2019-nCoV Literature Situation Report (Lit Rep)
March 27, 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

- **Multiple studies confirm the presence of antibodies to SARS-CoV-2 in neonates born to mothers with COVID-19 suggesting possible vertical transmission.**
- **A study finds that extended use of N95 and goggles with strict adherence to environmental and hand hygiene could be a safe option.**
- **Studies on HCWs and long-term-care-facility patients both indicate that current case definitions and symptom-based screening could fail to identify half of infected individuals.**
- **Research continues on pooled testing, ELISA, and symptom-based screeners which may help increase testing capacity.**

Transmission

- A study reviewed outcomes of six neonates, all delivered via C-section to COVID-19-positive mothers. All tested negative for SARS-CoV-2 and had generally favorable outcomes, however had elevated antibody and cytokine levels, indicating potential in-utero infection.
- A larger study of 33 neonates born to mothers with COVID-19 found that clinical symptoms were mild, outcomes were favorable, and no deaths were reported. 9% of infants in this study presented with early onset of SARS-CoV-2 infection suggesting a possibility of vertical maternal-fetal transmission.

   Zeng et al. (Mar 26, 2020). Antibodies in Infants Born to Mothers With COVID-19 Pneumonia. JAMA. https://doi.org/10.1001/jama.2020.4861
   Zeng et al. (Mar 26, 2020). Neonatal Early-Onset Infection With SARS-CoV-2 in 33 Neonates Born to Mothers With COVID-19 in Wuhan, China. JAMA. https://doi.org/10.1001/jamapediatrics.2020.0878

Testing and Treatment

- The authors report on the development and validation of a SARS-CoV-2 serology ELISA kit for detection of total anti-virus antibody in suspected cases and potentially using this as an at-home testing kit.
- Sensitivity and specificity of the ELISA kit were both 97.5%, and the kit was used to successfully identify antibodies in a patient who had tested negative twice using the nucleic acid test.

   Zhao et al. (Mar 27, 2020). Serological diagnostic kit of SARS-C 1 oV-2 antibodies using CHO2 expressed full-length SARS-CoV-2 S1 proteins. Pre-print downloaded Mar 27 from https://doi.org/10.1101/2020.03.26.20042184

- The authors found that a pooled sampling approach consistently detected single samples of SARS-Cov-2 in pools of up to 32 unique samples, with an estimated false negative rate of 10%.
- This method could be applied immediately in current clinical testing laboratories, potentially enabling expansion of screening capacities to enable monitoring cohesive groups like hospital staff, military units, or factory workers.
  Yelin et al. (Mar 27, 2020). Evaluation of COVID-19 RT-qPCR test in multi-sample pools. Pre-print downloaded Mar 27 from https://doi.org/10.1101/2020.03.26.20039438

- In this retrospective cohort study of 120 COVID-19 patients, risk factors for prolonged SARS-CoV-2 shedding include older age and lack of Lopinavir/Ritonavir treatment.
- Earlier administration of Lopinavir/Ritonavir treatment could shorten the duration of viral shedding.
  Yan et al. (Mar 27, 2020). Factors associated with prolonged viral shedding and impact of Lopinavir/Ritonavir treatment in patients with SARS-CoV-2 infection. Pre-print downloaded Mar 27 from https://doi.org/10.1101/2020.03.22.20040832

- The authors describe a mild COVID-19 family cluster, including a patient with a 49-day viral shedding period, the longest ever recorded. This cluster might have low toxicity and transmissibility but prolonged infective ability, contradicting known associations between viral shedding and prognosis.
- Infusion of plasma from recovered COVID-19 patients showed high efficiency in viral elimination.
  Tan et al. (Mar 27, 2020). A special case of COVID-19 with a long duration of viral shedding for 49 days. Pre-print downloaded Mar 27 from https://doi.org/10.1101/2020.03.22.20040071

- This retrospective observational study on 47 COVID-19 patients from Wuhan, China, showed that elevated lactate dehydrogenase could be a powerful predictor for lung injury and severe COVID-19 cases.
  Han et al. (Mar 27, 2020). Lactate dehydrogenase, a Risk Factor of Severe COVID-19 Patients. Pre-print downloaded Mar 27 from https://doi.org/10.1101/2020.03.24.20040162

Clinical Characteristics and Health Care Setting
- This clinical retrospective study of 83 critically ill COVID-19 patients found high rates of acute gastrointestinal injury (AGI) (87%) and hospital mortality (48%).
- Organ failure, white blood cell counts, and duration of mechanical ventilation were risk factors for grade II AGI and above. Patients with worse AGI had worse clinical severity, higher septic shock incidence, and higher 28-day mortality.
  Sun et al. (Mar 27, 2020). Acute gastrointestinal injury in critically ill patients with coronavirus disease 2019 in Wuhan, China. Pre-print downloaded Mar 27 from https://doi.org/10.1101/2020.03.25.20043570

- The authors discuss the theoretical biological mechanisms which could put inflammatory bowel disease patients at risk, with inflamed gut tissue representing an optimal doorway for viral entry.
- However, no published evidence suggest that COVID-19 occurs more frequently in IBD patients, and no IBD patients with SARS-CoV-2 infection were reported in Wuhan.
  Monteleone and Ardizzone (Mar 26, 2020). Are patients with inflammatory bowel disease at increased risk for Covid-19 infection? J Crohn's Colitis. https://doi.org/10.1093/ecco-jcc/jjaa061

- Findings from this retrospective study of 511 COVID-19 patients suggest that elderly (age 65+) patients with hypertension (HT) who are taking ARB anti-HT drugs may be less likely to develop severe lung disease when compared to patients taking no anti-HT drugs.

    Liu et al. (Mar 27, 2020). Anti-hypertensive Angiotensin II receptor blockers associated to mitigation of disease severity in elderly COVID-19 patients. Pre-print downloaded Mar 27 from https://doi.org/10.1101/2020.03.20.20039586

- This retrospective matched case-control study compared 89 parturients with COVID-19 to 173 non-COVID-19 parturients undergoing C-section delivery, and determined that COVID-19 parturient characteristics include: fever, cough, increased plasma CRP, and decreased lymphocyte count.
- Anaesthesia-related complications occurred more frequently in COVID-19 parturients, and their newborns had a higher risk of distress (low Apgar score and higher NICU admission).

    Zhang et al. (Mar 27, 2020). Anaesthetic management and clinical outcomes of parturients with COVID-19: a multicentre, retrospective, propensity score matched cohort study. Pre-print downloaded Mar 27 from https://doi.org/10.1101/2020.03.24.20042176

Modelling and Prediction

- A computational model using data from the US East and West coasts predicts that number of new cases may peak in mid-April and begin to abate by July, and that new cases may be significantly mitigated by increased availability of testing kits.

    Yeo et al. (Mar 27, 2020). A Computational Model for Estimating the Progression of COVID-19 Cases in the US West and East Coasts. Pre-print downloaded Mar 27 from https://doi.org/10.1101/2020.03.24.20043026

- The authors performed whole genome sequencing of SARS-CoV-2 from PCR-positive specimens obtained from the Diamond Princess cruise ship, suggesting that dissemination likely originated from a single introduction event before quarantine was initiated.
- This study demonstrates the usefulness of haplotype network analysis in identifying potential infection routes.

    Sekizuka et al. (Mar 27, 2020). Haplotype networks of SARS-CoV-2 infections in the Diamond Princess cruise ship outbreak. Pre-print downloaded Mar 27 from https://doi.org/10.1101/2020.03.23.20041970

Public Health Policy and Practice

- Symptom-based screening in Skilled Nursing Facilities, which often treat elderly and high-risk patients, could fail to identify approximately half of residents with COVID-19. The authors indicate that these and other long-term care facilities should take proactive steps to prevent introduction of SARS-CoV-2, and also provide recommendations for response after a facility has confirmed a COVID-19 case.

    Kimball et al. (Mar 27, 2020). Asymptomatic and Presymptomatic SARS-CoV-2 Infections in Residents of a Long-Term Care Skilled Nursing Facility — King County, Washington, March 2020. MMWR. https://www.cdc.gov/mmwr/volumes/69/wr/pdfs/mm6913e1-H.pdf

- To evaluate the safety of extended PPE use by HCWs treating COVID-19 patients, Ong et al perform a one-day sampling study on used PPE to ascertain the per contact episode risk of PPE contamination.
- All 90 samples from 30 HCWs were negative. This provides assurance that extended use of N95 and goggles with strict adherence to environmental and hand hygiene could be a safe option.

Ong et al. (Mar 27, 2020). Absence of contamination of personal protective equipment (PPE) by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). Pre-print downloaded Mar 27 from https://doi.org/10.1017/ice.2020.91

- The authors describe the clinical presentation and early outcomes of COVID-19 in 86 of the 1,353 Dutch HCWs who tested positive in this cross-sectional study and suggest adjusting the currently used case-definition for suspected COVID-19 in HCWs by considering fever as one of the possible symptoms and not as a required symptom. This could improve the sensitivity of COVID-19 detection in HCWs.

  Kluytmans-van den Bergh et al. (Mar 27, 2020). SARS-CoV-2 infection in 86 healthcare workers in two Dutch hospitals in March 2020: a cross-sectional study with short-term follow-up. Pre-print downloaded Mar 27 from https://doi.org/10.1101/2020.03.23.20041913

Other Resources and Commentaries
- Management of Critically Ill AdultsWith COVID-19 – JAMA (Mar 26)
  - Selected recommendations for infection control and testing, hemodynamic support, ventilatory support, and therapy for critically ill adults with COVID-19.
- Self-reported olfactory and taste disorders in SARS-CoV-2 patients: a cross-sectional study – Clin Infect Dis (Mar 26)
  - Olfactory and taste disorders (OTD) among COVID-19 patients are frequent, especially among females and younger patients, and may precede the onset of clinical disease.
- An artificial intelligence-based first-line defence against COVID-19: digitally screening citizens for risks via a chatbot –MedRxiv (Mar 27)
  - Symptoma, a freely available symptom-to-disease digital assistant, was used to accurately distinguish COVID-19 in 96% of clinical cases, far exceeding other available questionnaires.