2019-nCoV Literature Situation Report (Lit Rep)
April 28, 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

- **Barkan et al compares various exit strategy building blocks and measures to mitigate the current SARS-CoV-2 pandemic based on computerized simulations, finding significant differences in suppression among strategies with seemingly similar cost.**
- **African American race and Hispanic ethnicity are associated with higher likelihood of SARS-CoV-2 infection, even after adjusting for other important socio-demographic and comorbidity factors.**
- **A study found an increase of 1 μg/m3 in PM$_{2.5}$ is associated with an 8% increase in the US COVID-19 death rate, highlighting the importance of enforcing existing air pollution regulations.**
- **Patients on ACEi/ARB showed a 44% reduction in odds of developing severe disease and a 62% reduction in odds of death when compared to patients not on ACEi/ARB.**

Non-Pharmaceutical Interventions

- The authors compare various exit strategy building blocks and measures to mitigate the current SARS-CoV-2 pandemic based on computerized simulations, finding significant differences in suppression among strategies with seemingly similar cost.
- The most effective strategies found integrate several base strategies, and allow for the release of large portions of the population. Stratified population release to achieve herd immunity did not perform well compared with other strategies. This information may help optimize exit strategies to be more effective and suitable for a particular area or country while maximizing human life and economic value.

    Barkan et al. (April 28, 2020). Comparison of SARS-CoV-2 Exit Strategies Building Blocks. Pre-print downloaded Apr 28 from https://doi.org/10.1101/2020.04.23.20072850

Transmission

- A cross sectional analysis of 4,513 individuals, including 754 positive cases, explores race disparities and potential mediating pathways (low income, high population density, and high comorbidity burden).
- Findings show that African American race and Hispanic ethnicity are associated with higher likelihood of SARS-CoV-2 infection, even after adjusting for other important socio-demographic and comorbidity factors. The authors provide the potential explanation that residence in population-dense areas may limit ability to practice social distancing.

    Vahidy et al. (April 28, 2020). Racial and Ethnic Disparities in SARS-CoV-2 Pandemic: Analysis of a COVID-19 Observational Registry for a Diverse U.S. Metropolitan Population. Pre-print downloaded Apr 28 from https://doi.org/10.1101/2020.04.24.20073148

- This regional genome-wide association study included data from 396,042 individuals in England to investigate the association between genetic variants and regional differences in reported COVID-19 cases. The author found a temporary positive relationship between COVID-19 cases and regional socioeconomic status at the beginning of the outbreak, the opposite direction of expected disease increasing effects, and suggests that this may be due to higher rates of international travel, more social contacts, and/or better testing capacities.

    Abdellaoui (April 28, 2020). Regional differences in reported Covid-19 cases show genetic correlations with higher socio-economic status and better health, potentially confounding studies on the genetics of disease susceptibility. Pre-print downloaded Apr 28 from https://doi.org/10.1101/2020.04.24.20075333

Geographic Spread

- A cross-sectional ecological study used county-level data representing 98% of the US population to investigate the association between fine particulate matter ($PM_{2.5}$) and COVID-19 death.
- The authors found a statistically significant increase of only 1 μg/m3 in $PM_{2.5}$ is associated with an 8% increase in the COVID-19 death rate (95% CI: 2-15%). Findings underscore the importance of continuing to enforce existing air pollution regulations to protect human health both during and after the COVID-19 crisis.

    Wu et al. (April 7, 2020). Exposure to air pollution and COVID-19 mortality in the United States: A nationwide cross-sectional study. Pre-print downloaded Apr 28 from https://doi.org/10.1101/2020.04.05.20054502

- This study examines the relationship between daily confirmed COVID-19 cases and temperature using data from 31 provincial regions in China. The authors' model showed a significant decrease in incidence with temperatures above 46-50^{0}F. This suggests that temperature played an important role in the outbreak of COVID-19 in China, and may be useful in predicting the potential spread of COVID-19 in other geographic areas.

    Shi et al. (April 2020). Impact of temperature on the dynamics of COVID-19 outbreak in China. Sci Total Environ. https://doi.org/10.1016/j.scitotenv.2020.138890

Testing and Treatment

- This meta-analysis includes five studies totaling 308 patients either taking or not taking angiotensin converting enzyme inhibitors (ACEi) and angiotensin receptor blockers (ARB). Patients on ACEi/ARB showed a 44% reduction in odds of developing severe disease and a 62% reduction in odds of death when compared to patients not on ACEi/ARB.
- The authors conclude that it is safe to use ACEi/ARB with COVID-19 patients, and that this data suggests these medications may reduce the risk of developing severe disease and death.

    Ghosal et al. (April 28, 2020). The effect of angiotensin converting enzyme inhibitors and angiotensin receptor blockers on death and severity of disease in patients with coronavirus disease 2019 (COVID-19): A meta-analysis. Pre-print downloaded Apr 28 from https://doi.org/10.1101/2020.04.23.20076661

- This retrospective observational case series of 33 patients with SARS-CoV-2 pneumonia reviewed analysis of throat swabs, sputum, stool, and blood samples to evaluate viral load, IgM, IgG, spike protein receptor binding domain (RBD), and nucleocapsid.
- Results suggest that viral RNA persists in sputum and stool samples for a long time, and that anti-RBD may serve as a protective antibody against SARS-CoV-2 that is related to viral persistence and is valuable for development of vaccines.

Huang et al. (April 27, 2020). Long period dynamics of viral load and antibodies for SARS-CoV-2 infection: an observational cohort study. Pre-print downloaded Apr 27 from https://doi.org/10.1101/2020.04.22.20071258

Clinical Characteristics and Health Care Setting

- This 20-patient retrospective observational study suggests a link between Vitamin D insufficiency (VDI) and severe COVID-19. Anecdotal and observational data indicate that VDI may play a significant role in the disease progression of COVID-19.

  Lau et al. (April 28, 2020). Vitamin D insufficiency is prevalent in severe COVID-19. Pre-print downloaded Apr 28 from https://doi.org/10.1101/2020.04.24.20075838

- The authors discuss findings from five cases of large-vessel stroke in SARS-CoV-2 patients under 50 years of age in New York City.

  Oxley et al. (April 27, 2020). Large-Vessel Stroke as a Presenting Feature of Covid-19 in the Young. NEJM. https://doi.org/10.1056/NEJMc2009787

- This case report describes a SARS-CoV-2 infection with a clinical course of over 2 months, including reappearing viral RNA in saliva concurrent with viral specific antibodies. Findings indicate that SARS-CoV-2 can cause a long clinical course, and imply an immune evasion from the host immune system.

  Yang et al. (April 24, 2020). Persistent viral RNA positivity during recovery period of a patient with SARS-CoV-2 infection. J Med Virol. https://doi.org/10.1002/jmv.25940

Modelling and Prediction

- This IHME study describes modeling techniques used to estimate the trajectory of COVID-19 deaths as a function of social distancing, hospital and ICU admissions, length of stay, and ventilator need. Excess medical demand in the US is predicted to peak at 9,079 total beds and 9,356 ICU beds, and ventilator use is predicted to peak at 16,545. Death peaks vary from March 30 through May 12 by state.

- These estimates can help inform the development and implementation of strategies to mitigate gaps, including reducing non-COVID-19 demand for services and temporarily increasing system capacity.

  IHME COVID-19 health service utilization forecasting team (April 26, 2020). Forecasting the impact of the first wave of the COVID-19 pandemic on hospital demand and deaths for the USA and European Economic Areas. Pre-print downloaded Apr 27 from https://doi.org/10.1101/2020.04.21.20074732

- The author proposes a methodology for estimating population immunity to COVID-19 using available mortality data and properties of the SIR model, illustrated using 10 US states' data.

  Lesniewski (April 23, 2020). Estimating population immunity without serological testing. Pre-print downloaded Apr 27 from https://doi.org/10.1101/2020.04.23.20076786

Public Health Policy and Practice

- This cross-sectional study of 654 Israeli participants found that male gender, not having children, smoking, ADHD symptoms, low pro-sociality, past risk-taking behavior, current psychological distress, low perceived risk of COVID-19 exposure, low exposure to instructions, and low perceived efficacy of instructions were associated with non-adherence to instructions. The findings suggest that in setting out and communicating public health instructions, policymakers should consider these characteristics.

  Pollak et al. (April 28, 2020). Predictors of adherence to public health instructions during the COVID-19 pandemic. Pre-print downloaded Apr 28 from https://doi.org/10.1101/2020.04.24.20076620

- The authors ran patient care simulations to assess updated PPE recommendations from WHO and CDC on use of N95 respirators, eye protection, isolation gowns, and gloves during aerosol-generating procedures.
- Despite PPE, fluorescent markers were found on the uncovered skin, hair, and shoes of participants. These findings indicate that current recommendations for PPE may not fully prevent exposures in emergency department settings, and clothing that covers all skin may further diminish exposure risk.
    - *Feldman et al. (April 27, 2020). Exposure to a Surrogate Measure of Contamination from Simulated Patients by Emergency Department Personnel Wearing Personal Protective Equipment. JAMA.* https://doi.org/10.1001/jama.2020.6633
- Universal SARS-CoV-2 PCR testing of an adult homeless shelter in Boston shortly after a case cluster was identified yielded a prevalence of 36%, with a majority of newly identified infections being asymptomatic. Symptom screening in homeless shelters may not be adequate to capture the extent of disease transmission in this setting.
    - *Baggett et al. (April 27, 2020). Prevalence of SARS-CoV-2 Infection in Residents of a Large Homeless Shelter in Boston. JAMA.* https://doi.org/10.1001/jama.2020.6887

Other Resources and Commentaries

- Performance of temporal artery temperature measurement in ruling out fever: implications for COVID-19 screening – Pre-print (Apr 28)
- Wisconsin April 2020 election not associated with an increase in COVID-19 infection rates – Pre-print (Apr 28)
- Impact of contact tracing on SARS-CoV-2 transmission – Lancet Infect Dis (Apr 27)
- The incubation period of COVID-19 – A rapid systematic review and meta-analysis of observational research – Pre-print (Apr 28)
- Slum Health: Arresting COVID-19 and Improving Well-Being in Urban Informal Settlements– J Urban Health (Apr 24)
- Atypical presentation of COVID-19 in young infants – Lancet (Apr 17)