) to be 3.15 (95% CI 2.41, 3.90), the average incubation time to be 5.08 days (4.77, 5.39), the asymptomatic infection rate to be 46% (18.48%, 73.60%), and the case fatality rate to be 2.72% (1.29%, 4.16%) when asymptomatic infections are included.

  He et al. (May 29, 2020). Estimation of the Basic Reproduction Number, Average Incubation Time, Asymptomatic Infection Rate, and Case Fatality Rate for COVID-19: Meta-Analysis and Sensitivity Analysis. Journal of Medical Virology. https://doi.org/10.1002/jmv.26041

- Somsen et al. use an experimental system with healthy volunteers to examine the number, size, and persistence of respiratory droplets produced during a cough, sneeze, and normal talking. Small droplets of the size potentially associated with aerosol transmission of SARS-CoV-2 persisted up to 9 minutes. Increasing ventilation through mechanical systems and opening a door or a window substantially decreased the persistence of droplets. These findings support improving ventilation for public spaces to clear potentially infectious aerosols

  Somsen et al. (May 27, 2020). Small Droplet Aerosols in Poorly Ventilated Spaces and SARS-CoV-2 Transmission. The Lancet Respiratory Medicine. https://doi.org/10.1016/S2213-2600(20)30245-9

- Tam et al. reported a first case of detectable SARS-CoV-2 RNA from human milk in a forty-year old woman with COVID-19. Despite mild clinical symptoms, this patient had detectable viral RNA in two separate samples of human milk taken ten days apart, which were interspersed with a several negative results. The significance of this finding is uncertain as detectable RNA in these samples has not been shown to indicate viable virus nor to demonstrate a risk of infection via breastfeeding.

  Tam et al. (June 1, 2020). Detectable Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) in Human Breast Milk of a Mildly Symptomatic Patient with Coronavirus Disease 2019 (COVID-19). Clinical Infectious Diseases. https://doi.org/10.1093/cid/ciaa673

- Wong et al. report two further generations of SARS-CoV-2 transmission from attendees at a 16,000-person event who remained asymptomatic. The investigation confirmed 19 cases of SARS-CoV-2 among attendees and 52 cases among their secondary contacts. The authors argue for widespread testing at mass gatherings in areas of known community transmission.

  Wong et al. (May 30, 2020). Asymptomatic Transmission of SARS-CoV-2 and Implications for Mass Gatherings. Influenza and Other Respiratory Viruses. https://doi.org/10.1111/irv.12767

Geographic Spread

- A phylogenetic analysis reconstructed from CoV strains demonstrated that SARS-CoV-2, bat RaTG13 and pangolin CoV genomes formed a cluster, suggesting a close relationship between SARS-CoV-2 and bat SARS-like strains, and that pangolins may serve as SARS-CoV-2 intermediate hosts. Some of the observed variations in protein may serve as possible adaptation mutations in humans, but more studies are needed to better understand their function.

  Bezerra et al. (May 29, 2020). The Novel Coronavirus SARS-CoV-2: From a Zoonotic Infection to Coronavirus Disease-19 (COVID19). Journal of Medical Virology. https://doi.org/10.1002/jmv.26072

- Gonzalez-Reiche et al. report phylogenetic analysis of patients seeking care at the Mount Sinai Health System in New York City revealed 84 distinct SARS-CoV2 genomes, corresponding to multiple

independent introductions, mainly from Europe and other parts of the United States. There was also evidence for community transmission of SARS-CoV-2, as suggested by clusters of related viruses found in patients living in different neighborhoods of the city.

Gonzalez-Reiche et al. (May 29, 2020). Introductions and Early Spread of SARS-CoV-2 in the New York City Area. Science. https://doi.org/10.1126/science.abc1917

Testing and Treatment

- Basu et al. evaluated the performance of the recently-released Abbott ID NOW COVID-19 assay for SARS-CoV-2 RNA detection with the Cepheid Xpert Xpress SARS-CoV-2. They found that the ID NOW assay has utility as a rapid rule-in test for COVID-19 with samples at high viral load; however, an overall low positive percent agreement (55%-67%) of ID NOW with Xpert Xpress raises concerns regarding its suitability as a diagnostic tool in samples with lower viral loads.

  Basu et al. (May 29, 2020). Performance of Abbott ID NOW COVID-19 Rapid Nucleic Acid Amplification Test in Nasopharyngeal Swabs Transported in Viral Media and Dry Nasal Swabs, in a New York City Academic Institution. Journal of Clinical Microbiology. https://doi.org/10.1128/JCM.01136-20

- *[pre-print, not peer reviewed]* Davoudi-Monfared et al. report the results of a randomized trial evaluating the efficacy and safety of interferon β-1a (IFN) in patients with severe COVID-19, which showed no significant difference of time to clinical response between the IFN and the control groups (9.7 ± 5.8 vs. 8.3 ± 4.9 days). The IFN group had a higher discharge rate on day 14 and lower 28-day mortality (66.7% vs. 43.6% and 19.0% vs. 38.5%, respectively).

  Davoudi-Monfared et al. (May 30, 2020). Efficacy and Safety of Interferon Beta-1a in Treatment of Severe COVID-19 A Randomized Clinical Trial. Pre-print downloaded June 1 from https://doi.org/10.1101/2020.05.28.20116467

Vaccines

- *[pre-print, not peer reviewed]* Bartsch et al. simulated vaccination strategies for SARS-CoV-2 in the US and concluded that a vaccine with an efficacy of at least 70% and coverage of at least 60% could eliminate the need for social distancing measures if introduced within 90 days of the start of the pandemic.

  Bartsch et al. (May 30, 2020). How Efficacious Must a COVID-19 Coronavirus Vaccine Be to Prevent or Stop an Epidemic by Itself. Pre-print downloaded June 1 from https://doi.org/10.1101/2020.05.29.20117184

Clinical Characteristics and Health Care Setting

- Lee et al. report that a multicenter observational study in the UK found no evidence that cancer patients receiving cytotoxic chemotherapy or other anticancer treatment were at an increased risk of mortality from COVID-19 compared to those not on active treatment. The mortality is principally driven by advancing age and non-cancer comorbidities.
- Withholding effective cancer treatments during the pandemic may result in increased cancer morbidity and mortality without preventing deaths from COVID-19.

  Lee et al. (May 28, 2020). COVID-19 Mortality in Patients with Cancer on Chemotherapy or Other Anticancer Treatments: A Prospective Cohort Study. Lancet. https://doi.org/10.1016/S0140-6736(20)31173-9

Modeling and Prediction

- *[pre-print, not peer reviewed]* Brauner et al. inferred the effectiveness of non-pharmaceutical interventions using data in 41 countries. Results suggest a surprisingly large role for schools in COVID-19 transmission (mean reduction in R: 58%. Additional interventions with good effectiveness-burden tradeoffs included limiting gatherings, closing high-risk businesses, and testing persons with symptoms. Closing most nonessential businesses and issuing stay-at-home orders were found to have a limited additional effect with a high perceived burden.

  Brauner et al. (May 30, 2020). The Effectiveness and Perceived Burden of Nonpharmaceutical Interventions against COVID-19 Transmission a Modelling Study with 41 Countries. Pre-print downloaded June 1 from https://doi.org/10.1101/2020.05.28.20116129

- *[pre-print, not peer reviewed]* Cencetti et al. modeled contact tracing strategies and found that imposing quarantine on contacts with longer exposures at a shorter distance minimized the social cost of quarantine. They found that additional measures needed to be implemented with isolation and tracing to control the outbreak, and that a high level of app adoption was crucial to effectiveness of digital contact tracing.

  Cencetti et al. (May 30, 2020). Using Real-World Contact Networks to Quantify the Effectiveness of Digital Contact Tracing and Isolation Strategies for Covid-19 Pandemic. Pre-print downloaded June 1 from https://doi.org/10.1101/2020.05.29.20115915

Other Resources and Commentaries

- COVID-19 and fertility: a virtual reality – Reproductive Biomedicine Online (May 10)
- Care homes after covid-19: we need a wide ranging inquiry and reform – BMJ (May 28)
- Critical medication shortages further dwindling hospital resources during COVID-19 – The American Journal of Emergency Medicine (May 6)
- On the benefits of flattening the curve: A perspective – Mathematical Biosciences (May 27)
- Excess mortality in men and women in Massachusetts during the COVID-19 pandemic – Lancet (May 27)
- The starting line for COVID-19 vaccine development – Lancet (May 28)
- Recurrent positive SARS-CoV-2 - immune certificate may not be valid – Journal of Medical Virology (May 29)
- Higher prevalence of asymptomatic or mild COVID-19 in children, claims and clues – Journal of Medical Virology (May 29)
- Ethical guidelines for COVID-19 tracing apps – Nature (May 28)
- COVID-19 outbreaks in U.S. immigrant detention centers: the urgent need to adopt CDC guidelines for prevention and evaluation – Clinical Infectious Diseases (May 31)
- Implication of SARS-CoV-2 evolution in the sensitivity of RT-qPCR diagnostic assays – The Lancet Infectious Diseases (May 28)
- A Conceptual Discussion about R0 of SARS-COV-2 in Healthcare Settings – Clinical Infectious Diseases (May 30)
- SARS-CoV-2: The viral shedding vs infectivity dilemma – Infection, Disease & Health (May 13)
- Challenges in Laboratory Diagnosis of the Novel Coronavirus SARS-CoV-2 – Viruses (May 26)